Brait Builders Corp

506 Plain Street
Suite 201
Marshfield, MA 02050

Phone: (781) 837-6400
Fax: (781) 837-6022

TRANSMITTAL No. 00184

RECEIVED
November 25, 2014
Garcia Galuska & DeSousa

TO: Turowski2 Architecture, Inc.
313 Wareham Rd
Marion, MA 02738

DATE: 11/25/2014

REF: 26 00 00 ELECTRICAL

PROJECT: Norfolk County Agricultural HS

ATTN: Derrick E. Maloney

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☑ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☑ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☑ Specifications	☑ Attached	☐ Returned for Corrections
☐ Other:	☑ Separate Cover Via: owner-In Site	☐ Due Date:

COPIES	DATE	ITEM	NUMBER	REV. NO.	DESCRIPTION	STATUS
1	11/25/2014	SUB	26 00 00-012	003	Title: Closeout Phase II - O&M, W, As-Blts	NEW

Remarks:

Please see the attached resubmittal for your review.

☒ NO EXCEPTIONS TAKEN
☐ REVISE AND RESUBMIT
☐ FURNISH AS CORRECTED
☐ REJECTED

TUROWSKI² ARCHITECTURE, INC.

Checked by Meghan diBenedetto Date 12/05/14

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications and applicable laws, codes and regulations. Approval of a specific item shall not include approval of an assembly of which the item is a component. The contactor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe an satisfactory manner.

CC: File, Compass

From: Antonio Pina

Expedition ®

ENGINEERING
SHOP DRAWING REVIEW

GARCIA·GALUSKA·DESOUSA
Consulting Engineers Inc.
370 Faunce Corner Road, Dartmouth, MA 02747

DATE: December 3, 2014

PROJECT: Norfolk County Agricultural High School
Walpole, MA

525 007 00.00

SHOP DWG. NO.: E-35-3, E-36-3

TITLE: Closeout – Electrical O&M
260000-001R3

Closeout – Electrical As-Built Drawings
260000-002R3

REVIEWED BY: Antonio DaCunha, S.E.E.

NO EXCEPTION TAKEN [X]

EXCEPTION TAKEN [ ]

Close-out review is for general conformance with the design concept and for compliance with the contract documents. Marking or comments made on the Close-out submittal do not relieve the contractor from compliance with the requirements of the contract documents.

Date 12/03/2014 By AD

Review Notes:

PRODUCT SUBMITTAL FORM – **MODIFIED FOR CLOSEOUT**

This document is to be fully completed for ALL CLOSEOUT Submittals. This cover to precede O&M Manuals, Warranties, As-Built Record Drawings, or any other documents required for CLOSEOUT per the Project Specifications.

General Submittal Information:

Norfolk County Agricultural High School
Walpole, Massachusetts

Architect:

Turowski2 Architecture
313 Wareham Road
Marion, MA 02738

General Contractor:

Brait Builders Corp.
506 Plain ST, Suite 201
Marshfield, MA 02050

Filed Subcontractor /or/ Subcontractor /or/ Sub-subcontractor:

Richard T. Losordo Electrical Services, Inc.
244 Liberty Stunit 8a
Brockton, MA 02301
t: 508 436 4848
f: 508 436 4849

Date: 11-25-14

Submittal #: 26 00 00-012

Resubmittal: R-2

Spec. Section Reference: 26 00 00

Article:

Drawing Number Reference:

Detail Number:

Quantity submitted:

Notes:

Phase II : AN & CB Buildings

O&M Manuals, Warranty, As-Builts

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
PHASE TWO

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1.1 Phase II Warranty

RICHARD T. LOSORDO ELECTRICAL SERVICES, INC.

PO BOX 518, NORTH EASTON, MA 02356 p:508-436-4848
244 Liberty St, Unit 8A, Brockton, MA 02301 f:508-436-4849

Form of Guarantee

To: Brait Builders Corp.
506 Plain Street
Suite 201
Marshfield, MA 02050

RE: NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
Phase Two

Gentlemen:

In accordance with the contract requirements for the above referenced Project, the undersigned hereby agrees and warrants to Brait Builders Corp. and the Project OWNER to guarantee all the undersigned work and to place, repair, and make good without any costs to Brait Builders Corp. or the OWNER, any or all defects due to imperfect workmanship or defects in materials and equipment and to pay for any damages resulting there from which shall manifest itself during the period of guarantee required starting from the date of Final Completion as established by the Architect.

This guarantee set forth above shall not limit or supersede the terms of the contract documents or any other special or extended warranties that may require therein, nor shall it limit in any way the undersigned's liability imposed by law.

Executed as a sealed instrument this 7th day of August, 2014.

Richard T. Losordo Electrical Services, Inc.
SUBCONTRACTOR OR SUPPLIER

by _____
(Authorized Representative)

2.1 FIRE ALARM

FIRE ALARM OPERATION & MAINTENANCE MANUAL

Fire Command Systems, Inc.

145A Summit Street - Suite 209- Peabody, MA. 01960
Phone 978-401-9840 - Fax 978-401-9841
www.firecommandsystems.com

NOTIFIER® by Honeywell

DATE: August 18, 2014

PROJECT:

FCS Project # 2012039
Norfolk County Agricultural High School
400 Main Street
Walpole, MA

PRESENTED BY:

Fire Command Systems, Inc
145A Summit Street
Suite 209
(978) 401-9840 (T)
(978) 401-9841 (F)
www.firecommandsystems.com

ENGINEER:

Garia-Galuska-DeSousa
370 Faunce Corner Rd
Dartmouth, MA
(508) 996-5700 (T)
(978) 996-0883 (F)

INSTALLER:

Richard T. Losordo Electrical Services, Inc.
244 Liberty Street
Brockton, MA 02301
(508) 436-4848 (T)
(508) 436-4849 (F)

SYSTEM SALES REP: **Ara Beurekjian**

PROJECT MANAGER: **Andrew Zografos**

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Section 1

Schedule of Equipment

Qty	Model #	Description	Manufacturer
		Fire Alarm System Consisting of:	
		AD BUILDING	
		Control Equipment	
1	CPU2-3030D	Notifier Addressable Fire Alarm Control Panel	Notifier
1	LCM-320	Loop Control Module	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
2	NCM-F	Network Module for Fiber	Notifier
2	ACM-8R	Form-C (8) Relay Annuc. Module	Notifier
1	AMPS-24	Addressable Main Power Supply	Notifier
1	ACPS-610	Addressable Booster Power Supply	Notifier
1	SBB-D4R	Backbox, 4 chassis, red.	Notifier
1	DR-D4R	Door, lock & keys. Accepts 4 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CHS-M3	Chassis for 3030(2) / NCA(2)	Notifier
1	CA-1	Chassis, DVC, One Row	Notifier
1	CHS-4L	Chassis, Low Profile	Notifier
1	DP-DISP	Dress Plate, Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
2	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
1	LCD-160	Remote LCD Display Annuciator	Notifier
1	ABS-2DR	Annunciator Surface Box, Door & Lock, 2 Position, Red	Notifier
2	PS12750	Battery 12Volt 75AH	Power Sonic
		Peripheral Devices	
1	FSP-851	Addressable Photo Detector	Notifier
1	B210LP	Addressable Detector Base w/ Flange	Notifier
3	FZM-1	Addressable Zone-Monitor Module.	Notifier
1	FMM-1	Addressable Monitor Module	Notifier
3	FRM-1	Addressable Relay Module (3A@24VDC)	Notifier
		Notification Devices	
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
		Miscellaneous Items	
1	GD3	Passive Graphic Map	Space Age Electronics
1	SSU00685	Data Storage Housing w/ Electronic Module	Space Age Electronics

Qty	Model #	Description	Manufacturer
		AG BUILDING	
		Control Equipment	
1	CPU2-640	Notifier Addressable Fire Alarm Control Panel	Notifier
1	NCA-2	Network Control Annunciator	Notifier
3	NCM-F	Network Module for Fiber	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
1	DAA2-5025	Digital Audio Amplifier, 50W 25VRMS	Notifier
1	DAX-3525	Digital Audio Amp, 35W 25VRMS	Notifier
1	SBB-D4R	Backbox, 4 chassis, red.	Notifier
1	DR-D4R	Door, lock & keys. Accepts 4 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CA-1	Chassis, DVC, One Row	Notifier
1	NCA/640-2-KIT	Kit for Mounting NCA-2 to CPU2-640	Notifier
1	DP-DISP2	Dress Plate for CPU2-640 Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
2	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
1	FCPS-24S8R	Remote Booster Power Supply	Notifier
1	ZNAC-4	Class A Adapter for FCPS	Notifier
2	PS12750	Battery 12Volt 75AH	Power Sonic
2	PS1270	Battery 12Volt 7AH	Power Sonic
		Peripheral Devices	
17	FSP-851	Addressable Photo Detector	Notifier
1	B210LPBP	Addressable Detector Base w/ Flange, 10 Count	Notifier
5	B210LP	Addressable Detector Base w/ Flange	Notifier
2	B224BI	Addressable Isolator Base	Notifier
8	DNR	Addressable Duct Detector Housing	Notifier
8	FSP-851R	Addressable Photo Detector w/ Remote Test	Notifier
8	DST3	Duct Sampling Tube, 2-4'	Notifier
8	RTS151	Remote Test/ Indicator Station	Notifier
11	NBG-12LX	Addressable Pull Station	Notifier
8	STI1200	Stopper Cover w/o Horn, Flush	S.T.I
5	FMM-1	Addressable Monitor Module	Notifier
1	FMM-101	Addressable Mini Module	Notifier
3	FDM-1	Addressable Dual Monitor Module	Notifier
3	FCM-1	Addressable Control Module	Notifier
4	FRM-1	Addressable Relay Module (3A@24VDC)	Notifier
		Notification Devices	
38	SPSRV	Speaker/ Strobe, Wall, Multi-CD, Red, HI-DB	Notifier
4	SR	Strobe, Wall, Multi-CD, Red	Notifier
19	STI9708-R	Steel WEB Guard, Wall, Red, S.S A/V Devices, Surface	S.T.I
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
1	125STRNC1248D	Exterior Beacon - Clear	Edwards Signal
		Miscellaneous Items	
1	3221	KNOX BOX Recessed Black w/ Tamper	Knox
1	GD3	Passive Graphic Map	Space Age Electronics
1	IAMDRILLK	Drill Switch - Key Operated	Space Age Electronics
1	IGP1R	1 Gang Plate - Red	Space Age Electronics
1	PR-3	Relay, SPDT, Multivolt, 10-40VDC IN/OUT Wiring	Notifier
		Items for EG Garage	
1	SSU00635	18 point Terminal Cabinet	Space Age Electronics
1	3221	KNOX BOX Recessed Black w/ Tamper	Knox
4	302-ET-135	Conventional Heat Det. 135 øF- R.C Type In/ Outdoor, Threaded	Notifier
2	NBG-12LOB	Conventional Pull Station, Key Lock, Outdoor w/ box	Notifier
4	SPSRV	Speaker/ Strobe, Wall, Multi-CD, Red, HI-DB	Notifier
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal

Qty	Model #	Description	Manufacturer
		AS BUILDING	
		Control Equipment	
1	CPU2-640	Notifier Addressable Fire Alarm Control Panel	Notifier
1	NCA-2	Network Control Annunciator	Notifier
3	NCM-F	Network Module for Fiber	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
1	DAA2-5025	Digital Audio Amplifier, 50W 25VRMS	Notifier
1	BDA-25V	Back-up Digital Amplifier for 25VRMS	Notifier
1	SBB-C4R	Backbox, 3 chassis, red.	Notifier
1	DR-C4R	Door, lock & keys. Accepts 3 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CA-1	Chassis, DVC, One Row	Notifier
1	NCA/640-2-KIT	Kit for Mounting NCA-2 to CPU2-640	Notifier
1	DP-DISP2	Dress Plate for CPU2-640 Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
1	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
1	LCD-160	Remote LCD Display Annuciator	Notifier
1	ABS-2DR	Annunciator Surface Box, Door & Lock, 2 Position, Red	Notifier
1	FCPS-24S6R	Remote Booster Power Supply	Notifier
1	ZNAC-4	Class A Adapter for FCPS	Notifier
2	PS12550	Battery 12Volt 55AH	Power Sonic
2	PS1270	Battery 12Volt 7AH	Power Sonic
		Peripheral Devices	
29	FSP-851	Addressable Photo Detector	Notifier
1	FST-851H	Addressable High-Thermal Detector	Notifier
2	B210LPBP	Addressable Detector Base w/ Flange, 10 Count	Notifier
6	B210LP	Addressable Detector Base w/ Flange	Notifier
4	B224BI	Addressable Isolator Base	Notifier
1	5604	Conventional Heat Detector 194 øF Fixed	Notifier
7	NBG-12LX	Addressable Pull Station	Notifier
4	FMM-1	Addressable Monitor Module	Notifier
1	FMM-101	Addressable Mini Module	Notifier
4	FDM-1	Addressable Dual Monitor Module	Notifier
2	FCM-1	Addressable Control Module	Notifier
4	FRM-1	Addressable Relay Module (3A@24VDC)	Notifier
		Notification Devices	
50	SPSRV	Speaker/ Strobe, Wall, Multi-CD, Red, HI-DB	Notifier
2	SR	Strobe, Wall, Multi-CD, Red	Notifier
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
1	125STRNC1248D	Exterior Beacon - Clear	Edwards Signal
		Miscellaneous Items	
1	3221	KNOX BOX Recessed Black w/ Tamper	Knox
1	GD3	Passive Graphic Map	Space Age Electronics
1	IAMDRILLK	Drill Switch - Key Operated	Space Age Electronics
1	IGP1R	1 Gang Plate - Red	Space Age Electronics
1	PR-1	Relay, SPDT, Multivolt, 24VDC, 24/115VAC	System Sensor
1	PR-3	Relay, SPDT, Multivolt, 10-40VDC IN/OUT Wiring	System Sensor

Qty	Model #	Description	Manufacturer
		AN BUILDING	
		Control Equipment	
1	CPU2-640	Notifier Addressable Fire Alarm Control Panel	Notifier
1	NCA-2	Network Control Annunciator	Notifier
3	NCM-F	Network Module for Fiber	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
1	DAA2-5025	Digital Audio Amplifier, 50W 25VRMS	Notifier
1	DAX-3525	Digital Audio Amp, 35W 25VRMS	Notifier
1	SBB-D4R	Backbox, 4 chassis, red.	Notifier
1	DR-D4R	Door, lock & keys. Accepts 4 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CA-1	Chassis, DVC, One Row	Notifier
1	NCA/640-2-KIT	Kit for Mounting NCA-2 to CPU2-640	Notifier
1	DP-DISP2	Dress Plate for CPU2-640 Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
2	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
1	FCPS-24S8R	Remote Booster Power Supply	Notifier
1	ZNAC-4	Class A Adapter for FCPS	Notifier
2	PS12750	Battery 12Volt 75AH	Power Sonic
2	PS1270	Battery 12Volt 7AH	Power Sonic
		Peripheral Devices	
30	FSP-851	Addressable Photo Detector	Notifier
2	B210LPBP	Addressable Detector Base w/ Flange, 10 Count	Notifier
6	B210LP	Addressable Detector Base w/ Flange	Notifier
4	B224BI	Addressable Isolator Base	Notifier
3	5604	Conventional Heat Detector 194 øF Fixed	Notifier
2	CO1224TR	Conventional Carbon Monoxide Detector - Round	Notifier
2	DNR	Addressable Duct Detector Housing	Notifier
2	FSP-851R	Addressable Photo Detector w/ Remote Test	Notifier
2	DST3	Duct Sampling Tube, 2-4'	Notifier
2	RTS151	Remote Test/ Indicator Station	Notifier
20	NBG-12LX	Addressable Pull Station	Notifier
1	NBG-12LOB	Conventional Pull Station, Key Lock, Outdoor w/ box	Notifier
2	STI1200	Stopper Cover w/o Horn, Flush	S.T.I
6	FMM-1	Addressable Monitor Module	Notifier
3	FMM-101	Addressable Mini Module	Notifier
7	FDM-1	Addressable Dual Monitor Module	Notifier
2	FCM-1	Addressable Control Module	Notifier
5	FRM-1	Addressable Relay Module (3A@24VDC)	Notifier
		Notification Devices	
35	SPSRV	Speaker/ Strobe, Wall, Multi-CD, Red, HI-DB	Notifier
1	SPSRK	Speaker/ Strobe, Wall, Multi-CD, Red, Outdoor, w/ Box	Notifier
18	SR	Strobe, Wall, Multi-CD, Red	Notifier
7	STI9708-R	Steel WEB Guard, Wall, Red, S.S A/V Devices, Surface	S.T.I
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
1	125STRNC1248D	Exterior Beacon - Clear	Edwards Signal
		Miscellaneous Items	
1	GD8	Passive Graphic Map	Space Age Electronics
1	IAMDRILLK	Drill Switch - Key Operated	Space Age Electronics
1	IGP1R	1 Gang Plate - Red	Space Age Electronics
1	PR-1	Relay, SPDT, Multivolt, 24VDC, 24/115VAC	Notifier
1	PR-3	Relay, SPDT, Multivolt, 10-40VDC IN/OUT Wiring	Notifier

Qty	Model #	Description	Manufacturer
		CB BUILDING	
		Control Equipment	
1	CPU2-640	Notifier Addressable Fire Alarm Control Panel	Notifier
1	NCA-2	Network Control Annunciator	Notifier
3	NCM-F	Network Module for Fiber	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
1	DAX-3525	Digital Audio Amp, 35W 25VRMS	Notifier
1	SBB-C4R	Backbox, 3 chassis, red.	Notifier
1	DR-C4R	Door, lock & keys. Accepts 3 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CA-1	Chassis, DVC, One Row	Notifier
1	NCA/640-2-KIT	Kit for Mounting NCA-2 to CPU2-640	Notifier
1	DP-DISP2	Dress Plate for CPU2-640 Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
1	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
2	PS12550	Battery 12Volt 55AH	Power Sonic
		Peripheral Devices	
12	FSP-851	Addressable Photo Detector	Notifier
2	FST-851	Addressable Thermal Detector	Notifier
1	B210LPBP	Addressable Detector Base w/ Flange, 10 Count	Notifier
2	B210LP	Addressable Detector Base w/ Flange	Notifier
2	B224BI	Addressable Isolator Base	Notifier
3	NBG-12LX	Addressable Pull Station	Notifier
1	FMM-1	Addressable Monitor Module	Notifier
1	FMM-101	Addressable Mini Module	Notifier
4	FDM-1	Addressable Dual Monitor Module	Notifier
2	FCM-1	Addressable Control Module	Notifier
		Notification Devices	
22	SPSRV	Speaker/ Strobe, Wall, Multi-CD, Red, HI-DB	Notifier
2	SR	Strobe, Wall, Multi-CD, Red	Notifier
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
1	125STRNC1248D	Exterior Beacon - Clear	Edwards Signal
		Miscellaneous Items	
1	GD8	Passive Graphic Map	Space Age Electronics
1	IAMDRILLK	Drill Switch - Key Operated	Space Age Electronics
1	IGP1R	1 Gang Plate - Red	Space Age Electronics
1	PR-3	Relay, SPDT, Multivolt, 10-40VDC IN/OUT Wiring	Notifier

Qty	Model #	Description	Manufacturer
		EQ BUILDING	
		Control Equipment	
1	CPU2-640	Notifier Addressable Fire Alarm Control Panel	Notifier
1	NCA-2	Network Control Annunciator	Notifier
3	NCM-F	Network Module for Fiber	Notifier
1	ACM-8R	Form-C (8) Relay Annuc. Module	Notifier
1	DVC-EM	Digital Voice Command Center	Notifier
1	DVC-KD	Digital Voice Command, Display Unit	Notifier
1	CMIC-1	Chassis with Paging Microphone	Notifier
1	DAX-3525	Digital Audio Amp, 35W 25VRMS	Notifier
1	SBB-D4R	Backbox, 4 chassis, red.	Notifier
1	DR-D4R	Door, lock & keys. Accepts 4 chassis, red.	Notifier
1	SSU00500	Battery Cabinet	Space Age Electronics
1	CA-1	Chassis, DVC, One Row	Notifier
1	CHS-4L	Chassis, Low Profile	Notifier
1	NCA/640-2-KIT	Kit for Mounting NCA-2 to CPU2-640	Notifier
1	DP-DISP2	Dress Plate for CPU2-640 Top Tier	Notifier
2	BMP-1	Blank Module Dress Plate	Notifier
1	DPA-1	Dress Plate, DVC, One Row	Notifier
2	DP-1B	Blank Dress Plate	Notifier
1	BP2-4	Battery Dress Panel	Notifier
2	PS12550	Battery 12Volt 55AH	Power Sonic
		Peripheral Devices	
1	FSP-851	Addressable Photo Detector	Notifier
2	FST-851	Addressable Thermal Detector	Notifier
2	B210LP	Addressable Detector Base w/ Flange	Notifier
1	B224BI	Addressable Isolator Base	Notifier
4	5603	Conventional Heat Detector 135 øF Fixed	Notifier
18	302-ET-135	Conventional Heat Det. 135 øF- R.C Type In/ Outdoor, Threaded	Notifier
4	NBG-12LOB	Conventional Pull Station, Key Lock, Outdoor w/ box	Notifier
6	FMM-1	Addressable Monitor Module	Notifier
1	FMM-101	Addressable Mini Module	Notifier
		Notification Devices	
11	SPSRK	Speaker/ Strobe, Wall, Multi-CD, Red, Outdoor, w/ Box	Notifier
2	SR	Strobe, Wall, Multi-CD, Red	Notifier
1	125STRNR1248D	Exterior Beacon - Red	Edwards Signal
		Miscellaneous Items	
1	3221	KNOX BOX Recessed Black w/ Tamper	Knox
1	DM4 Series	WP Exterior LED Annuc	Space Age Electronics
1	IAMDRILLK	Drill Switch - Key Operated	Space Age Electronics
1	IGP1R	1 Gang Plate - Red	Space Age Electronics

Section 2

Warranty & Maintenance Statement

Manufacturer Warranties and Limitation of Liability

Manufacturer Warranties. Subject to the limitations set forth herein, Manufacturer warrants that the Products manufactured by it in its Northford, Connecticut facility and sold by it to its authorized Distributors shall be free, under normal use and service, from defects in material and workmanship for a period of thirty six months (36) months from the date of manufacture (effective Jan. 1, 2009). The Products manufactured and sold by Manufacturer are date stamped at the time of production. Manufacturer does not warrant Products that are not manufactured by it in its Northford, Connecticut facility but assigns to its Distributor, to the extent possible, any warranty offered by the manufacturer of such product. This warranty shall be void if a Product is altered, serviced or repaired by anyone other than Manufacturer or its authorized Distributors. This warranty shall also be void if there is a failure to maintain the Products and the systems in which they operate in proper working conditions.

MANUFACTURER MAKES NO FURTHER WARRANTIES, AND DISCLAIMS ANY AND ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS, TRADEMARKS, PROGRAMS AND SERVICES RENDERED BY MANUFACTURER INCLUDING WITHOUT LIMITATION, INFRINGEMENT, TITLE, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. MANUFACTURER SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY OR DEATH WHICH MAY ARISE IN THE COURSE OF, OR AS A RESULT OF, PERSONAL, COMMERCIAL OR INDUSTRIAL USES OF ITS PRODUCTS.

This document constitutes the only warranty made by Manufacturer with respect to its products and replaces all previous warranties and is the only warranty made by Manufacturer. No increase or alteration, written or verbal, of the obligation of this warranty is authorized. Manufacturer does not represent that its products will prevent any loss by fire or otherwise.

Warranty Claims. Manufacturer shall replace or repair, at Manufacturer's discretion, each part returned by its authorized Distributor and acknowledged by Manufacturer to be defective, provided that such part shall have been returned to Manufacturer with all charges prepaid and the authorized Distributor has completed Manufacturer's Return Material Authorization form. The replacement part shall come from Manufacturer's stock and may be new or refurbished. THE FOREGOING IS DISTRIBUTOR'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A WARRANTY CLAIM.

Warn-HL-08-2009.fm

Section 5: Testing the System

5.1 Acceptance Test

When finished with the original installation and all modifications, conduct a complete operational test on the entire installation to verify compliance with applicable NFPA standards. Testing should be conducted by a factory-trained fire alarm technician in the presence of a representative of the Authority Having Jurisdiction and the owner's representative. Follow procedures outlined in NFPA Standard 72's section on *Inspection, Testing and Maintenance*.

5.2 Periodic Testing and Service

Periodic testing and servicing of the control panel, all initiating and notification devices, and any other associated equipment is essential to ensure proper and reliable operation. Test and service the control panel according to the schedules and procedures outlined in the following documents:

- NFPA Standard 72's section on *Inspection, Testing and Maintenance*.
- Service manuals and instructions for the peripheral devices installed in the system. Correct any trouble condition or malfunction immediately.

5.3 Operational Checks

Between formal periodic testing and servicing intervals, the following operation checks should be performed monthly, or more frequently when required by the Authority Having Jurisdiction.

o Before proceeding: a) notify the fire department and the central alarm receiving station if transmitting alarm conditions; b) notify facility personnel of the test so that alarm sounding devices are disregarded during the test period; and c) when necessary, disable activation of alarm notification appliances and speakers to prevent their sounding.

o Disconnect all releasing devices to prevent accidental activation in accordance with NFPA 2001 and NFPA 12A releasing agents.

WARNING:
Do not rely on disable/enable software settings to lockout releasing devices.

o Check that the green POWER LED lights.

o Check that all status LEDs are off.

o Press and hold the LAMP TEST key. Verify that all LEDs and all LCD display segments work.

o Activate an Initiating Device Circuit using an alarm initiating device or an addressable initiating device on the SLC and check that all programmed active notification appliances function. Reset the alarm initiating device, the control panel, and any other associated equipment. In voice alarm applications, confirm that the proper tone(s) and/or messages sound during alarm conditions. Select the paging function and confirm that the message can be heard in the affected fire zones. Repeat the above step with each Initiating Device Circuit and each addressable device.

o On systems equipped with a fire fighter's telephone circuit, make a call from a telephone circuit and confirm a ring tone. Answer the call and confirm communication with the incoming caller. End the call and repeat for each telephone circuit in the system.

o Remove AC power, activate an Initiating Device Circuit through an alarm initiating device or an addressable initiating device on the SLC, and check that programmed active notification

Continued on next page...

appliances sound, and alarm indicators illuminate. Measure the battery voltage with notification appliances active. Replace any battery with a terminal voltage less than 21.6 VDC and reapply AC Power.

NOTE: The battery test requires fully charged batteries. If batteries are new or discharged due to a recent power outage, allow the batteries to charge for 48 hours before testing.

- o Return all circuits to their pretest condition.
- o Check that all status LEDs are off and the green POWER LED is on.
- o Notify fire, central station and/or building personnel when you finish testing the system.

5.4 Battery Checks and Maintenance

Maintenance-free sealed lead-acid batteries used in the system do not require the addition of water or electrolyte. These batteries are charged and maintained in a fully charged state by the main power supply's charger during normal system operation. A discharged battery typically reaches the voltage of 27.6 VDC within 48 hours; the charge rate depends on the battery size (2.0A for 18-26AH; 5.0A-5.7A for 26AH-200AH).

Sealed lead-acid batteries must be replaced within at most 5 years from their date of manufacture. Minimal replacement battery capacity appears on the control panel marking label. Immediately replace a leaking or damaged battery. You can get replacement batteries from the manufacturer.

WARNING:
Batteries contain Sulfuric Acid which can cause severe burns to the skin and eyes and damage to fabrics.

- If a battery leaks and contact is made with the Sulfuric Acid, immediately flush skin and/or eyes with water for at least 15 minutes. Water and household baking soda provides a good neutralizing solution for Sulfuric Acid.
- If Sulfuric Acid gets into eyes, seek immediate medical attention.
- Ensure proper handling of the battery to prevent short circuits.
- Take care to avoid accidental shorting of the leads from uninsulated work benches, tools, bracelets, rings, and coins.

WARNING:
Shorting the battery leads can damage the battery, equipment, and could cause injury to personnel.

Section 3

Battery & Circuit Calculations

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-3030 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING AD				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.71 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.54 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 52.45 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.626 A	x	Required Standby Time: 60 hours	37.57
Secondary Alarm Load 17.537 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	4.38
		Total Secondary Load	41.96
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**52.45** AH

Battery Selection — 75 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-3030 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-3030D	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
AMPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	2	x [0.01200] = 0.02400	x [0.08300] = 0.16600	x [0.01200] = 0.02400
LCM-320	1	x [0.10000] = 0.10000	x [0.10000] = 0.10000	x [0.10000] = 0.10000
ACPS-610	1	x [0.09000] = 0.09000	x [0.09000] = 0.09000	x [0.09000] = 0.09000
ACM-8R	2	x [0.03000] = 0.06000	x [0.15800] = 0.31600	x [0.03000] = 0.06000
LCD-160	1	x [0.10000] = 0.10000	x [0.10000] = 0.10000	x [0.05000] = 0.05000
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	1	x [0.00036] = 0.00036	x [0.00000] = 0.00000	x [0.00036] = 0.00036
FZM-1	3	x [0.00030] = 0.00090	x [0.00000] = 0.00000	x [0.00030] = 0.00090
FRM-1	3	x [0.00020] = 0.00060	x [0.00000] = 0.00000	x [0.00020] = 0.00060
FMM-1	1	x [0.00035] = 0.00035	x [0.00000] = 0.00000	x [0.00035] = 0.00035
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.7102 A**	**7.5370 A**	**0.6262 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.53700] = 7.53700
ACPS-610	1	x [10.00000] = 10.00000
Total (Amperes):		**17.5370 A**

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-640 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING AG				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.39 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.01 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 47.71 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.603 A	x	Required Standby Time: 60 hours	36.19
Secondary Alarm Load 7.914 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	1.98
		Total Secondary Load	38.16
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**47.71** AH

Battery Selection — 75 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-640 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-640 W/ NCA-2 DISPLAY	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
CPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	3	x [0.01200] = 0.03600	x [0.08300] = 0.24900	x [0.01200] = 0.03600
DAA2-5025	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.13800] = 0.13800
DAX-3525	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.11200] = 0.11200
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	17	x [0.00036] = 0.00612	x [0.00000] = 0.00000	x [0.00036] = 0.00612
FSP-851R	8	x [0.00030] = 0.00240	x [0.00000] = 0.00000	x [0.00030] = 0.00240
NBG-12LX	11	x [0.00030] = 0.00330	x [0.00000] = 0.00000	x [0.00030] = 0.00330
FMM-101	1	x [0.00038] = 0.00038	x [0.00000] = 0.00000	x [0.00038] = 0.00038
FCM-1	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
FRM-1	5	x [0.00020] = 0.00100	x [0.00000] = 0.00000	x [0.00020] = 0.00100
FMM-1	3	x [0.00035] = 0.00105	x [0.00000] = 0.00000	x [0.00035] = 0.00105
FDM-1	3	x [0.00075] = 0.00225	x [0.00000] = 0.00000	x [0.00075] = 0.00225
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.3871 A**	**7.0140 A**	**0.6031 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.01400] = 7.01400
DAA-5025/DAA-5070	1	x [0.90000] = 0.90000
Total (Amperes):		**7.9140 A**

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-640 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING AN				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.40 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.01 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 48.39 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.612 A	x	Required Standby Time: 60 hours	36.73
Secondary Alarm Load 7.914 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	1.98
		Total Secondary Load	38.71
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**48.39** AH

Battery Selection — 75 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-640 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-640 W/ NCA-2 DISPLAY	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
CPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	3	x [0.01200] = 0.03600	x [0.08300] = 0.24900	x [0.01200] = 0.03600
DAA2-5025	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.13800] = 0.13800
DAX-3525	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.11200] = 0.11200
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	31	x [0.00036] = 0.01116	x [0.00000] = 0.00000	x [0.00036] = 0.01116
FSP-851R	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
NBG-12LX	20	x [0.00030] = 0.00600	x [0.00000] = 0.00000	x [0.00030] = 0.00600
FMM-101	1	x [0.00038] = 0.00038	x [0.00000] = 0.00000	x [0.00038] = 0.00038
FCM-1	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
FRM-1	4	x [0.00020] = 0.00080	x [0.00000] = 0.00000	x [0.00020] = 0.00080
FMM-1	4	x [0.00035] = 0.00140	x [0.00000] = 0.00000	x [0.00035] = 0.00140
FDM-1	7	x [0.00075] = 0.00525	x [0.00000] = 0.00000	x [0.00075] = 0.00525
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.3962 A**	**7.0140 A**	**0.6122 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.01400] = 7.01400
DAA-5025/DAA-5070	1	x [0.90000] = 0.90000
Total (Amperes):		**7.9140 A**

NOTIFIER by Honeywell

System Power Requirements

FCPS-24s8 Power Supply

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	POWER SUPPLIES AT MAX LOAD IN BUILDINGS AG & AN				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info!@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements

3.20 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load

0.09 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load

8.00 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements

6.63 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load	x	Required Standby Time	
0.055 A		60 hours	3.30
Secondary Alarm Load	x	Required Alarm Time (hours)	
8.000 A		15 Minutes	
		0.250 hours	2.00
Auxiliary Power Supply Load	x	Required Alarm Time (hours)	
0.000 A		0.250 hours	0.00
		Total Secondary Load	5.30
		Spare Cpacity	x 1.25
		Secondary Load Requirements	**6.63** AH

Battery Selection

7 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

FCPS-24s8 Power Supply

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
FCPS-24S8 Main Circuit Board	1	x [0.09100] = 0.09100	x [0.14500] = 0.14500	x [0.05500] = 0.05500
STROBE DEVICES @ MAX LOAD	1	x [0.00000] = 0.00000	x [7.85500] = 7.85500	x [0.00000] = 0.00000
Total (Amperes):		**0.0910 A**	**8.0000 A**	**0.0550 A**

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-640 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING AS				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.49 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.11 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 43.23 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.543 A	x	Required Standby Time: 60 hours	32.58
Secondary Alarm Load 8.014 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	2.00
		Total Secondary Load	34.58
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**43.23** AH

Battery Selection — 55 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-640 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-640 W/ NCA-2 DISPLAY	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
CPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	3	x [0.01200] = 0.03600	x [0.08300] = 0.24900	x [0.01200] = 0.03600
DAA2-5025	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.13800] = 0.13800
LCD-160	1	x [0.10000] = 0.10000	x [0.10000] = 0.10000	x [0.05000] = 0.05000
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	29	x [0.00036] = 0.01044	x [0.00000] = 0.00000	x [0.00036] = 0.01044
FST-851H	1	x [0.00030] = 0.00030	x [0.00000] = 0.00000	x [0.00030] = 0.00030
NBG-12LX	7	x [0.00030] = 0.00210	x [0.00000] = 0.00000	x [0.00030] = 0.00210
FMM-101	1	x [0.00038] = 0.00038	x [0.00000] = 0.00000	x [0.00038] = 0.00038
FCM-1	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
FRM-1	4	x [0.00020] = 0.00080	x [0.00000] = 0.00000	x [0.00020] = 0.00080
FMM-1	4	x [0.00035] = 0.00140	x [0.00000] = 0.00000	x [0.00035] = 0.00140
FDM-1	4	x [0.00075] = 0.00300	x [0.00000] = 0.00000	x [0.00075] = 0.00300
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.4890 A**	**7.1140 A**	**0.5430 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.11400] = 7.11400
DAA-5025/DAA-5070	1	x [0.90000] = 0.90000
Total (Amperes):		**8.0140 A**

NOTIFIER by Honeywell

System Power Requirements

FCPS-24s6 Power Supply

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	POWER SUPPLIES AT MAX LOAD IN BUILDING AS				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements

3.20 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load

0.09 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load

6.00 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements

6.00 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load	x	Required Standby Time	
0.055 A		60 hours	3.30
Secondary Alarm Load	x	Required Alarm Time (hours)	
6.000 A		15 Minutes	
		0.250 hours	1.50
Auxiliary Power Supply Load	x	Required Alarm Time (hours)	
0.000 A		0.250 hours	0.00
		Total Secondary Load	4.80
		Spare Capacity	x 1.25
		Secondary Load Requirements	**6.00** AH

Battery Selection

7 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

FCPS-24s6 Power Supply

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
FCPS-24S6 Main Circuit Board	1	x [0.09100] = 0.09100	x [0.14500] = 0.14500	x [0.05500] = 0.05500
NACS AT MAX LOAD	1	x [0.00000] = 0.00000	x [5.85500] = 5.85500	x [0.00000] = 0.00000
Total (Amperes):		**0.0910 A**	**6.0000 A**	**0.0550 A**

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-640 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING CB				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.38 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.01 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 36.55 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.458 A	x	Required Standby Time: 60 hours	27.49
Secondary Alarm Load 7.014 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	1.75
		Total Secondary Load	29.24
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**36.55** AH

Battery Selection — 55 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-640 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-640 W/ NCA-2 DISPLAY	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
CPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	3	x [0.01200] = 0.03600	x [0.08300] = 0.24900	x [0.01200] = 0.03600
DAX-3525	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.11200] = 0.11200
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	12	x [0.00036] = 0.00432	x [0.00000] = 0.00000	x [0.00036] = 0.00432
FST-851	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
NBG-12LX	3	x [0.00030] = 0.00090	x [0.00000] = 0.00000	x [0.00030] = 0.00090
FMM-101	1	x [0.00038] = 0.00038	x [0.00000] = 0.00000	x [0.00038] = 0.00038
FCM-1	2	x [0.00030] = 0.00060	x [0.00000] = 0.00000	x [0.00030] = 0.00060
FMM-1	1	x [0.00035] = 0.00035	x [0.00000] = 0.00000	x [0.00035] = 0.00035
FDM-1	4	x [0.00075] = 0.00300	x [0.00000] = 0.00000	x [0.00075] = 0.00300
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.3801 A**	**7.0140 A**	**0.4581 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.01400] = 7.01400
Total (Amperes):		**7.0140 A**

NOTIFIER by Honeywell

System Power Requirements

Notifier NFS2-640 Fire Alarm Control Panel

Protected Premises:	NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL			Date:	5/12/2012
Address:	BUILDING EQ				
City:	WALPOLE	State:	MA	Zip:	
Prepared By:	Fire Command Systems, Inc.			Phone:	978-401-9840
Address:	145A Summit Street, Suite 209			Email:	info@firecommandsystems.com
City:	Peabody	State:	MA	Zip:	01960

AC Branch Current Requirements — 5.00 AMPS @ 120 VAC

Current required by source to power the fire alarm system.

Primary Standby Load — 0.40 Amps

Current load on the primary power supply during **non-alarm** conditions.

Primary Alarm Load — 7.17 Amps

Current load on the primary power supply during **alarm** conditions.

Secondary Load Requirements — 38.41 Amp Hours

Total Secondary Load from the calculation table below.

Current Draw		Time (hours)	Total (AH)
Secondary Standby Load 0.482 A	x	Required Standby Time: 60 hours	28.94
Secondary Alarm Load 7.172 A	x	Required Alarm Time (hours): 15 Minutes (0.250 hours)	1.79
		Total Secondary Load	30.73
		Spare Capacity	x 1.25
		Secondary Load Requirements (Amp Hours)	**38.41** AH

Battery Selection — 55 Amp Hours

NOTIFIER by Honeywell

Device Current Draw

NFS2-640 Fire Alarm Control Panel

Quantity x [device current draw] = total current draw per device (in amps)

Part Number	Qty	Primary Non-Alarm	Primary Alarm	Secondary Non-Alarm
CPU2-640 W/ NCA-2 DISPLAY	1	x [0.20200] = 0.20200	x [0.25000] = 0.25000	x [0.12800] = 0.12800
CPS-24	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.04000] = 0.04000
NCM-F	3	x [0.01200] = 0.03600	x [0.08300] = 0.24900	x [0.01200] = 0.03600
DAX-3525	1	x [0.00000] = 0.00000	x [0.00000] = 0.00000	x [0.11200] = 0.11200
ACM-8R	1	x [0.03000] = 0.03000	x [0.15800] = 0.15800	x [0.03000] = 0.03000
DVC-EM	1	x [0.08700] = 0.08700	x [0.44000] = 0.44000	x [0.08700] = 0.08700
DVC-AO	1	x [0.04500] = 0.04500	x [0.17500] = 0.17500	x [0.04500] = 0.04500
FSP-851	1	x [0.00036] = 0.00036	x [0.00000] = 0.00000	x [0.00036] = 0.00036
FST-851	6	x [0.00030] = 0.00180	x [0.00000] = 0.00000	x [0.00030] = 0.00180
FMM-101	1	x [0.00038] = 0.00038	x [0.00000] = 0.00000	x [0.00038] = 0.00038
FMM-1	5	x [0.00035] = 0.00175	x [0.00000] = 0.00000	x [0.00035] = 0.00175
SLC Loop Device Activation Current	1	x [0.00000] = 0.00000	x [0.40000] = 0.40000	x [0.00000] = 0.00000
MAX NAC LOAD	1	x [0.00000] = 0.00000	x [5.50000] = 5.50000	x [0.00000] = 0.00000
Total (Amperes):		**0.4043 A**	**7.1720 A**	**0.4823 A**

Part Number	Qty	Secondary Alarm
Total Primary Alarm Load - C2	1	x [7.17200] = 7.17200
Total (Amperes):		**7.1720 A**

Norfolk County Agricultural High School

SPEAKER CIRCUITS

Wire	14	**Ohm/Ft**	0.0031	**Circuit Voltage**	25

				Watt Setting								
			Watts	**0.25**	**0.5**	**1**	**2**					
Cir#	**Description - Floor**	**Buidling**	**Distance**							**Total Watts**	**Total Ohms**	**Total RL**	**db Loss**
1	N1S1 - MAIN	AG	700			19				19	4.298	32.89	-2
2	N1S2 - MAIN	AG	700			19				19	4.298	32.89	-2
3	N1S3 - MAIN	EG	200				4			8	1.228	78.13	0
4	N2S1 - LOWER	AS	700			21				21	4.298	29.76	-2
5	N2S2 - UPPER	AS	700			29				29	4.298	21.55	-3
6	N3S1 - BASEMENT	AN	500			11				11	3.07	56.82	-1
7	N3S2 - GROUND	AN	700			16				16	4.298	39.06	-2
8	N3S3 - 2ND FLOOR	AN	600			11				11	3.684	56.82	-1
9	N4S1 - LOWER	CB	700			23				23	4.298	27.17	-2
10	N5S1 - MAIN	EQ	400				11			22	2.456	28.41	-1

Norfolk County Agricultural High School

STROBE CIRCUITS

Wire	14	Ohm/Ft	0.0031	Circuit Voltage	20

				Strobe Rating - True Measure										
			Amps	0.057	0.075	0.111	0.168	0.35	0					
Cir#	**Description - Floor**	**Building**	**Distance**	**15cd**	**30cd**	**75cd**	**110cd**	**BEACON**	**0**	**Total Amps**	**Total Ohms**	**Volt Drop**	**Voltage**	**Pass**
1	N1V1 - FCPS TRIP	AG	15							0	0.0921	0.00	20.00	OK
2	N1V2 - SPARE	AG	0							0	0	0.00	20.00	OK
3	N1V3 - MAIN	EG	250			4				0.444	1.535	0.68	19.32	OK
4	N1V4 - EXTERIOR	EG	100					1		0.35	0.614	0.21	19.79	OK
5	N1V5 - MAIN	AG	350			1	8			1.455	2.149	3.13	16.87	OK
6	N1V6 - MAIN	AG	350		2	7	1			1.095	2.149	2.35	17.65	OK
7	N1V7 - MAIN	AG	350		1	2	8			1.641	2.149	3.53	16.47	OK
8	N1V8 - MAIN	AG	350	2		8				1.002	2.149	2.15	17.85	OK
9	N2V1 - FCPS TRIP	AS	15							0	0.0921	0.00	20.00	OK
10	N2V2 -BASEMENT/LOWER	AS	400	1		5	1			0.78	2.456	1.92	18.08	OK
11	N2V3 - LOWER	AS	400	1		6				0.723	2.456	1.78	18.22	OK
12	N2V4 - LOWER	AS	400			3	4			1.005	2.456	2.47	17.53	OK
13	N2V5 -BASEMENT/LOWER	AS	400			8				0.888	2.456	2.18	17.82	OK
14	N2V6 - UPPER	AS	500	4		4				0.672	3.07	2.06	17.94	OK
15	N2V7 - UPPER	AS	500	2		5				0.669	3.07	2.05	17.95	OK
16	N2V8 - UPPER	AS	500	2		1	4			0.897	3.07	2.75	17.25	OK
17	N3V1 - FCPS TRIP	AN	15							0	0.0921	0.00	20.00	OK
18	N3V2 - UPPER LEVEL	AN	500			4	1			0.612	3.07	1.88	18.12	OK
19	N3V3 - UPPER LEVEL	AN	500			5	1			0.723	3.07	2.22	17.78	OK
20	N3V4 - BASEMENT	AN	400	1		9				1.056	2.456	2.59	17.41	OK
21	N3V5 - BASEMENT	AN	400	2		8				1.002	2.456	2.46	17.54	OK
22	N3V6 - LOWER LEVEL	AN	400	4		4				0.672	2.456	1.65	18.35	OK
23	N3V7 - LOWER LEVEL	AN	400			6	2			1.002	2.456	2.46	17.54	OK
24	N3V8 - LOWER LEVEL	AN	400	1		6				0.723	2.456	1.78	18.22	OK
25	N4V1 - BASEMENT	CB	400			2				0.222	2.456	0.55	19.45	OK
26	N4V2 - LOWER LEVEL	CB	400			7				0.777	2.456	1.91	18.09	OK
27	N4V3 - LOWER LEVEL	CB	400			8				0.888	2.456	2.18	17.82	OK
28	N4V4 - LOWER LEVEL	CB	400	1		4	1			0.669	2.456	1.64	18.36	OK
29	N5V1 - MAIN LEVEL	EQ	300	2		5				0.669	1.842	1.23	18.77	OK
30	N5V2 - MAIN LEVEL	EQ	300			6				0.666	1.842	1.23	18.77	OK
31	N5V3 - EXTERIOR	EQ	75					1		0.35	0.4605	0.16	19.84	OK
32	N5V4 - SPARE	EQ	0							0	0	0.00	20.00	OK

Section 4

System Configuration Reports

All Current Modules

Note: For Printing this Report directly from the Reports screen in VerifireTools, Please use Paper of size 8.5 * 14" Legal.

NFS2-3030

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 1**

Modules

SLC Loop/ Panel	Device Address/ Point	Type Code Label	FlashScan Type	Custom Label	Extended Label	Control-By-Event	Silenceable	Alarm Veri-Part	Local Mode Part	Walk Test Part	Switch Inhibit	Custom Act Msg	Serial Number	Bell Coding Mode	Activation Dela y (secs)	DCNormalState	FeedBack Delay (secs)	Wiring Class	Waterflow Delay (Sec)
1	1	Relay	RELAY	CROSS TRIP TO OLD	PANEL		No	N/A	No	No	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	100	Power Monitr	PS MON	NODE 1 POWER SUPPLY			N/A	No	No	N/A	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	101	Power Monitr	PS MON	NODE 1 POWER SUPPLY	AC FAIL		N/A	No	No	N/A	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	102	Power Monitr	PS MON	NODE 1 POWER SUPPLY	BATTERY		N/A	No	No	N/A	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	103	Power Monitr	PS MON	NODE 1 POWER SUPPLY	EARTH FAULT		N/A	No	No	N/A	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	104	Power Monitr	PS MON	NODE 1 POWER SUPPLY	CHARGR FAULT		N/A	No	No	N/A	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

All Current Detectors

Note: For Printing this Report directly from the Reports screen in VerifireTools, Please use Paper of size 8.5 * 14" Legal.

NFS2-3030

Site ID: 0 **Port ID: 0** **Node Address: 1**

Date: 9/11/2013

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Control-By-Event	1st Multi Detector	2nd Multi Detector	Local Mode	Alarm Verification	Custom Action Msg	Occupied Pre-alarm	Occupied Fire Alarm	Unoccupied Pre-alarm	Unoccupied Fire Alarm	Pre-Alarm Mode	Weekly Occup Sched	Serial Number	SounderBaseCodingMode	Silenceable Sounder Base	Intelligent Sounder
1	1	Smoke(Photo)	PHOTO	MAIN OFFICE	AD BUILDING	Z1,Z99	None	None	No	No	None	0	8	0	8	Action	None	N/A	N/A	No	No
1	2	Smoke(Photo)	PHOTO	FL1 MDF ROOM	AD BUILDING	Z1,Z99	None	None	No	No	None	0	8	0	8	Action	None	N/A	N/A	No	No

Additional Data for the Detectors

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Low Temp Warning	CO Pre-Alarm
1	1	Smoke(Photo)	PHOTO	MAIN OFFICE	AD BUILDING	N/A	N/A
1	2	Smoke(Photo)	PHOTO	FL1 MDF ROOM	AD BUILDING	N/A	N/A

All Current Modules

NFS2-640

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 2**

Modules

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	1	Control	CONTROL	RED BEACON	AS BLDG	No	No	No	Z99,Z0	N/A
1	2	Control	CONTROL	WATERFLOW BEACON	AS BLDG	No	Yes w/o Resound	No	Z81	N/A
1	4	Fire Control	MONITOR	FIRE DRILL SWITCH	AS BLDG	N/A	N/A	N/A	Z97,Z99	N/A
1	5	Relay	RELAY	PRI ELEV RECALL	AS BLDG	No	No	No	Z50	N/A
1	6	Relay	RELAY	ALT ELEV RECALL	AS BLDG	No	No	No	Z51	N/A
1	7	Relay	RELAY	FIRE HAT	AS BLDG	No	No	No	Z52	N/A
1	8	Track Superv	MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z80	N/A
1	9	Track Superv	MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z80	N/A
1	10	Waterflow	MINI/DUAL MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z81,Z99	0
1	11	Track Superv	MINI/DUAL MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z80	N/A
1	12	Waterflow	MINI/DUAL MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z81,Z99	0
1	13	Track Superv	MINI/DUAL MONITOR	SPRINKLER RM 6003	AS BLDG BSMT	N/A	N/A	N/A	Z80	N/A
1	14	Pull Station	MANUAL STATION	STAIR #6000	AS BLDG BSMT	N/A	N/A	N/A	Z1,Z99	N/A
1	15	Waterflow	MINI/DUAL MONITOR	WATERFLOW	AS BLDG FL1	N/A	N/A	N/A	Z81,Z99	0
1	16	Track Superv	MINI/DUAL MONITOR	TAMPER SWITCH	AS BLDG FL1	N/A	N/A	N/A	Z80	N/A
1	17	Pull Station	MANUAL STATION	STAIR #6226	AS BLDG FL1	N/A	N/A	N/A	Z1,Z99	N/A

Site ID: 0 **Port ID: 0** **Node Address: 2**

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	18	Pull Station	MANUAL STATION	OUTDR STORG RM6122	AS BLDG FL1	N/A	N/A	N/A	Z1,Z99	N/A
1	19	Pull Station	MANUAL STATION	VESTIBULE RM6120	AS BLDG FL1	N/A	N/A	N/A	Z1,Z99	N/A
1	20	Pull Station	MANUAL STATION	ROOM 6004	AS BLDG BSMT	N/A	N/A	N/A	Z3,Z99	N/A
1	21	Pull Station	MANUAL STATION	CORR. 6225	AS BLDG FL2	N/A	N/A	N/A	Z2,Z99	N/A
1	22	Relay	RELAY	ELEV SHAFT DAMPR	AS BLDG	No	No	No	Z0	N/A
1	23	Pull Station	MANUAL STATION	VESTIBULE RM6100	AS BLDG FL1	N/A	N/A	N/A	Z1,Z99	N/A
1	24	Heat Detect	MONITOR	MECH RM 6217	AS BLDG FL2	N/A	N/A	No	Z2,Z99	N/A
1	25	Waterflow	MINI/DUAL MONITOR	WATERFLOW	AS BLDG FL2	N/A	N/A	N/A	Z81,Z99	0
1	26	Track Superv	MINI/DUAL MONITOR	TAMPER SWITCH	AS BLDG FL2	N/A	N/A	N/A	Z80	N/A
1	27	Relay	RELAY	RTU-1 SHUTDOWN	AS BLDG	No	No	No	Z40	N/A

Bell Circuits

1	Strobe Ckt	N/A	STROBE CIRCUIT 1	FLOOR 1	No	Yes - Fire	No	Z76,ZL11,Z97,ZF8	N/A
2	Strobe Ckt	N/A	STROBE CIRCUIT 2	FLOOR 1	No	Yes - Fire	No	Z76,ZL11,Z97,ZF8	N/A
3	Strobe Ckt	N/A	STROBE CIRCUIT 3	FLOOR 1	No	Yes - Fire	No	Z76,ZL11,Z97,ZF8	N/A
4	Strobe Ckt	N/A	STROBE CIRCUIT 4	FLOOR 1	No	Yes - Fire	No	Z76,ZL11,Z97,ZF8	N/A

All Current Detectors

Note: For Printing this Report directly from the Reports screen in VerifireTools, Please use Paper of size 8.5 * 14" Legal.

NFS2-640

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 2**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder
1	1	Smoke(Photo)	PHOTO	CORR 6121 @ ELEV	AS BLDG FL1	0	8	None(N)	No	Z1,Z50,Z99	No
1	2	Smoke(Photo)	PHOTO	STAIR #6000	AS BLDG BSMT	0	8	None(N)	No	Z1,Z99	No
1	3	Smoke(Photo)	PHOTO	SPRINKLER RM 6003	AS BLDG BSMT	0	8	None(N)	No	Z1,Z99	No
1	4	Smoke(Photo)	PHOTO	IDF ROOM 6002	AS BLDG BSMT	0	8	None(N)	No	Z1,Z99	No
1	5	Smoke(Photo)	PHOTO	ELEV MACH RM 6001	AS BLDG BSMT	0	8	None(N)	No	Z1,Z52,Z99	No
1	6	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6102	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	7	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6116	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	8	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6104	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	9	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6106	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	10	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6114	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	11	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6110	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	12	Smoke(Photo)	PHOTO	EMERG ELEC RM 6006	AS BLDG BSMT	0	8	None(N)	No	Z1,Z99	No
1	13	Smoke(Photo)	PHOTO	STAIR #6004	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	15	Smoke(Photo)	PHOTO	ELECT ROOM 6005	AS BLDG BSMT	0	8	None(N)	No	Z1,Z99	No
1	16	Smoke(Photo)	PHOTO	CORR 6121 @ RM 6112	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No

NFS2-640

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 2**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder
1	17	Smoke(Photo)	PHOTO	VESTIBULE 6120	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	18	Smoke(Photo)	PHOTO	STAIR #6004	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No
1	19	Smoke(Photo)	PHOTO	STAIR #6113	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	20	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6210	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	21	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6207	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	22	Smoke(Duct P)	PHOTO	DUCT DETECTR RM 6210	AS BLDG FL2	8	8	None(N)	No	Z2,Z40,Z99	No
1	23	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6206	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	24	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6218	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	25	Smoke(Duct P)	PHOTO	DUCT SETECTR RM 6215	AS BLDG FL2	8	8	None(N)	No	Z2,Z40,Z99	No
1	26	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6221	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	27	Smoke(Photo)	PHOTO	CORR 6225 @ RM 6202	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	28	Smoke(Photo)	PHOTO	CORR 6225 @ ELEVATOR	AS BLDG FL2	0	8	None(N)	No	Z2,Z50,Z99	No
1	29	Smoke(Photo)	PHOTO	STAIR 6226 @ RECEPTN	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	30	Smoke(Photo)	PHOTO	CORR 6225 @ STR 6226	AS BLDG FL2	0	8	None(N)	No	Z2,Z99	No
1	31	Smoke(Photo)	PHOTO	RECEPTION 6101	AS BLDG FL1	0	8	None(N)	No	Z1,Z99,Z51	No
1	32	Smoke(Photo)	PHOTO	VESTIBULE 6100	AS BLDG FL1	0	8	None(N)	No	Z1,Z99	No

All Current Detectors

Note: For Printing this Report directly from the Reports screen in VerifireTools, Please use Paper of size 8.5 * 14" Legal.

NFS2-640

Date: 8/11/2014

Site ID: 0 | **Port ID: 0** | **Node Address: 3**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder	Reference Detector
1	1	Smoke(Photo)	PHOTO	VESTIBULE 2101	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	2	Smoke(Photo)	PHOTO	WAITING RM 2100	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	3	Smoke(Photo)	PHOTO	WAITING RM BY 2102	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	4	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	5	Smoke(Photo)	PHOTO	NURSES OFFICE 2106	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	6	Smoke(Photo)	PHOTO	ELECTRC RM 2116	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	7	Smoke(Photo)	PHOTO	CORRDR BY ELECTRC RM	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	8	Smoke(Photo)	PHOTO	CORRDR BY STORAGE RM	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	9	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	10	Smoke(Photo)	PHOTO	RECORDS RM 2113	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	11	Smoke(Photo)	PHOTO	CORRDR BY BOILER RM	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	12	Smoke(Photo)	PHOTO	CRRDR BY STAIRWELL	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	13	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	0	8	None(N)	No	Z3,Z99	No	N/A
1	14	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2100	AN BUILDING	0	8	None(N)	No	Z3,Z99,Z51	No	N/A
1	15	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A

NFS2-640

Date: 8/11/2014

Site ID: 0 | **Port ID: 0** | **Node Address: 3**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder	Reference Detector
1	16	Smoke(Photo)	PHOTO	CORRIDR 2200	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	17	Smoke(Photo)	PHOTO	STAIRWELL 2220	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	18	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	19	Smoke(Photo)	PHOTO	CONFRNCE RM 2214	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	20	Smoke(Photo)	PHOTO	RECEPTION BY RM2209	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	21	Smoke(Photo)	PHOTO	RECPTN BY CRRDR 2200	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	22	Smoke(Photo)	PHOTO	CORRIDR BY RM2207	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	23	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2200	AN BUILDING	0	8	None(N)	No	Z1,Z99,Z50	No	N/A
1	24	Smoke(Photo)	PHOTO	CRRDR BY RM 2201	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	25	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	26	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	0	8	None(N)	No	Z2,Z99	No	N/A
1	27	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2300	AN BUILDING	0	8	None(N)	No	Z2,Z99,Z50	No	N/A
1	28	Smoke(Duct P)	PHOTO	RTU1 CONFRNCE SUPPLY	AN BUILDING	0	8	None(N)	No	Z1,Z99,Z54	No	N/A
1	29	Smoke(Duct P)	PHOTO	RTU1 CONFRNCE RETURN	AN BUILDING	0	8	None(N)	No	Z1,Z99,Z54	No	N/A
1	30	Smoke(Photo)	PHOTO	STAIRWELL 2220	AN BUILDING	0	8	None(N)	No	Z2,Z99	No	N/A
1	31	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	0	8	None(N)	No	Z2,Z99	No	N/A
1	32	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	0	8	None(N)	No	Z2,Z99	No	N/A
1	43	Smoke(Photo)	PHOTO	ELEVATOR MACHINE RM	AN BUILDING	0	8	None(N)	No	Z3,Z51,Z52	No	N/A

All Current Modules

NFS2-640

Date: 8/18/2014

Site ID: 0 | **Port ID: 0** | **Node Address: 3**

Modules

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	1	Pull Station	MANUAL STATION	VESTIBULE 2101	AN BUILDING	N/A	N/A	N/A	Z3,Z99	N/A
1	2	Pull Station	MANUAL STATION	WAITING RM 2100	AN BUILDING	N/A	N/A	N/A	Z3,Z99	N/A
1	3	Pull Station	MANUAL STATION	STAIRWELL 2128	AN BUILDING	N/A	N/A	N/A	Z3,Z99	N/A
1	4	Track Superv	MINI/DUAL MONITOR	C.O DT NURSES RM2106	AN BUILDING	N/A	N/A	N/A	Z55	N/A
1	5	Pull Station	MANUAL STATION	STAIRWELL 2114	AN BUILDING	N/A	N/A	N/A	Z3,Z99	N/A
1	6	Track Superv	MONITOR	C.O DT BOILR RM2001	AN BUILDING	N/A	N/A	N/A	Z55	N/A
1	7	Waterflow	MONITOR	MAIN FLOW	AN BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	8	Track Superv	MINI/DUAL MONITOR	TAMPER GROUND FL	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	9	Waterflow	MINI/DUAL MONITOR	GROUND FLOOR	AN BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	10	Track Superv	MINI/DUAL MONITOR	TAMPER BASEMENT	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	11	Waterflow	MINI/DUAL MONITOR	BASEMENT	AN BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	12	Track Superv	MINI/DUAL MONITOR	WET SYSTEM TAMPER	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	13	Track Superv	MINI/DUAL MONITOR	DRY SYSTEM TAMPER	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	14	Track Superv	MINI/DUAL MONITOR	DRY LOW AIR	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	15	Waterflow	MINI/DUAL MONITOR	DRY SYSTEM FLOW	AN BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	16	Track Superv	MINI/DUAL MONITOR	BUILDING SIDE TAMPER	AN BUILDING	N/A	N/A	N/A	Z80	N/A

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Date: **8/18/2014**

Site ID: 0 | **Port ID: 0** | **Node Address: 3**

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	17	Track Superv	MINI/DUAL MONITOR	CITY SIDE TAMPER	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	18	Track Superv	MINI/DUAL MONITOR	TAMPER 2ND FLOOR	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	19	Waterflow	MINI/DUAL MONITOR	2ND FLOOR	AN BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	20	Pull Station	MANUAL STATION	CLASSRM 2304	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	22	Pull Station	MANUAL STATION	STAIRWELL 2123	AN BUILDING	N/A	N/A	N/A	Z3,Z99	N/A
1	23	Track Superv	MONITOR	STANDPIPE TAMPER	AN BUILDING	N/A	N/A	N/A	Z80	N/A
1	24	Pull Station	MANUAL STATION	CORRDR 2200 BY STAIR	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	25	Pull Station	MANUAL STATION	STAIRWELL 2200	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	26	Pull Station	MANUAL STATION	EXISTING SHOP	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	27	Pull Station	MANUAL STATION	SHOP BY DOUBLE DOORS	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	28	Monitor	MONITOR	HEAT IN CRWL SPACE	AN BUILDING	N/A	N/A	N/A	Z4,Z99	N/A
1	29	Pull Station	MANUAL STATION	SHOP OFFICE	AN BUILDING	N/A	N/A	N/A	Z4,Z99	N/A
1	30	Pull Station	MANUAL STATION	MAIN SHOP	AN BUILDING	N/A	N/A	N/A	Z4,Z99	N/A
1	31	Pull Station	MANUAL STATION	WELDING SHOP	AN BUILDING	N/A	N/A	N/A	Z4,Z99	N/A
1	32	Pull Station	MANUAL STATION	CORRDR BY ELEVATOR	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	33	Pull Station	MANUAL STATION	CLASSRM 2201	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	35	Monitor	MONITOR	HEAT DT ELEVATR SHFT	AN BUILDING	N/A	N/A	N/A	Z2,Z99,Z51,Z52	N/A
1	36	Relay	RELAY	ELEVATOR DAMPR	AN BUILDING	No	No	No	Z99	N/A
1	37	Pull Station	MANUAL STATION	STAIRWELL 2220	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A

Site ID: 0 | **Port ID: 0** | **Node Address: 3**

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	38	Pull Station	MANUAL STATION	CLASSRM 2308	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	39	Pull Station	MANUAL STATION	STAIRWELL 2114	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	40	Monitor	MINI/DUAL MONITOR	PULLSTN ROOF TOP	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	41	Pull Station	MANUAL STATION	CORRDOR2300	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	42	Pull Station	MANUAL STATION	CLASSRM 2301	AN BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	43	Relay	RELAY	RECALL PRIMARY	AN BUILDING	No	No	No	Z50	N/A
1	44	Relay	RELAY	RECALL ALTERNATE	AN BUILDING	No	No	No	Z51	N/A
1	45	Relay	RELAY	RECALL FIREHAT	AN BUILDING	No	No	No	Z52	N/A
1	46	Control NAC	CONTROL	RED BEACON	AN BUILDING	No	Yes - Fire	No	Z71,Z99,Z11	N/A
1	47	Control NAC	CONTROL	SPRINKER BEACON	AN BUILDING	No	Yes - Fire	No	Z81	N/A
1	48	Relay	RELAY	RTU1 SHUTDOWN	AN BUILDING	No	No	No	Z73,Z54	N/A
1	49	Fire Control	MINI/DUAL MONITOR	DRILL SWITCH	AN BUILDING	N/A	N/A	N/A	Z90	N/A
1	55	Pull Station	MANUAL STATION	SPECIAL NEEDS 2204	AN BUILDING	N/A	N/A	N/A	Z1,Z99	N/A

Bell Circuits

1	Control NAC	N/A	STROBE CIRCUIT	No	Yes - Fire	No	Z71,Z11,ZF8,Z99	N/A
2	Control NAC	N/A	STROBE CIRCUIT	No	Yes - Fire	No	Z71,Z11,ZF8,Z99	N/A
3	Control NAC	N/A	STROBE CIRCUIT	No	Yes - Fire	No	Z71,Z11,ZF8,Z99	N/A
4	Control NAC	N/A	STROBE CIRCUIT	No	Yes - Fire	No	Z71,Z11,ZF8,Z99	N/A

All Current Detectors

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NFS2-640

Date: 8/3/2014

Site ID: 0 | **Port ID: 0** | **Node Address: 4**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder	Reference Detector
1	1	Smoke(Photo)	PHOTO	VESTIBULE 5100	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	2	Smoke(Photo)	PHOTO	CORRIDOR 5120	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	3	Smoke(Photo)	PHOTO	STAIRWELL 5116	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	4	Smoke(Photo)	PHOTO	CORRDR BY VESTIBULE	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	5	Smoke(Photo)	PHOTO	CORRDR BY COMP LAB	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	6	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5107	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	7	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5108	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	8	Smoke(Photo)	PHOTO	IDF CLOSET 5104	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	9	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5102	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	10	Smoke(Photo)	PHOTO	CORRDR BY WOMENS RM	CB BUILDING	0	8	None(N)	No	Z1,Z99	No	N/A
1	11	Smoke(Photo)	PHOTO	BOILER RM BY STRWLL	CB BUILDING	0	8	None(N)	No	Z2	No	N/A
1	12	Heat	HEAT	BOILER RM BY PUMPS	CB BUILDING	Fixed	Fixed	None(N)	No	Z2	No	N/A
1	13	Heat	HEAT	BOILER RM REAR STAIR	CB BUILDING	Fixed	Fixed	None(N)	No	Z2	No	N/A
1	14	Smoke(Photo)	PHOTO	BOILER RM BY METERS	CB BUILDING	0	8	None(N)	No	Z2	No	N/A

All Current Modules

NFS2-640

Date: 8/3/2014

Site ID: 0 | **Port ID: 0** | **Node Address: 4**

Modules

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	1	Control NAC	CONTROL	RED BEACON	CB BUILDING	No	Yes - Fire	No	Z71,Z99,Z11	N/A
1	2	Control NAC	CONTROL	SPRINKLER BEACON	CB BUILDING	No	Yes w/o Resound	No	Z70,Z81	N/A
1	3	Pull Station	MANUAL STATION	VESTIBULE 5100	CB BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	4	Waterflow	MINI/DUAL MONITOR	WATERFLOW 1ST FLOOR	CB BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	5	Waterflow	MINI/DUAL MONITOR	WATERFLOW BASEMENT	CB BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	6	Track Superv	MINI/DUAL MONITOR	BYPASS TAMPER	CB BUILDING	N/A	N/A	N/A	Z80	N/A
1	7	Track Superv	MINI/DUAL MONITOR	TAMPER 1ST FLOOR	CB BUILDING	N/A	N/A	N/A	Z80	N/A
1	8	Track Superv	MINI/DUAL MONITOR	TAMPER BASEMENT	CB BUILDING	N/A	N/A	N/A	Z80	N/A
1	9	Waterflow	MINI/DUAL MONITOR	MAIN WATERFLOW	CB BUILDING	N/A	N/A	N/A	Z81,Z99	0
1	10	Track Superv	MINI/DUAL MONITOR	CITY SIDE TAMPER	CB BUILDING	N/A	N/A	N/A	Z80	N/A
1	11	Track Superv	MINI/DUAL MONITOR	BLDG SIDE TAMPER	CB BUILDING	N/A	N/A	N/A	Z80	N/A
1	12	Pull Station	MANUAL STATION	CRRDR BY RM 5108	CB BUILDING	N/A	N/A	N/A	Z1,Z99	N/A
1	13	Pull Station	MANUAL STATION	ROOM 5002	CB BUILDING	N/A	N/A	N/A	Z2,Z99	N/A
1	14	Fire Control	MINI/DUAL MONITOR	DRILL SWITCH	CB BUILDING	N/A	N/A	N/A	Z90	N/A

Bell Circuits

Site ID: 0 **Port ID: 0** **Node Address: 4**

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
	1	Control NAC	N/A	STROBE CIRCUIT		No	Yes - Fire	No	Z71,Z99,Z11,ZF8	N/A
	2	Control NAC	N/A	STROBE CIRCUIT		No	Yes - Fire	No	Z71,Z99,Z11,ZF8	N/A
	3	Control NAC	N/A	STROBE CIRCUIT		No	Yes - Fire	No	Z71,Z99,Z11,ZF8	N/A
	4	Control NAC	N/A	STROBE CIRCUIT		No	Yes - Fire	No	Z71,Z99,Z11,ZF8	N/A

All Current Detectors

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NFS2-640

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 6**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder
1	1	Smoke(Duct P)	PHOTO	ERV-1 MACH SHOP 8101	AG BLDG	0	8	None(N)	No	Z1,Z40,Z99	No
1	2	Smoke(Duct P)	PHOTO	ERV-1 MACH SHOP 8101	AG BLDG	0	8	None(N)	No	Z1,Z40,Z99	No
1	3	Smoke(Duct P)	PHOTO	ERV-2 TOOL CRIB 8103	AG BLDG	0	8	None(N)	No	Z1,Z41,Z99	No
1	4	Smoke(Duct P)	PHOTO	ERV-2 TOOL CRIB 8103	AG BLDG	0	8	None(N)	No	Z1,Z41,Z99	No
1	5	Smoke(Photo)	PHOTO	CORR BY BOYS RM 8120	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	6	Smoke(Photo)	PHOTO	CORR BY GIRLS RM8121	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	7	Smoke(Photo)	PHOTO	VESTIBULE	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	8	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8105	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	9	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8118	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	10	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8117	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	11	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8117	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	12	Smoke(Photo)	PHOTO	IDF CLOSET RM 8116	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	13	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8116	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	14	Smoke(Duct P)	PHOTO	ERV-3 CORR 8123	AG BLDG	0	8	None(N)	No	Z1,Z42,Z99	No
1	15	Smoke(Duct P)	PHOTO	ERV-3 CORR 8123	AG BLDG	0	8	None(N)	No	Z1,Z42,Z99	No

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Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 6**

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pre-Alarm Sensitivity	Fire Alarm Sensitivity	Cooperative Detector Mode	Alarm Verification Participation	Control-By-Event	Intelligent Sounder
1	16	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8108	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	17	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8108	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	18	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8110	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	19	Smoke(Duct P)	PHOTO	ERV-4 STORGE 8127	AG BLDG	0	8	None(N)	No	Z1,Z43,Z99	No
1	20	Smoke(Duct P)	PHOTO	ERV-4 STORGE 8127	AG BLDG	0	8	None(N)	No	Z1,Z43,Z99	No
1	21	Smoke(Photo)	PHOTO	STAIR TO ROOF 8131	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	22	Smoke(Photo)	PHOTO	VESTIBULE 8125	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	23	Smoke(Photo)	PHOTO	CORR 8124	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	24	Smoke(Photo)	PHOTO	CORR 8123 BY RM 8110	AG BLDG	0	8	None(N)	No	Z1,Z99	No
1	25	Smoke(Photo)	PHOTO	ELECTRIC RM 8122	AG BLDG	0	8	None(N)	No	Z1,Z99	No

All Current Modules

NFS2-640

Date: 9/11/2013

Site ID: 0 | **Port ID: 0** | **Node Address: 6**

Modules

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	1	Control	CONTROL	RED BEACON	AG BLDG	No	No	No	Z0	N/A
1	2	Control	CONTROL	WATERFLOW BEACON	AG BLDG	No	Yes w/o Resound	No	Z81	N/A
1	4	Fire Control	MONITOR	DRILL SWITCH	AG BLDG	N/A	N/A	N/A	Z97,Z99	N/A
1	5	Pull Station	MANUAL STATION	VESTIBULE 8100	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	6	Relay	RELAY	ERV-1 SHUTDOWN	AG BLDG	No	No	No	Z40	N/A
1	7	Pull Station	MANUAL STATION	DIESEL ENG SHOP 8102	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	8	Pull Station	MANUAL STATION	MACH SHOP NORTH 8101	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	9	Pull Station	MANUAL STATION	MACH SHOP WEST 8101	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	10	Track Superv	MINI/DUAL MONITOR	MAIN SPRNKLR TAMPER	AG BLDG	N/A	N/A	N/A	Z80	N/A
1	11	Waterflow	MINI/DUAL MONITOR	MAIN WATERFLOW	AG BLDG	N/A	N/A	N/A	Z81,Z99	0
1	12	Relay	RELAY	ERV-3 SHUTDOWN	AG BLDG	No	No	No	Z42	N/A
1	14	Track Superv	MINI/DUAL MONITOR	MAIN SPRNKLR TAMPER	AG BLDG	N/A	N/A	N/A	Z80	N/A
1	15	Track Superv	MINI/DUAL MONITOR	MAIN SPRNKLR TAMPER	AG BLDG	N/A	N/A	N/A	Z80	N/A
1	16	Relay	RELAY	ERV-2 SHUTDOWN	AG BLDG	No	No	No	Z41	N/A
1	17	Pull Station	MANUAL STATION	SMALL ENG SHOP 8105	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	18	Pull Station	MANUAL STATION	WELDING SHOP 8106	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A

Site ID: 0 **Port ID: 0** **Node Address: 6**

SLC Loop/ Panel	Device Address/ Point	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Switch Inhibit	Silenceable	Walk Test Participation	Control-By-Event	Waterflow Delay (Sec)
1	19	Pull Station	MANUAL STATION	WELDING SHOP 8106A	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	20	Relay	RELAY	DUST COLL WOOD 8108	AG BLDG	No	No	No	Z48	N/A
1	21	Monitor	MONITOR	DUST COLL WOOD 8108	AG BLDG	N/A	N/A	N/A	Z1,Z99,Z48	N/A
1	22	Pull Station	MANUAL STATION	WOOD SHOP 8101	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	23	Pull Station	MANUAL STATION	VESTIBULE 8125	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	24	Relay	RELAY	ERV-4 SHUTDOWN	AG BLDG	No	No	No	Z43	N/A
1	25	Pull Station	MANUAL STATION	GARAGE 8128	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A
1	26	Pull Station	MANUAL STATION	STAIR TO ROOF 8131	AG BLDG	N/A	N/A	N/A	Z1,Z99	N/A

Bell Circuits

1	Control NAC	N/A	N6B1	AG BUILDING	No	Yes - Fire	No	Z75,ZF8,Z0,Z97	N/A
2	Bell Circuit	N/A	N6B2	AG BUILDING	No	Yes - Fire	No	Z75,ZF8,Z0,Z97	N/A
3	Bell Circuit	N/A	N6B3	AG BUILDING	No	Yes - Fire	No	Z75,ZF8,Z0,Z97	N/A
4	Bell Circuit	N/A	BEACON N6B4	AG BUILDING	No	No	No	Z75,ZF8,Z0	N/A

Section 5

Operation Manuals

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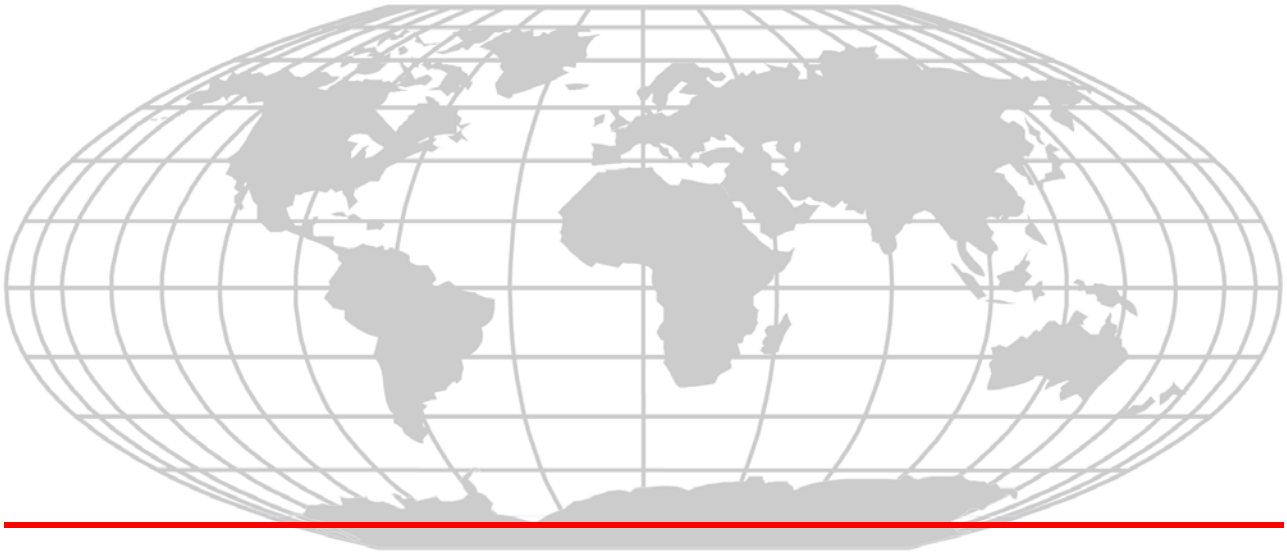

Fire Alarm Control Panel
NFS2-640/E
Operations Manual

Document 52743
1/18/2010 Rev: E
P/N 52743:E ECN 10-249

Fire Alarm System Limitations

While a fire alarm system may lower insurance rates, it is not a substitute for fire insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guides for Proper Use of System Smoke Detectors, which are made available at no charge to all installing dealers. These documents can be found at http://www.systemsensor.com/html/applicat.html. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, or chimneys may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, crippling its ability to report a fire.

Audible warning devices such as bells may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol or medication. Please note that:

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A fire alarm system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers only. Adequate written records of all inspections should be kept.

Limit-C1-2-2007

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49º C/32-120º F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Overtightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Precau-D1-9-2005

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing devices pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when devices are operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his or her own expense.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

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Send email messages to:

FireSystems.TechPubs@honeywell.com

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Section 1: General Information

1.1 UL 864 Compliance

This product has been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition.

1.2 About This Manual

1.2.1 Cautions and Warnings

This manual contains cautions and warnings to alert the reader as follows:

CAUTION:
Information about procedures that could cause programming errors, runtime errors, or equipment damage.

WARNING:
Indicates information about procedures that could cause irreversible damage to the control panel, irreversible loss of programming data or personal injury.

1.2.2 Typographic Conventions

This manual uses the following typographic conventions as listed in below:

When you see	Specifies	Example
text in small caps	the text as it appears in the LCD display or on the control panel	MARCH TIME is a selection that appears in the LCD display; or Press the ENTER key
text in quotes	a reference to a section or a LCD menu screen	“Read Status”; specifies the Read Status section or menu screen
bold text	In body text, a number or character that you enter	Press **1**; means to press the number “1” on the keypad
italic text	a specific document	*NFS2-640 Installation Manual*
a graphic of the key	In a graphic, a key as it appears on the control panel	Press Esc means to press the Escape key

Table 1.1 Typographic Conventions in this Manual

NOTE: In this manual, the term NFS2-640 is used to refer to the NFS2-640 and NFS2-640E unless otherwise noted.

1.2.3 Supplemental Information

The table below provides a list of documents referenced in this manual, as well as documents for selected other compatible devices. The document series chart (DOC-NOT) provides the current document revision. A copy of this document is included in every shipment.

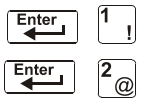
Compatible Conventional Devices (Non-addressable)	**Document Number**
Device Compatibility Document	15378
Fire Alarm Control Panel (FACP) and Main Power Supply Installation	**Document Number**
NFS2-640 Installation, Operations, and Programming Manuals	52741, 52742, 52743
DVC and DAA Digital Audio Series Manual	52411
DAA Digital Audio Amplifier Product Installation Document	52410
SLC Wiring Manual	51253
Note: For individual SLC Devices, refer to the *SLC Wiring Manual*	
Off-line Programming Utility	**Document Number**
VeriFire® Tools CD help file Veri•Fire Medium Systems Help File	VERIFIRE-TCD VERIFIRE-CD
Cabinets & Chassis	**Document Number**
CAB-3/CAB-4 Series Cabinet Installation Document	15330
Battery/Peripherals Enclosure Installation Document	50295
Power Supplies, Auxiliary Power Supplies & Battery Chargers	**Document Number**
ACPS-610/E Instruction Manual	53018
ACPS-2406 Installation Manual	51304
APS-6R Instruction Manual	50702
APS2-6R Instruction Manual	53232
CHG-120 Battery Charger Manual	50641
FCPS-24 Field Charger/Power Supply Manual	50059
FCPS-24S6/8 Field Charger/Power Supply Manual (Sync)	51977
Networking	**Document Number**
Noti•Fire•Net Manual, Network Version 5.0 & Higher	51584
High-Speed Noti•Fire•Net Manual	54013
NCM-W/F Installation Document	51533
HS-NCM High-Speed NCM Document	54014
NCS Network Control Station Manual, Network Version 5.0 & Higher	51658
Onyxworks Workstation	52305, 52306, 52307
System Components	**Document Number**
Annunciator Control System Manual	15842
Annunciator Fixed Module Manual	15048
AFM-16A Annunciator Fixed Module Manual	15207
ACM-8R Annunciator Control Module Manual	15342
FDU-80 Remote Annunciator Manual	51264
LDM Series Lamp Driver Annunciator Manual	15885
NCA-2 Network Control Annunciator Manual	52482
SCS Smoke Control Manual (Smoke and HVAC Control Station)	15712
RPT-485W/RPT-485WF EIA-485 Annunciator Loop Repeater Manual	15640
DPI-232 Direct Panel Interface Manual	51499

Table 1.2 Supplemental Documentation (1 of 2)

TM-4 Installation Document (Reverse Polarity Transmitter)	51490
UDACT Manual (Universal Digital Alarm Communicator/Transmitter)	50050
ACT-2 Installation Document	51118
FireVoice 25/50 & FireVoice 25/50ZS Manual	52290
RM-1 Series Remote Microphone Installation Document	51138
RA400Z Remote LED Annunciator Installation Document	I56-508
XP10-M Installation Document	I56-1803
XP6-C Installation Document	I56-1805
XP6-MA Installation Document	I56-1806
XP6-R Installation Document	I56-1804
XPIQ Audio Transponder Manual	51013
LCD2-80	53242

Table 1.2 Supplemental Documentation (2 of 2)

1.2.4 Shortcuts to Operating Functions



To the left of each program function, you'll find a keypad shortcut, which contains a series of keypad entries required to access the program function. All shortcuts start with the control panel in normal operation.

For example, the keypad shortcut to the left, shows how to enter the Read Status function with the control panel in normal operation, as well as how to exit the function.

1.3 Introduction to the Control Panel

The NFS2-640 is a modular, intelligent Fire Alarm Control Panel (FACP) with features suitable for most applications. Following is a list of operating features available.

- Alarm Verification selection, to reduce unwanted alarms, for intelligent detector points
- Positive Alarm Sequence (PAS) and Presignal per NFPA 72
- Silence Inhibit timer and Auto Silence timer for Notification Appliance Circuits (NACs)
- March time/temporal code for Notification Appliance Circuits (NACs)
- Programmable Signal Silence, System Reset, and Alarm Activate functions through monitor modules
- Automatic time-of-day and day-of-week control functions, with holiday option
- Intelligent Sensing with nine field-adjustable Pre-Alarm levels with programmable Control-By-Event (CBE)
- Operate automatic smoke or heat detector sounder base on action Pre-Alarm level, with general evacuation on alarm level
- Security alarm point option with separate audible signal code
- Centralized voice paging and audible alarm signaling options
- Programmable Control-By-Event control of outputs from individual alarm or supervisory addressable devices
- Networks with other FACPs and equipment for large applications.

Section 2: Use of the Controls

2.1 Introduction

Listing of the controls and indicators and where to find information on their use:

Operating Components	Covered in
Twelve System Status Indicator LEDs	“System Status Indicator LEDs” on page 13
Five Control Keys	“Control Keys” on page 14
Programming Keypad	“Programming Keypad” on page 17

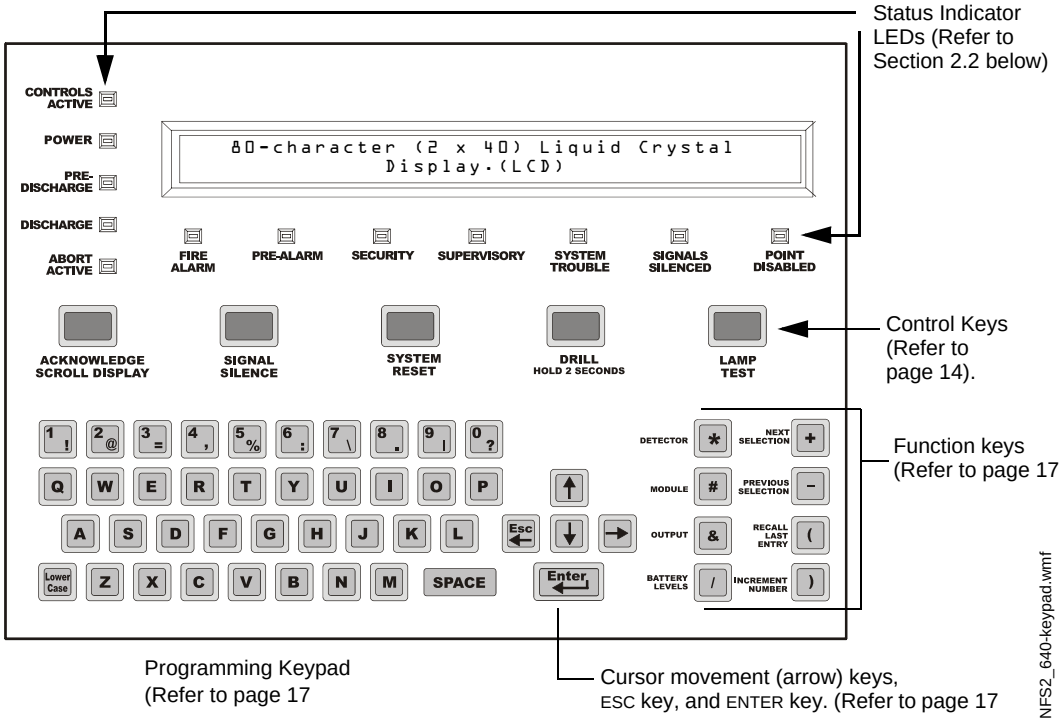


Figure 2.1 NFS2-640 Control Panel Keys and Indicators

2.2 System Status Indicator LEDs

The control panel contains 12 labeled LEDs described in Table 2.1.

Indicator	Color	When Active	To Turn Off
CONTROLS ACTIVE	Green	LIghts when the panel assumes control of local operation as primary display.	Turns off automatically when another panel assumes control of local operation.
POWER	Green	Lights when the proper primary AC power is applied. Remains lit while power is applied.	Always lit with AC power applied.

Table 2.1 Descriptions of System Status Indicator LEDs (1 of 2)

Indicator	Color	When Active	To Turn Off
PRE-DISCHARGE	Red	Lights when any of the releasing zones have been activated, but have not yet discharged a releasing agent.	Turns off automatically when no releasing zones are in the pre-discharge state.
DISCHARGE	Red	Lights when any of the releasing zones are active and in the process of discharging a releasing agent.	Turns off automatically when no releasing zones are discharging a releasing agent.
ABORT ACTIVE	Yellow	Lights when an abort switch has been activated.*	Turns off automatically when an abort switch has been pressed and its timer is still counting down.
FIRE ALARM	Red	Flashes when a non-acknowledged fire alarm exists. Lights steadily after you acknowledge the fire alarm.	Clear the alarm condition and reset the system.
PRE-ALARM	Red	Flashes when a non-acknowledged fire Pre-Alarm exists. Lights steadily after you acknowledge the Pre-Alarm.	Clear the pre-alarm condition. (An Action Pre-Alarm requires a system reset.)
SECURITY	Blue	Flashes when a non-acknowledged Security alarm exists. Lights steadily after you acknowledge the alarm.	Clear the Security alarm condition and reset the system.
SUPERVISORY	Yellow	Flashes when a non-acknowledged Supervisory condition exists. Lights steadily after you acknowledge the event.	Clear the condition (Supervisory inputs require a system reset if they are latching. Refer to Table 3.3 page 26 for latching information.).
SYSTEM TROUBLE	Yellow	Flashes when a non-acknowledged system trouble exists. Lights steadily after you acknowledge the trouble.	Clear the trouble condition.
SIGNALS SILENCED	Yellow	Lights steadily after a fire alarm condition occurs and after you press SIGNAL SILENCE to silence all outputs. Flashes to indicate that some silenceable outputs are on and some are off.	Press SYSTEM RESET. DRILL will also turn off the LED.
POINT DISABLED	Yellow	Lights when one or more system devices are disabled.	Enable the device or remove the disabled device from the system program.

Table 2.1 Descriptions of System Status Indicator LEDs (2 of 2)

* Activation of a Manual Release Switch will override Predischarge Delay and override an active Abort Release Switch, resulting in an immediate agent release.

2.3 Control Keys

The control panel provides five Control Keys as described below:

2.3.1 Acknowledge/Scroll Display

Use the ACKNOWLEDGE/SCROLL DISPLAY key to respond to new alarm or trouble signals. When pressed, the control panel does the following:

- Silences the panel sounder
- Changes all active LED indicators from flashing to steady
- Sends an Acknowledge message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators
- Sends a signal to silence the sounders on the FDU-80 and ACS annunciators

You can also press this key to display multiple alarms or troubles. If more than one alarm or trouble exists, the control panel displays the next alarm or trouble for 3 seconds (or until you press the ACKNOWLEDGE/SCROLL DISPLAY key), then displays the next alarm or trouble.

NOTE: If Local Control is set to "0" (No Control), the FACP will not respond to ACKNOWLEDGE, and the piezo will not sound.

2.3.2 Signal Silence

Use the SIGNAL SILENCE key to silence the panel sounder and turn off all audio and visual devices connected to Notification Appliance Circuits. When pressed, the control panel does the following:

- Turns off the panel sounder
- Turns off all silenceable output circuits
- Lights the SIGNALS SILENCED LED
- Sends a SIGNALS SILENCED message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators

Partial Signal Silence

When some active oututs are silenced and others remain constant, the SIGNALS SILENCED LED will flash.

NOTE: If Local Control is set to "0" (No Control) or "2" (Partial Control), the FACP will not respond to SIGNAL SILENCE.

2.3.3 System Reset

Use the SYSTEM RESET key to reset the control panel. When pressed, the control panel does the following:

- Clears ALL active inputs
- Interrupts resettable power
- Sends a "System Reset" message to the History buffer, and installed printers, CRT-2 terminals, and FDU-80 annunciators
- Decouples from Noti•Fire•Net, if connected, for 60 seconds to allow Cooperative Control By Event (CCBE) to clear.

If any alarm or trouble exists after you press the SYSTEM RESET key, all NACs, control outputs, and panel audio and visual indicators will reactivate.

NOTE: Trouble conditions will not clear and re-report upon reset.

NOTE: If Local Control is set to "0" (No Control), the FACP will not respond to SYSTEM RESET.

2.3.4 Drill

Use the DRILL key to manually activate all silenceable outputs and Notification Appliance Circuits. To prevent accidental activation, you must press the DRILL key for 2 seconds. When pressed, the control panel does the following:

- Turns on all silenceable NACs

- Turns off the SIGNALS SILENCED LED
- Sends a Manual Evacuate message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators

NOTE: If Local Control is set to “0” (No Control) or “2” (Partial Control), the FACP will not respond to DRILL.

2.3.5 Lamp Test

Use the LAMP TEST key to test the control panel LEDs and the panel sounder. When pressed and held, the control panel does the following:

- Lights all control panel LEDs
- Turns on the panel sounder
- Lights all segments of the LCD display. When the LAMP TEST key is held for longer than five seconds, the LCD will display the Software Revisions.

2.4 Programming Keypad

The programming keypad includes:

- Function keys: DETECTOR, MODULE, OUTPUT, BATTERY LEVELS, NEXT SELECTION, PREVIOUS SELECTION, RECALL LAST ENTRY, and INCREMENT NUMBER
- ENTER key
- Cursor movement keys: ESC/LEFT ARROW key, UP key, RIGHT key, DOWN key
- Alphabetic and numeric keys, with LOWER CASE selection key

Shown below is the Programming Keypad, with descriptions for the keys.

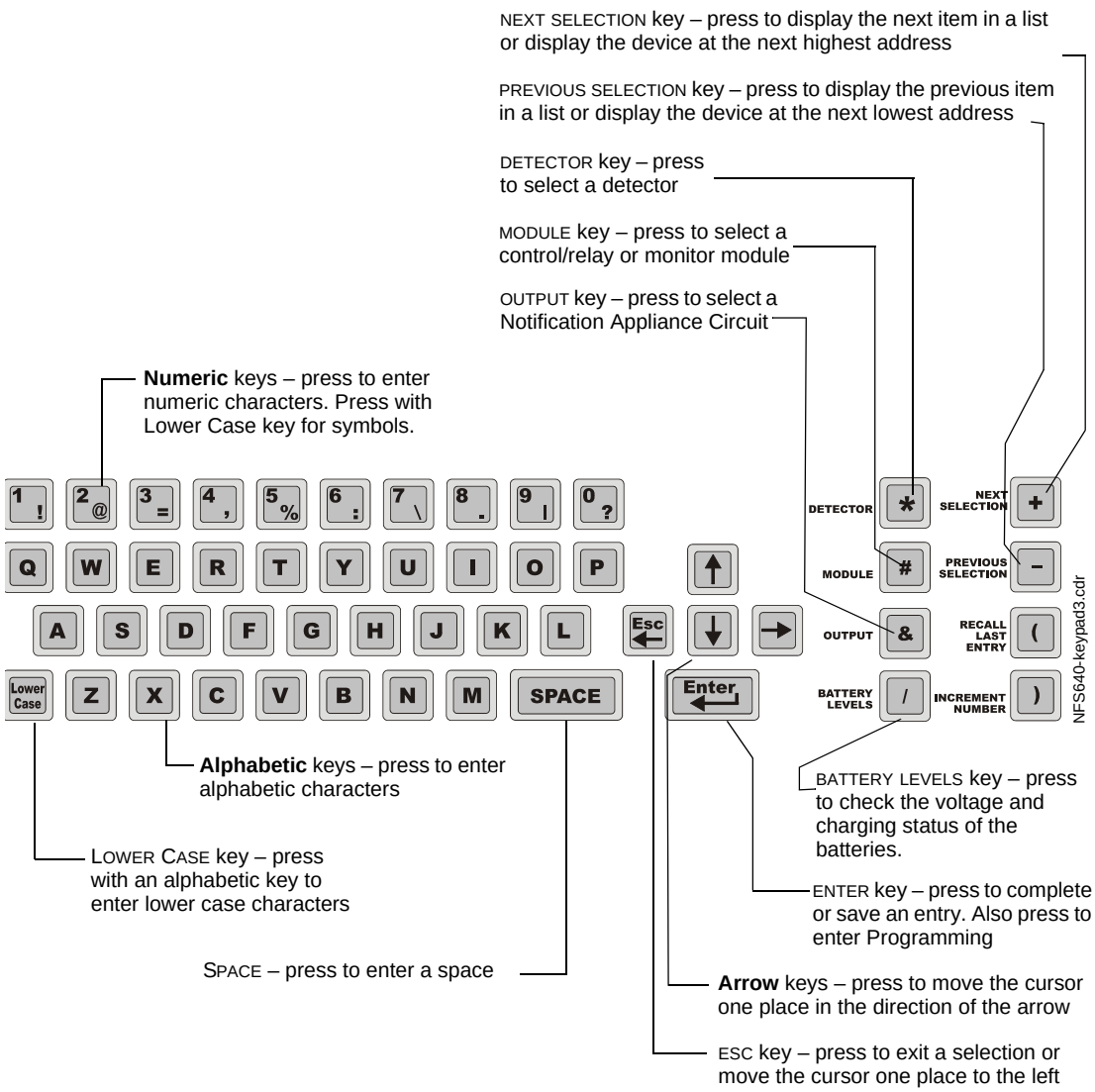


Figure 2.2 Programming Keypad

Section 3: Operation of the Control Panel

3.1 Overview

This section contains instructions for operating the control panel. Listed below are the topics detailed in this section:

Section	Refer to Page
3.2, "Normal Mode of Operation"	page 19
3.3, "Fire Alarm Mode of Operation"	page 20
3.4, "System Trouble Mode of Operation"	page 22
3.5, "Security Alarm Mode of Operation"	page 24
3.6, "Active Supervisory Signal Mode of Operation"	page 25
3.7, "Pre-Alarm Warning Mode of Operation"	page 27
3.8, "Disabled Points Mode of Operation"	page 28
3.9, "Non-Alarm Mode of Operation"	page 29
3.10, "Active Trouble Monitor Mode of Operation"	page 30
3.11, "Output Circuit Trouble Mode of Operation"	page 31
3.12, "Operation of Special System Timers"	page 33
3.13, "Waterflow Circuit Operation"	page 34
3.14, "Style 6 and Style 7 Operation"	page 34

This manual also contains information on operating the control panel in the appendixes, listed as follows:

- Appendix A, “Special Zone Operation”, on page 51
- Appendix B, “Intelligent Detector Functions”, on page 61
- Appendix C, “Remote Terminal Access”, on page 63
- Appendix D, “Point and System Troubles Lists”, on page 71

WARNING:
When used for CO_2 releasing applications, observe proper precautions as stated in NFPA 12. Do not enter the protected space unless physical lockout and other safety procedures are fully completed. Do not use software disable functions in the panel as lockout.

3.2 Normal Mode of Operation

The system operates in Normal mode when no alarms or troubles exist. In Normal mode, the control panel displays a System Normal message as follows

```
SYSTEM NORMAL          01:56P 041508 Sat
```

Figure 3.1 Sample System Normal Message

In Normal mode, the control panel does the following functions at regular intervals:

- Polls all SLC devices and the four NACs to check for valid replies, alarms, troubles, circuit integrity, supervisory signals, etc.
- Checks power supply troubles and batteries at 10-second intervals
- Sends a supervisory query on the optional FDU-80 and verifies proper response
- Refreshes the LCD display and the optional FDU-80 display and updates time
- Scans for any keypad or Control Key entries
- Performs a detector automatic test operation
- Tests system memory
- Monitors for microcontroller failure

3.3 Fire Alarm Mode of Operation

3.3.1 How the Control Panel Indicates a Fire Alarm

When an initiating device (detector or monitor module) activates, the control panel does the following:

- Produces a steady audible tone
- Activates the System Alarm relay (TB4)
- Flashes the FIRE ALARM LED
- Displays a Type Code that indicates the type of device that activated the fire alarm
- Displays ALARM in the status banner on the LCD display, along with information specific to the device, as shown below:

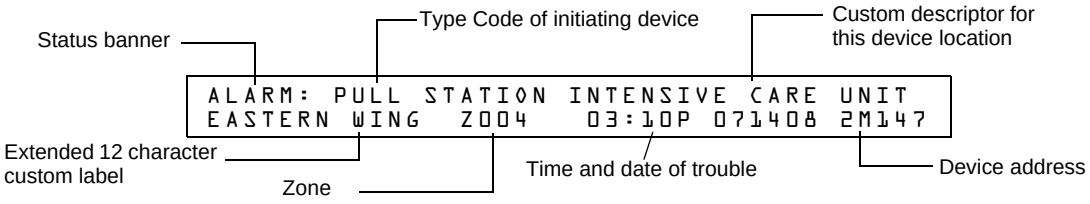


Figure 3.2 Sample Fire Alarm Display

- Sends an Alarm message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
- Latches the control panel in alarm. (You can not return the control panel to normal operation until you correct the alarm condition and reset the control panel)
- Initiates any Control-By-Event actions
- Starts timers (such as Silence Inhibit, Auto Silence)
- Activates the general alarm zone (Z00)

3.3.2 How to Respond to a Fire Alarm

If the control panel indicates a fire alarm, you can do the following:

- To silence only the panel sounder:

  Press the ACKNOWLEDGE/SCROLL DISPLAY key. The local sounder will silence and the FIRE ALARM LED will change from flashing to steady.

  The control panel will send an acknowledge message to the LCD display, history buffer, and installed printers, FDU-80 annunciators, and CRT-2s.

- To silence the panel sounder and any activated outputs that are programmed as silenceable:

  Press the SIGNAL SILENCE key. The FIRE ALARM LED and SIGNALS SILENCED LED light steady.

  The control panel sends an Signal Silenced message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. The figure below shows a sample Alarm Silenced message.

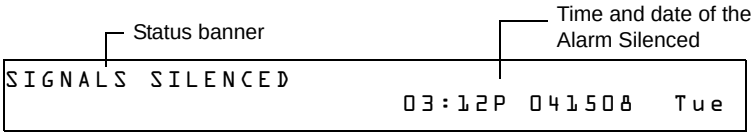


Figure 3.3 Sample Alarm Silenced Message

1. Check the Alarm message for the location and type of trouble.
2. Correct the condition causing the alarm.
3. When you finish correcting the alarm condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the "System Normal" message). The control panel sends a "System Normal" message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.3.3 Interpreting Fire Alarm Type Codes

The Type Code that displays in the Alarm message indicates the function of the point that initiates the fire alarm. For example, a monitor module with a PULL STATION Type Code means that the monitor module connects to a manual pull station. The table below lists the Type Codes that can appear in an alarm message:

Type Code	Latching (Y/N)	Purpose	What it does
Monitor Modules			
Blank	Y	Indicates activation of a device with no description	Lights FIRE ALARM LED and activates CBE
HEAT DETECT	Y	Indicates activation of a conventional heat detector	Lights FIRE ALARM LED and activates CBE
MONITOR	Y	Indicates activation of an alarm-monitoring device	Lights FIRE ALARM LED and activates CBE
PULL STATION	Y	Indicates activation of a manual fire-alarm-activating device, such as a pull station.	Lights FIRE ALARM LED and activates CBE
RF MON MODUL	Y	Indicates activation of a wireless alarm-monitoring device	Lights FIRE ALARM LED and activates CBE
RF PULL STA	Y	Indicates activation of a wireless manual fire-alarm-activating device, such as a pull station	Lights FIRE ALARM LED and activates CBE
SMOKE CONVEN	Y	Indicates activation of a conventional smoke detector attached to an FZM-1	Lights FIRE ALARM LED and activates CBE
SMOKE DETECT	Y	Indicates activation of a conventional smoke detector attached to an FZM-1	Lights FIRE ALARM LED and activates CBE
WATERFLOW	Y	Indicates activation a waterflow alarm switch	Lights FIRE ALARM LED and activates CBE
EVACUATE SW	N	Performs Drill function.	Activates all silenceable outputs
MAN. RELEASE	Y	Indicates activation of a monitor module programmed to a releasing zone to perform a releasing function.	Lights FIRE ALARM LED and activates CBE
MANREL DELAY	Y	Indicates activation of a monitor module programmed for a release output	Lights FIRE ALARM LED and activates CBE
SECOND SHOT	N	Provides second activation of releasing zone after soak timer has expired.	Indicates ACTIVE and activates CBE

Table 3.1 Fire Alarm Type Codes (1 of 2)

Type Code	Latching (Y/N)	Purpose	What it does
Detectors			
SMOKE(ION)	Y	Indicates activation of an ion smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCT I)	Y	Indicates activation of a duct ion smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(PHOTO)	Y	Indicates activation of a photo smoke detector	Lights FIRE ALARM LED and activates CBE
RF_PHOTO	Y	Indicates activation of a wireless photoelectric smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTP)	Y	Indicates activation of a duct photo smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(HARSH)*	Y	Indicates activation of a HARSH smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(LASER)	Y	Indicates activation of a laser smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTL)	Y	Indicates activation of a duct laser smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(BEAM)	Y	Indicates activation of a beam smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTL)	Y	Indicates activation of a duct laser smoke detector	Lights FIRE ALARM LED and activates CBE
AIR REF	Y	Indicates activation of a laser air reference detector.	Lights FIRE ALARM LED and activates CBE
HEAT	Y	Indicates activation of a 190^{o}F intelligent thermal detector	Lights FIRE ALARM LED and activates CBE
HEAT+	Y	Indicates activation of a 190^{o}F adjustable threshold intelligent thermal detector	Lights FIRE ALARM LED and activates CBE
HEAT(ANALOG)	Y	135^{o}F intelligent thermal sensor	Lights FIRE ALARM LED and activates CBE
HEAT (ROR)	Y	15^{o}F per minute rate-of-rise detector	Lights FIRE ALARM LED and activates CBE
SMOKE ACCLIM	Y	Indicates activation of detector (Acclimate Plus™, FSC-851 IntelliQuad), without freeze warning	Lights FIRE ALARM LED and activates CBE
SMOKE (ACCL+)	Y	Indicates activation of detector (Acclimate Plus™, FSC-851 IntelliQuad), with freeze warning	Lights FIRE ALARM LED and activates CBE
SMOKE MULTI*	Y	Multisensor smoke detector	Lights FIRE ALARM LED and activates CBE
*CLIP mode only			

Table 3.1 Fire Alarm Type Codes (2 of 2)

3.4 System Trouble Mode of Operation

3.4.1 How the Control Panel Indicates a System Trouble

The system goes into system trouble when the control panel detects an electrical fault. If no fire alarms exist, the control panel does the following:

- Produces a pulsed audible tone
- Activates the Trouble relay (TB4)
- Flashes the SYSTEM TROUBLE LED
- Displays a Type Code that indicates the type of device with a trouble.
- Displays TROUBL in the status banner on the LCD display as well as the type of trouble and information specific to the device, as shown in Figure 3.4 below.
- Sends a Trouble message to the LCD display, history buffer and installed printers, FDU-80 annunciators, and CRT-2s.

NOTE: If a fire alarm exists when a trouble exists, the SYSTEM TROUBLE LED lights, but the Alarm message appears in the LCD display.

Typical Trouble message that appears on the LCD display:

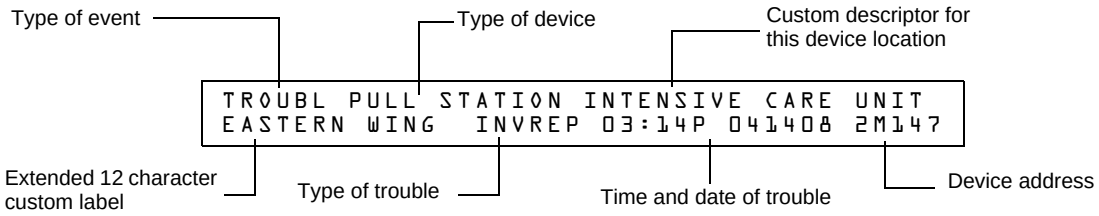


Figure 3.4 Sample Trouble Message

3.4.2 How to Respond to a System Trouble

If the control panel indicates a trouble, you can do the following:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, security and supervisory signals.

NOTE: Pressing the SIGNAL SILENCE key when only troubles exist, gives the same result as pressing the ACKNOWLEDGE/SCROLL DISPLAY key. The SIGNALS SILENCED LED does not light unless an alarm exists in the system.

2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

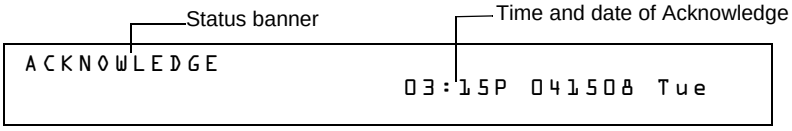


Figure 3.5 Sample Acknowledge Message

3. Check the trouble message for the location and type of trouble.

```
TROUBL MONITOR        MODULE ADDRESS  M021 ZOO OPEN CIRCUIT  08:10A 042108 2M021
TROUBL MONITOR        MODULE ADDRESS  M022 ZOO OPEN CIRCUIT  08:12A 042108 2M022
```

Figure 3.6 Sample Trouble Messages on CRT-2 or Printer

4. Correct the condition causing the trouble. If the trouble clears, the control panel sends a Clear Trouble message to the History buffer and installed printers FDU-80 annunciators, and CRT-2s.

If all troubles clear and no supervisory signals or fire alarms exist, the control panel does the following:

- Returns to Normal operation (indicated by the “System Normal” message)
- Sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Restores troubles automatically - even if troubles are not acknowledged

If multiple trouble conditions exist in the system, the LCD and optional CRT-2 and FDU-80s automatically step through each trouble every 3 seconds in the following order:

1. Alarms, in order of address
2. Supervisory, in order of address
3. Troubles, in order of address

Press the ACKNOWLEDGE/SCROLL DISPLAY key and the display stops on the current trouble event for 1 minute, then begins to automatically step through remaining troubles. To manually step through remaining troubles, press the ACKNOWLEDGE/SCROLL DISPLAY key.

Refer to Appendix D, "Point and System Troubles Lists", on page 71 for explanations of troubles that appear on the display.

3.5 Security Alarm Mode of Operation

3.5.1 How the Control Panel Indicates a Security Alarm

The system goes into Security mode when a monitor module point programmed with a Security Type Code activates. If no fire alarm exists, the control panel does the following:

- Produces a warbling audible tone
- Turns on the Security relay (TB5)
- Flashes the SECURITY LED (blue)
- Displays a Type Code that indicates the type of security alarm being generated
- Displays ACTIVE in the status banner on the control panel, along with information specific to the device
- Sends a Security message to the LCD display, History buffer, and installed printers, FDU-80 annunciators, and CRT-2s
- Sends a Security message to the proprietary receiver via the network, if applicable.

NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Security alarm will resound the panel sounder.

A Typical security message that appears on LCD display:

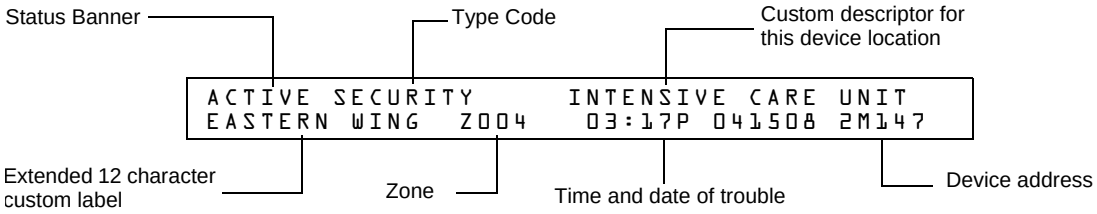


Figure 3.7 Sample Security Alarm Message

3.5.2 How to Respond to a Security Alarm

A Security Type Code latches the control panel. To return the control panel to normal operation, you must correct the condition causing the security condition, then reset the control panel. If the control panel indicates a security alarm, take the following action:

NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Security alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL display key to silence the panel sounder and switch the SECURITY LED from flashing to steady—regardless of the number of troubles, alarms, supervisory, and security signals. The control panel sends a Security message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the Security point.

3. When you finish correcting the Security condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the "System Normal" message). The control panel sends a "System Normal" message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.5.3 Interpreting Security Type Codes

The Type Code that displays in the security alarm message indicates the type of security alarm being generated by the monitor module that initiates the alarm. For example, a monitor module with a Type Code of AREA MONITOR indicates an intruder in a protected premises area. The table below lists the Type Codes that can appear in a security alarm message.

Monitor Modules			
Type Code	**Latching (Y/N)**	**Purpose**	**What it does**
AREA MONITOR	Y	Monitors area surveillance equipment, such as motion detectors	Lights SECURITY LED, activates CBE
SECURITY	Y	Monitors security switches for tampering	Lights SECURITY LED, activates CBE
SYS MONITOR	Y	Monitors critical equipment for security	Lights SECURITY LED, activates CBE

Table 3.2 Security Type Codes

3.6 Active Supervisory Signal Mode of Operation

3.6.1 How the Control Panel Indicates an Active Supervisory

The system goes into Supervisory mode when a monitor module point programmed with a Supervisory type code activates. When a Supervisory point activates, the control panel does the following:

- Produces a warbling audible tone
- Turns on the Supervisory relay (TB5)
- Flashes the SUPERVISORY LED (yellow)
- Displays one of the Type Codes listed in Table 3.3.
- Displays ACTIVE in the status banner on the control panel, along with information specific to the device
- Sends a Supervisory message to the LCD display, History buffer, and installed printers, FDU-80 annunciators, and CRT-2s

NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

A Typical Supervisory message that appears on LCD display:

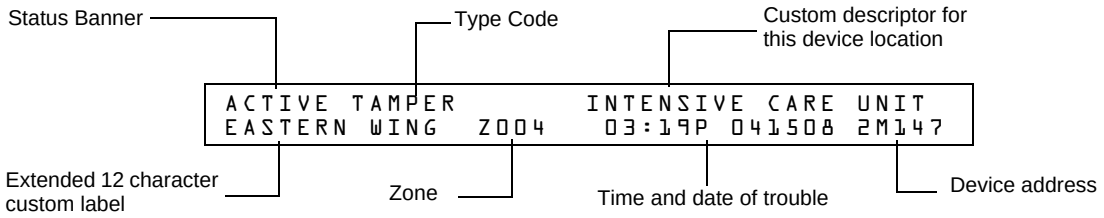


Figure 3.8 Sample Supervisory Signal Message

3.6.2 How to Respond to an Active Supervisory

If a Latching Supervisory Type Code Displays

Some Supervisory Type Codes latch the control panel (Refer to Table 3.3 for a list of these type codes). To return the control panel to normal operation, you must correct the condition causing the supervisory condition, then reset the control panel. Take the following action:

NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SUPERVISORY LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals. The control panel sends a Supervisory message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the supervisory point.
3. When you finish correcting the latching supervisory condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the "System Normal" message). The control panel sends a "System Normal" message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

If Non-latching Type Code Displays

Some Supervisory Type Codes do not latch the control panel. (Refer to Table 3.3 for a list of these type codes). The control panel automatically returns to normal operation, when you correct the condition that activates the supervisory point. If the control panel indicates a non-latching supervisory point, take the following action:

NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SUPERVISORY LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals. The control panel sends a Supervisory message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the supervisory point.
3. The control panel automatically returns to normal operation (indicated by the "System Normal" message) and the control panel sends a "System Normal" message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.6.3 How to Interpret Supervisory Type Codes

The Type Code that displays in the Supervisory message indicates the function of the point that initiates the Supervisory. For example, a monitor module with a TAMPER Type Code means that the monitor module connects to a tamper switch.

Type Codes that can appear in an Supervisory message:

Monitor Modules			
Type Code	**Latching (Y/N)**	**Purpose**	**What it does**
WATERFLOW S	Y	Indicates supervisory condition for activated waterflow switch	Lights SUPERVISORY LED and activates CBE
RF SUPERVSRY	N	Monitors a radio frequency device	Lights SUPERVISORY LED and activates CBE
LATCH SUPERV	Y	Indicates latching supervisory condition	Lights SUPERVISORY LED and activates CBE

Table 3.3 Supervisory Type Codes (1 of 2)

Monitor Modules			
Type Code	**Latching (Y/N)**	**Purpose**	**What it does**
TRACK SUPERV	N	Indicates tracking supervisory condition	Lights SUPERVISORY LED and activates CBE
SPRINKLR SYS	Y	Indicates activation of sprinkler system	Lights SUPERVISORY LED and activates CBE
TAMPER	Y	Indicates activation of tamper switch	Lights SUPERVISORY LED and activates CBE
Detectors			
SUP.T(DUCTI)	N	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(DUCTI)	Y	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPT(DUCTL)	N	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPL(DUCTL)	Y	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(DUCTP)	N	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(DUCTP)	Y	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPT(PHOTO)	N	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(PHOTO)	Y	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(ION)	N	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(ION)	Y	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(LASER)	Y	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(LASER)	N	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE

Table 3.3 Supervisory Type Codes (2 of 2)

3.7 Pre-Alarm Warning Mode of Operation

3.7.1 How the Control Panel Indicates a Pre-Alarm Warning

The control panel activates a Pre-Alarm Warning if a detector exceeds the programmed Pre-Alarm Alert or Action level. When a detector activates a Pre-Alarm, the control panel does the following:

- Pulses the panel sounder
- Flashes the PRE-ALARM LED
- Activates the Pre-Alarm zone (F9)
- Sends a Pre-Alarm message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Displays a PREALARM status banner, the Type Code of the detector, and the Pre-Alarm level (Alert or Action) on the LCD display, along with information specific to the device as shown in Figure 3.9.

3.7.2 How to Respond to a Pre-Alarm Warning

Pre-Alarm Alert and Action Levels

The Pre-Alarm function is a programmable option which determines the system's response to real-time detector sensing values above the programmed setting. Use the Pre-Alarm function if you want to get an early warning of incipient or potential fire conditions. The Pre-Alarm function provides one of two levels of Pre-Alarm as follows:

NOTE: For detailed information on Pre-Alarm applications, refer to the *NFS2-640 Programming Manual*.

- Alert – a non-latching condition that causes a Pre-Alarm when a detector reaches the programmed Pre-Alarm level.
- Action – a latching condition that causes a Pre-Alarm when a detector reaches the programmed Pre-Alarm level.

Responding to a Pre-Alarm Warning

The Pre-Alarm screen display is the same for both alert and action conditions. Following is a sample screen for a Pre-Alarm message.

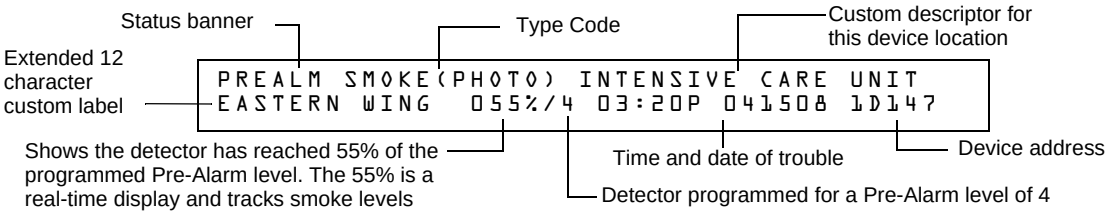


Figure 3.9 Sample of an Alert Pre-Alarm Message

An Alert Pre-Alarm automatically restores to normal when the detector sensitivity, programmable to one of nine settings, drops below the programmed Alert level. Zone F09 automatically clears when no Pre-Alarm conditions exist.

An Action Pre-Alarm latches until you reset the system - even if the detector sensitivity drops below the Action level. Zone F09 activates - but Zone Z00 (general alarm) and the trouble and alarm relays do not activate. The fifth zone programmed, not the first four, in the detector's CBE activates. A subsequent alarm condition for this detector clears the Action indication from the LCD display.

Interpreting Pre-Alarm Type Codes

The Type Code that displays in the Pre-Alarm warning indicates the function of the point that initiates the Pre-Alarm warning. Refer to the Detectors section of Table 3.1 for the Type Codes that can appear in a Pre-Alarm warning, and for descriptions of those Type Codes.

3.8 Disabled Points Mode of Operation

The control panel indicates disabled points by displaying a screen for each disabled detector, monitor module, and control/relay module. Disabled points do not cause an alarm or any Control-by-Event activity. If more than one point is disabled, the control panel displays by priority, mimicking the alarms.

CAUTION:
Disabling a zone disables all input and output devices associated with the zone.

When one or more points are disabled, the control panel does the following:

- Holds all disabled output points in the off-state
- Flashes the SYSTEM TROUBLE LED
- Lights the POINT DISABLED LED
- Sends a Disabled Point message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Displays a message for each disabled point

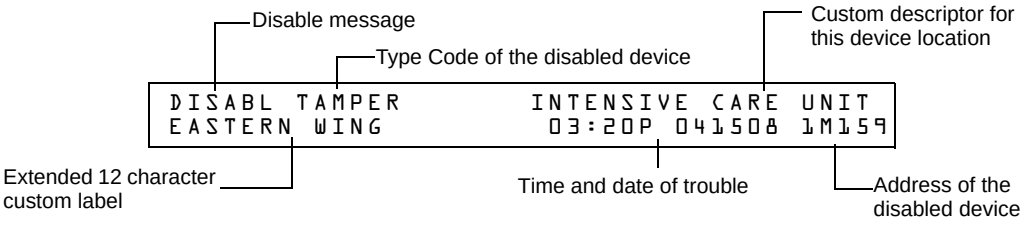


Figure 3.10 Sample Disabled Point Message

3.9 Non-Alarm Mode of Operation

3.9.1 Purpose of Non-Alarm Points

Non-Alarm points are addressable monitor modules programmed with one of the Non-Alarm Type Codes listed in Table 3.4. Non-Alarm points, except Non-Fire, operate like monitored system functions that can produce troubles—but with the differences shown in the following sections.

Monitor Modules			
Type Code	**Latching (Y/N)**	**Purpose**	**What it does**
ACCESS MONTR	N	Used for monitoring building access	Activates CBE
ACK SWITCH	N	Performs Acknowledge function	Silences panel sounder, gives an Acknowledge message on the panel LCD
ALLCALL PAGE	N	Activates all speaker circuits for paging	Activates speakers
DRILL SWITCH	N	Performs Drill function	Activates silenceable outputs
FIRE CONTROL	N	Used for air handler shutdown, intended to override normal operating automatic functions	Activates CBE, does NOT light an indicator at the control panel
NON-FIRE	N	Used for energy management or other non-fire situations. Does not affect operation of the control panel	Activates CBE, does NOT light an indicator at the control panel
PAS INHIBIT	N	Inhibits Positive Alarm Sequence	Inhibits Positive Alarm Sequence
RESET SWITCH	N	Performs Reset function	Resets control panel
SIL SWITCH	N	Performs Signal Silence function	Turns off all activated silenceable outputs
TELE PAGE	N	Performs function of Page Button on FFT-7	Allows remote paging to a fire area
ABORT SWITCH	N	Indicates Active at the panel	Aborts activation of a releasing zone

Table 3.4 Non-Alarm Type Codes

3.9.2 How the Control Panel Indicates an Active Fire Control

Activation of a FIRE CONTROL point causes the control panel to do the following:

- Initiate the monitor module Control-by-Event
- Send a message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Display an ACTIVE status banner and FIRE CONTROL Type Code on the LCD display, along with information specific to the device

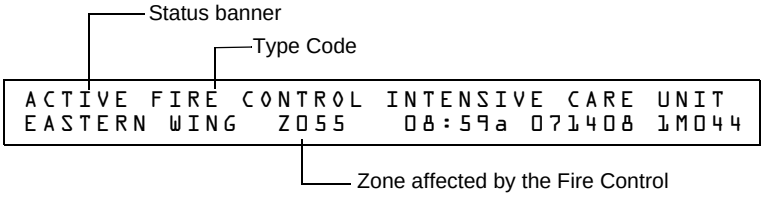


Figure 3.11 Sample Fire Control Point Display

3.9.3 How the Control Panel Indicates an Active Non-Fire Point

Non-Fire point operation does not affect control panel operation, nor does it display a message at the panel LCD. Activation of a Non-Fire point activates CBE—but does not cause any indication on the control panel. For example, you can program a Non-Fire point to turn lights in a zone to a lower setting when activated. In this case, when the point activates the control panel activates the point's CBE to turn the lights down without any audio or visual indication on the control panel.

3.10 Active Trouble Monitor Mode of Operation

3.10.1 How the Control Panel Indicates an Active Trouble Monitor

Trouble Monitor Points are monitor modules programmed with the following Type Codes:

Type Code	Latching (Y/N)	Device Function	Point Function
AUDIO SYSTEM	N	Used for monitoring audio equipment audio amplifiers or associated equipment	Indicates trouble
EQUIP MONITR	N	Used for recording access to monitored equipment	Activates CBE
POWER MONITR	N	Used to monitor remote power supplies or other external equipment	Indicates trouble
TROUBLE MON	N	Used to monitor remote power supplies or other external equipment	Indicates trouble

Table 3.5 Trouble Monitor Type Codes

These types of monitor modules operate like monitored system functions that can produce troubles—but with the following differences:

- The LCD display status banner displays ACTIVE as shown:

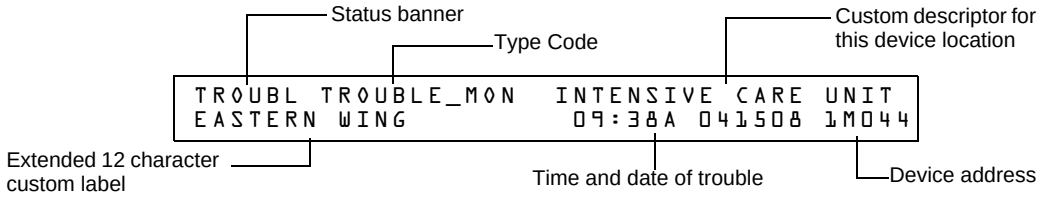


Figure 4 Sample Trouble Monitor Point Message

- The monitor module is non-latching: the module will return to normal when the trouble condition no longer exists.
- The monitor modules activate Control-by-Event
- The panel trouble relay transfers (TB4)

3.10.2 How to Respond to an Active Trouble Monitor

If the control panel indicates an active Trouble Monitor Point, take the following action:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals.
2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. Check the trouble message for the location and type of trouble.
3. Correct the condition causing the trouble.
4. When the trouble condition is corrected, the panel will return to normal operation (indicated by the "System Normal" message).
5. The control panel sends a "System Normal" message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.11 Output Circuit Trouble Mode of Operation

3.11.1 Overview

Output circuits include NACs, Control/Relay Modules, and Transponder Points. This section contains a description of control panel operation for each type of output circuit.

- Four NACs are included on the control panel
- Control/Relay Modules connected to the control panel on an SLC
- Transponder Points: XPC-8 (CLIP only), or XP6-C (CLIP or FlashScan)

Trouble Type Codes for Control Modules and NAC Circuits

Type Code	Silenceable (Y/N)	Configuration	Device Function
CONTROL	N	NAC	Supervised NAC
RELAY	N	FORM-C relay	Relay Output
BELL CIRCUIT	N	NAC	Supervised NAC for notification appliance
STROBE CKT	N	NAC	Supervised NAC for notification appliance
HORN CIRCUIT	N	NAC	Supervised NAC for notification appliance
AUDIBLE CKT	N	NAC	Supervised NAC for notification appliance
SPEAKER	N	NAC	Supervised NAC for speaker circuit
REL END BELL	N	NAC	Supervised NAC for notification appliance
blank	N	NAC	Supervised NAC for undefined device
RELEASE CKT	N	NAC	Directs outputs to perform a releasing function.
REL CKT ULC	N	NAC	Directs outputs to perform a release function as required by ULC.
REL AUDIBLE	N	NAC	NAC, activated upon release
NONRESET CTL*	N	NAC	Relay output, unaffected by “System Reset” command
TELEPHONE	N	NAC	Standard Telephone circuit
REL CODE BELL**	N	NAC	Supervised NAC (NFS2-640 NAC only)
INSTANT RELE	N	NAC	NAC, short = normal; supervised for open circuits and ground faults. Always non-silenceable and switch-inhibited.
ALARMS PEND	N	NAC	Output that will activate upon receipt of an alarm condition, and remain in the alarm state until all alarms have been acknowledged.
CONTROL NAC**	N	NAC	Supervised NAC
GEN ALARM	Y		Control Module, an XPC-8 circuit, or an XP6-C configured as a Municipal Box Transmitter for NFPA 72 Auxiliary Fire Alarm Systems application. This Type ID can also be used for general alarm activation.
GEN SUPERVIS	Y		Control Module, an XPR-8 relay, or an XP6-R activated under any Supervisory condition (includes sprinkler type).
GEN TROUBLE	Y		Control Module, an XPR-8 relay, or an XP6-R activated under any System Trouble condition.
GENERAL PEND	Y		Control Module, an XPC-8 circuit, or an XP6-C that will activate upon receipt of an alarm and/or trouble condition, and remain in the ON state until all events have been ACKNOWLEDGED.
TROUBLE PEND	N		Control Module, an XPC-8 circuit, or an XP6-C that will activate upon receipt of a trouble condition, and remain in the ON state until all troubles have been ACKNOWLEDGED.

* Type Code is Control Module type code only.
** Type Code is NAC Circuit type code only.

Table 3.6 Control Module and NAC Circuit Trouble Type Codes

3.11.2 How the Control Panel Indicates a NAC Trouble

A Trouble occurring on a NAC causes the control panel to do the following:

- Produce a pulsed audible tone
- Flash the SYSTEM TROUBLE LED
- Turn on the Trouble relay (TB4)
- Send a message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Display a TROUBL status banner and a CONTROL Type Code on the LCD display, along with information specific to the device

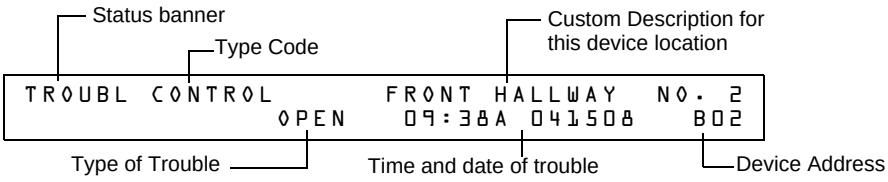


Figure 3.1 Sample of a NAC in Trouble Message

3.11.3 How the Control Panel Indicates a Control/Relay Trouble

A trouble occurring on a control/relay module or control/relay transponder causes the control panel to do the following:

- Produce a pulsed audible tone
- Flash the SYSTEM TROUBLE LED
- Turn on the Trouble relay (TB4)
- Send a message to the LCD display, History buffer and installed printers FDU-80 annunciators, and CRT-2s
- Display a TROUBL status banner and CONTROL Type Code on the LCD display, along with information specific to the device

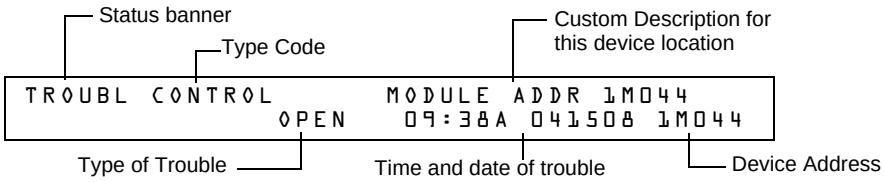


Figure 3.2 Sample of a Control/Relay Module in Trouble Message

3.11.4 How to Respond to a NAC or Control/Relay Trouble

If the control panel indicates an active NAC or Control/Relay Trouble, take the following action:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals.
2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. Check the trouble message for the location and type of trouble.
3. Correct the condition causing the trouble.
4. When the trouble condition is corrected, the panel will return to normal operation (indicated by the “System Normal” message).
5. The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.12 Operation of Special System Timers

3.12.1 What are System Timers?

There are user-programmable time delays for three specific functions: the Auto Silence Timer, the Alarm Verification Timer, and the Silence Inhibit Timer. Figure 3.3 shows a sample System Function Selection screen with system timer settings. For instructions on changing system functions, refer to the *NFS2-640 Programming Manual.*

3.12.2 How to View System Timer Selections

You can use the Read Status Entry option (explained in Chapter 4) to view the current selection for the System Timers. To do so, press the keys shown below in sequence:

Enter, 2 @, 0 ?, Enter, Z, S, 0 ?, Enter

The LCD display shows the current selections for System Functions, which includes the three system timers.
Sample LCD display of a System Function screen with system timer selections:

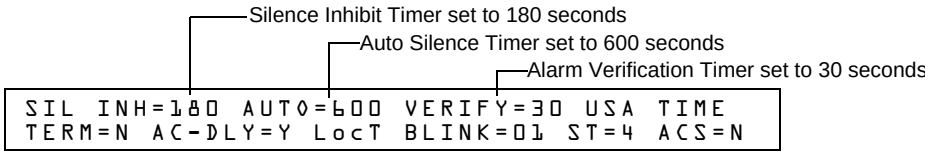


Figure 3.3 Sample System Function Selection Screen

3.12.3 How System Timers Work

The control panel can operate with special system timers: Auto Silence Timer, Alarm Verification Timer and Silence Inhibit Timer.

Auto Silence Timer

A timer that functions like pressing the SIGNAL SILENCE key. When the Auto Silence Timer reaches its programmed value (600-900 seconds), the control panel automatically shuts off all active outputs programmed as silenceable.

Alarm Verification Timer

A timer that directs the control panel to ignore a fire alarm for a smoke detector, programmed for Alarm Verification, while the Alarm Verification Timer is counting. Table 3.7 contains a summary of how the Alarm Verification Timer works.

If	The control panel does this
A second fire alarm occurs while the Alarm Verification Timer is counting	Ignores the Alarm Verification Timer
The Alarm Verification Timer elapses and a fire alarm still exists	Activates the fire alarm
The Alarm Verification Timer expires and a fire alarm no longer exists	Increments the Alarm Verification counter (up to 99) for the device and returns to normal operation

Table 3.7 Alarm Verification Timer Operation

Silence Inhibit Timer

A timer that disables the SIGNAL SILENCE key function and inhibits reset during countdown for the programmed time (0-300 seconds) when a fire alarm occurs. A Silence Inhibit Timer starts at the first fire alarm. Subsequent alarms will not restart the timer until the alarm condition is completely resolved and a panel reset is performed.

3.13 Waterflow Circuit Operation

If a monitor module programmed with a WATERFLOW Type Code initiates a fire alarm, the control panel disables the SIGNAL SILENCE key and the Auto Silence Timer. Refer to the *NFS2-640 Installation Manual* for information on Waterflow circuits.

3.14 Style 6 and Style 7 Operation

Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open or short), it will attempt to drive both ends of the loop, maintaining communication in an unsupervised method. The trouble will display on the panel as a Style 6 trouble until you correct the condition. Style 7 configuration of the SLC requires the use of ISO-X isolator modules.

Section 4: Read Status Operation

4.1 Introduction

This section contains instructions and sample screens to show how to access all Read Status functions and menus. For information on Read Status using a CRT-2 refer to “Remote Terminal Access” on page 63.

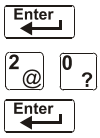
4.2 What is Read Status?

Read Status is a control panel function that lets you view system program information—but not change any programmed settings. The Read Status function lets you do the following:

- View Read Status information without entering a password.
- Enter and operate Read Status functions while the control panel provides full fire protection.
- View Read Status information while a fire alarm or trouble condition exists.

NOTE: If a fire alarm or trouble occurs while you are in Read Status, the control panel automatically exits Read Status operation and displays the new fire alarm or trouble.

4.2.1 Quick Reference Key Sequences



For quick reference, in the left margin next to each Read Status option is a block that shows the key sequence needed to view that option.

For example, the block to the left shows how to display the “Read Point” screen:

4.3 Entering Read Status

To enter Read Status, follow these steps:

1. From the “System Normal” screen, press the ENTER key. The control panel displays the “Entry” screen as shown below;

```
1=PROGRAMMING        2=READ STATUS ENTRY
 (ESCAPE TO ABORT)
```

2. From the “Entry” screen, press the **2** key. The control panel displays the “Read Status Options” screen as shown below:.

```
READ POINT=0 HIST=2 ALARM HIST=4 <ENTER>
PRNT POINT=1 HIST=3 ALARM HIST=5 <ENTER>
```

4.4 Viewing and Printing a Read Status

To view or print Read Status information follow the instructions below:

Option	Press	Lets you
Read Point	**0** key, ENTER key	View information for a detector, module, NAC or zone
Print Points	**1** key, ENTER key	Print information for all installed points in the system
Read History	**2** key, ENTER key	Display the total number of events in the History buffer and step through each event in sequence
Print History	**3** key, ENTER key	Print the contents of the History buffer (up to 800 events)
Read Alarm History	**4** key, ENTER key	View a display of the number of alarms in the Alarm History buffer, then scroll through each alarm event
Print Alarm History	**5** key, ENTER key	Print the contents of the Alarm History buffer (up to 200 events)

NOTE: If attempting to read a point that is not installed, the control panel displays “Not Installed”.

During all Read Status operations (except print operations) the control panel starts a 2-minute timer each time you press a key. If the control panel does not detect a key press for 2 minutes, the control panel exits Read Status and returns to the “System Normal” display.

In Read Status, you can also do the following:

- Press the ESC key to delete the previous entry.
- Press the SYSTEM RESET key to abort Read Status.

4.4.1 How to View Read Status of Devices, Zones, & System Settings

Overview

Read Point options 0, 2, and 4 in the Read Status Screen let you display and view information for devices and zones programmed into the control panel, as well as view system and annunciator settings. This section provides instructions and sample displays so you can view Read Status.

Topics covered in this section:

To view Read Status for	Refer to
Intelligent Detectors	“How to View Read Status for a Detector” on page 37
Control/relay and Monitor modules	“How to View Read Status for a Control/Relay or Monitor Module” on page 38
NAC	“How to View Read Status for a NAC” on page 39
Software Zones (Z01-Z99)	“How to View Read Status for a Software Zone (Z01-Z99)” on page 40
Special Zones (F0-F9)	“How to View Read Status for a Special Zone (F0-F9)” on page 40
Releasing Zones (R0-R9)	“How to View Read Status for a Releasing Zone (R0-R9)” on page 41
System Functions	“How to Read Status for System Functions” on page 41
Annunciator Selections	“How to Read Status for Annunciator Selections” on page 42

How to Display the Total of Installed Devices

Enter 2 @ A

To view the total number of installed devices, enter the "Read Status" screen by pressing the ENTER key, then **2**, then **A**. A screen similar to the following will appear:

```
L1:159Dets, 159Mods  L2:055Dets, 047Mods
Panel Outputs: 64  Bells: 04
SB L1:000          SB L2:000
```

How to Display a Point or Zone for Read Status

Enter 2 @ 0 ? Enter

From the "Read Status" screen, press 0**,** then press the ENTER key to display the "Read Point Entry" screen as shown below:

```
ZONE=Z,AA,E          DETECTOR=*,LDAAA,E
MODULE=#,LMAA,E       OUTPUT CKT=&,AA,E
```

- To view a detector, press DETECTOR *, SLC number, detector SLC address, ENTER.
- To view a zone, press Z, zone number, ENTER.
- To view a monitor or control/relay module, press MODULE #, SLC number, module SLC address, ENTER.
- To view a NAC, press OUTPUT &, two-digit address, (for example 01 for B01, etc.), ENTER.

When you select a device or a zone, the control panel displays information for the device or zone, but does not send this information to the serial ports or the History buffer.

How to View Read Status for a Detector

Enter 2 @ 0 ? Enter *

SLC number followed by three digit address

\+ next device

\- previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for a detector as follows: press DETECTOR, enter the SLC number followed by the three digit address, then press the ENTER key. For example, to read the status of detector 1D002: press DETECTOR, enter the SLC number (1), enter address 002, then press the ENTER key. The control panel now displays information about the detector, as shown in Figure 4.1.

The display and descriptions of the fields are shown below:

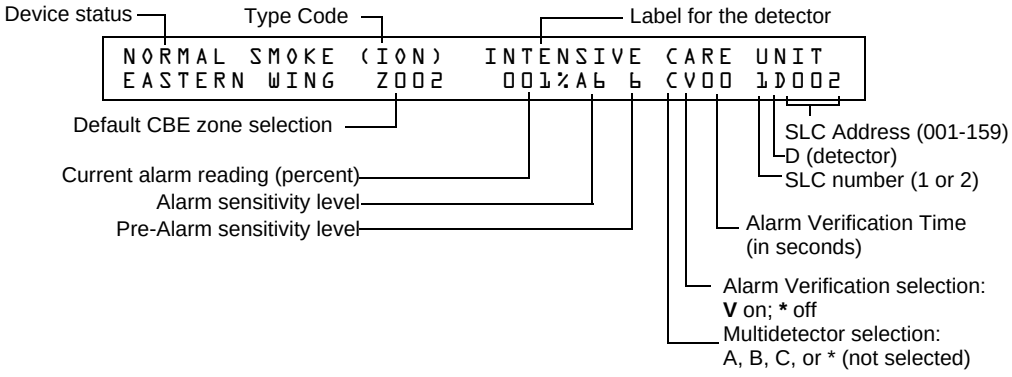


Figure 4.1 Sample Detector Read Status Display

- **Device Status** The status of the detector: Normal, Alarm, or Test.
- **Type Code** The software Type Code that identifies the type of detector. (Refer to "Point Programming" in the *NFS2-640 Programming Manual*.)
- **Default CBE Zone Selection** This is the first zone in the 5 zone CBE list. Defaults are Zone 001 (Heat detectors) Zone 002 (Ion detectors) Zone 003 (Photo detectors) Zone 004 (Laser detectors) Zone 005 (Multisensor). Values may differ depending on point programming.
- **Current alarm reading** (xxx%) The current alarm reading of the detector, as a percentage of the alarm sensitivity setting.
- **Alarm sensitivity level** (Ax) The alarm sensitivity (x=1-9) entered in the Detector Sensitivity Screen.
- **Pre-Alarm sensitivity level** The Pre-Alarm Sensitivity (1-9; 0 = Pre-Alarm not used) entered in the Detector Settings Screen.

NOTE: Refer to "Detector Sensitivity Settings" in the *NFS2-640 Programming Manual* for more information on the Pre-Alarm and Alarm Sensitivity settings

- **Cooperative Multi-Detector selection** A smoke detector programmed to evaluate readings from nearby detectors in making Alarm or Pre-Alarm decisions. Cooperative Multi-Detector sensing also allows the combination of ionization with photoelectric technology in reaching an alarm decision.
  ***** – Multi-not used.
  A – combines the detector's alarm decision with the next SLC address above.
  B – combines the detector's alarm decision with the next SLC address below.
  C – combines the detector's alarm decision with the next SLC address above and the next SLC address below.
- **Alarm Verification** (***** or **V**)
  ***** – Alarm Verification not programmed for this detector.
  V – Alarm Verification enabled.
  Alarm Verification is a user-defined global time function that can reduce the number of nuisance alarms. Refer to page page 33 for more information.
- **Device SLC Address** The SLC address of the detector.

How to View Read Status for a Control/Relay or Monitor Module

Enter 2 @ 0 ? Enter #

SLC address Enter

\+ next device

– previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for a monitor or a control/relay module as follows: press MODULE, enter the SLC address, then press the ENTER key. For example, to read the status of a FCM-1 module 2M147: press MODULE, enter 2 then 147, then press the ENTER key. The control panel now displays information about the module as shown in Figure 4.2.

The display and descriptions of the fields are shown below:

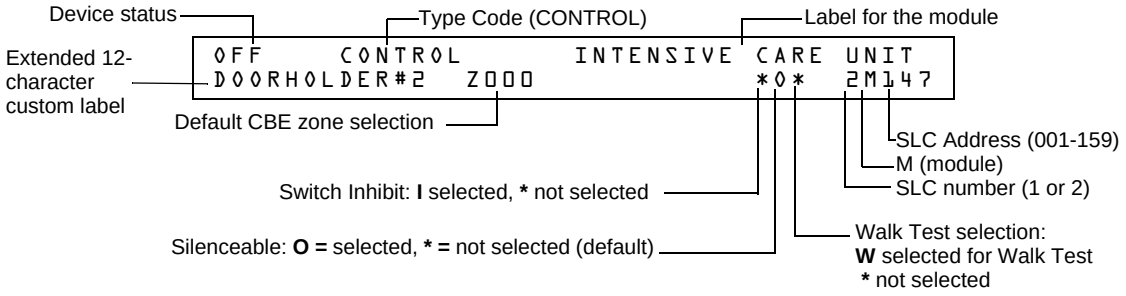


Figure 4.2 Sample Control/Relay or Monitor Module Read Status Display

- **Device Status** The status of the module: control/relay module [On (device active) OFF (device not active] or monitor module (Normal, Alarm, or Test).
- **Type Code** The software Type Code that identifies the type of module. (Refer to "Point Programming" in the *NFS2-640 Programming Manual*.)
- **CBE list** Only the first zone in the device's CBE list will be displayed.
- **Device SLC Address** The SLC address of the module.
- **Switch Inhibit (control/relay module only)** Displays whether the remote ON/OFF capability of the device is inhibited. (I=on; *=off).
- **Silenceable (control/relay module only)** A selection that specifies if the device can be silenced during an alarm by pressing the signal silence key. Possible values are:
  ***** = output nonsilenceable
  F = silenceable, resound by fire alarm
  U = silenceable, resound by supervisory alarm
  B = silenceable, resound by security alarm
  T = silenceable, resound by trouble
  O = silenceable, does not resound

NOTE: If the "Strobe" Type ID is used with System Sensor Strobe synchronization, F, U, B, T, or O will silence the entire circuit, "*" will silence the horn portion only.

Walk Test (control/relay module only) A selection that specifies if the device will activate during a Walk Test.

How to View Read Status for a NAC

Enter 2 @ 0 ? Enter &

Device address Enter

\+ next device

\- previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for a NAC as follows: press OUTPUT, enter the device address, then press the ENTER key. For example, to read the status of NAC 0-2: press OUTPUT, enter 02, then press the ENTER key. The control panel now displays information for a NAC as shown in Figure 4.3.

The display and descriptions of the fields are shown below:

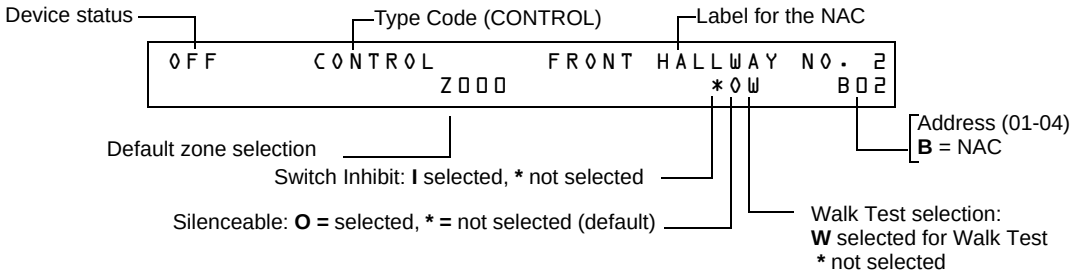


Figure 4.3 Sample NAC Read Status Display

- **Device Status** The status of the device: ON (device active) OFF (device not active).
- **Type Code** The software Type Code that identifies the type of NAC. Refer to "Appendix F - Type Codes" in *NFS2-640 Programming Manual*.
- **CBE List** Only the first zone in the NAC's CBE list will be displayed here.
- **Device Address** The address of the NAC (01-04)
- **Switch Inhibit** A selection for disabling the switch function for the control/relay or transponder output circuit. (**I**=on; *****=off).

- **Silenceable** A selection that specifies if the device can be silenced during an alarm by pressing the SIGNAL SILENCE key. Possible values are:
  ***** = output nonsilenceable
  F = silenceable, resound by fire alarm
  U = silenceable, resound by supervisory alarm
  B = silenceable, resound by security alarm
  T = silenceable, resound by troubl
  O = silenceable, does not resound

NOTE: If the "Strobe" Type ID is used with System Sensor Strobe synchronization, F,U, B, T, or O will silence the entire circuit, "*****" will silence the horn portion only.

- **Walk Test** A selection that specifies if the device will activate during a Walk Test.

How to View Read Status for a Software Zone (Z01-Z99)

Enter 2 @ 0 ? Enter
Z Software Zone Number Enter
\+ next device
\- previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for a Software Zone as follows: press **Z**, enter the zone number (01-99), then press the ENTER key. For example, to read the status of Software Zone 07: press **Z**, enter **07**, then press the ENTER key. The control panel now displays information for a Software Zone as shown below.

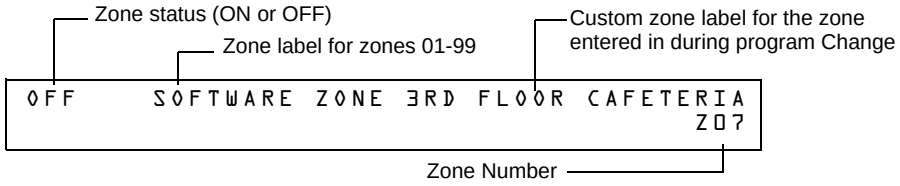


Figure 4.4 Sample Software Zone Read Status Display

How to View Read Status for a Special Zone (F0-F9)

Enter 2 @ 0 ? Enter
Z Special Zone Number Enter
\+ next device
\- previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for a Special Zone as follows: press **Z**, enter the zone number (F0-F9), then press the ENTER key. For example, to read the status of Special Zone F8: press **Z**, enter **F8**, then press the ENTER key. The control panel now displays information for a Special Zone as shown below.

NOTE: The zone label depends on the type of Special Zone. For example, CODING FUNCTION CODE TYPE for F8.

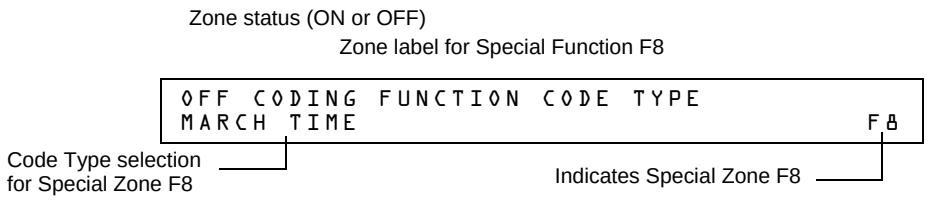


Figure 4.5 Sample Special Zone Read Status Display

How to View Read Status for a Releasing Zone (R0-R9)

Enter, 2 @, 0 ?, Enter

Z Releasing Zone Number Enter

\+ next device

– previous device

From the "Read Status" screen, press **0**, then press the ENTER key. You can now view the Read Status of a Releasing Zone as follows: press **Z**, enter the zone number (R0-R9), then press the ENTER key. For example, to read the status of Releasing Zone R0, enter **Z**, enter R0, then press the ENTER key. The control panel now displays information for a Releasing Zone as shown below.

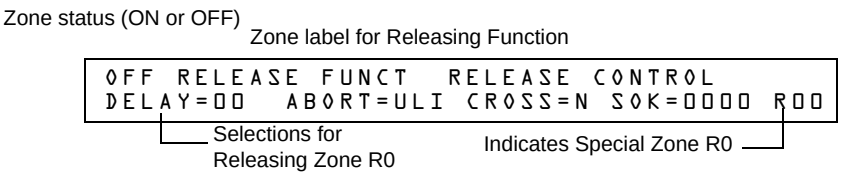


Figure 4.6 Sample Releasing Zone Read Status Display

How to Read Status for System Functions

Enter, 2 @, 0 ?

Enter, Z, S, 0 ?

Enter

The "System Functions" screen specifies global settings for the control panel. From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for System Functions as follows: press Z, enter **S0**, press the ENTER key. Shown below is a sample display and description of items for the Read Status of System Functions:

```
SIL INH=000 AUTO=000 VERIFY=30 USA TIME
TERM=N AC_DLY=Y LocT BLINK=01 ST=4 ACS=N
```

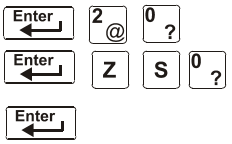
Parameter	Description	Settings
SIL INH=000	Silence Inhibit timer in seconds. Required in Canada and some areas of the USA.	000 = no timer; or the timer duration in seconds up to 300.
AUTO=000	Auto Silence Timer in seconds.	000 = no timer; 600-900 seconds.
VERIFY=30	Alarm Verification Timer	00 = no timer; 00-30 seconds.
USA TIME	Time and date display format	USA TIME or EUR TIME
TERM=N	Terminal supervision	YES – To supervise the wiring of an FDU-80. NO – No FDU-80 supervision.
AC_DLY=N	Delays AC loss reporting	YES - AC loss reporting is delayed for approximately 3 hours. NO - No AC loss delay.
LocT	One of three operating modes of a PC or terminal connected to the control panel (through TB12 PC Terminal)	LocT – terminal connected to control panel and located in the same room as the control panel. LocM – terminal connected to control panel but requires password for operation. RemT – terminal connected through a modem for Read Status operations only.

Table 4.1 System Function Parameters (1 of 2)

Parameter	Description	Settings
BLINK=01	The rate at which intelligent control or monitor modules blink during polling	BLINK=00: No blink BLINK=01: Devices blink on every poll. BLINK=16: Devices blink every 16th poll.
ST=4	NFPA wiring style operation for the SLC	4 – Style 4 SLC or 6 – both Style 6 and Style 7 SLC
ACS=N	Use ACS Selection Groups	N – No annunciator selected or Y – Select and display ACS Selection Groups

Table 4.1 System Function Parameters (2 of 2)

How to Read Status for Annunciator Selections



Annunciator Selection screens specify the information that displays on ACS annunciators. From the "Read Status" screen, press **0**, then press the ENTER key. You can now view Read Status for System Functions as follows: press **Z**, enter **S**, enter annunciation selection number (1-4 for annunciator, 5-8 for other settings), press the ENTER key. Sample LCD displays for the Read Status of Annunciator Selection are shown below:

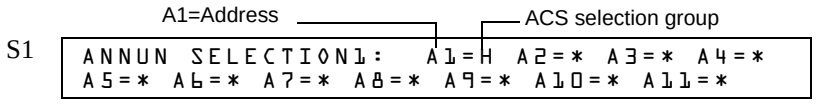


Figure 4.7 Annunciator Selection 1 Screen

To view the next three annunciator selection screens, press the + (NEXT SELECTION) key.

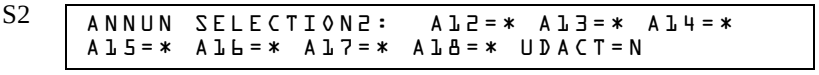


Figure 4.8 Annunciator Selection 2 Screen

If UDACT=N, the control panel displays the Annunciator Selections 3 and 4 screen, addresses A20-A32, as shown below:

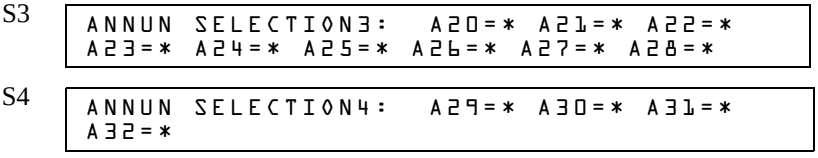


Figure 4.9 Annunciator Selections 3 and 4 Screens

See page 42 and 43 of the NFS2 640 Programming Manual.

Figure 4.10 System Function Selection 5 Screen

See page 44 of the NFS2 640 Programming Manual.

S6

```
FLASHSCAN   L1DET    L1MOD   L2DET    L2MOD
              Y        Y       Y        Y
```

Figure 4.11 System Function Selection 6 Screen

See Page 42 of the NFS2 640 Programming Manual .

S7

```
NODE: 000.XXX, STYLE7:N
THRESHOLD CHANNEL A:H, CHANNEL B:H
```

Figure 4.12 System Function Selection 7 Screen

- SEC_RLY and SUP_RLY (0= turn on by Fire Alarm, 1= turn on by Security, 2= turn on by Supervisory).
- BAT_SIZE (1= battery size is greater than 26 Ahr, 0= less than 26 Ahr).
- C_DRILL (custom drill N= No custom drill, Y= Yes).
- TERM_DATA (0= LCD80 Terminal using 7 bit data, 1= LCD80 Terminal using 8 bit data).
- PRT_BAND (0= 2400, 1= 4800, 2= 9600).

S8

```
SEC_RLY:1 SUP_RLY:2 BAT_SIZE:0 C_DRILL:N
TERM_DATA:0   PRT_BAUD:2   CHARGER:Y
```

Figure 4.13 System Function Selection 8 Screen

NOTE: Please refer to the Verifire Tools help file for information on programming the above screen.

An Annunciator Selection screen shows the information that will display on the ACS annunciators.

1 through 9	Programmable Annunciator #1 through #9
0	Programmable Annunciator #10

A	8 Systems points + Zones 1-56
B	Zones 57-99, 9 F zones, 8 R zones, 4NAC
C	Loop 1, Modules 1-64
D	Loop 2, Modules 1-64
E	Loop 1, Modules 65-128
F	Loop 2, Modules 65-128
G	Loop 1, Modules 129-159 & Loop 2, Modules 129-159
H	Loop 1, Detectors 1-64
I	Loop 2, Detectors 1-64
J	Loop 1, Detectors 65-128
K	Loop 2, Detectors 65-128
L	Loop 1, Detectors 129-159 & Loop 2, Detectors 129-159
M	Not Used
N	8 Systems points + Zones 1-56, used for remote station communicator (TM-4)
O	8 Systems points + Zones 1-56, used for municipal box trip output (TM-4)

Annunciator addresses 1 to 19 can be programmed to any one of the above selections. If there is a UDACT, selections A-M will be sent to Annunciator addresses 20 to 32 respectively.

Table 4.2 ACS Selection Groups (2 of 2)

The table above contains the ACS display selections. Annunciators set to annunciator address 1 to 19 can be programmed to any one of the above selections. If t here is a UDACT, selections A-M will be sent to Annunciator addresses 20 to 32 respectively.

An example of ACS selections in Annuciator Selection Screen 1:

```
ANNUN SELECTION:   A1=H  A2=C  A3=*  A4=*
A5=*   A6=*   A7=*   A8=*   A9=*   A10=*   A11=*
```

Figure 4.14 Annunciator Selection Screen 1 Example

NOTE: An ACS selection marked with an asterisk (*) indicates no annunciator selection.

The figure above shows annunciator selections for addresses A1-A2 (addresses A3-A10, marked with asterisks, are not selected).

- Annunciators set to annunciator address 1 (A1) display the status of detectors 1-64 on SLC 1 (ACS Selection Group H)
- Annunciators set to annunciator address 2 (A2) display the status of intelligent modules 1-64 on SLC-1 (ACS Selection Group C).

How to Read Status for Battery Levels

Pressing the BATTERY LEVEL key on the NFS2-640 keyboard displays information concerning the state of the battery.

A sample LCD display is shown below.

```
Battery Voltage: 27.48V
Charger Current: 00.06A
```

Figure 4.15 Battery Levels

4.4.2 How to View Read Status for Event and Alarm History

Overview

The control panel maintains a History buffer of the last 800 events, each with a time and date stamp. History events include the following:

- All alarms, troubles and operator actions, such as: Acknowledge, System Reset, Signal Silence, Drill, and Walk Test.
- Programming entries (Program Change and Status Change, but not Read Status), along with a number (0-9) indicating the programming submenu (for example, 0=Clear). For an example, see Figure 4.18.

You can view events from the History buffer in two forms: by displaying all events (option 2, HIST=2) or by displaying alarm events only (option 4, ALARM HIST=4).

NOTE: The History buffer contains 800 events total, including the alarm events that display for Alarm history. The control panel generates Alarm history from the alarm events that exist in the 800-event History buffer.

How to View Read Status for Event History

Enter 2 @

2 @ Enter

\+ next event

\- previous event

Option 2 (HIST=**2**) lets you view the total number of events in the History buffer (up to 800 events), then view each event in chronological sequence. From the "Read Status" screen, press **2**, then press the ENTER key to display the "Event History" screen. A sample of the Event History screen is shown below:

```
EVENT HISTORY START
EVENTS IN HISTORY: 550
```

The number of events in the History buffer

Figure 4.16 Sample Event History Display

To display events in the History buffer, do the following:

- Press the NEXT SELECTION key to step through each event from the first entry (oldest event first) in the History buffer, or
- Press the PREVIOUS SELECTION key to step through each event from the most recent entry in the History buffer.

NOTE: The NEXT SELECTION key will show the most recent event first, and then move to its normal function of displaying the oldest events first.

A sample LCD display for a trouble event:

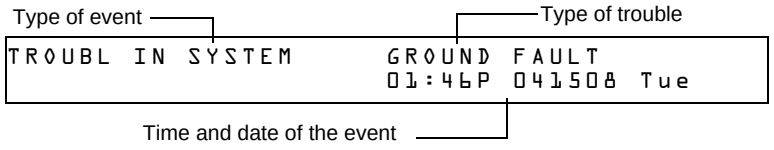


Figure 4.17 Sample Trouble Event Display

A sample LCD display for a Program Change event:

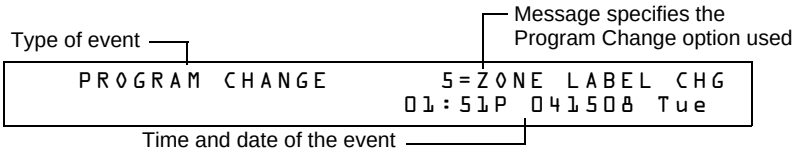


Figure 4.18 Sample Program Change Event Display

How to View Read Status for Alarm History

Enter 2 @

4 , Enter

\+ next event

\- previous event

Option 4 (ALARM HIST=4) lets you view the total number of alarms in the History buffer (up to 200), then view each alarm in chronological sequence. From the "Read Status" screen, press **4**, then press the ENTER key to display the "Event History" screen. A sample Alarm History screen is shown below:

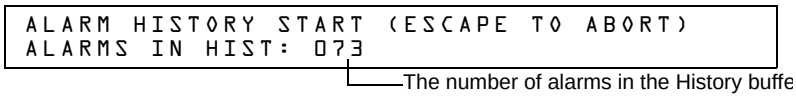


Figure 4.19 Sample Alarm History Display

To display alarms in the buffer, do the following:

- Press the NEXT SELECTION key to step through each alarm from the first entry (oldest alarm first) in the buffer, or
- Press the PREVIOUS SELECTION key to step through each alarm from the most recent entry in the buffer

NOTE: The NEXT SELECTION key will show the most recent event first, and then move to its normal function of displaying the oldest events first.

A sample display for an alarm event:

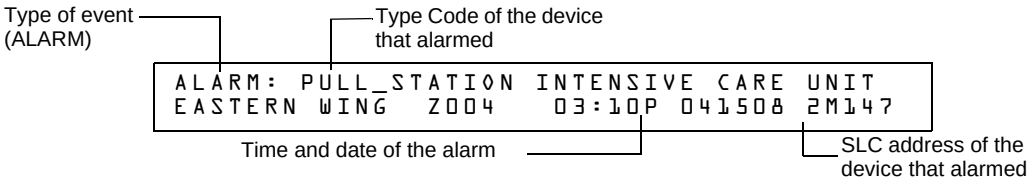


Figure 4.20 Sample Alarm Event Display

4.4.3 How to Print Points, Event and Alarm History

Overview

Read Point options 1, 3, and 5 in the "Read Status" screen let you print points, event history, and alarm history. This section contains instructions for printing, as well as sample point, event history, and alarm history printouts.

NOTE: Before printing, make sure your control panel is connected to a compatible printer and the printer is configured according to the manufacturer's specifications, and that the correct baud rate is selected at the panel.

How to Print Points

Enter 2 @ 1 !
Enter

Option 1 (PRNT POINT=1) lets you print a list of all points programmed into the system. From the "Read Status" screen, press **1**, then press the ENTER key to print a list of installed points. A sample Print Point screen is shown below:

```
                                STATUS PRINT
```

Figure 4.21 Sample Print Point Display

A sample printout of three points using the Print Point option:

```
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D043                Z003  000%AB A **   1D043
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D044                Z003  000%AB A **   1D044
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D045                Z003  000%AB A **   1D045
```

How to Print Event History

Enter 2 @ 3 =
Enter

Option 3 (HIST=3) lets you print a list of all events in the History buffer (up to 800). From the "Read Status" screen, press **3**, then press the ENTER key to print a list of events. A sample History Print screen is shown below:

```
                                HISTORY PRINT
```

Figure 4.22 Sample History Print Screen

A sample printout of three events in history using the History Print option:

```
******************** EVENT HISTORY START*****************************************
 SYSTEM RESET                                                 02:28P 042408 Thu
ALARM: SMOKE (ION)  DETECTOR ADDR 1D075               Z002   02:28P 042408 1D075
ALARM: SMOKE (ION)  DETECTOR ADDR 1D076               Z002   02:28P 042408 1D076
 ACKNOWLEDGE                                                  02:28P 042408 Thu
```

How to Print Alarm History

Enter 2 @ 5 %
Enter

Option 5 (ALARM HIST=5) lets you print a list of alarm events in the History buffer (up to 200). From the "Read Status" screen, press **5**, then press the ENTER key to print a list of alarm events. A sample Print Alarm History screen is shown below:

```
                          ALARM HISTORY PRINT
```

Figure 4.23 Sample Print Alarm History Display

A sample printout of two alarm events in the History buffer using the Print Alarm History option.

```
********************ALARM HISTORY START ***************************************
ALARM: SMOKE (ION)  DETECTOR ADDR 1D075               Z002   02:28P 012208 1D075
ALARM: SMOKE (ION)  DETECTOR ADDR 1D076               Z002   02:28P 012208 1D076
********************      PRINT END      ***************************************
```

4.4.4 How to View and Print Hidden Event and Alarm History

The control panel maintains a copy of the History buffer. For instance, if someone clears the History buffer using Status Change programming option 4, the control panel retains a copy of the History buffer. The copy of the preceding History buffer is called a Hidden History buffer and a copy of the preceding Alarm History is called a Hidden Alarm History buffer.

If you attempt to view or print history and the control panel displays one of the screens shown below you can use the options listed in the table below to view the contents of a Hidden History buffer.

Figure 4.24 History Empty Display

Figure 4.25 Alarm History Empty Display

Options for viewing and printing Hidden History and Hidden Alarm History do not appear in the LCD display when in Read Status. You can view and print the contents of these Hidden History buffers using the options listed in the table below. You read and print Hidden History and Hidden Alarm History the same way you read and print history using the options that appear on the "Read Status" screen. The table also contains references to the sections that contain instructions for reading and printing history.

To	Press	Refer to
Read Hidden Alarm History	Enter, 2 @, 6 :, Enter	"How to View Read Status for Alarm History" on page 46
Print Hidden Alarm History	Enter, 2 @, 7 \, Enter	"How to Print Alarm History" on page 47
Read Hidden History	Enter, 2 @, 8 ., Enter	"How to View Read Status for Event History" on page 45
Print Hidden History	Enter, 2 @, 9 |, Enter	"How to Print Event History" on page 47

Table 4.3 Hidden History Selections

Notes

Appendix A: Special Zone Operation

A.1 Overview

This section contains information for operating the control panel as detailed in the topics listed below:

Section	Special Zone	Refer to Page
A.2, "Releasing Zones (R0-R9)"	R0-R9	page 51
A.3, "Time, Date, and Holiday Functions"	F5, F6, F7	page 54
A.4, "NAC Coding"	F8	page 56
A.5, "Presignal and Positive Alarm Sequence (PAS) Operation"	F0	page 57

A.2 Releasing Zones (R0-R9)

A.2.1 Purpose of Releasing Zones

WARNING: When used for CO_2 releasing applications, observe proper precautions as stated in NFPA 12. Do not enter the protected space unless physical lockout and other safety procedures are fully completed.
Do not use software disable functions in the panel as lockout.

The control panel provides ten Releasing Zones (R0-R9). These are special zones that you can use for up to ten independent releasing operations. This section contains descriptions of each Releasing Function option and an example of how Releasing Zone options work.

For instructions on programming Releasing Functions, refer to the *NFS2-640 Programming Manual.*

Each Releasing Zone includes the following releasing options:

Option	Description
Cross Zone	Cross Zones let you program the control panel to activate a Releasing Zone when two or more detectors are alarmed. Cross Zone selections are: **Y** Two or more detectors are alarmed that are mapped to one of the ten Releasing Zones (R0-R9) **Z** Two or more detectors are alarmed that are mapped to two different Software Zones and mapped to one of the ten Releasing Zones (R0-R9). **H** At least one smoke detector mapped to one of the ten Releasing Zones (R0-R9) is alarmed *and* at least one heat detector mapped to the same Releasing Zone as the smoke detector is alarmed. **N** Cross Zones not used
Delay Timer	Select a 0–60 second delay before activating a zone.
Abort	An Abort Switch Type Code used to abort activation of a zone.
Manual Release	Allows immediate zone activation by overriding the abort function, cross-zone function, and delay timer.
Soak Timer	Automatically shuts off the releasing device after a preprogrammed period of time. Select 0001-9999 seconds for a Soak Timer or 0000 seconds for no Soak Timer.

Table A.1 Releasing Options

A.2.2 How to View Releasing Zone Selections

You can use the Read Status Entry option to view the current selections for a Releasing Zone. For example, to view selections for Releasing Zone R1, press the keys in sequence:

A sample LCD display of a Releasing Function selected for Releasing Zone R1:

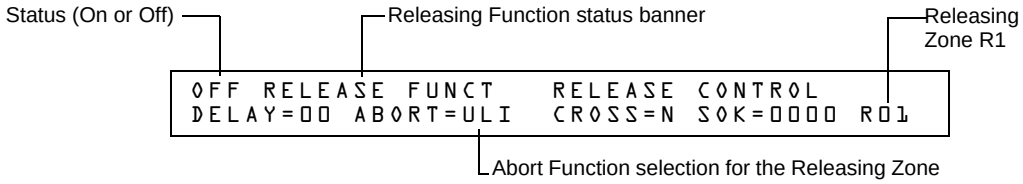
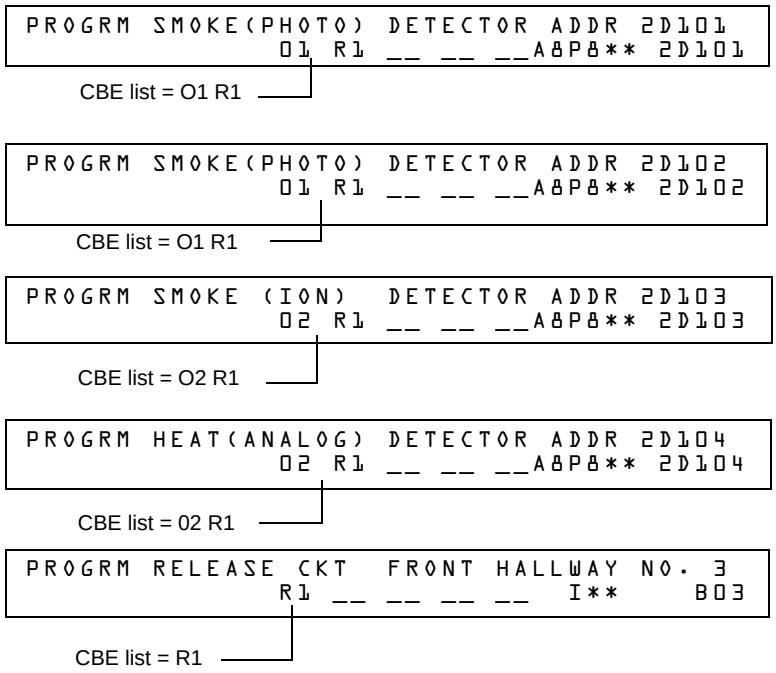


Figure A.1 Sample Read Status for a Releasing Zone

A.2.3 How Releasing Zones Operate

The figure below contains an illustrated example of how Releasing Zones work, using cross zone selections with four detectors and a NAC mapped to Releasing Zone 1 (listed as ZR1 in the CBE list). Table A.2 lists the cross zone selections and the conditions that activate the Releasing Zone:



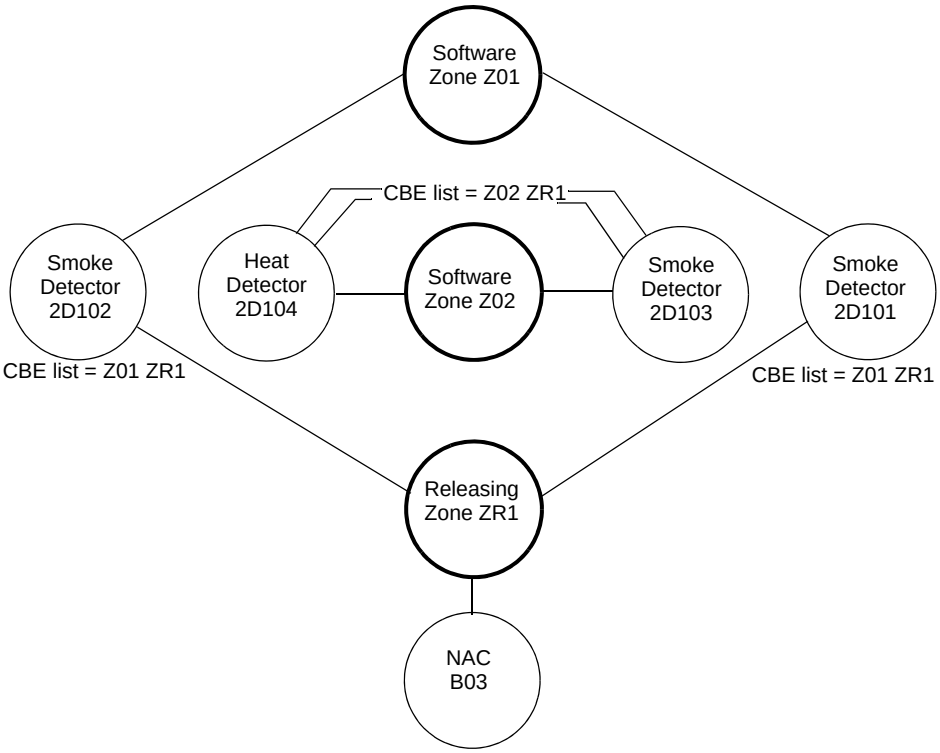


Figure A.2 Illustrated Example of Cross Zone Programming

Listing of each Cross Zone option and the conditions required to activate the Releasing Zone, according to the example shown in Figure A.2.

Cross Zone Selection (Cross=)	**Condition(s) Required to Activate the Releasing zone**
Cross=**N**	An alarm from any detector activates the releasing circuit.
Cross=**Y**	An alarm from any two detectors activates the releasing circuit.
Cross=**Z**	An alarm from two detectors mapped to different Software Zones, but mapped to the same Releasing Zone. • An alarm from 2D101 and 2D103 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D102 and 2D104 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D101 and 2D104 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D102 and 2D103 – detectors mapped to different zones, but both list ZR1 in their CBE.
Cross=**H**	Activation of heat detector 2D104 and one smoke detector (2D101, 2D102, or 2D103).

Table A.2 Example of Cross Zone Selections

A.3 Time, Date, and Holiday Functions

A.3.1 Overview

The control panel includes a real-time clock that displays the time-of-day, the date, and the day-of-week. The clock includes a lithium battery backup. Time displays in a USA format (12-hour time format with month/day/year) or a EUR (European) format as shown below:

```
TROUBL CONTROL        MODULE ADDR 1M159
                 OPEN   03:48P 041508 1M159
```

USA Time and Date format (default)

```
TROUBL CONTROL        MODULE ADDR 1M159
                 OPEN   15:48  140408 1M159
```

EUR Time and date format

Figure A.3 Sample USA and EUR Time/Date Formats

The control panel also provides Time Control zones F5 and F6 for time and date control functions and zone F7 for holiday functions.

A.3.2 How to View Time Control Selections

You can use the Read Status Entry option to view the current selection for the Time function. To do so, press the following keys in sequence:

Enter, 2 @, 0 ?, Enter, Z, F, 5 %, Enter

or

Enter, 2 @, 0 ?, Enter, Z, F, 6 :, Enter

NOTE: For instructions on programming the Time function, refer to the *NFS2-640 Programming Manual.*

The LCD display shows the current selections for the Time Control function. The figure below shows a sample LCD display of a Time Control function:

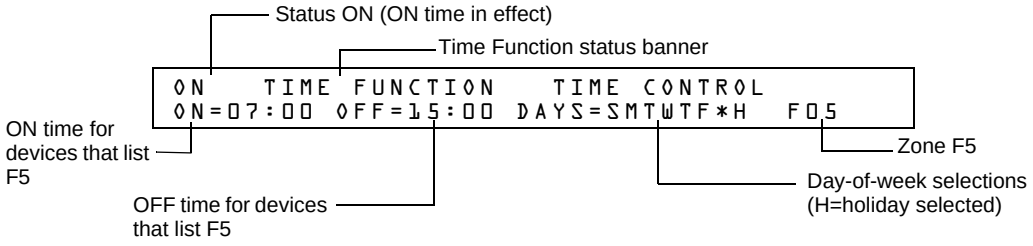


Figure A.4 Sample Read Status for Time Function

A.3.3 How to View Holiday Function Selections

You can use the Read Status Entry option to view the current selection for the Holiday function. To do so, press the following keys in sequence:

NOTE: For instructions on programming the Holiday function, refer to the *NFS2-640 Programming Manual.*

The LCD display in Figure A.5 gives an example of an LCD display of a Holiday function:

Status ON (holiday function not in effect)
Holiday Function status banner

```
ON HOLIDAY FUNCTION 12/15 **/** **/**
**/** **/** **/** **/** **/** **/**
```

Holiday selections (for zone F7)

Figure A.5 Sample Read Status for Holiday Function

A.3.4 How Time Control and Holiday Functions Work

Time and Holiday activation occurs automatically and does not require operator intervention. All outputs with a CBE list containing F5 or F6 activate within the times specified for the days of the week listed in F5 or F6. All smoke detectors with a CBE list containing F5 or F6 switch to their lowest sensitivity (AL:9) within the times specified for the days of the week listed in ZF5 or ZF6. Refer to "Intelligent Sensing Applications" in the *NFS2-640 Programming Manual* for details on setting detector sensitivity.

Time Control is active for all days of the week listed in F5 or F6. Holidays listed in F7 are excluded unless you list Holidays (H) in the day-of-week selection of F5 and F6 (shown in Figure A.4). Enter the time functions in a 24-hour format with the OFF time later than the ON time. After changing programming using Time Control, always reset the control panel.

NOTE: You can turn a NON FIRE control point on and off, by listing zone F5 or F6 in the CBE list of a control/relay module.

You can use Time Control zones F5 and F6 to program non-fire applications such as turning lights on and off, setting a thermostat, and so on. For example, you can program zones F5 and F6 to activate outputs at one time of day and deactivate outputs at later time, on specified days of a week. Table A.3 contains descriptions of additional Time Control applications:

Application	Requirement
Control day and night sensitivity of intelligent, addressable detectors	List zone F5 or F6 in the detector CBE. This automatically sets the detector sensitivity to the minimum setting (AL:9) during the day and automatically returns detector sensitivity to programmed sensitivity during the evening.
Control a specific date of-year	Input up to nine date in the Holiday selection screen for Special Zone F7, then list zone F7 (Holiday) in the CBE of a device.

Table A.3 Time Control Applications

A.4 NAC Coding

A.4.1 Overview of Coding

A Coding selection is the Code Type that pulses when the control panel activates a NAC mapped to Special Zone F8. Special Zone F8 provides seven coding selections (see Table A.4) that you can list in the CBE of a NAC . To use a Code Type, program a NAC to list Zone F8 (reserved for a Code Type) in the NAC CBE list.

NOTE: Control modules (FCM-1, FRM-1) cannot be coded.

The table below contains descriptions of the signals that correspond to each NAC Code Type:

Coding Selection	Signal	Notes
March Time (default)	120 PPM (pulses Per minute)	Default selection for NACs mapped to F8.
Two-Stage	Alert signal (20 PPM) or General Alarm signal (Temporal pattern)	Alert signal – When an alarm occurs and not activated by another zone, the output pulses at 20 PPM. General Alarm signal – If not acknowledged within 5 minutes, the control panel switches from 20 PPM to Temporal pattern.
California	10 sec. On, 5 sec. Off, repeats	n/a
Temporal	0.5 on, 0.5 off, 0.5 on, 0.5 off, 0.5 on, 1.5 off, repeats	Used as a standard general EVAC signal.
Canadian Dual Stage (3 minutes)	Alert signal (20 PPM) Drill Switch activation switches to Temporal pattern	Same as Two-Stage except will only switch to second stage by activation of Drill Switch three minute timer.
Canadian Dual Stage (5 minutes)	Alert signal (20 PPM) Drill Switch activation switches to Temporal pattern	Same as Two-Stage except will only switch to second stage by activation of Drill Switch five minute timer.
System Sensor Strobe		Synchronizes System Sensor ADA horn/strobes.

Table A.4 F8 Code Types and Audio Signals

A.4.2 How to View Coding (F8) Selections

You can use the Read Status Entry option to view the current selection for the Coding function. To do so, press the following keys in sequence:

Enter, 2 @, 0 ?, Enter, Z, F, 8 ., Enter

NOTE: For instructions on programming the Coding function, refer to the *NFS2-640 Programming Manual.*

The LCD display shows the current selections for the Code Type. Figure A.6 shows a sample LCD display of a Code Type selection of March Time:

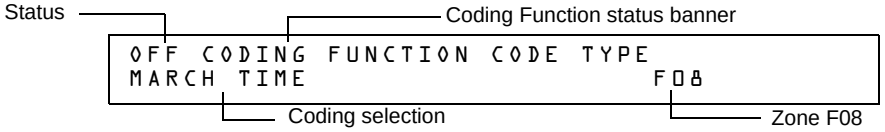


Figure A.6 Sample Read Status for Coding Function

A.4.3 How to Respond to an Alarm with Coding

If an alarm occurs with a Coding selection, the control panel latches the control panel in alarm and pulses outputs mapped to F8 at the pulse specified by the Coding selection (see Table A.4). To silence the outputs, press the SIGNAL SILENCE key.

A.5 Presignal and Positive Alarm Sequence (PAS) Operation

A.5.1 Overview

This section describes the Presignal and PAS selection, and provides instructions on how to do the following:

- View Presignal and PAS selections
- Respond to an alarm with Presignal
- Operate the control panel with a Presignal Delay Timer only
- Operate the control panel with a Presignal Delay Timer and PAS

A.5.2 What is Presignal and PAS?

Presignal is a feature that initially causes alarm signals to only sound in specific areas, monitored by qualified persons. This allows delay of the alarm from 60 to180 seconds after the start of alarm processing. The control panel Presignal feature provides two selections:

NOTE: Presignal differs from the Alarm Verification Timer which does not require human intervention.

- A Presignal Delay Timer (60-180 seconds) that delays activation of all outputs with a CBE that includes Special Zone F0.
- A PAS selection, in addition to the Presignal Delay Timer, that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs activate immediately and automatically.

An illustration of Presignal and PAS timing.

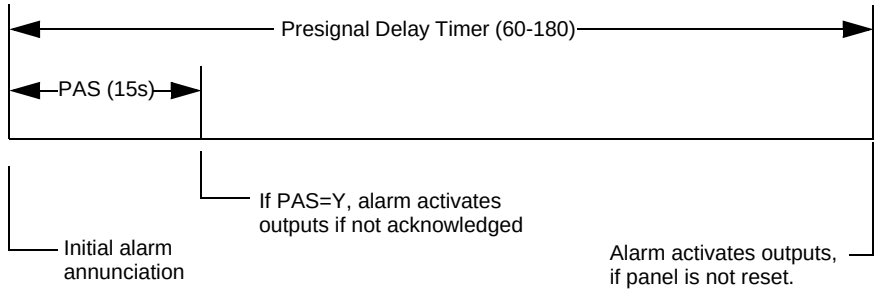


Figure A.7 Presignal and PAS Time

A.5.3 How to View Presignal and PAS Selections

You can use the Read Status Entry option to view the current selection for the Presignal function. To do so, press the keys in sequence:

Enter, 2 @, 0 ?, Enter, Z, F, 0 ?, Enter

NOTE: For instructions on programming the Presignal function, refer to the *NFS2-640 Programming Manual.*

The LCD display shows the current selections for the Presignal function. The figure below shows a sample LCD display of a Presignal function selected for PAS and a Presignal Delay Timer of 60 seconds:

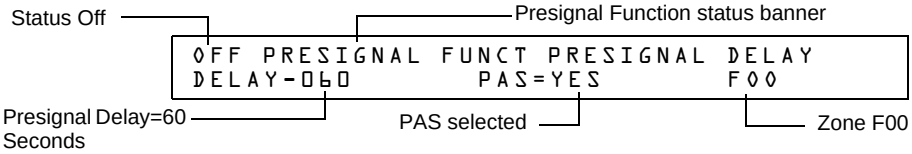


Figure A.8 Sample Read Status for Presignal Function

NOTE: If any monitor modules are programmed with a PAS INHIBIT Type Code and a fire alarm occurs, zone F0 goes false and aborts the Presignal Delay Timer.

A.5.4 How to Respond to an Alarm with Presignal Delay Timer (no PAS)

If an alarm occurs with a Presignal Delay Timer (60-180 seconds), the control panel displays the type of device and the SLC address of the device causing the alarm. If a second alarm occurs during the Presignal Delay Timer, the control panel aborts the Presignal Delay Timer and activates all programmed outputs. A sample Alarm screen for a monitor module is shown below:

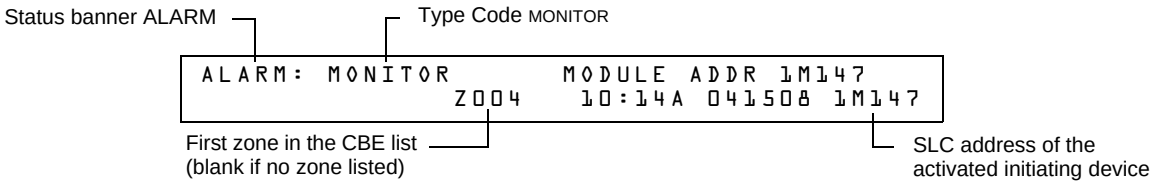


Figure A.9 Sample Alarm Display Screen

The FIRE ALARM LED flashes and the panel sounder pulses a steady tone. The control panel latches until the alarm is corrected and you press the SYSTEM RESET key to reset the control panel. You have the duration of the Presignal Delay Timer (60-180 seconds) to respond to the alarm before the control panel automatically activates all outputs programmed to F0. You can take the following actions:

- To silence the panel sounder and change the FIRE ALARM LED from flashing to steady, press the ACKNOWLEDGE/SCROLL DISPLAY key.
- To abort the Presignal Delay Timer, press the SYSTEM RESET key.
- To manually activate all outputs programmed to F0, press the DRILL key. The Manual Evacuate screen appears, the panel sounder pulses and the FIRE ALARM LED changes from flashing to steady. The Manual Evacuate screen and Alarm screen display alternately at 3-second intervals.

If the Presignal Delay Timer reaches its programmed value, without operator intervention, the control panel activates all outputs programmed to F0.

A.5.5 How to Respond to an Alarm with Presignal Delay Timer (PAS selected)

If an alarm occurs with a Presignal Delay Timer (60-180 seconds) and PAS selected, the control panel displays an Alarm screen that shows the type of device and the SLC address of the device causing the alarm. When an alarm comes from an initiating device with a CBE list that includes F0 (with PAS selected), the control panel delays the following outputs:

- System Alarm relay
- TM-4 Polarity Reversal Alarm output
- TM-4 Municipal Box output

NOTE: These outputs do not delay for Presignal operations without PAS selected.

If a second alarm occurs during the Presignal Delay Timer, the control panel aborts the Presignal Delay Timer and activates all programmed outputs.

A sample Alarm screen for a monitor module:

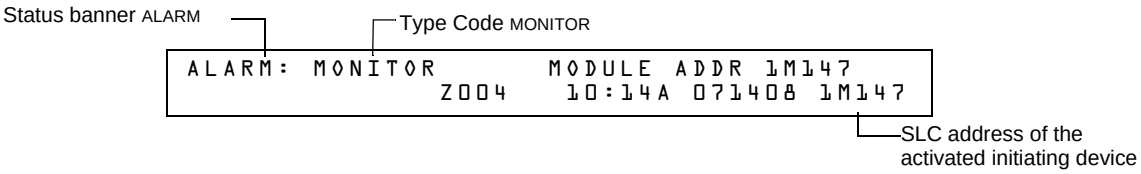


Figure A.10 Sample Alarm Display Screen

The FIRE ALARM LED flashes and the panel sounder pulses a steady tone. The control panel latches until the alarm is corrected and you press the SYSTEM RESET key to reset the control panel. You have 15 seconds to acknowledge the alarm or the control panel automatically activates all outputs programmed to F0. If you acknowledge the alarm within 15 seconds, the control panel increases the delay time to the full Presignal Delay Timer (60-180 seconds). You have the duration of the Presignal Delay Timer to respond to the alarm before the control panel activates all outputs programmed to F0. You can take the following actions:

- To increase the delay to the full programmed Presignal Delay Timer, press the ACKNOWLEDGE/SCROLL DISPLAY key. The panel sounder goes silent and the FIRE ALARM LED changes from flashing to steady.
- To abort the Presignal Delay Timer, press the SYSTEM RESET key.
- To manually activate all outputs programmed to F0, press the DRILL key. The Manual Evacuate screen appears, the panel sounder pulses and the FIRE ALARM LED changes from flashing to steady. The Manual Evacuate screen and Alarm screen display alternately at 3-second intervals.

If the Presignal Delay Timer reaches its programmed value, without operator intervention, the control panel activates all outputs programmed to F0.

Appendix B: Intelligent Detector Functions

NOTE: For instructions on selecting Intelligent Detector Functions, refer to the *NFS2-640 Programming Manual*.

Descriptions for Intelligent Detector Functions

Function	Description
Analog Display	The control panel reads and displays analog information from the 318 analog detectors (159 per SLC). The display shows the sensed air at the detector as a percentage of the alarm threshold for each detector.
Sensitivity Adjust	Nine selections for manually setting intelligent detector alarm levels within the UL range. *If using ionization detectors in duct applications, set Sensitivity Adjust to Level 1.* Refer to the *NFS2-640 Programming Manual* for detector sensitivity information.
Day/Night Sensitivity Operation	You can program the system to automatically force smoke detectors to minimum sensitivity during the day. Refer to “Time, Date, and Holiday Functions” on page 54.
Maintenance Alert	When compensation reaches the limit of the amount of drift compensation that can be safely applied, the control panel reports a trouble condition, according to National Fire Alarm Code standards. This condition also activates if the detector remains at very high or very low measured air levels for an extended time.
Automatic Test Operation	The control panel performs an automatic test of each detector every 256 minutes. Failure to meet the test limits causes an Auto Test Fail trouble.
Type Code Supervision	The control panel monitors hardware device Type Codes for each installed device at regular intervals (an interval can take up to 40 minutes for a full capacity system). If a mismatch of type compared to the program occurs, the control panel generates a point trouble labeled Invalid Type.
LED Control Operation	A global program selection to prevent detector LEDs from blinking as a result of polling during normal operation. A typical application is a sleeping area where a blinking light can distract people. As a standard function, independent of this programming selection, the control panel allows all LEDs to turn on in alarm.
Alarm Verification Timer and Verification Counter Operation	The control panel performs alarm verification on programmed intelligent smoke detectors. The Alarm Verification Timer is a global program selection of 0–60 seconds (ULC installations can not exceed 30 seconds). Each detector includes a Verification Counter, which displays the number of times that a detector entered verification but did not time-out to alarm. The Verification Counter increments to 99 and holds.

Table B.1 Intelligent Detector Functions

Notes

Appendix C: Remote Terminal Access

C.1 General Description

The control panel can communicate with a remote terminal or computer connected to the EIA-232 PC/Terminal port. Refer to the *NFS2-640 Installation Manual* for installation information.

NOTE: See the *NFS2-640 Programming Manual* for instructions on enabling the CRT.

This port may be set up for interactive operation or for monitoring only. Interactive operation requires that all equipment be UL-listed under UL Standard for Safety UL 864 and be installed and set up as directed under Local Terminal Mode (LocT) or Local Monitor Mode (LocM).

ITE (Information Technology Equipment) equipment listed under UL 1950 is allowed for ancillary system monitoring when the system is installed and set up as directed under Remote Terminal Mode (RemT).

C.2 Operating Modes

The control panel provides three operating modes for the CPU EIA-232 PC/Terminal port:

- Local Terminal - LocT
- Local Monitor - LocM
- Remote Monitor - RemM

You select the operating mode during control panel programming (Global System Functions). For more information, refer to the *NFS2-640 Programming Manual*.

The following subsections outline the functions, password requirements, and additional information for each operating mode.

C.2.1 Local Terminal Mode (LocT)

Functions, passwords, and special requirements of Local Terminal Mode (LocT) are:

Functions:	Read Status, Alter Status, and Control Functions (Table C.1).
Passwords:	User-defined password for Alter Status functions.
Requirements:	The terminal must be mounted in a UL 864 listed enclosure or positioned to provide equivalent protection against unauthorized use.

Functions available with the Local Terminal Mode:

Function	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer. • Step through Alarm History • Display the entire Alarm History

Table C.1 Local Terminal Mode Functions (1 of 2)

Function	Lets you...
Alter Status	• Disable/Enable an individual point. • Change the sensitivity of a detector. • Clear the verification counter of all detectors. • Clear the entire History buffer. • Set the Intelligent Sensing alert and action levels.
Control Functions	• Acknowledge. • Signal Silence. • System Reset. • Drill.

Table C.1 Local Terminal Mode Functions (2 of 2)

C.2.2 Local Monitor Mode (LocM)

Functions, passwords, and special requirements of Local Monitor Mode (LocM) are:

Functions: Read Status, Alter Status, and Control Functions (Table C.2).

Passwords: User-defined password for Alter Status and Control functions.

Requirements: Password security feature for Control Functions eliminates the need for mounting the CRT-2 in an enclosure.

Functions available with the Local Monitor Mode:

Function	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer. • Step through Alarm History • Display the entire Alarm History
Alter Status	• Disable/Enable an individual point. • Change the sensitivity of a detector. • Clear the verification counter of all detectors. • Clear the entire History buffer. • Set the Intelligent Sensing alert and action levels.
Control Functions	• Acknowledge • Signal Silence • System Reset • Drill

Table C.2 Local Monitor Mode Functions

C.2.3 Remote Terminal Mode (RemT)

Functions, passwords, and special requirements of Remote Terminal Mode (RemT) are:

Functions: Read Status only. See Table C.3.

Passwords: None

Requirements: Use with UL ITE-listed terminals, including personal computers with the VeriFire™ Tools or terminal emulation software. Intended for terminals connected through modems, including FSK modems connected through a public switched telephone network.

Functions available with the Remote Terminal Mode:

Functions	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer. • Step through Alarm History • Display the entire Alarm History
Alter Status	• N/A
Control Functions	• N/A

Table C.3 Remote Terminal Mode Functions

C.3 Using the CRT-2 for Read Status

C.3.1 Overview

This section shows how to perform Read Status functions from a CRT-2.

NOTE: See the *NFS2-640 Programming Manual* for instructions on enabling the CRT port.

For more information see the “Read Status” section of this manual.

Function	Lets you...
Read Point	Read the status of any point in the system (detectors, modules, software zones, and system parameters).
Alm/Tbl Status	Display a list of all devices in the system that are in Alarm or trouble.
Read All Points	Display a list of all points programmed in the system. This list will display the status of all addressable detectors, modules, system parameters and software zones.
History Step	Step through the History buffer one event at a time.
History All	Send the entire History buffer to the CRT, from the most recent event to the oldest event.
Alarm History Step	Step through Alarm History one alarm at a time.
Alarm History All	Display a history list of all alarms.

Table C.4 Read Status Functions

C.3.2 Accessing Read Status Options

Access the Read Status function from the CRT-2 by following these steps.

1. Turn on the CRT-2, which is connected to the control panel.
2. Press the Read Status function key. The control panel displays the “Read Status” menu options:

```
Rd Point=1, Rd Alm/Tbl=2, All Points=3, Hist:Step=4/All=5, Ala-Hist:Step=6/All=7
```

From the Read Status menu, you can select options 1-7.

C.3.3 Read Point

From the Read Status menu, select option **1** - Read Point. The CRT-2 displays the following:

Press <**1**> <**ENTER**>

```
Type (n)D(nnn), (n)M(nnn), Z(nn), F(n),, R(n), Ex, Lx or S(n) then hit Enter
```

Address)01-159)
SLC number
Number

Enter the following:

1. Enter the SLC number “1” or “2”.

NOTE: Press **F5** to scroll forward through a list of devices. Press **F6** to scroll back through a list of devices.

2. Enter the first letter of the device, using upper case letters.
   - Detector = “D”
   - Module = “M”
   - Zone = “Z”
   - Special Function = “F”
   - Releasing Zone = “R”
   - E Zone = “E”
   - L Zone = “L”
   - System Parameter = “S”
3. Enter the address or number of the device.
4. Press “ENTER”.

Example Read points for detectors 1D001 and 1D002 on SLC 1:

Press <**1**> <**D**> <**0**> <**0**> <**1**> <**ENTER**>

```
NORMAL SMOKE(PHOTO) INTENSIVE CARE UNIT NURSE LOUNGE  ZONE   020%AL L CV30 1D001
```

Press <**NEXT**>

```
NORMAL SMOKE (ION)  DETECTOR ADDR 1D002              ZONE   000%AL L **   1D002
```

C.3.4 Display Devices in Alarm or Trouble

From the “Read Status” menu, select option **2** - Read Alarms/Troubles. The CRT-2 will display the alarm and trouble history.

The semicolon, a control character in networking applications, separates the hour and minute of events displayed from history. If events display as they occur, a colon separates the hour and minute.

Press <**2**> <**ENTER**>

Semicolon

```
TROUBL SMOKE(PHOTO) DETECTOR ADDR 1D003          INVREP 01;09P 041608 1D003
TROUBL SMOKE (ION)  DETECTOR ADDR 1D004          INVREP 01;09P 041608 1D004
TROUBL HEAT(FIXED)  DETECTOR ADDR 1D006          INVREP 01;09P 041608 1D006
TROUBL MONITOR      MODULE ADDR 1M041            INVREP 01;09P 041608 1M041
TROUBL IN SYSTEM     GROUND FAULT                       01;09P 041608 Wed
TROUBL IN SYSTEM     BATTERY                            01;09P 041608 Wed
```

C.3.5 Display All Programmed Points

From the “Read Status” menu, select option **3** - All Points. This option lets you view the status of all addressable detectors, modules, system parameters, and software zones.

```
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D002          Z003   000%A8 8 **   1D002
NORMAL SMOKE (ION)  DETECTOR ADDR 1D003          Z002   020%A6 6 **   1D003
NORMAL HEAT(FIXED)  DETECTOR ADDR 1D006          Z001   050%      *   1D006
NORMAL SMOKE(LASER) DETECTOR ADDR 1D099          Z004   000%A6 6 *VDD 1D099
OFF    RELEASE CKT  MODULE ADDR 1M001            ZR00            I**  1M001
NORMAL MONITOR      MODULE ADDR 1M001            ZR00            I**  1M001
OFF    RELAY        MODULE ADDR 1M033            Z000            *FW  1M033
OFF    SOFTWARE ZONE Zone 01                                             Z01
```

C.3.6 Step-through History

From the “Read Status” menu, select option **4** - Step-through History. This option lets you step through all history events one at a time.

C.3.7 View All History

From the “Read Status” menu, select option **5** - History ALL. The entire history of events will display on the screen.

C.3.8 Step-through Alarm History

From the “Read Status” menu, select option **6** - Step-through Alarm History. This option lets you step through the panel’s alarm history one event at a time.

C.3.9 View All Alarm History

From the “Read Status” menu, select option **7** - Alarm History All. The entire history of alarm events will display on the screen, from most recent to oldest.

Press <**6**> <**ENTER**>

```
************************  EVENT HISTORY START ************************************
ALARM: MAN_RELEASE MODULE ADDR 1M065                    10:21A 041508 1M065
ALARM: MAN_RELEASE MODULE ADDR 1M065                    10:19A 041508 1M065
ALARM: MAN_RELEASE MODULE ADDR 1M065                    03:20P 041408 1M065
ALARM: SMOKE (ION) DETECTOR ADDR 1D129                  03:20P 041408 1M065
```

Step through the Alarm History buffer one event at a time by pressing the Next **F5** or Prior **F6** function keys.

C.4 Using the CRT-2 for Alter Status

C.4.1 Overview

This section shows how to Alter Status functions from a CRT-2.

NOTE: The panel must be in Local Terminal Mode (LocT) or Local Monitor Mode (LocM).

NOTE: See the *NFS2-640 Programming Manual* for instructions on enabling the CRT port.

Function	Lets you...
Disable	Enable or disable detectors or modules.
Alarm/Pre-Alarm	Change the Alarm and Pre-Alarm levels of any addressable detector in the system.
Clear Verification	Clear the verification counter for all the addressable detectors in the system.
Clear History	Clear the contents of the History buffer.
Set Action/Alert	Set the Pre-Alarm for Alert or Action.

Table C.5 Alter Status Functions

C.4.2 Accessing Alter Status Options

Access **Alter Status** function from the CRT-2 by following these steps.

1. Turn on the CRT-2 connected to the control panel.
2. Press the Alter Status function key. The control panel displays the Password screen.

Press <**ALTER STATUS**>

```
Enter Status CHange Password or Escape to Abort
```

3. Enter the Status Change Password. The factory default Status Change Password is 11111.The password does not display on the CRT-2. Five asterisks will appear in place of the password.

Press <**1**><**1**><**1**><**1**><**1**><**ENTER**>

```
*****
```

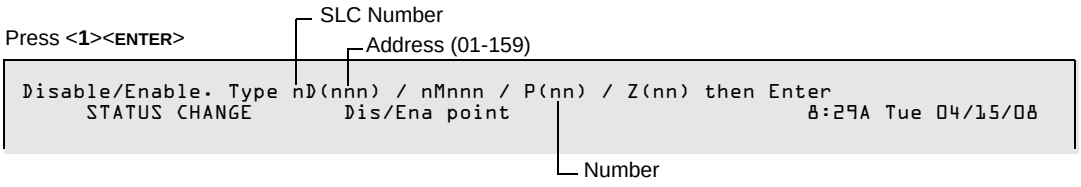
The Alter Status Options menu appears.

```
1=Disable 2=Alarm/Prealarm 3=Clear Verification 4=Clear History 5=Alert/Action
```

From the Alter Status Options menu, you can select **1**-**5**.

C.4.3 Enable or Disable Detectors, Modules or Zones

From the "Alter Status" menu select option **1** - Disable. Disable lets you enable or disable detectors, modules, or zones.



Enter the following:

1. Enter the SLC loop number **1** or **2**.
2. Enter the first letter to read one of the following, using upper case letters:
3. Detector = **D**
   Module = **M**
   NAC = **P**
   Zone - **Z**
4. Enter the address or number of the device.
5. Press ENTER and a display similar to the following will appear.

EXAMPLE Disable Detector address 101 on SLC1:

Press <**1**><**D**><**1**><**0**><**1**><**ENTER**>

```
D101 Now Enabled, Enter E(Enable) / D(Disable) or Esc. to Abort
```

Press **D** to Disable (**E** to Enable); then press ENTER.

Press <**D**><**ENTER**>

```
Device now disabled
TROUBL SMOKE(PHOTO) DETECTOR ADDR 101 ZO3 DEVICE DISABLED 08:29A Tue 04/15/08 D101
```

C.4.4 Change Alarm and Pre-Alarm Levels

This option lets you change the Alarm and Pre-alarm levels of any addressable detector in the system. Follow these steps.

1. From the "Alter Status" menu select option **2** - Alarm/Pre-alarm.

Press <**2**><**ENTER**>

```
Det. Alarm/Prealarm level, type address D(
TROUBL SMOKE(PHOTO) DETECTOR ADDR 101 ZO3 DEVICE DISABLED 08:29A Tue 04/15/08 D101
```

2. Enter the address of the detector you wish to change. For example, change alarm and pre-alarm levels for detector 102 on SLC 1 to Alarm Level 4 & Pre-alarm Level 2.

Press <**1**><**D**><**1**><**0**><**2**><**ENTER**><**A**><**5**><**P**><**2**><**ENTER**>

```
STATUS CHANGE   Alarm/Prealarm level                  08:29A Tue 04/15/08
D102 sens. at level 5, Prealarm at level 3, Enter AxPx to change, Esc. to Abort
D102 now set at new Alarm level 5 and new Pre-alarm level 2
```

C.4.5 Clear Verification Counter

Clear verification lets you clear the verification counter for all the addressable detectors in the system.

Press <**3**><**ENTER**>

```
STATUS CHANGE   Clear verify count                    08:29A Tue 04/15/08
```

C.4.6 Clear the Entire History Buffer

Clear History lets you clear the entire History buffer.

Press <**4**><**ENTER**>

```
***************History Clear*************************
```

C.4.7 Set the Pre-Alarm for Alert or Action

Set Action/Alert lets you set the Pre-alarm for Alert or Action. For example, change Pre-alarm from “Alert” to “Action” as follows:

Press <**5**><**ENTER**>

```
Set Pre-alarm Alert (NO)/Action(YES). Type N or Y then Enter
     STATUS CHANGE   Change Alert/Action                  08:29A Tue 04/15/08
```

Press <**Y**><**ENTER**>

```
Pre-alarm now set for ACTION
```

Appendix D: Point and System Troubles Lists

There are a variety of point or system trouble types that may appear in a trouble message. The tables below give lists of the troubles and indications of their cause.

D.1 Point (Device) Troubles

A message from the "Trouble Type" column in the following table will appear in the upper right corner of the panel display when a point (device) trouble occurs. Use this table to help determine what the trouble is.

POINT TROUBLES		
TROUBLE TYPE	**TROUBLE DESCRIPTION**	**ACTION**
AC FAILURE	The auxiliary power supply has lost AC power.	Determine whether there is an AC power loss or whether the power supply and wiring is correct.
ADRFLT	.Detector and new sounder base address doesn't match. Or the ACPS address is incorrect.	Readdress the incorrect device.
ALIGN	A beam detector is in configuration mode.	No action is necessary, as the trouble will clear when the configuration is complete. However, the detector will not detect a fire while this trouble exists.
BLOCK	Something has come between the detector's beam and its reflector.	Investigate and clear the blockage.
CHGFLT	The power supply's battery charger is not working properly.	Correct the fault.
CO 6MN	The CO (carbon monoxide) detection element on an FSC-851 IntelliQuad detector has six months left to expiration. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
CO EXP	The CO (carbon monoxide) detection element on an FSC-851 IntelliQuad detector has reached the expiration date. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
CO TBL	The CO element on an FSC-851 IntelliQuad detector is not working properly. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
DIRTY 1	The detector is dirty and needs cleaning	Clean the detector.
DIRTY 2	The detector requires cleaning immediately. It is a false alarm risk.	Clean the detector immediately.
DISABL	The point has been disabled.	Service and re-enable the point.
GNDFLT	There is a ground fault on the main or auxiliary power supply.	Correct the fault.
HI BAT	The auxiliary power supply's battery charge is too high.	Check the batteries for problems. Replace batteries if necessary.
INVREP	The device has returned a response to the panel that the panel did not expect.	Check the device for functionality, addressing and wiring.
IR TBL	The infrared element is not working properly on an FSC-851 IntelliQuad detector. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
LO BAT	The auxiliary power supply's battery charge is low.	Check the batteries for problems. Replace batteries if necessary.
LO TEMP	The temperature read by a Heat+ or Acclimate™+ detector is too low.	Raise the heat in the area of the detector.
LO VAL	The detector chamber reading is too low; the detector is not operating properly. Or (CLIP Mode only) the thermistors, CO element, or infra-red element on an FSC-851 IntelliQuad detector is not working properly, or the FSC-851 IntelliQuad is experiencing a freeze warning.	The detector must be removed and replaced by an authorized service representative.
NO ANS	The device (module or detector) is not responding to the poll. Either the device is not working or it is not connected properly.	Determine whether the device is functional, and connected and addressed properly on the SLC.
NO SIG	The device (module or detector) is not responding to the poll. Either the device is not working or it is not connected properly.	Determine whether the device is functional, and connected and addressed properly on the SLC.
OPEN	The module device has an open circuit on its supervised wiring.	Check the connections from the module to the input or output device to which it is wired.
OPEN ON x	There is an open on speaker circuit x.	Locate the open and fix.
PSFAIL	The power supply is not working properly.	Check the battery for problems. Replace battery if necessary.
PRLOSS	The output module or new sounder base lost power.	Turn power back on.
SHORT	The module device has a short circuit on its supervised wiring.	Check the connections from the module to the input or output device to which it is wired.
SHORT ON x.	There is a short on speaker circuit x.	Locate the short and fix.

Table D.1 Point (Device) Troubles (1 of 2)

POINT TROUBLES		
TROUBLE TYPE	**TROUBLE DESCRIPTION**	**ACTION**
TEST F	This detector has failed the FACP's periodic detector test for alarm capabilities.	The detector should be removed and replaced by an authorized service representative.
THERM	The thermistors are not functioning properly on an FSC-851 IntelliQuad detector. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
VER HI	This detector, which has been programmed to participate in alarm verification, has gone into and come out of verification its programmed limit without going into alarm. Either something is wrong with the detector or there is a condition nearby (such as someone smoking) that causes it to go into verification frequently.	Check the detector and the nearby conditions to determine the problem.
XP TBL	XPIQ general trouble.	Check the XPIQ point for problems.

Table D.1 Point (Device) Troubles (2 of 2)

D.2 System Troubles

A message from the "Trouble Type" column in the following table will appear in the panel display when a system trouble occurs. Use this table to help determine the cause of the trouble.

SYSTEM TROUBLES		
TROUBLE MESSAGE TYPE	**TROUBLE DESCRIPTION**	**ACTION**
AC FAIL	The main power supply has lost AC power.	Investigate whether there is an AC power loss, or whether the PS is correctly installed and wired.
ADV WALK TEST	There is an Advanced Walk Test in progress.	No action is required.
ANNUN x NO ANSWER	The annunciator at address x is not responding.	Determine whether the device is functional, and connected and addressed properly.
ANNUN x TROUBLE	The annunciator at address x is in trouble.	Determine if the ACS module is functional, correctly installed, and configured properly.
AUXILIARY TROUBLE	An auxiliary device connected to the CPU2-640 at J6 is in trouble or the cable is missing.	Check the wiring and source.
BASIC WALK TEST	A Basic Walk Test is in progress.	No action is required.
BATTERY	The main power supply's battery charge is too high or too low.	Check batteries, replace if necessary.
BAT.BACKUP RAM	RAM battery backup is low.	Replace battery.
CHARGER FAIL	The main power supply's battery charger is not working properly.	Correct the fault.
CORRUPT LOGIC EQUAT	The database that houses the panel's logic equations is corrupt.	The database must be re-downloaded, or all programming must be cleared and re-entered.
DRILL ACTIVATED	Drill has been activated.	No action is required.
DETECTOR INITIALIZE	The detectors are initializing.	No action is required, as the trouble will clear when initialization is completed. However, the detector will not detect a fire while this trouble exists.
DVC ANALOG OUT x TBL	A trouble has occurred on DVC-AO analog output x (1-4). The analog output is configured for style 7, but no audio signal is returned.	Investigate and fix.
DVC AUDIO LIB. CORRUP	The audio library is corrupt.	The library must be re-downloaded, or all programming must be cleared and re-entered. If the trouble still does not clear, contact Technical Services.
DVC AUDIO LIB. INCOMP	The application or database version is incompatible.	The correct application or database version must be downloaded.
DVC BUZZER OFF-LINE	The piezo is disabled.	Re-enable the piezo at switch 5 on the DVC.
DVC DAA DOWNLOADING	A DAA download is in progress.	No action is required.
DVC DATABASE CORRUPT	The database that houses the DVC's programming is corrupt.	The database must be re-downloaded, or all programming must be cleared and re-entered. If the trouble still does not clear, contact Technical Services.
tDVC FFT Riser TBL		

Table D.2 System Troubles

SYSTEM TROUBLES		
TROUBLE MESSAGE TYPE	**TROUBLE DESCRIPTION**	**ACTION**
DVC DBASE INCOMPAT	The application or database version is incompatible.	The correct application or database version must be downloaded.
DVC DVC AUX TROUBLE	This trouble is generated when the auxiliary input is supervised (as determined in VeriFire toolsprogramming) and no signal is coming from the input.	Check the wiring and source.
DVC EXT RAM ERROR	The external RAM test failed.	Service is required.
DVC FFT TROUBLE	There is a short or open on the FFT riser.	Check that the 4-wire switch is correctly set and that there is an end-of-line resistor in place for 2-wire operation.
DVC FLASH IMAGE ERR	The DVC software is corrupt.	Re-download the panel code software from VeriFire tools. If the trouble still does not clear, call Technical Services.
DVC LOADING NO SERV	A program or database download is in progress. The panel is NOT providing fire protection during the download.	Proper authorities should be notified while a download is in progress so that other means of fire protection can be supplied.
DVC LOCAL MIC. TBL	The local microphone is in trouble. There is no communication, or paging has been enabled for over 28 seconds and no signal has been received.	Investigate whether the mic is plugged into the DVC or whether there is a problem with the local mic.
DVC LOCAL PHONE TBL	The local FFT handset is in trouble. There is no communication, or paging has been enabled for over 28 seconds and no signal has been received.	Investigate whether the handset is plugged into the DVC or whether there is a problem with the local handset.
DVC NVRAM BATT TBL	Battery backup and/or clock backup is low.	Replace the battery. Refer to the *DVC Series Manual* for replacement instructions.
DVC PROGRAM CORRUPT	The database that houses the DVC's programming is corrupt.	The database must be re-downloaded, or all programming must be cleared and re-entered. If the trouble still does not clear, contact Technical Services.
DVC REM. MIC. TBL	The remote microphone is in trouble. It is installed and supervised, but no signal is coming from it.	Check wiring and connections.
DVC SELF TEST FAIL	The diagnostic test failed on the DVC.	Call Technical Services.
DVC SOFT. MISMATCH	One or more DAAs has a software revision that does not match other DAA software revisions.	Update the DAA software to match.
EPROM ERROR	The application and/or boot code is corrupt.	Service is required.
EXCEEDED CONN. LIMIT	More than two panels have been connected to a high-speed network communications module.	Remove extra panel(s).
EXTERNAL RAM ERROR	The external RAM test failed.	Service is required.
GROUND FAULT	A ground fault has occurred within the panel.	Locate the ground fault and repair.
GROUND FAULT LOOP x	There is a ground fault on loop x.	Locate the ground fault and repair.
HS-NCM SNIFFER ACTIV	The panel is in a diagnostic mode.	No action is required.
INTERNAL RAM ERROR	The internal RAM test failed.	Service is required.
LCD80 SUPERVISORY	Communication has been lost with the LCD-80.	Check connections to the LCD-80 Annunciator.
LOADING.NO SERVICE	A program or database download is in progress. The panel is *NOT* providing fire protection during the download.	Proper authorities should be notified while a download is in progress so that other means of fire protection can be supplied.
MASTER BOX TROUBLE	A TM-4 connected to a municipal box is in trouble.	Reset the master box.
MASTER BOX NO ANSWER	A TM-4 connected to a municipal box is not responding.	Determine whether the device is functional and connected properly.
NCM COMM FAILURE	Communication is lost between the CPU2-640 and the network communications module or DVC.	Check to see if the NUP cable is properly installed and the network communications module or DVC is functional.
NETWORK FAIL PORT x	Communication lost between NCM Port x and corresponding node.	Check wiring and verify the node is online.
NETWORK INCOMPATIBLE	The brand of this panel is incompatible with this network.	Verify all nodes are branded for the same OEM.
NFPA 24HR REMINDER	This message occurs every day at 11 AM if any troubles exist.	Resolve any troubles on the system.
NO DEV. INST ON L1	No devices are installed on the system.	Install SLC and run autoprogram.
PANEL DOOR OPEN	The panel door is open.	Close door.

Table D.2 System Troubles

SYSTEM TROUBLES		
TROUBLE MESSAGE TYPE	**TROUBLE DESCRIPTION**	**ACTION**
POWER SUPPLY COMM FAIL	There has been a communication failure with the power supply.	Service is required.
PROGRAM CORRUPTED	The database that houses the panel's programming is corrupt.	The database must be re-downloaded, or all programming must be cleared and re-entered. If the trouble still does not clear, contact Technical Services.
PROGRAM MODE ACTIVATED	A user is currently accessing the panel's programming menus.	No action is required / Exit the Programming mode.
RELEASE DEV. DISABLE	Releasing devices have been disaled.	Enable the devices.
SELF TEST FAILED	Diagnostic test failed.	Call Technical Services.
STYLE 6 POS. LOOP x	There is an open circuit on the positive side of loop x. Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X isolator modules.	
STYLE 6 NEG. LOOP x	There is an open circuit on the negative side of loop x. Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X isolator modules.	
STYLE 6 SHORT LOOP x	Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open or short), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X isolator modules.	
TERM. SUPERVISORY	There is a communication error with the CRT-2.	Check connections to the CRT-2 terminal.
UDACT NO ANSWER	The UDACT is not responding.	Determine whether the UDACT is functional, and connected and addressed properly.
UDACT TROUBLE	The UDACT is in trouble.	Determine if the UDACT is functional and wired correctly.

Table D.2 System Troubles

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QUALITY SYSTEMS

Section 6

User Added Documents

Section 7

Electronic reference Catalog (Separate CD)

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION

To be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

1. PROPERTY INFORMATION

Name of property: Norfolk Agricultural School - ANNEX BUILDING

Address: 400 Main Street Walpole Ma

Description of property: Educational Facility

Occupancy type: Student/ Educational Facilty

Name of property representative:

Address:

Phone: Fax: E-mail:

Authority having jurisdiction over this property:

Phone: Fax: E-mail:

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Installation contractor for this equipment: Richard Losordo Electrical

Address:

License or certification number:

Phone: Fax: E-mail:

Service organization for this equipment:

Address:

License or certification number:

Phone: Fax: E-mail:

A contract for test and inspection in accordance with NFPA standards is in effect as of:

Contracted testing company:

Address:

Phone: Fax: E-mail:

Contract expires: Contract number: Frequency of routine inspections:

3. DESCRIPTION OF SYSTEM OR SERVICE

☐ Fire alarm system (nonvoice)

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

☐ Mass notification system (MNS)

☒ Combination system, with the following components:

☒ Fire alarm ☒ EVACS ☐ MNS ☐ Two-way, in-building, emergency communication system

☐ Other (specify):

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3. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: 2010 Additional description of system(s):

3.1 Control Unit

Manufacturer: Notifier Model number: NFS2-640

3.2 Mass Notification System

☒ This system does not incorporate an MNS

3.2.1 System Type:

☐ In-building MNS—combination

☐ In-building MNS—stand-alone ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify):

3.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS autonomous control unit ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Direct recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high-power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify):

3.3 System Documentation

☒ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the numbered record drawings are stored on site. Location: In FACP

3.4 System Software

☐ This system does not have alterable site-specific software.

Operating system (executive) software revision level: Ver 21

Site-specific software revision date: AUGUST 4, 2014 Revision completed by: Joe Santagati
Fire Command Systems

☒ A copy of the site-specific software is stored on site. Location: In FACP

3.5 Off-Premises Signal Transmission

☐ This system does not have off-premises transmission.

Name of organization receiving alarm signals with phone numbers:

Alarm: Phone:

Supervisory: Phone:

Trouble: Phone:

Entity to which alarms are retransmitted: Phone:

Method of retransmission:

If Chapter 26, specify the means of transmission from the protected premises to the supervising station:

If Chapter 27, specify the type of auxiliary alarm system: ☐ Local energy ☐ Shunt ☐ Wired ☐ Wireless

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4. CIRCUITS AND PATHWAYS

4.1 Signaling Line Pathways

4.1.1 Pathways Class Designations and Survivability

Pathways class: A Survivability level: 1 Quantity: 1
(See NFPA 72, Sections 12.3 and 12.4)

4.1.2 Pathways Utilizing Two or More Media

Quantity: N/a Description:

4.1.3 Device Power Pathways

☐ No separate power pathways from the signaling line pathway

☐ Power pathways are separate but of the same pathway classification as the signaling line pathway

☐ Power pathways are separate and different classification from the signaling line pathway

4.1.4 Isolation Modules

Quantity: 2

4.2 Alarm Initiating Device Pathways

4.2.1 Pathways Class Designations and Survivability

Pathways class: N/a Survivability level: Quantity:
(See NFPA 72, Sections 12.3 and 12.4)

4.2.2 Pathways Utilizing Two or More Media

Quantity: Description:

4.2.3 Device Power Pathways

☐ No separate power pathways from the initiating device pathway

☐ Power pathways are separate but of the same pathway classification as the initiating device pathway

☐ Power pathways are separate and different classification from the initiating device pathway

4.3 Non-Voice Audible System Pathways

4.3.1 Pathways Class Designations and Survivability

Pathways class: A Survivability level: 1 Quantity: 4
(See NFPA 72, Sections 12.3 and 12.4)

4.3.2 Pathways Utilizing Two or More Media

Quantity: N/A Description:

4.3.3 Appliance Power Pathways

☒ No separate power pathways from the notification appliance pathway

☐ Power pathways are separate but of the same pathway classification as the notification appliance pathway

☐ Power pathways are separate and different classification from the notification appliance pathway

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5. ALARM INITIATING DEVICES

5.1 Manual Initiating Devices

5.1.1 Manual Fire Alarm Boxes ☐ This system does not have manual fire alarm boxes.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

5.1.2 Other Alarm Boxes ☒ This system does not have other alarm boxes.

Description: _____

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

5.2 Automatic Initiating Devices

5.2.1 Smoke Detectors ☐ This system does not have smoke detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: ☐ Complete area ☐ Partial area ☐ Nonrequired partial area

Other (specify): _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Multicriteria ☐ Aspirating ☐ Beam

Other (specify): _____

5.2.2 Duct Smoke Detectors ☒ This system does not have alarm-causing duct smoke detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Aspirating ☐ Beam

5.2.3 Radiant Energy (Flame) Detectors ☒ This system does not have radiant energy detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

5.2.4 Gas Detectors ☒ This system does not have gas detectors.

Type of detector(s): _____

Number of devices: Addressable: _____ Conventional: _____

Type of coverage: _____

5.2.5 Heat Detectors ☐ This system does not have heat detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Type of coverage: ☐ Complete area ☐ Partial area ☐ Nonrequired partial area ☐ Linear ☐ Spot

Type of heat detector sensing technology: ☐ Fixed temperature ☐ Rate-of-rise ☐ Rate compensated

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5. ALARM INITIATING DEVICES *(continued)*

5.2.6 Addressable Monitoring Modules ☒ This system does not have monitoring modules.

Number of devices: _____

5.2.7 Waterflow Alarm Devices ☐ This system does not have waterflow alarm devices.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

5.2.8 Alarm Verification ☒ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

5.2.9 Presignal ☒ This system does not incorporate pre-signal.

Number of devices subject to presignal: _____

Describe presignal functions: _____

5.2.10 Positive Alarm Sequence (PAS) ☒ This system does not incorporate PAS.

Describe PAS: _____

5.2.11 Other Initiating Devices ☒ This system does not have other initiating devices.

Describe: _____

6. SUPERVISORY SIGNAL-INITIATING DEVICES

6.1 Sprinkler System Supervisory Devices ☐ This system does not have sprinkler supervisory devices.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

6.2 Fire Pump Description and Supervisory Devices ☒ This system does not have a fire pump.

Type fire pump: ☐ Electric pump ☐ Engine

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

6.2.1 Fire Pump Functions Supervised

☐ Power ☐ Running ☐ Phase reversal ☐ Selector switch not in auto ☐ Engine or control panel trouble ☐ Low fuel

Other (specify): _____

6.3 Duct Smoke Detectors (DSDs) ☒ This system does not have DSDs causing supervisory signals.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Aspirating ☐ Beam

6.4 Other Supervisory Devices ☒ This system does not have other supervisory devices.

Describe: _____

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7. MONITORED SYSTEMS

7.1 Engine-Driven Generator ☐ This system does not have a generator.

7.1.1 Generator Functions Supervised

☐ Engine or control panel trouble ☐ Generator running ☐ Selector switch not in auto ☐ Low fuel

☐ Other (specify): _____

7.2 Special Hazard Suppression Systems ☒ This system does not monitor special hazard systems.

Description of special hazard system(s): _____

7.3 Other Monitoring Systems ☒ This system does not monitor other systems.

Description of special hazard system(s): _____

8. ANNUNCIATORS ☒ This system does not have annunciators.

8.1 Location and Description of Annunciators

Location 1: _____

Location 2: _____

Location 3: _____

9. ALARM NOTIFICATION APPLIANCES

9.1 In-Building Fire Emergency Voice Alarm Communication System ☐ This system does not have an EVACS.

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound-processing equipment: In FACP Panel

Location of paging microphone stations:

Location 1: At fcc

Location 2: _____

Location 3: _____

9.2 Nonvoice Notification Appliances ☐ This system does not have nonvoice notification appliances.

Horns: _____ With visible: _____ Bells: _____ With visible: _____

Chimes: _____ With visible: _____

Visible only: _____ Other (describe): _____

9.3 Notification Appliance Power Extender Panels ☒ This system does not have power extender panels.

Quantity: _____

Locations: _____

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10. MASS NOTIFICATION CONTROLS, APPLIANCES, AND CIRCUITS ☒ This system does not have an MNS.

10.1 MNS Local Operating Consoles

Location 1: _____

Location 2: _____

Location 3: _____

10.2 High-Power Speaker Arrays

Number of HPSA speaker initiation zones: _____

Location 1: _____

Location 2: _____

Location 3: _____

10.3 Mass Notification Devices

Combination fire alarm/MNS visible appliances: _____ MNS-only visible appliances: _____

Textual signs: _____ Other (describe): _____

Supervision class: _____

10.3.1 Special Hazard Notification

☒ This system does not have special suppression predischarge notification.

☐ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS

11.1 Telephone System ☒ This system does not have a two-way telephone system.

Number of telephone jacks installed: _____ Number of warden stations installed: _____

Number of telephone handsets stored on site: _____

Type of telephone system installed: ☐ Electrically powered ☐ Sound powered

11.2 Two-Way Radio Communications Enhancement System

☒ This system does not have a two-way radio communications enhancement system.

Percentage of area covered by two-way radio service: Critical areas: _____ % General building areas: _____ %

Amplification component locations: _____

Inbound signal strength: _____ dBm Outbound signal strength: _____ dBm

Donor antenna isolation is: _____ dB above the signal booster gain

Radio frequencies covered: _____

Radio system monitor panel location: _____

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11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS *(continued)*

11.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

☒ This system does not have an area of refuge (area of rescue assistance) emergency communications system.

Number of stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

11.4 Elevator Emergency Communications Systems

☒ This system does not have an elevator emergency communications system.

Number of elevators with stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

11.5 Other Two-Way Communication Systems

Describe: _____

12. CONTROL FUNCTIONS

This system activates the following control fuctions:

☐ Hold-open door releasing devices ☐ Smoke management ☐ HVAC shutdown ☐ F/S dampers

☐ Door unlocking ☐ Elevator recall ☐ Fuel source shutdown ☐ Extinguishing agent release

☐ Elevator shunt trip ☐ Mass notification system override of fire alarm notification appliances

Other (specify): _____

12.1 Addressable Control Modules

☐ This system does not have control modules.

Number of devices: _____

Other (specify): _____

13. SYSTEM POWER

13.1 Control Unit

13.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.1.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

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13. SYSTEM POWER *(continued)*

13.1.3 Uninterruptible Power System ☐ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture ☐ Battery calculations are attached

13.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

☐ This system does not have an EVACS or MNS system.

13.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.2.2 Engine-Driven Generator ☐ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

13.2.3 Uninterruptible Power System ☐ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture ☐ Battery calculations are attached

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13. SYSTEM POWER *(continued)*

13.3 Notification Appliance Power Extender Panels ☒ This system does not have power extender panels.

13.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.3.2 Engine-Driven Generator ☒ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

13.3.3 Uninterruptible Power System ☒ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.3.4 Batteries

Location: BELOW THE FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture ☒ Battery calculations are attached

14. RECORD OF SYSTEM INSTALLATION

Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before conducting operational acceptance tests.

This is a: ☒ New system ☐ Modification to an existing system Permit number: _____

The system has been installed in accordance with the following requirements: (Note any or all that apply.)

☐ *NFPA 72*, Edition: _____

☐ *NFPA 70, National Electrical Code*, Article 760, Edition: _____

☐ Manufacturer's published instructions

Other (specify): _____

System deviations from referenced NFPA standards: _____

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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15. RECORD OF SYSTEM OPERATIONAL ACCEPTANCE TEST

☐ New system

All operational features and functions of this system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements for the following:

☐ Modifications to an existing system

All newly modified operational features and functions of the system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of the following:

☐ *NFPA 72*, Edition: _____

☐ *NFPA 70, National Electrical Code*, Article 760, Edition: _____

☐ Manufacturer's published instructions

Other (specify): _____

☐ Individual device testing documentation [Inspection and Testing Form (Figure 14.6.2.4) is attached]

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16. CERTIFICATIONS AND APPROVALS

16.1 System Installation Contractor:

This system, as specified herein, has been installed and tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16.2 System Service Contractor:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16.3 Supervising Station:

This system, as specified herein, will be monitored according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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16. CERTIFICATIONS AND APPROVALS *(continued)*

16.4 Property or Owner Representative:

I accept this system as having been installed and tested to its specifications and all NFPA standards cited herein.

Signed:		Printed name:		Date:	
Organization:		Title:		Phone:	

16.5 Authority Having Jurisdiction:

I have witnessed a satisfactory acceptance test of this system and find it to be installed and operating properly in accordance with its approved plans and specifications, with its approved sequence of operations, and with all NFPA standards cited herein.

Signed:		Printed name:		Date:	
Organization:		Title:		Phone:	

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ANNEX BUILDING
NORFOLD AGRECULTURAL HIGH SCHOOL
400 MAIN STREET WALPOLE MA

Date: **8/4/2014**

NFS2-640

Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pass or Fail
1	Smoke(Photo)	PHOTO	VESTIBULE 2101	AN BUILDING	PASS
2	Smoke(Photo)	PHOTO	WAITING RM 2100	AN BUILDING	PASS
3	Smoke(Photo)	PHOTO	WAITING RM BY 2102	AN BUILDING	PASS
4	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	PASS
5	Smoke(Photo)	PHOTO	NURSES OFFICE 2106	AN BUILDING	PASS
6	Smoke(Photo)	PHOTO	ELECTRC RM 2116	AN BUILDING	PASS

7	Smoke(Photo)	PHOTO	CORRDR BY ELECTRC RM	AN BUILDING	PASS
8	Smoke(Photo)	PHOTO	CORRDR BY STORAGE RM	AN BUILDING	PASS
9	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	PASS
10	Smoke(Photo)	PHOTO	RECORDS RM 2113	AN BUILDING	PASS
11	Smoke(Photo)	PHOTO	CORRDR BY BOILER RM	AN BUILDING	PASS
12	Smoke(Photo)	PHOTO	CRRDR BY STAIRWELL	AN BUILDING	PASS
13	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	PASS
14	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2100	AN BUILDING	PASS
15	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	PASS
16	Smoke(Photo)	PHOTO	CORRIDR 2200	AN BUILDING	PASS
17	Smoke(Photo)	PHOTO	STAIRWELL 2220	AN BUILDING	PASS
18	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	PASS
19	Smoke(Photo)	PHOTO	CONFRNCE RM 2214	AN BUILDING	PASS

20	Smoke(Photo)	PHOTO	RECEPTION BY RM2209	AN BUILDING	PASS
21	Smoke(Photo)	PHOTO	RECPTN BY CRRDR 2200	AN BUILDING	PASS
22	Smoke(Photo)	PHOTO	CORRIDR BY RM2207	AN BUILDING	PASS
23	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2200	AN BUILDING	PASS
24	Smoke(Photo)	PHOTO	CRRDR BY RM 2201	AN BUILDING	PASS
25	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	PASS
26	Smoke(Photo)	PHOTO	STAIRWELL 2128	AN BUILDING	PASS
27	Smoke(Photo)	PHOTO	ELEVATOR LOBBY 2300	AN BUILDING	PASS
28	Smoke(Duct P)	PHOTO	RTU1 CONFRNCE SUPPLY	AN BUILDING	PASS
29	Smoke(Duct P)	PHOTO	RTU1 CONFRNCE RETURN	AN BUILDING	PASS
30	Smoke(Photo)	PHOTO	STAIRWELL 2220	AN BUILDING	PASS
31	Smoke(Photo)	PHOTO	STAIRWELL 2114	AN BUILDING	PASS

32	Smoke(Photo)	PHOTO	STAIRWELL 2123	AN BUILDING	PASS
43	Smoke(Photo)	PHOTO	ELEVATOR MACHINE RM	AN BUILDING	PASS
1	Pull Station	MANUAL STATION	VESTIBULE 2101	AN BUILDING	PASS
2	Pull Station	MANUAL STATION	WAITING RM 2100	AN BUILDING	PASS
3	Pull Station	MANUAL STATION	STAIRWELL 2128	AN BUILDING	PASS
4	Track Superv	MINI/DUAL MONITOR	C.O DT NURSES RM2106	AN BUILDING	PASS
5	Pull Station	MANUAL STATION	STAIRWELL 2114	AN BUILDING	PASS
6	Track Superv	MONITOR	C.O DT BOILR RM2001	AN BUILDING	PASS
7	Waterflow	MONITOR	MAIN FLOW	AN BUILDING	PASS
8	Track Superv	MINI/DUAL MONITOR	TAMPER GROUND FL	AN BUILDING	PASS
9	Waterflow	MINI/DUAL MONITOR	GROUND FLOOR	AN BUILDING	PASS
10	Track Superv	MINI/DUAL MONITOR	TAMPER BASEMENT	AN BUILDING	PASS

11	Waterflow	MINI/DUAL MONITOR	BASEMENT	AN BUILDING	PASS
12	Track Superv	MINI/DUAL MONITOR	WET SYSTEM TAMPER	AN BUILDING	PASS
13	Track Superv	MINI/DUAL MONITOR	DRY SYSTEM TAMPER	AN BUILDING	PASS
14	Track Superv	MINI/DUAL MONITOR	DRY LOW AIR	AN BUILDING	PASS
15	Waterflow	MINI/DUAL MONITOR	DRY SYSTEM FLOW	AN BUILDING	PASS
16	Track Superv	MINI/DUAL MONITOR	BUILDING SIDE TAMPER	AN BUILDING	PASS
17	Track Superv	MINI/DUAL MONITOR	CITY SIDE TAMPER	AN BUILDING	PASS
18	Track Superv	MINI/DUAL MONITOR	TAMPER 2ND FLOOR	AN BUILDING	PASS
19	Waterflow	MINI/DUAL MONITOR	2ND FLOOR	AN BUILDING	PASS
20	Pull Station	MANUAL STATION	CLASSRM 2304	AN BUILDING	PASS
22	Pull Station	MANUAL STATION	STAIRWELL 2123	AN BUILDING	PASS
23	Track Superv	MONITOR	STANDPIPE TAMPER	AN BUILDING	PASS
24	Pull Station	MANUAL STATION	CORRDR 2200 BY STAIR	AN BUILDING	PASS

25	Pull Station	MANUAL STATION	STAIRWELL 2200	AN BUILDING	PASS
26	Pull Station	MANUAL STATION	EXISTING SHOP	AN BUILDING	PASS
27	Pull Station	MANUAL STATION	SHOP BY DOUBLE DOORS	AN BUILDING	PASS
28	Monitor	MONITOR	HEAT IN CRWL SPACE	AN BUILDING	PASS
29	Pull Station	MANUAL STATION	SHOP OFFICE	AN BUILDING	PASS
30	Pull Station	MANUAL STATION	MAIN SHOP	AN BUILDING	PASS
31	Pull Station	MANUAL STATION	WELDING SHOP	AN BUILDING	PASS
32	Pull Station	MANUAL STATION	CORRDR BY ELEVATOR	AN BUILDING	PASS
33	Pull Station	MANUAL STATION	CLASSRM 2201	AN BUILDING	PASS
35	Monitor	MONITOR	HEAT DT ELEVATR SHFT	AN BUILDING	PASS
36	Relay	RELAY	ELEVATOR DAMPR	AN BUILDING	PASS
37	Pull Station	MANUAL STATION	STAIRWELL 2220	AN BUILDING	PASS

38	Pull Station	MANUAL STATION	CLASSRM 2308	AN BUILDING	PASS
39	Pull Station	MANUAL STATION	STAIRWELL 2114	AN BUILDING	PASS
40	Monitor	MINI/DUAL MONITOR	PULLSTN ROOF TOP	AN BUILDING	PASS
41	Pull Station	MANUAL STATION	CORRDOR2300	AN BUILDING	PASS
42	Pull Station	MANUAL STATION	CLASSRM 2301	AN BUILDING	PASS
43	Relay	RELAY	RECALL PRIMARY	AN BUILDING	PASS
44	Relay	RELAY	RECALL ALTERNATE	AN BUILDING	PASS
45	Relay	RELAY	RECALL FIREHAT	AN BUILDING	PASS
46	Control NAC	CONTROL	RED BEACON	AN BUILDING	PASS
47	Control NAC	CONTROL	SPRINKER BEACON	AN BUILDING	PASS
48	Relay	RELAY	RTU1 SHUTDOWN	AN BUILDING	PASS
49	Fire Control	MINI/DUAL MONITOR	DRILL SWITCH	AN BUILDING	PASS

55	Pull Station	MANUAL STATION	SPECIAL NEEDS 2204	AN BUILDING	PASS

Bell Circuits

1	Control NAC		STROBE CIRCUIT		PASS
2	Control NAC		STROBE CIRCUIT		PASS
3	Control NAC		STROBE CIRCUIT		PASS
4	Control NAC		STROBE CIRCUIT		PASS

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM INSPECTION AND TESTING FORM

To be completed by the system inspector or tester at the time of the inspection or test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Date of this inspection or test: August 4, 2014 Time of inspection or test: 12:PM

1. PROPERTY INFORMATION

Name of property: Norfolk Agricultural School ANNEX BUILDING

Address: 400 Main Street Walpole Ma

Description of property: EDUCATIONAL FACILITY

Occupancy type: STUDENT / EDUCATION FACULTY

Name of property representative:

Address:

Phone: Fax: E-mail:

Authority having jurisdiction over this property:

Phone: Fax: E-mail:

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Service and/or testing organization for this equipment: RICHARD LOSORDO ELECTRIC

Address:

Phone: Fax: E-mail:

Service technician or tester:

Qualifications of technician or tester:

A contract for test and inspection in accordance with NFPA standards is in effect as of:

The contract expires: Contract number: Frequency of tests and inspections:

Monitoring organization for this equipment:

Address:

Phone: Fax: E-mail:

Entity to which alarms are retransmitted: Phone:

3. TYPE OF SYSTEM OR SERVICE

☐ Fire alarm system (nonvoice)

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

☐ Mass notification system (MNS)

☒ Combination system, with the following components:

☒ Fire alarm ☒ EVACS ☐ MNS ☐ Two-way, in-building, emergency communication system

☐ Other (specify):

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3. TYPE OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: 2010 Additional description of system(s):

3.1 Control Unit

Manufacturer: NOTIFIER Model number: NFS2-640

3.2 Mass Notification System

☒ This system does not incorporate an MNS.

3.2.1 System Type:

☐ In-building MNS—combination

☐ In-building MNS—stand-alone ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify):

3.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS ACU only ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Direct recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high-power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify):

3.3 System Documentation

☒ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the record record drawings are stored on site. Location:

3.4 System Software

☐ This system does not have alterable site-specific software.

Software revision number: VER 21 Software last updated on: JULY 25, 2014

☒ A copy of the site-specific software is stored on site. Location: IN FACP

4. SYSTEM POWER

4.1 Control Unit

4.1.1 Primary Power

Input voltage of control panel: Control panel amps:

4.1.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.1.3 Uninterruptible Power System

☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

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4. SYSTEM POWER *(continued)*

4.1.4 Batteries

Location: BELOW FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture.

4.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

☐ This system does not have an EVACS or MNS.

4.2.1 Primary Power

Input voltage of EVACS or MNS panel: EVACS or MNS panel amps:

4.2.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.2.3 Uninterruptible Power System

☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

4.2.4 Batteries

Location: BELOW FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture.

4.3 Notification Appliance Power Extender Panels

☒ This system does not have power extender panels.

4.3.1 Primary Power

Input voltage of power extender panel(s): Power extender panel amps:

4.3.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.3.3 Uninterruptible Power System

☐ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

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4. SYSTEM POWER *(continued)*

4.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture.

5. ANNUNCIATORS

☒ This system does not have annunciators.

5.1 Location and Description of Annunciators

Annunciator 1: _____

Annunciator 2: _____

Annunciator 3: _____

6. NOTIFICATIONS MADE PRIOR TO TESTING

Monitoring organization	Contact:		Time:	
Building management	Contact:		Time:	
Building occupants	Contact:		Time:	
Authority having jurisdiction	Contact:		Time:	
Other, if required	Contact:		Time:	

7. TESTING RESULTS

7.1 Control Unit and Related Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☒	☒	
Lamps/LEDs/LCDs	☒	☒	
Fuses	☒	☒	
Trouble signals	☒	☒	
Disconnect switches	☒	☒	
Ground-fault monitoring	☒	☒	
Supervision	☒	☒	
Local annunciator	☒	☒	
Remote annunciators	☐	☐	N/A
Power extender panels	☐	☐	N/A
Isolation modules	☒	☒	
Other (specify) _____	☐	☐	

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7. TESTING RESULTS *(continued)*

7.2 Control Unit Power Supplies

Description	Visual Inspection	Functional Test	Comments
120-volt power	☒	☒	
Generator or UPS	☐	☐	
Battery condition	☒	☒	
Load voltage	☒	☒	
Discharge test	☒	☒	
Charger test	☒	☒	
Other (specify) _____	☐	☐	

7.3 In-Building Fire Emergency Voice Alarm Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☒	☒	
Lamps/LEDs/LCDs	☒	☒	
Fuses	☒	☒	
Primary power supply	☒	☒	
Secondary power supply	☒	☒	
Trouble signals	☒	☒	
Disconnect switches	☒	☒	
Ground-fault monitoring	☒	☒	
Panel supervision	☒	☒	
System performance	☒	☒	
Sound pressure levels Occupied ☐ Yes ☐ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	☐	☐	
System intelligibility ☐ CSI ☐ STI (attach report with locations, values, and weather conditions)	☐	☐	
Other (specify) _____	☐	☐	

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7. TESTING RESULTS *(continued)*

7.4 Notification Appliance Power Extender Panels

Description	Visual Inspection	Functional Test	Comments
Lamps/LEDs/LCDs	☐	☐	
Fuses	☐	☐	
Primary power supply	☐	☐	
Secondary power supply	☐	☐	
Trouble signals	☐	☐	
Ground-fault monitoring	☐	☐	
Panel supervision	☐	☐	
Other (specify)	☐	☐	

7.5 Mass Notification Equipment

Description	Visual Inspection	Functional Test	Comments
Functional test	☐	☐	
Reset/power down test	☐	☐	
Fuses	☐	☐	
Primary power supply	☐	☐	
UPS power test	☐	☐	
Trouble signals	☐	☐	
Disconnect switches	☐	☐	
Ground-fault monitoring	☐	☐	
CCU security mechanism	☐	☐	
Prerecorded message content	☐	☐	
Prerecorded message activation	☐	☐	
Software backup performed	☐	☐	
Test backup software	☐	☐	
Fire alarm to MNS interface	☐	☐	
MNS to fire alarm interface	☐	☐	
In-building MNS to wide-area MNS	☐	☐	

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7. TESTING RESULTS *(continued)*

7.5 Mass Notification Equipment *(continued)*

Description	Visual Inspection	Functional Test	Comments
MNS to direct recipient MNS	☐	☐	
Sound pressure levels Occupied ☐ Yes ☐ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	☐	☐	
System intelligibility ☐ CSI ☐ STI (attach report with locations, values, and weather conditions)	☐	☐	
Other (specify)	☐	☐	

7.6 Two-Way Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Phone handsets	☐	☐	
Phone jacks	☐	☐	
Off-hook indicator	☐	☐	
Call-in signal	☐	☐	
System performance	☐	☐	
System audibility	☐	☐	
System intelligibility	☐	☐	
Radio communications enhancement system	☐	☐	
Area of refuge communication system	☐	☐	
Elevator emergency communications system	☐	☐	
Other (specify)	☐	☐	

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7. TESTING RESULTS *(continued)*

7.7 Combination Systems

Description	Visual Inspection	Functional Test	Comments
Fire extinguishing monitoring devices/system	☐	☐	
Carbon monoxide detector/system	☐	☐	
Combination fire/security system	☐	☐	
Other (specify)	☐	☐	

7.8 Special Hazard Systems

Description (specify)	Visual Inspection	Functional Test	Comments
	☐	☐	
	☐	☐	
	☐	☐	

7.9 Emergency Communications System

☐ Visual

☐ Functional

☐ Simulated operation

☐ Ensure predischarge notification appliances of special hazard systems are not overridden by the MNS. See *NFPA 72*, 24.4.1.7.1.

7.10 Monitored Systems

Description (specify)	Visual Inspection	Functional Test	Comments
Engine-driven generator	☐	☐	
Fire pump	☐	☐	
Special suppression systems	☐	☐	
Other (specify)	☐	☐	

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7. TESTING RESULTS *(continued)*

7.11 Auxiliary Functions

Description	Visual Inspection	Functional Test	Comments
Door-releasing devices	☐	☐	
Fan shutdown	☐	☐	
Smoke management/smoke control	☐	☐	
Smoke damper operation	☐	☐	
Smoke shutter release	☐	☐	
Door unlocking	☐	☐	
Elevator recall	☐	☐	
Elevator shunt trip	☐	☐	
MNS override of FA signals	☐	☐	
Other (specify)	☐	☐	

7.12 Alarm Initiating Device

☐ Device test results sheet attached listing all devices tested and the results of the testing

7.13 Supervisory Alarm Initiating Device

☐ Device test results sheet attached listing all devices tested and the results of the testing

7.14 Alarm Notification Appliances

☐ Appliance test results sheet attached listing all appliances tested and the results of the testing

7.15 Supervisory Station Monitoring

Description	Yes	No	Time	Comments
Alarm signal	☒	☐		
Alarm restoration	☒	☐		
Trouble signal	☒	☐		
Trouble restoration	☒	☐		
Supervisory signal	☒	☐		
Supervisory restoration	☒	☐		

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8. NOTIFICATIONS THAT TESTING IS COMPLETE

Monitoring organization	Contact:		Time:	
Building management	Contact:		Time:	
Building occupants	Contact:		Time:	
Authority having jurisdiction	Contact:		Time:	
Other, if required	Contact:		Time:	

9. SYSTEM RESTORED TO NORMAL OPERATION

Date: _____ Time: _____

10. CERTIFICATION

10.1 Inspector Certification:

This system, as specified herein, has been inspected and tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

10.2 Acceptance by Owner or Owner's Representative:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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DEVICE TEST RESULTS

(Attach additional sheets if required)

Device Type	Address	Location	Test Results

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FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION

To be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

1. PROPERTY INFORMATION

Name of property: Norfolk Agricultural School - CB Building

Address: 400 Main Street Walpole Ma

Description of property: Educational Facility

Occupancy type: Student/ Educational Faculty

Name of property representative:

Address:

Phone: Fax: E-mail:

Authority having jurisdiction over this property:

Phone: Fax: E-mail:

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Installation contractor for this equipment: Richard Losordo Electrical

Address:

License or certification number:

Phone: Fax: E-mail:

Service organization for this equipment:

Address:

License or certification number:

Phone: Fax: E-mail:

A contract for test and inspection in accordance with NFPA standards is in effect as of:

Contracted testing company:

Address:

Phone: Fax: E-mail:

Contract expires: Contract number: Frequency of routine inspections:

3. DESCRIPTION OF SYSTEM OR SERVICE

☐ Fire alarm system (nonvoice)

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

☐ Mass notification system (MNS)

☒ Combination system, with the following components:

☒ Fire alarm ☒ EVACS ☐ MNS ☐ Two-way, in-building, emergency communication system

☐ Other (specify):

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3. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: 2010 Additional description of system(s):

3.1 Control Unit

Manufacturer: Notifier Model number: NFS2-640

3.2 Mass Notification System ☒ This system does not incorporate an MNS

3.2.1 System Type:

☐ In-building MNS—combination

☐ In-building MNS—stand-alone ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify):

3.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS autonomous control unit ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Direct recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high-power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify):

3.3 System Documentation

☒ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the numbered record drawings are stored on site. Location: In FACP

3.4 System Software ☐ This system does not have alterable site-specific software.

Operating system (executive) software revision level: Ver 21

Site-specific software revision date: July 25, 2014 Revision completed by: Joe Santagati
Fire Command Systems

☒ A copy of the site-specific software is stored on site. Location: In FACP

3.5 Off-Premises Signal Transmission ☐ This system does not have off-premises transmission.

Name of organization receiving alarm signals with phone numbers:

Alarm: Phone:

Supervisory: Phone:

Trouble: Phone:

Entity to which alarms are retransmitted: Phone:

Method of retransmission:

If Chapter 26, specify the means of transmission from the protected premises to the supervising station:

If Chapter 27, specify the type of auxiliary alarm system: ☐ Local energy ☐ Shunt ☐ Wired ☐ Wireless

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4. CIRCUITS AND PATHWAYS

4.1 Signaling Line Pathways

4.1.1 Pathways Class Designations and Survivability

Pathways class: A Survivability level: 1 Quantity: 1
(See NFPA 72, Sections 12.3 and 12.4)

4.1.2 Pathways Utilizing Two or More Media

Quantity: N/a Description:

4.1.3 Device Power Pathways

☐ No separate power pathways from the signaling line pathway

☐ Power pathways are separate but of the same pathway classification as the signaling line pathway

☐ Power pathways are separate and different classification from the signaling line pathway

4.1.4 Isolation Modules

Quantity: 2

4.2 Alarm Initiating Device Pathways

4.2.1 Pathways Class Designations and Survivability

Pathways class: N/a Survivability level: Quantity:
(See NFPA 72, Sections 12.3 and 12.4)

4.2.2 Pathways Utilizing Two or More Media

Quantity: Description:

4.2.3 Device Power Pathways

☐ No separate power pathways from the initiating device pathway

☐ Power pathways are separate but of the same pathway classification as the initiating device pathway

☐ Power pathways are separate and different classification from the initiating device pathway

4.3 Non-Voice Audible System Pathways

4.3.1 Pathways Class Designations and Survivability

Pathways class: A Survivability level: 1 Quantity: 4
(See NFPA 72, Sections 12.3 and 12.4)

4.3.2 Pathways Utilizing Two or More Media

Quantity: N/A Description:

4.3.3 Appliance Power Pathways

☒ No separate power pathways from the notification appliance pathway

☐ Power pathways are separate but of the same pathway classification as the notification appliance pathway

☐ Power pathways are separate and different classification from the notification appliance pathway

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5. ALARM INITIATING DEVICES

5.1 Manual Initiating Devices

5.1.1 Manual Fire Alarm Boxes ☐ This system does not have manual fire alarm boxes.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

5.1.2 Other Alarm Boxes ☒ This system does not have other alarm boxes.

Description: _____

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

5.2 Automatic Initiating Devices

5.2.1 Smoke Detectors ☐ This system does not have smoke detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: ☐ Complete area ☐ Partial area ☐ Nonrequired partial area

Other (specify): _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Multicriteria ☐ Aspirating ☐ Beam

Other (specify): _____

5.2.2 Duct Smoke Detectors ☒ This system does not have alarm-causing duct smoke detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Aspirating ☐ Beam

5.2.3 Radiant Energy (Flame) Detectors ☒ This system does not have radiant energy detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

5.2.4 Gas Detectors ☒ This system does not have gas detectors.

Type of detector(s): _____

Number of devices: Addressable: _____ Conventional: _____

Type of coverage: _____

5.2.5 Heat Detectors ☐ This system does not have heat detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Type of coverage: ☐ Complete area ☐ Partial area ☐ Nonrequired partial area ☐ Linear ☐ Spot

Type of heat detector sensing technology: ☐ Fixed temperature ☐ Rate-of-rise ☐ Rate compensated

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5. ALARM INITIATING DEVICES *(continued)*

5.2.6 Addressable Monitoring Modules ☒ This system does not have monitoring modules.

Number of devices: _____

5.2.7 Waterflow Alarm Devices ☐ This system does not have waterflow alarm devices.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

5.2.8 Alarm Verification ☒ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

5.2.9 Presignal ☒ This system does not incorporate pre-signal.

Number of devices subject to presignal: _____

Describe presignal functions: _____

5.2.10 Positive Alarm Sequence (PAS) ☒ This system does not incorporate PAS.

Describe PAS: _____

5.2.11 Other Initiating Devices ☒ This system does not have other initiating devices.

Describe: _____

6. SUPERVISORY SIGNAL-INITIATING DEVICES

6.1 Sprinkler System Supervisory Devices ☐ This system does not have sprinkler supervisory devices.

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

6.2 Fire Pump Description and Supervisory Devices ☒ This system does not have a fire pump.

Type fire pump: ☐ Electric pump ☐ Engine

Type and number of devices: Addressable: _____ Conventional: _____ Coded: _____ Transmitter: _____

Other (specify): _____

6.2.1 Fire Pump Functions Supervised

☐ Power ☐ Running ☐ Phase reversal ☐ Selector switch not in auto ☐ Engine or control panel trouble ☐ Low fuel

Other (specify): _____

6.3 Duct Smoke Detectors (DSDs) ☒ This system does not have DSDs causing supervisory signals.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): _____

Type of coverage: _____

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Aspirating ☐ Beam

6.4 Other Supervisory Devices ☒ This system does not have other supervisory devices.

Describe: _____

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7. MONITORED SYSTEMS

7.1 Engine-Driven Generator ☐ This system does not have a generator.

7.1.1 Generator Functions Supervised

☐ Engine or control panel trouble ☐ Generator running ☐ Selector switch not in auto ☐ Low fuel

☐ Other (specify): _____

7.2 Special Hazard Suppression Systems ☒ This system does not monitor special hazard systems.

Description of special hazard system(s): _____

7.3 Other Monitoring Systems ☒ This system does not monitor other systems.

Description of special hazard system(s): _____

8. ANNUNCIATORS ☒ This system does not have annunciators.

8.1 Location and Description of Annunciators

Location 1: _____

Location 2: _____

Location 3: _____

9. ALARM NOTIFICATION APPLIANCES

9.1 In-Building Fire Emergency Voice Alarm Communication System ☐ This system does not have an EVACS.

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound-processing equipment: In FACP Panel

Location of paging microphone stations:

Location 1: Front entry to CB Building

Location 2: _____

Location 3: _____

9.2 Nonvoice Notification Appliances ☐ This system does not have nonvoice notification appliances.

Horns: _____ With visible: _____ Bells: _____ With visible: _____

Chimes: _____ With visible: _____

Visible only: _____ Other (describe): _____

9.3 Notification Appliance Power Extender Panels ☒ This system does not have power extender panels.

Quantity: _____

Locations: _____

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10. MASS NOTIFICATION CONTROLS, APPLIANCES, AND CIRCUITS ☒ This system does not have an MNS.

10.1 MNS Local Operating Consoles

Location 1: _____

Location 2: _____

Location 3: _____

10.2 High-Power Speaker Arrays

Number of HPSA speaker initiation zones: _____

Location 1: _____

Location 2: _____

Location 3: _____

10.3 Mass Notification Devices

Combination fire alarm/MNS visible appliances: _____ MNS-only visible appliances: _____

Textual signs: _____ Other (describe): _____

Supervision class: _____

10.3.1 Special Hazard Notification

☒ This system does not have special suppression predischarge notification.

☐ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS

11.1 Telephone System ☒ This system does not have a two-way telephone system.

Number of telephone jacks installed: _____ Number of warden stations installed: _____

Number of telephone handsets stored on site: _____

Type of telephone system installed: ☐ Electrically powered ☐ Sound powered

11.2 Two-Way Radio Communications Enhancement System

☒ This system does not have a two-way radio communications enhancement system.

Percentage of area covered by two-way radio service: Critical areas: _____ % General building areas: _____ %

Amplification component locations: _____

Inbound signal strength: _____ dBm Outbound signal strength: _____ dBm

Donor antenna isolation is: _____ dB above the signal booster gain

Radio frequencies covered: _____

Radio system monitor panel location: _____

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11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS *(continued)*

11.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

☒ This system does not have an area of refuge (area of rescue assistance) emergency communications system.

Number of stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

11.4 Elevator Emergency Communications Systems

☒ This system does not have an elevator emergency communications system.

Number of elevators with stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

11.5 Other Two-Way Communication Systems

Describe: _____

12. CONTROL FUNCTIONS

This system activates the following control fuctions:

☐ Hold-open door releasing devices ☐ Smoke management ☐ HVAC shutdown ☐ F/S dampers

☐ Door unlocking ☐ Elevator recall ☐ Fuel source shutdown ☐ Extinguishing agent release

☐ Elevator shunt trip ☐ Mass notification system override of fire alarm notification appliances

Other (specify): _____

12.1 Addressable Control Modules

☐ This system does not have control modules.

Number of devices: _____

Other (specify): _____

13. SYSTEM POWER

13.1 Control Unit

13.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.1.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

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13. SYSTEM POWER *(continued)*

13.1.3 Uninterruptible Power System ☐ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture ☐ Battery calculations are attached

13.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

☐ This system does not have an EVACS or MNS system.

13.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.2.2 Engine-Driven Generator ☐ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

13.2.3 Uninterruptible Power System ☐ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture ☐ Battery calculations are attached

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13. SYSTEM POWER *(continued)*

13.3 Notification Appliance Power Extender Panels ☒ This system does not have power extender panels.

13.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panel board): _____

Disconnecting means location: _____

13.3.2 Engine-Driven Generator ☒ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

13.3.3 Uninterruptible Power System ☒ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.3.4 Batteries

Location: BELOW THE FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture ☒ Battery calculations are attached

14. RECORD OF SYSTEM INSTALLATION

Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before conducting operational acceptance tests.

This is a: ☒ New system ☐ Modification to an existing system Permit number: _____

The system has been installed in accordance with the following requirements: (Note any or all that apply.)

☐ *NFPA 72*, Edition: _____

☐ *NFPA 70, National Electrical Code*, Article 760, Edition: _____

☐ Manufacturer's published instructions

Other (specify): _____

System deviations from referenced NFPA standards: _____

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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15. RECORD OF SYSTEM OPERATIONAL ACCEPTANCE TEST

☐ New system

All operational features and functions of this system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements for the following:

☐ Modifications to an existing system

All newly modified operational features and functions of the system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of the following:

☐ *NFPA 72*, Edition: _____

☐ *NFPA 70, National Electrical Code*, Article 760, Edition: _____

☐ Manufacturer's published instructions

Other (specify): _____

☐ Individual device testing documentation [Inspection and Testing Form (Figure 14.6.2.4) is attached]

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16. CERTIFICATIONS AND APPROVALS

16.1 System Installation Contractor:

This system, as specified herein, has been installed and tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16.2 System Service Contractor:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

16.3 Supervising Station:

This system, as specified herein, will be monitored according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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16. CERTIFICATIONS AND APPROVALS *(continued)*

16.4 Property or Owner Representative:

I accept this system as having been installed and tested to its specifications and all NFPA standards cited herein.

Signed:		Printed name:		Date:	
Organization:		Title:		Phone:	

16.5 Authority Having Jurisdiction:

I have witnessed a satisfactory acceptance test of this system and find it to be installed and operating properly in accordance with its approved plans and specifications, with its approved sequence of operations, and with all NFPA standards cited herein.

Signed:		Printed name:		Date:	
Organization:		Title:		Phone:	

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NORKFOLK AGGIE
CB BUILDING
400 MAIN STREET
WALPOLE, MA

Date: **7/25/2014**

NFS2-640

SLC Loop	Device Address	Type Code Label	Flash Scan Type	Custom Label	Extended Label	Pass or Fail
1	1	Smoke(Photo)	PHOTO	VESTIBULE 5100	CB BUILDING	PASS
1	2	Smoke(Photo)	PHOTO	CORRIDOR 5120	CB BUILDING	PASS
1	3	Smoke(Photo)	PHOTO	STAIRWELL 5116	CB BUILDING	PASS
1	4	Smoke(Photo)	PHOTO	CORRDR BY VESTIBULE	CB BUILDING	PASS

1	5	Smoke(Photo)	PHOTO	CORRDR BY COMP LAB	CB BUILDING	PASS
1	6	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5107	CB BUILDING	PASS
1	7	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5108	CB BUILDING	PASS
1	8	Smoke(Photo)	PHOTO	IDF CLOSET 5104	CB BUILDING	PASS
1	9	Smoke(Photo)	PHOTO	CRRDR BY CLSSRM 5102	CB BUILDING	PASS
1	10	Smoke(Photo)	PHOTO	CORRDR BY WOMENS RM	CB BUILDING	PASS
1	11	Smoke(Photo)	PHOTO	BOILER RM BY STRWLL	CB BUILDING	PASS
1	12	Heat	HEAT	BOILER RM BY PUMPS	CB BUILDING	PASS
1	13	Heat	HEAT	BOILER RM REAR STAIR	CB BUILDING	PASS
1	14	Smoke(Photo)	PHOTO	BOILER RM BY METERS	CB BUILDING	PASS

Modules

1	1	Control NAC	CONTROL	RED BEACON	CB BUILDING	PASS

1	2	Control NAC	CONTROL	SPRINKLER BEACON	CB BUILDING	PASS
1	3	Pull Station	MANUAL STATION	VESTIBULE 5100	CB BUILDING	PASS
1	4	Waterflow	MINI/DUAL MONITOR	WATERFLOW 1ST FLOOR	CB BUILDING	PASS
1	5	Waterflow	MINI/DUAL MONITOR	WATERFLOW BASEMENT	CB BUILDING	PASS
1	6	Track Superv	MINI/DUAL MONITOR	BYPASS TAMPER	CB BUILDING	PASS
1	7	Track Superv	MINI/DUAL MONITOR	TAMPER 1ST FLOOR	CB BUILDING	PASS
1	8	Track Superv	MINI/DUAL MONITOR	TAMPER BASEMENT	CB BUILDING	PASS
1	9	Waterflow	MINI/DUAL MONITOR	MAIN WATERFLOW	CB BUILDING	PASS
1	10	Track Superv	MINI/DUAL MONITOR	CITY SIDE TAMPER	CB BUILDING	PASS
1	11	Track Superv	MINI/DUAL MONITOR	BLDG SIDE TAMPER	CB BUILDING	PASS
1	12	Pull Station	MANUAL STATION	CRRDR BY RM 5108	CB BUILDING	PASS
1	13	Pull Station	MANUAL STATION	ROOM 5002	CB BUILDING	PASS
1	14	Fire Control	MINI/DUAL MONITOR	DRILL SWITCH	CB BUILDING	PASS

Bell Circuits

1	Control NAC	N/A	STROBE CIRCUIT	PASS
2	Control NAC	N/A	STROBE CIRCUIT	PASS
3	Control NAC	N/A	STROBE CIRCUIT	PASS
4	Control NAC	N/A	STROBE CIRCUIT	PASS

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM INSPECTION AND TESTING FORM

To be completed by the system inspector or tester at the time of the inspection or test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Date of this inspection or test: JULY 25, 2014 Time of inspection or test: 12:PM

1. PROPERTY INFORMATION

Name of property: Norfolk Agricultural School CB Building

Address: 400 Main Street Walpole Ma

Description of property: EDUCATIONAL FACILITY

Occupancy type: STUDENT / EDUCATION FACULTY

Name of property representative:

Address:

Phone: Fax: E-mail:

Authority having jurisdiction over this property:

Phone: Fax: E-mail:

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Service and/or testing organization for this equipment: RICHARD LOSORDO ELECTRIC

Address:

Phone: Fax: E-mail:

Service technician or tester:

Qualifications of technician or tester:

A contract for test and inspection in accordance with NFPA standards is in effect as of:

The contract expires: Contract number: Frequency of tests and inspections:

Monitoring organization for this equipment:

Address:

Phone: Fax: E-mail:

Entity to which alarms are retransmitted: Phone:

3. TYPE OF SYSTEM OR SERVICE

☐ Fire alarm system (nonvoice)

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

☐ Mass notification system (MNS)

☒ Combination system, with the following components:

☒ Fire alarm ☒ EVACS ☐ MNS ☐ Two-way, in-building, emergency communication system

☐ Other (specify):

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3. TYPE OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: 2010 Additional description of system(s):

3.1 Control Unit

Manufacturer: NOTIFIER Model number: NFS2-640

3.2 Mass Notification System

☒ This system does not incorporate an MNS.

3.2.1 System Type:

☐ In-building MNS—combination

☐ In-building MNS—stand-alone ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify):

3.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS ACU only ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Direct recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high-power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify):

3.3 System Documentation

☒ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the record record drawings are stored on site. Location:

3.4 System Software

☐ This system does not have alterable site-specific software.

Software revision number: VER 21 Software last updated on: JULY 25, 2014

☒ A copy of the site-specific software is stored on site. Location: IN FACP

4. SYSTEM POWER

4.1 Control Unit

4.1.1 Primary Power

Input voltage of control panel: Control panel amps:

4.1.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.1.3 Uninterruptible Power System

☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

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4. SYSTEM POWER *(continued)*

4.1.4 Batteries

Location: BELOW FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture.

4.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

☐ This system does not have an EVACS or MNS.

4.2.1 Primary Power

Input voltage of EVACS or MNS panel: EVACS or MNS panel amps:

4.2.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.2.3 Uninterruptible Power System

☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

4.2.4 Batteries

Location: BELOW FACP Type: SLA Nominal voltage: 12/24 Amp/hour rating: 55

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture.

4.3 Notification Appliance Power Extender Panels

☒ This system does not have power extender panels.

4.3.1 Primary Power

Input voltage of power extender panel(s): Power extender panel amps:

4.3.2 Engine-Driven Generator

☐ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

4.3.3 Uninterruptible Power System

☐ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

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4. SYSTEM POWER *(continued)*

4.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

☐ Batteries are marked with date of manufacture.

5. ANNUNCIATORS

☒ This system does not have annunciators.

5.1 Location and Description of Annunciators

Annunciator 1: _____

Annunciator 2: _____

Annunciator 3: _____

6. NOTIFICATIONS MADE PRIOR TO TESTING

Monitoring organization	Contact:		Time:	
Building management	Contact:		Time:	
Building occupants	Contact:		Time:	
Authority having jurisdiction	Contact:		Time:	
Other, if required	Contact:		Time:	

7. TESTING RESULTS

7.1 Control Unit and Related Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☒	☒	
Lamps/LEDs/LCDs	☒	☒	
Fuses	☒	☒	
Trouble signals	☒	☒	
Disconnect switches	☒	☒	
Ground-fault monitoring	☒	☒	
Supervision	☒	☒	
Local annunciator	☒	☒	
Remote annunciators	☐	☐	N/A
Power extender panels	☐	☐	N/A
Isolation modules	☒	☒	
Other (specify) _____	☐	☐	

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7. TESTING RESULTS *(continued)*

7.2 Control Unit Power Supplies

Description	Visual Inspection	Functional Test	Comments
120-volt power	☒	☒	
Generator or UPS	☐	☐	
Battery condition	☒	☒	
Load voltage	☒	☒	
Discharge test	☒	☒	
Charger test	☒	☒	
Other (specify) _____	☐	☐	

7.3 In-Building Fire Emergency Voice Alarm Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☒	☒	
Lamps/LEDs/LCDs	☒	☒	
Fuses	☒	☒	
Primary power supply	☒	☒	
Secondary power supply	☒	☒	
Trouble signals	☒	☒	
Disconnect switches	☒	☒	
Ground-fault monitoring	☒	☒	
Panel supervision	☒	☒	
System performance	☒	☒	
Sound pressure levels Occupied ☐ Yes ☐ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	☐	☐	
System intelligibility ☐ CSI ☐ STI (attach report with locations, values, and weather conditions)	☐	☐	
Other (specify) _____	☐	☐	

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7. TESTING RESULTS *(continued)*

7.4 Notification Appliance Power Extender Panels

Description	Visual Inspection	Functional Test	Comments
Lamps/LEDs/LCDs	☐	☐	
Fuses	☐	☐	
Primary power supply	☐	☐	
Secondary power supply	☐	☐	
Trouble signals	☐	☐	
Ground-fault monitoring	☐	☐	
Panel supervision	☐	☐	
Other (specify)	☐	☐	

7.5 Mass Notification Equipment

Description	Visual Inspection	Functional Test	Comments
Functional test	☐	☐	
Reset/power down test	☐	☐	
Fuses	☐	☐	
Primary power supply	☐	☐	
UPS power test	☐	☐	
Trouble signals	☐	☐	
Disconnect switches	☐	☐	
Ground-fault monitoring	☐	☐	
CCU security mechanism	☐	☐	
Prerecorded message content	☐	☐	
Prerecorded message activation	☐	☐	
Software backup performed	☐	☐	
Test backup software	☐	☐	
Fire alarm to MNS interface	☐	☐	
MNS to fire alarm interface	☐	☐	
In-building MNS to wide-area MNS	☐	☐	

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7. TESTING RESULTS *(continued)*

7.5 Mass Notification Equipment *(continued)*

Description	Visual Inspection	Functional Test	Comments
MNS to direct recipient MNS	☐	☐	
Sound pressure levels Occupied ☐ Yes ☐ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	☐	☐	
System intelligibility ☐ CSI ☐ STI (attach report with locations, values, and weather conditions)	☐	☐	
Other (specify)	☐	☐	

7.6 Two-Way Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Phone handsets	☐	☐	
Phone jacks	☐	☐	
Off-hook indicator	☐	☐	
Call-in signal	☐	☐	
System performance	☐	☐	
System audibility	☐	☐	
System intelligibility	☐	☐	
Radio communications enhancement system	☐	☐	
Area of refuge communication system	☐	☐	
Elevator emergency communications system	☐	☐	
Other (specify)	☐	☐	

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7. TESTING RESULTS *(continued)*

7.7 Combination Systems

Description	Visual Inspection	Functional Test	Comments
Fire extinguishing monitoring devices/system	☐	☐	
Carbon monoxide detector/system	☐	☐	
Combination fire/security system	☐	☐	
Other (specify)	☐	☐	

7.8 Special Hazard Systems

Description (specify)	Visual Inspection	Functional Test	Comments
	☐	☐	
	☐	☐	
	☐	☐	

7.9 Emergency Communications System

☐ Visual

☐ Functional

☐ Simulated operation

☐ Ensure predischarge notification appliances of special hazard systems are not overridden by the MNS. See *NFPA 72*, 24.4.1.7.1.

7.10 Monitored Systems

Description (specify)	Visual Inspection	Functional Test	Comments
Engine-driven generator	☐	☐	
Fire pump	☐	☐	
Special suppression systems	☐	☐	
Other (specify)	☐	☐	

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7. TESTING RESULTS *(continued)*

7.11 Auxiliary Functions

Description	Visual Inspection	Functional Test	Comments
Door-releasing devices	☐	☐	
Fan shutdown	☐	☐	
Smoke management/smoke control	☐	☐	
Smoke damper operation	☐	☐	
Smoke shutter release	☐	☐	
Door unlocking	☐	☐	
Elevator recall	☐	☐	
Elevator shunt trip	☐	☐	
MNS override of FA signals	☐	☐	
Other (specify)	☐	☐	

7.12 Alarm Initiating Device

☐ Device test results sheet attached listing all devices tested and the results of the testing

7.13 Supervisory Alarm Initiating Device

☐ Device test results sheet attached listing all devices tested and the results of the testing

7.14 Alarm Notification Appliances

☐ Appliance test results sheet attached listing all appliances tested and the results of the testing

7.15 Supervisory Station Monitoring

Description	Yes	No	Time	Comments
Alarm signal	☒	☐		
Alarm restoration	☒	☐		
Trouble signal	☒	☐		
Trouble restoration	☒	☐		
Supervisory signal	☒	☐		
Supervisory restoration	☒	☐		

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8. NOTIFICATIONS THAT TESTING IS COMPLETE

Monitoring organization	Contact:		Time:	
Building management	Contact:		Time:	
Building occupants	Contact:		Time:	
Authority having jurisdiction	Contact:		Time:	
Other, if required	Contact:		Time:	

9. SYSTEM RESTORED TO NORMAL OPERATION

Date: _____ Time: _____

10. CERTIFICATION

10.1 Inspector Certification:

This system, as specified herein, has been inspected and tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

10.2 Acceptance by Owner or Owner's Representative:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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DEVICE TEST RESULTS

(Attach additional sheets if required)

Device Type	Address	Location	Test Results

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2.2 LIGHTING

YALE ELECTRIC

55 SHAWMUT ROAD
CANTON, MA 02021

OPERATION & MAINTENANCE MANUAL

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL

Prepared for:

RICHARD LOSORDO ELECTRICAL

BROCKTON, MA

DATE: 09/27/2013

Yale Electric
55 SHAWMUT ROAD
CANTON, MA 02021
Tel - 781-737-2500
Fax - 781-821-4895

OPERATION & MAINTENANCE MANUAL

DATE: 27-Sep-13
CONTRACTOR: LOSORDO ELECTRICAL SERVICES
JOB NAME: NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL

TYPE	MANUFACTURER	CATALOG NUMBER	LAMP CATALOG NUMBER
DC	NORA	NULB24LED30A / NATL 530HW	LED
FC3	ZOOM	ZR P6 154T5HO N WFR 3 W UNV TELE	FP54/835/HO/ECO
FC4	ZOOM	ZR P6 154T5HO N WFR 4 W UNV TELE	FP54/835/HO/ECO
FP4	METALUMEN	S8A 1 T5 4 VD SB Y W E 1 UNV	FP54/835/HO/ECO
FC8	ZOOM	ZR P6 154T5HO N WFR 8 W UNV TELE	FP54/835/HO/ECO
FP18D	METALUMEN	FS4W 2 T5HO 8 N SB D WT E D5 1 UNV	FP54/835/HO/ECO
FP4H	METALUMEN	S8A 1 T5 4 N SB Y W E 1 UNV	FP54/835/HO/ECO
FP8	METALUMEN	S8A 2 T5 8 VD SB Y W E LR UNV	FP54/835/HO/ECO
FP8H	METALUMEN	S8A 2 T5 8 VD SB Y W E LR UNV	FP54/835/HO/ECO
FP8D	METALUMEN	S8A 2 T5 8 VD SB Y W E D1 1 UNV	FP54/835/HO/ECO
FP8HD	METALUMEN	S8A 2 T5 8 VD SB Y W E D1 1 UNV	FP54/835/HO/ECO
FS4	H.E.WILLIAMS	20 4 154T5H A EB1 UNV	FP54/835/HO/ECO
FS8	H.E.WILLIAMS	20 8 154T5H A EB1 UNV	FP54/835/HO/ECO
FW4	H.E.WILLIAMS	WMA 4 254T5H A DL EB1/ 1 UNV	FP54/835/HO/ECO
FW8	H.E.WILLIAMS	WMA 4 254T5H A DL EB1/ 1 UNV	FP54/835/HO/ECO
I4	H.E.WILLIAMS	85 4 228T5S EB2 UNV	FP28/835/ECO
I4D	H.E.WILLIAMS	85 4 228T5S EBD2 UNV DIM 0-10VOLT	FP28/835/ECO
I8	H.E.WILLIAMS	85 8 428T5S EB2 / 2 UNV	FP28/835/ECO
I8D	H.E.WILLIAMS	85 8 428T5S EBD2 UNV DIM 0-10VOLT	FP28/835/ECO
JC4	H.E.WILLIAMS	EGL 4 454T5H HIA EB2 / 2BD UNV	FP54/835/HO/ECO
R22	ZOOM	Z1127 D 314T5 WA G 2X2 W UNV	FP14/835/ECO
RC1	H.E.WILLIAMS	LEDP60 1100 35K CS ED*AD 120	LED
RC2	H.E.WILLIAMS	LEDP60 2000 35K CS ED*AD 120	LED
RDI2	H.E.WILLIAMS	DIG S22 224T5H WPR SPLIT EB1 / 1 UNV	FP54/835/HO/ECO
RDI4	H.E.WILLIAMS	DIG S24 224T5H WPR SPLIT EB1 / 1 UNV	FP54/835/HO/ECO
RDI4D	H.E.WILLIAMS	DIG S24 224T5H WPR SPLIT EBD*AD7 120	FP54/835/HO/ECO
SC1D	DAYBRITE	AVS2CF40 SPMW UNV 1/2 EBD MARK VII	FT40DL/RS/835
SL1	VISIONAIRE	ARI 1L T3 84L 3 4K UNV AM RPP4 / RNTA 4RS 188 20 S1	N/A
SL3	ROBERT LIGHTING	CWPBLED48UNV	LED
SL4	ROBERT LIGHTING	CWPBLED24UNV	LED
SL4E	ROBERT LIGHTING	CWPBLED24UNV EM	LED
TD25	H.E.WILLIAMS	HETG S22 214T5S A EBSD 95-2*UT BD UNV	FP14/835/ECO
TD25D	H.E.WILLIAMS	HETG S22 214T5S A EBSD2*UT DB UNV	FP14/835/ECO
TD5	H.E.WILLIAMS	HETG S24 228T5S A EBSD 95-2* AD-BD 2 UNV	FP14/835/ECO
TD5A	H.E.WILLIAMS	HETF S24 228T5S A EBSD 95*AD BD 2 UNV DFK2448W	FP14/835/ECO
TD5D	H.E.WILLIAMS	HETG S24 228T5S A EBSD UNV	FP14/835/ECO
V4	H.E.WILLIAMS	AV8 4 228T5S WPC EB2 BD UNV	FP28/835/ECO
V8	LDPI	240 T5HO 4L 8 UNV1 TS P	FP28/835/ECO

AC	EMERGI-LITE	WWP1R	N/A
X1	EMERGI-LITE	WWPXN1R	N/A
X2	EMERGI-LITE	WWPXN2R	N/A
WP	EMERGI-LITE	WWSVXN1R D4X CW	N/A
EB	EMERGI-LITE	12PR40M 2 MK DA	N/A
EBH	EMERGI-LITE	12SV54M 2 MW DA	N/A
EBW	EMERGI-LITE	12SV24M 2 MK DA CW4	N/A
HC	BARRON	CT702 LB WH	N/A
OCC	SCHNEIDER	SLSCDS800	N/A
OCS	SCHNEIDER	SLSCDS2000	N/A
PP	SCHNEIDER	SLSPP1277	N/A
		FACTORY WARRANTY	
		NORA LIGHTING, ZOOM, METALUMEN, H.E.WILLIAMS, DAYBRITE, VISIONAIRE, ROBERT LIGHTING, LDPI, EMERGI-LITE, BARRON AND SCHNEIDER	

SK & Associates	Description : NULB24LED30A/NULB36LED30A/NATL-530HW Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **DC**

NORALIGHTING.

Type
Project
Catalog No.
Lamp/Wattage

NULB Series
Ultra-Low Profile Linear LED Lightbar
Lamp: LED Source

PRODUCT DESCRIPTION
Nora Lighting's low-profile, Title 24 compliant fixtures provide excellent and even illumination on all surfaces. At only 3.3 watts per foot, LightBar is one of the most energy efficient products in the market. Combined with an ultra low-profile housing, five fixture lengths, an assortment of interconnector cables and mounting brackets that install at a variety of angles, Nora's LightBar offers an unprecedented level of contractor friendly installations. LED technology eliminates forward heat from the fixture, also no UV or infrared rays to harm artwork or heat sensitive foods.

FEATURES
- Title 24 Compliant; Up to 50 Lumens per watt
- Up to 8' runs with 30W Driver or 16' runs with 60W Driver
- Available in 3000K & 4200K CCT
- Available in 5 different lengths; 6", 12", 24", 36" & 48"
- Easy installation with adjustable aiming mounting brackets
- Flush end connectors
- Dimmable
- Lightbars and Class II Drivers are rated for -20°C operation
- 30,000 hours of rated lamp life

SPECIFICATIONS

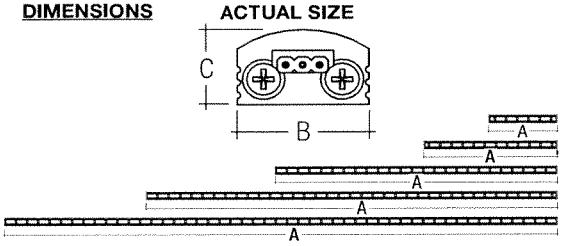
Lightbar	NULB-6	NULB-12	NULB-24	NULB-36	NULB-48
Input Watts	1.78W	3.56W	7.12W	10.68W	14.24W
Input Current	38mA	75mA	151mA	226mA	302mA
Lumens 3000K	80	161	322	483	644
Lumens 4200K	89	178	356	534	712
Efficacy @ 4200K	50LPW	50LPW	50LPW	50LPW	50LPW
Number of LEDs	6	12	24	36	48

Included with every Lightbar:
(1) LightBar, (2) Flat Mounting Clips* [NAL-201], (2) Angled Mounting Clips* [NAL-245], and (1) End to End Connector [NAL-200]. (* 36" & 48" Lightbars come with 3 mounting clips each).

Housing
Solid aluminum extrusion, flush mounted end caps, and available in 3 different sizes. Available in Natural Aluminum or Bronze.

ELECTRICAL
Drivers
(NATL-530) 30W Class 2 LED Driver, 24VDC. Power supply cord is 6' and cord & plug is 2'. For a total of 8' in length. Accomodates up to 8' runs. Requires a power line interconnector.
(NATL-560) 60W Class 2 LED Driver, 24VDC. Power supply cord is 6' and cord & plug is 2'. For a total of 8' in length. Accomodates up to 16' runs. Requires a power line interconnector.
(NATL-524) 24W Plug-In Driver, 24VDC. The power interconnection cable is 6' in length. Can accomodate up to 7' runs. Requires a power line interconnector.
(NATL-545) 45W Plug-In Driver, 24VDC. The power interconnection cable is 6' in length. Can accomodate up to 13' runs. Requires a power line interconnector.
(NMT-60/24C2) 60W Class 2 Magnetic Dimmable LED Driver, 24VDC. Includes 10' power line connector. Dimmable with magnetic low voltage dimmer. Requires a power line interconnector.

DIMENSIONS — ACTUAL SIZE



Dimensions	NULB-6	NULB-12	NULB-24	NULB-36	NULB-48
A: Length	6-1/16"	11-3/4"	23-5/8"	35-5/8"	47-5/8"
B: Width	3/4"	3/4"	3/4"	3/4"	3/4"
C: Height	1/2"	1/2"	1/2"	1/2"	1/2"

Source
NULB-6 - 6 LEDs (Included)
NULB-12 - 12 LEDs (included)
NULB-24 - 24 LEDs (included)
NULB-38 - 38 LEDs (included)
NULB-48 - 48 LEDs (included)

Finishes
Bronze (anodized) and Natural Aluminum.

Labels and Warranty
ETL Listed for Dry Location
Title 24 Compliant
2 Year Warranty

OPTIONAL ACCESSORIES

Interconnectors

NAL-200	End to End Connector
NAL-202	2" Interconnection Cable
NAL-206	6" Interconnection Cable
NAL-218	18" Interconnection Cable
NAL-238	38" Interconnection Cable
NAL-258	58" Interconnection Cable

Mounting Clips

NAL-201	Flat Mounting Clip (Set of 2)
NAL-245	Angled Mounting Clip (Set of 2)

Power Feed Interconnectors

NAL-207	18" Power Line Interconnector 90°
NAL-207/72	72" Power Line Interconnector 90°
NAL-212	12" Power Line Interconnector w/ Switch

Power Line Connector

NALTL-30	30" Power Line Connector

Others

NAL-220	Mini Coupler
NAL-221	Mini Power Feed Splitter
NAL-250	Dimmer

Create a complete fixture / driver catalog number: Example: NULB-6LED30A / NMT-60/24C2 / NALTL-30

Lightbar - *select one from each column*

Catalog No.	Length	Source	Color Temp.	Finish
NULB	6 = 6"	LED	30 = 3000K	A = Natural Aluminum
	12 = 12"		42 = 4200K	BZ = Bronze
	24 = 24"			
	36 = 36"			
	48 = 48"			

Orivers

LEO Oriver
NATL-524
NATL-545
NATL-530
NATL-560
NMT-60/24C2

Optional Accesories

Inter-Connectors	Mounting Clips	Power Feed	Power Line	Others
NAL-200	NAL-201	NAL-207	NALTL-30	NAL-220
NAL-202	NAL-245	NAL-212		NAL-221
NAL-206				NAL-250
NAL-218				
NAL-238				
NAL-258				

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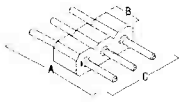
LIGHTBAR ACCESSORIES

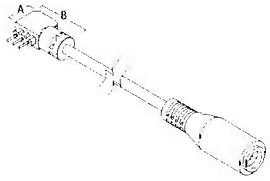
NAL-200 - End to End Connector

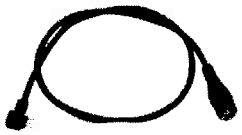


A: Overall Length: 7/16"
B: Insulated Length: 1/8"
C: Insulated Width: 5/16"

Miniature interconnector for seamless end-to-end transitions.
NAL-200 is included with every Lightbar.

NAL-207 - 18" Power Line Interconnector 90°
NAL-207/72 - 72" Power Line Interconnector 90°

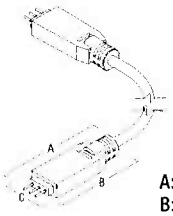




A: Width: 3/8"
B: Length: 7/10"

The right angle, power feed interconnector cable allows for
easy installation in a limited space installation.

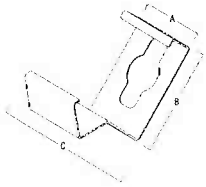
NAL-202 - 2" Interconnection Cable
NAL-206 - 6" Interconnection Cable
NAL-218 - 18" Interconnection Cable
NAL-239 - 38" Interconnection Cable
NAL-258 - 58" Interconnection Cable



A: Connect Length: 1"
B: Insulated Length: 15/16"
C: Insulated Width: 2/5"

The interconnection cables allow for the linking of any 2 Lightbars in any direction.

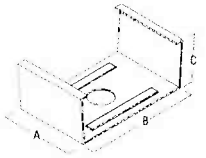
NAL-245 - Angled Mounting Clip (Set of 2)



A: Width: 1/2"
B: Length: 5/8"
C: Height: 11/16"

Adjustable aiming of 45°, 53° and 65° is available with the Angled Mounting Clip.
A set of two or three NAL-245 clips are included with every Lightbar.

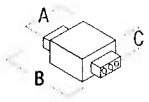
NAL-201 - Flat Mounting Clip (Set of 2)



A: Width: 7/16"
B: Length: 3/4"
C: Height: 5/16"

Adjustable aiming of 0°, 10° and 23° is available with the Flat Mounting Clip.
A set of two or three NAL-201 clips are included with every Lightbar.

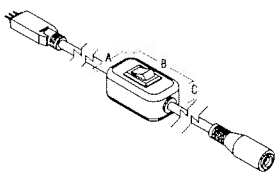
NAL-220 - Mini Coupler



A: Width: 0.4"
B: Length: 0.8"
C: Height: 0.2"

Used to extend interconnection cables and power line interconnectors.

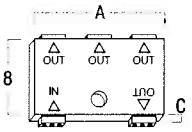
NAL-212 - Power Line Interconnector w/ Switch



A: Width: 3/4"
B: Length: 1-3/8"
C: Height: 5/8"

The 12" straight power feed interconnector cable includes an in-line power switch;
allowing individual switching for any LightBar run.

NAL-221 - Mini Power Feed Splitter



A: Width: 1-1/2"
B: Length: 0.8"
C: Height: 0.2"

Allows one driver to be split into 4 separate runs simultaneously.
Requires one interconnection cable for each Lightbar.

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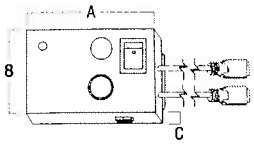
LIGHTBAR ACCESSORIES

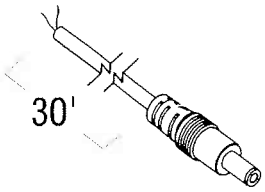
NAL-250 - Dimmer



A: Width: 2"
B: Length: 3-1/2"
C: Height: 1-3/8"

Capable of dimming 2 separate Lightbar runs simultaneously.
3 Modes: Dimming Mode, Auto-fading Mode, and Flashing Mode.
Includes: (1) Dimmer, (2) 6" Interconnection Cables [NAL-206],
(2) End to End Connectors [NAL-201], and 6 mounting screws.

NALTL-30 - 30' Power Line Connector



30' Male connector lead to be used with remote power supply.
To be used with NMT-60/24C2.

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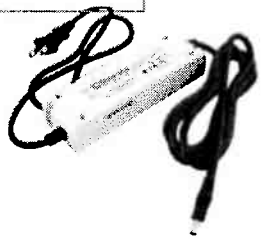
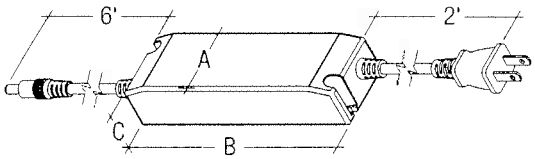
LIGHTBAR DRIVERS

NATL-530 - 30W Class 2 LED Driver
NATL-560 - 30W Class 2 LED Driver

HW- 30W Class 2 LED Driver

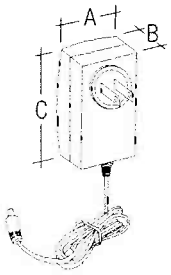




	NATL-530	NATL-560	Run Length	LED Driver
A: Driver Width:	1-3/4"	2-3/8"	8' Run	NATL-530: 30W Driver
B: Driver Length:	5-5/8"	7"	16' Run	NATL-560: 60W Driver
C: Driver Height:	1-1/4"	1-3/8"		

LED Driver's come with an easy connect power cord and requires no additional wiring.
The power supply cord is 6' long and the cord & plug is 2' long.
Requires a power feed interconnector cable.

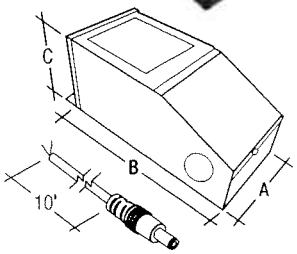
NATL-524 - 24W Direct Plug-In Driver
NATL-545 - 45W Direct Plug-In Driver



		Run Length	LED Driver
A: Driver Width:	1-3/4"		
B: Driver Length:	1-1/2"	7' Run	NATL-524: 24W Driver
C: Driver Height:	3-2/5"	13' Run	NATL-545: 45W Driver

Direct Plug-In Driver allows direct connection to the LED Tape Light.
Includes a 6' power interconnector cable.
Can accommodate runs up to 12'.
Requires a power feed interconnector cable.

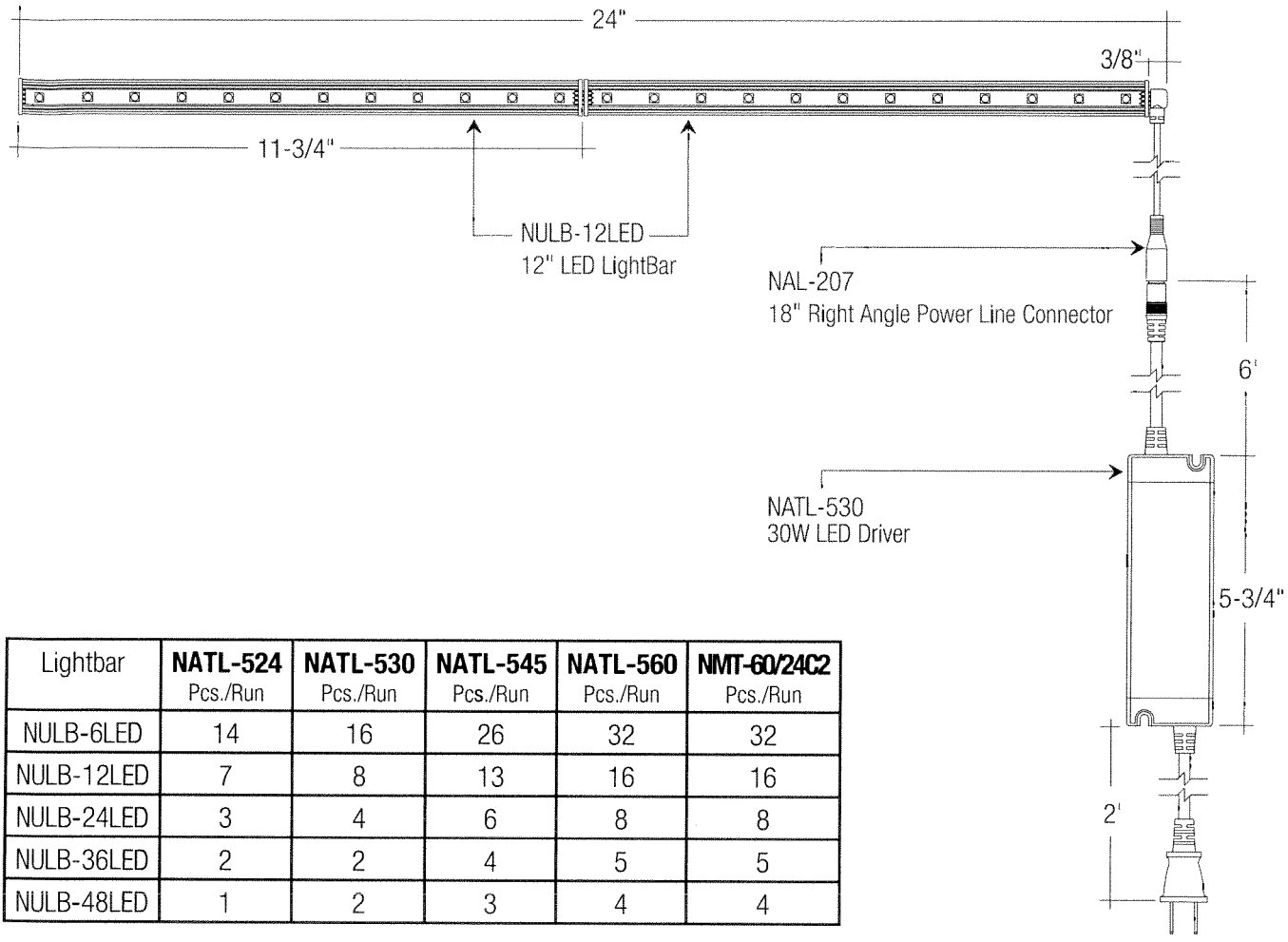
NMT-60/24C2 - 60W Class 2 Magnetic Hardwire LED Driver



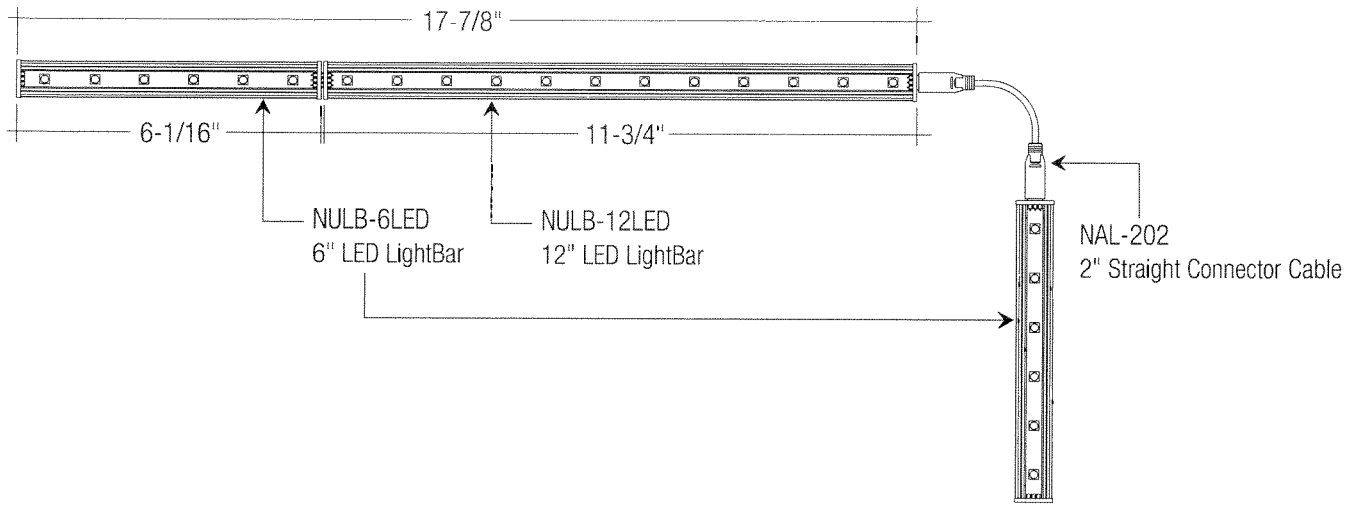
		Run Length
A: Driver Width:	2-1/2"	
B: Driver Length:	6"	16' Run
C: Driver Height:	2-1/4"	

Includes 10' power line connector.
Manual reset thermal circuit-secondary side.
Dimmable with magnetic low voltage dimmer.
For a longer power line connector or additional, use NALTL-30.
Requires a power line interconnector.

SUGGESTED LAYOUT



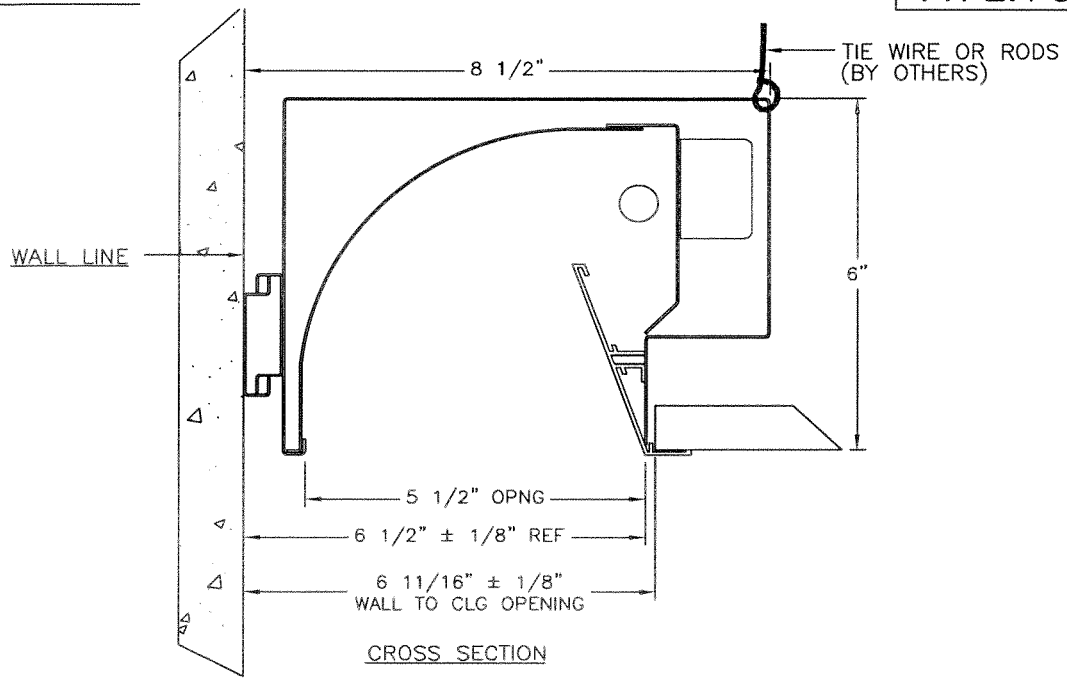
Lightbar	**NATL-524** Pcs./Run	**NATL-530** Pcs./Run	**NATL-545** Pcs./Run	**NATL-560** Pcs./Run	**NMT-60/24C2** Pcs./Run
NULB-6LED	14	16	26	32	32
NULB-12LED	7	8	13	16	16
NULB-24LED	3	4	6	8	8
NULB-36LED	2	2	4	5	5
NULB-48LED	1	2	3	4	4



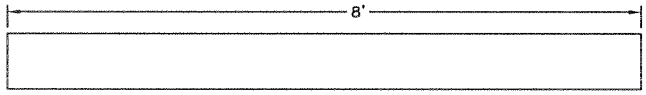
SK & Associates	Description Project Name: ZR P6 154T5HO N WFR 3 W UNV NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FC3

MODEL No.: ZR-P6-1T5HO-N-WFR-W-UNV-TELE

TYPE: FC8,FC4,FC3

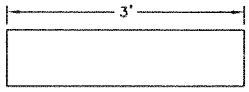


CROSS SECTION



TYPE: FC8
QTY:11

TYPE: FC4
QTY:17



TYPE: FC3
QTY:5

SPECIFICATIONS

LIGHTING	DIRECT
MOUNTING	WFR – WALL FLANGE RECESSED
LENGTH	3', 4' & 8' NOMINAL
HOUSING	20 GA COLD ROLLED STEEL WITH EXTRUDED ALUMINUM CEILING TRIM FINISH: BAKED WHITE ENAMEL
REFLECTOR	DIE FORMED No. 20 GA CRS. FINISH– BAKED WHITE ENAMEL
SHIELDING	OPEN, UNSHIELDED
LAMP	(1) F54 T5HO PER CROSS SECTION (BY OTHERS)
BALLAST	CBM–ETL CERTIFIED, CLASS P, ELECTRONIC PROGRAM START
WIRING	SINGLE CIRCUIT 120V–277V

OPTION: TELE - (1)Telescoping End

c UL us LISTED SUITABLE FOR DAMP LOCATIONS

REV	DESCRIPTION	BY	DATE
3			
2			
1			

NOTE: ALL SPECIFICATIONS MUST BE CHECKED AND SIGNED OFF PRIOR TO PRODUCTION

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PROJECT:					
NORFOLK AGGIE					
MODEL NO.:					
ZR-P6-154T5HO-N-WFR-W-UNV					
DRAWN BY:	APPROVED BY:	DATE:	SCALE:	TYPE:	CUSTOMER ORDER #
TL		11/08/2011	NTS		

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ONE BRIDAL AVE WEST WARWICK, RI 02893
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Fax. (401) 615-9109
E-mail INFO@ZOOMLIGHTING.COM
www.ZOOMLIGHTING.com

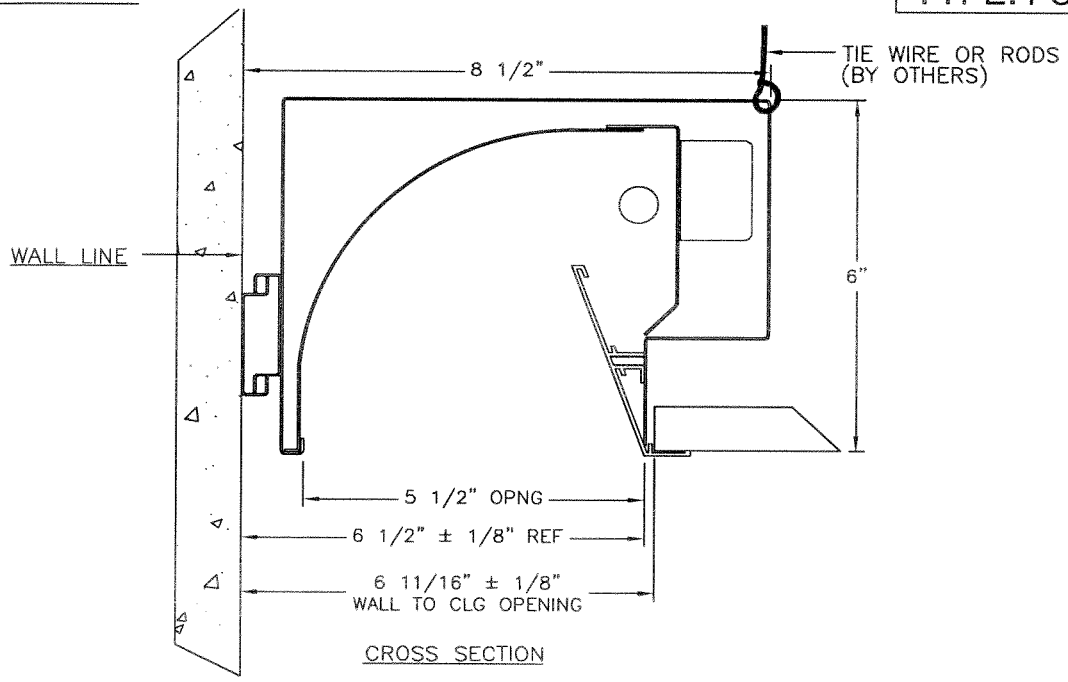
FILE NAME: ZR-P6-1T8-WFR

ORDER #:

SK & Associates	Description : ZR-P6-154T5HO-N-WFR-4-W-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FC4**

MODEL No.: ZR-P6-1T5HO-N-WFR-W-UNV-TELE

TYPE: FC8,FC4,FC3



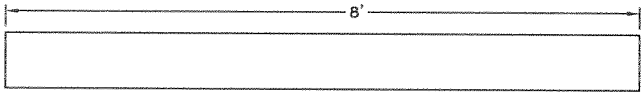
CROSS SECTION

SPECIFICATIONS

LIGHTING	DIRECT
MOUNTING	WFR – WALL FLANGE RECESSED
LENGTH	3', 4' & 8' NOMINAL
HOUSING	20 GA COLD ROLLED STEEL WITH EXTRUDED ALUMINUM CEILING TRIM FINISH: BAKED WHITE ENAMEL
REFLECTOR	DIE FORMED No. 20 GA CRS. FINISH– BAKED WHITE ENAMEL
SHIELDING	OPEN, UNSHIELDED
LAMP	(1) F54 T5HO PER CROSS SECTION (BY OTHERS)
BALLAST	CBM–ETL CERTIFIED, CLASS P, ELECTRONIC PROGRAM START
WIRING	SINGLE CIRCUIT 120V–277V

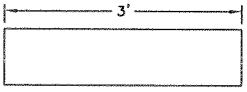
OPTION: TELE - (1)Telescoping End

TYPE: FC8
QTY:11



TYPE: FC4
QTY:17

TYPE: FC3
QTY:5



c UL us LISTED SUITABLE FOR DAMP LOCATIONS

REV	DESCRIPTION	BY	DATE
3			
2			
1			

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PROJECT: NORFOLK AGGIE			
MODEL NO.: ZR-P6-154T5HO-N-WFR-W-UNV			
DRAWN BY: TL	APPROVED BY:	DATE: 11/08/2011	SCALE: NTS
TYPE:		CUSTOMER ORDER #	
FILE NAME: ZR-P6-1T8-WFR			
ORDER #:		SHEET 1 OF 1	

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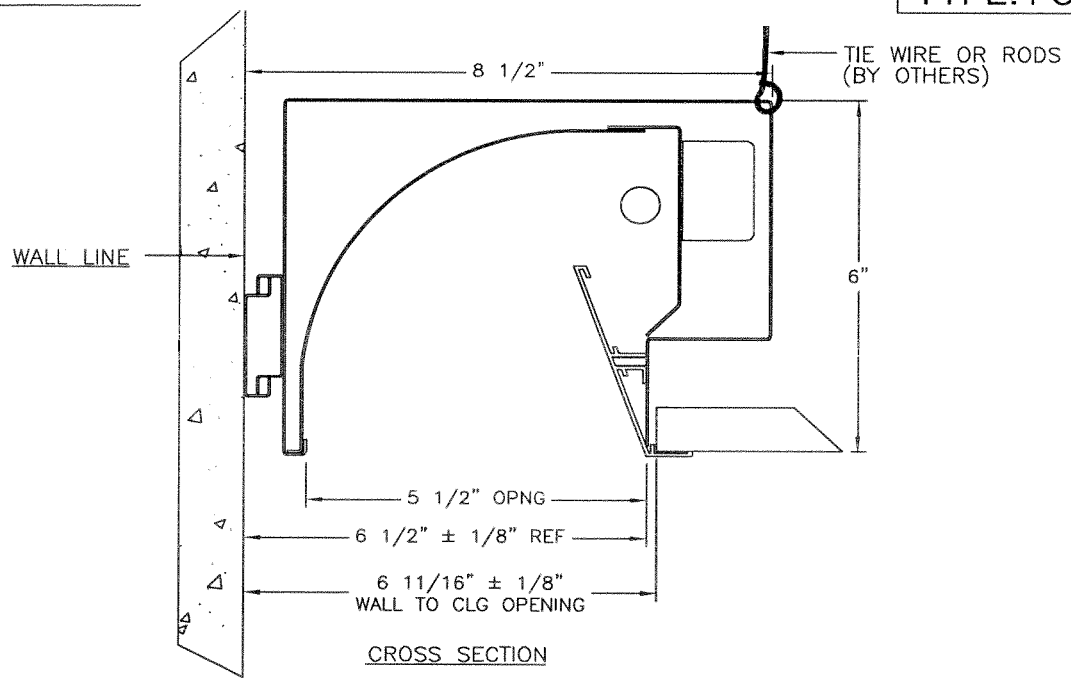
SK & Associates	Description : ZR-P6-154T5HO-N-WFR-8-W-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FC8**

MODEL No.: ZR-P6-1T5HO-N-WFR-W-UNV-TELE

TYPE: FC8,FC4,FC3



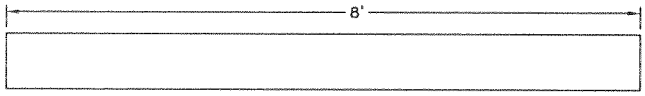
CROSS SECTION

SPECIFICATIONS

LIGHTING	DIRECT
MOUNTING	WFR – WALL FLANGE RECESSED
LENGTH	3', 4' & 8' NOMINAL
HOUSING	20 GA COLD ROLLED STEEL WITH EXTRUDED ALUMINUM CEILING TRIM FINISH: BAKED WHITE ENAMEL
REFLECTOR	DIE FORMED No. 20 GA CRS. FINISH– BAKED WHITE ENAMEL
SHIELDING	OPEN, UNSHIELDED
LAMP	(1) F54 T5HO PER CROSS SECTION (BY OTHERS)
BALLAST	CBM–ETL CERTIFIED, CLASS P, ELECTRONIC PROGRAM START
WIRING	SINGLE CIRCUIT 120V–277V

OPTION: TELE - (1)Telescoping End

TYPE: FC8
QTY:11



TYPE: FC4
QTY:17

TYPE: FC3
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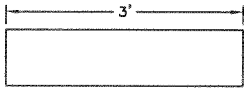

c UL us LISTED SUITABLE FOR DAMP LOCATIONS

REV	DESCRIPTION	BY	DATE
3			
2			
1			

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PROJECT: NORFOLK AGGIE					
MODEL NO.: ZR-P6-154T5HO-N-WFR-W-UNV					
DRAWN BY: TL	APPROVED BY:	DATE: 11/08/2011	SCALE: NTS	TYPE:	CUSTOMER ORDER #
zoom	ZOOM LIGHTING LTD. ONE BRIDAL AVE WEST WARWICK, RI 02893 Tel. (401) 262-0225 Fax. (401) 615-9109 E-mail INFO@ZOOMLIGHTING.COM www.ZOOMLIGHTING.com			FILE NAME: ZR-P6-1T8-WFR	
				ORDER #:	SHEET 1 OF 1

SK & Associates	Description: **BALLAST FOR FC3, FC4 & FC8** Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FC3**

Robertson WORLDWIDE
INNOVATIVE LIGHTING SOLUTIONS

PSA254T5MV

Ballast Type:	Electronic	Starting Method:	Programmed	Unit Weight:	1.05 lb.
Input Voltage:	120 thru 277VAC ±10%	Lamp Connection:	Series	Carton Quantity:	40
Input Frequency:	50/60 Hz.	Unit Color:	Galvanized	Skid Quantity:	1200

ELECTRICAL SPECIFICATION:

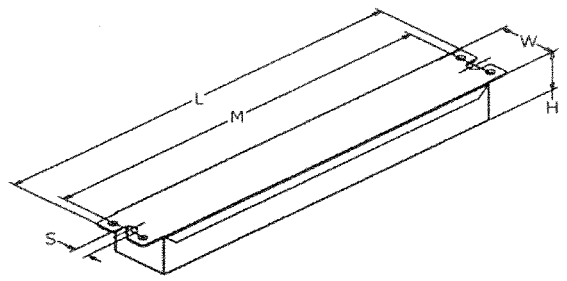
Line Voltage (V)	Lamp Type	Lamp Watts	No. of Lamps	Line Current (A)	Input Power (W)	Power Factor	Max Current THD (%)	Current Crest Factor	Ballast Factor	Wiring Diagram	B.E.F.
120	F54T5HO	54	2	1.00	119	>0.99	≤10	≤1.4	1.00	015C	0.84
277				0.43	118	>0.99					0.85
120	FT55W/2G11/RS	55	2	0.94	112	>0.99	≤10	≤1.4	0.90	015C	0.80
277				0.41	113	>0.98					
120	FT50W/2G11/RS	50	2	0.90	110	>0.98	≤10	≤1.5	0.96	015C	0.87
277				0.40		>0.98					
120	FT36W/2G11	36	2	0.66	79	>0.99	≤10	≤1.5	1.00	015C	1.27
277				0.29	80	>0.98					1.25
120	F54T5HO	54	1	0.51	61	>0.99	≤10	≤1.5	1.03	003	1.69
277				0.23	62	>0.98	≤10				1.66
120	FT55W/2G11/RS	55	1	0.48	53	>0.98	≤10	≤1.4	0.94	003	1.77
277				0.20	51	>0.97					1.84
120	FT50W/2G11/RS	50	1	0.43	51	>0.99	≤10	≤1.4	0.93	003	1.82
277				0.18		>0.97					
120	FT36W/2G11	36	1	0.33	40	>0.99	≤10	≤1.5	0.98	003	2.45
277				0.16	42	>0.96					2.33
120	FC12T5HO	55	1	0.41	49	>0.99	≤10	≤1.5	0.92	003	1.88
277				0.19	51	>0.97	≤12				1.80

PERFORMANCE:
- High efficiency electronic ballast
- Programmed start
- Series operation
- High power factor
- Encased & potted
- Sound rated A
- End of Lamp Life protection
- Internal surge protection
- Meets FCC Part 18 (Class A) for EMI and RFI non-consumer limits
- Meets ANSI standard C82.11
- Meets ANSI standard C62.41

APPLICATION:
- Maximum case temperature: 194°F/90°C
- Maximum ambient temperature: 104°F/40°C
- Minimum starting temperature: 0°F/-18°C
- Not recommended for extreme temperature variations
- Lamp starts: >50,000 starts
- Remote mounting: 18 ft.

SAFETY:
- UL/935 (Class P, Type HL, Type CC, Type 1 outdoor) listed
- CSA certified (cUL)
- RoHS Compliant
- No PCB's

CASE STYLE: 12D



H	W	L	M	S
1 1/16	1 3/8	9 7/16	8 7/8	9/32
1.06	1.38	9.44	8.88	0.28
2.69cm	3.51cm	23.98cm	22.56cm	0.71cm

WIRING DIAGRAM

003

015C

Standard lead lengths:
- Blk: 24"
- Red: (2) 29"
- Yel: (2) 45"
- Wht: 24"
- Blu: (2) 29"

* 3/8 Strip

WARRANTY:
Robertson Worldwide warrants to the purchaser that this ballast will be free from defects in material or workmanship for a period of five years for operation at a maximim case temperature of 75°C or three years for operation at a maximum case temperature of 90°C from date of manufacture when properly installed and under normal conditions of use. For more information on Robertson Worldwide ballasts, call 1-800-323-5633 or visit www.robertsonww.com. For our energy star compliant ballasts, visit www.nema.org/lampballastmatrix/ Specifications subject to change without notice.

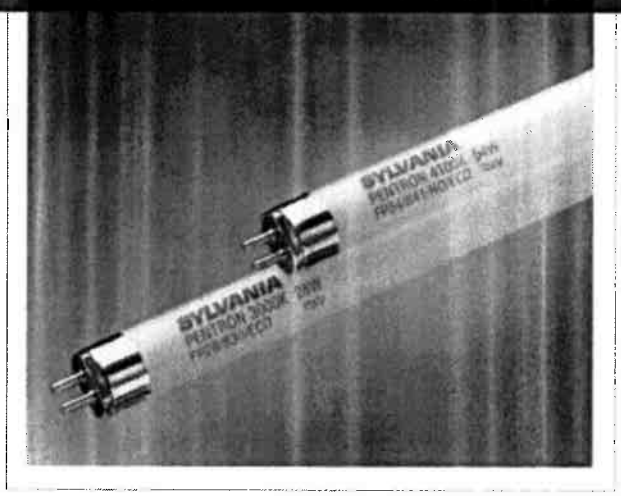
4/30/2010

ROBERTSON WORLDWIDE
13611 Thornton Rd, Blue Island, IL 60406, TEL: 1-800-323-5633, FAX: 1-877-388-2420, www.robertsonww.com

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

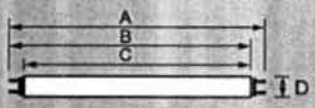
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

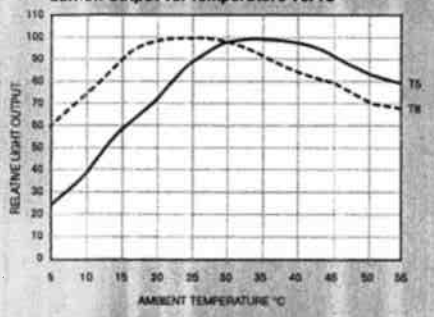
Technical Information

Dimensions



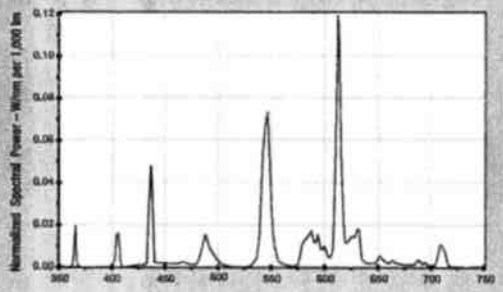
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

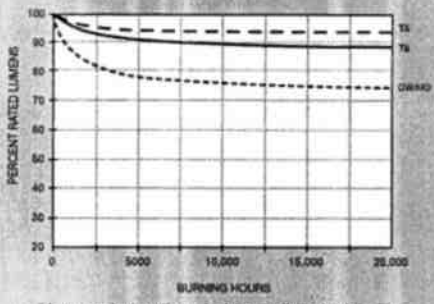


Spectral Power Distributions

PENTRON 830

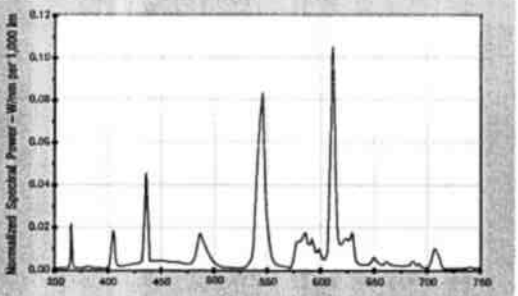


Fluorescent Lamp Lumen Maintenance

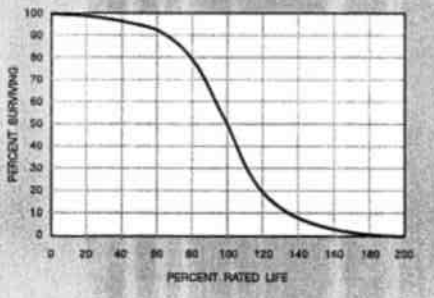


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

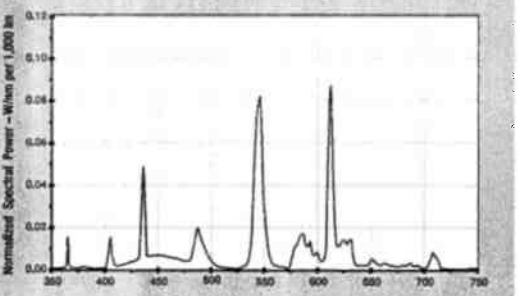
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
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Danvers, MA 01923

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Fax: 1-800-562-4674

OEM/Special Markets
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Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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Mississauga, ON L5S 1S4

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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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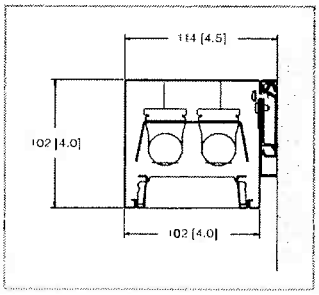
SK & Associates	Description : FS4W-2-T5HO-8-N-SB-D-WT-E-D5-1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP18D**

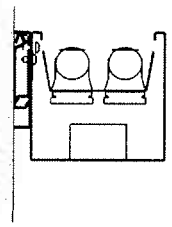
Ordering Guide

Flex FS4W Series
Wall Mount

Mounting Information

Nominal Length	Overall mm [In]	Nominal Length	Overall mm [In]
4' T8	1240 [48.9]	4' T5	1194 [47.0]
8' T8	2459 [96.8]	8' T5	2366 [93.2]





T5/T8

Photometrics pages 14-15

Part number example

FS4W | 1 | T5 | 8 | N | OL | D | W | BN4 | AB | 277

Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage
FS4W										

Number of Lamps
- 1
- 2

Lamp Type
- T8 32W
- T5 28W
- T5HO 54W

Length
- 4
- 8
- 12 (8+4)
- 16 (8+8)
- 20 (8+8+4)
- 24 (8+8+8)
- 28 (8+8+8+4)
- 32 (8+8+8+8)
- 36 (8+8+8+8+4)
- 40 (8+8+8+8+8)
- 44 (8+8+8+8+8+4)
- 48 (8+8+8+8+8+8)

Refer to website for run chart dimensions

Control Up
- N None
- A Asymmetric reflector (Available 1 lamp only)

Control Down
- SBR Dropped Solid Cross Blade Baffle
- SB Solid Cross Blade Baffle
- PB Perforated Cross Blade Baffle
- SSL Semi Specular Parabolic Louver
- /O Opal Overlay for use with the above controls
- ML Micro Linear Lens
- OL Opal Lens
- N None
- A Asymmetric reflector (Available 1 lamp only)

Mounting
- Wall bracket
- D Direct
- I Indirect

Finish
- WT White Textured
- C Textured Custom Finish *For custom Finish specify RAL#*

Ballast

Standard
- E Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO

Dimming (120v/277v only)
- D1 Advance Mark 7 (1/2 Lamp T8, 1/2 Lamp T5HO)
- D2 Advance Mark 10 (1/2 Lamp T8, 1/2 Lamp T5HO)
- D3 Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO)
- D4 Lutron Hi-lume (1/2 Lamp T8, T5HO)
- D5 Lutron Eco-System (T5-T5HO-T8)

Battery Pack Options (120v/277v only)
- BN1 Bodine B50LP (T8)
- BN2 Bodine LP400 (T8)
- BN3 Bodine LP500 (T5)
- BN4 Bodine LP600 (T5/T5HO/T8)

Please refer to circuitry guide for complete details

Circuitry
- 1 Circuit (Standard)
- AB Alternating Switching
- LR Left-right switching
- /EN Emergency/ Night Light

Voltage
- 120
- 277
- 347
- UNV

R2-04-11

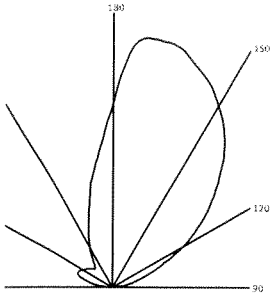
Approvals

Metalumen
570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589
www.metalumen.com

Signature

Date

Distribution Curve



Candlepower Summary

Angle	0.0	22.5	45	67.5	90	Output Lumens
90	2	1	2	2	2	1
95	34	24	34	35	34	17
100	78	64	79	82	78	41
105	126	108	127	126	126	64
110	177	171	178	160	177	88
115	234	249	233	164	234	109
120	294	351	294	151	294	129
125	354	453	356	137	354	146
130	423	552	425	123	423	160
135	491	649	488	112	491	169
140	552	755	552	117	552	174
145	607	846	609	151	607	174
150	667	922	663	199	667	168
155	719	994	715	250	719	155
160	766	1046	765	311	766	135
165	801	1099	806	398	801	110
170	828	1108	812	508	828	77
175	821	1070	823	623	821	40
180	812	812	812	812	812	5

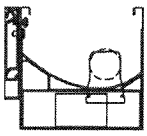
Corridor Layout

10.7(L) x 2.4(W) x 3.0(H)m [35 x 8 x 10 ft]
Reflectances: 80/50/20
Maintenance Factor: 0.75
Mounting Height: 2.3m [7'-6"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	0	0	0
0-40	0	0	0
0-60	0	0	0
0-90	0	0	0
90-120	386	13	20
90-130	677	23	35
90-150	1360	47	69
90-180	1963	68	100
0-180	1964	68	100

T8 - 1 Lamp



Photometric Report: File # FS4W-1T8-A-N-I
Efficiency: 67.7%
100% Indirect
Lamp: 1- F32 T8 Lamp
Control: Asymmetric reflector

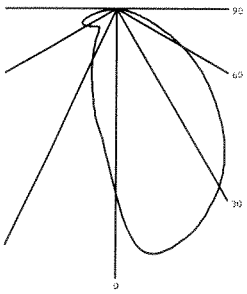
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	64	64	64	64	55	55	55	55	37	37	37
1	58	56	53	51	50	47	46	44	32	31	30
2	53	48	45	41	45	41	38	36	28	26	25
3	48	42	38	34	41	36	33	30	25	22	21
4	44	37	32	29	37	32	28	25	22	19	17
5	40	33	28	24	34	28	24	21	19	17	15
6	37	29	24	21	31	25	21	18	17	14	13
7	34	26	21	18	29	22	18	15	15	13	11
8	31	23	19	15	26	20	16	13	14	11	9
9	29	21	16	13	24	18	14	12	12	10	8
10	27	19	15	12	23	16	13	10	11	9	7

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

Distribution Curve



Candlepower Summary

Angle	0.0	22.5	45	67.5	90	Output Lumens
0	822	822	822	822	822	5
5	828	614	824	1065	828	40
10	817	507	817	1118	817	78
15	802	400	808	1093	802	110
20	764	316	764	1053	764	136
25	722	250	720	991	722	155
30	671	197	666	926	671	169
35	609	153	614	849	609	175
40	554	119	550	754	554	174
45	491	112	491	648	491	169
50	425	123	422	550	425	160
55	356	137	356	451	356	146
60	293	151	294	350	293	129
65	233	164	234	251	233	110
70	178	160	177	168	178	88
75	127	126	126	108	127	64
80	78	82	78	63	78	41
85	33	35	34	24	33	17
90	2	2	2	1	2	1

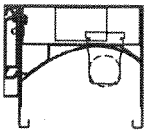
Corridor Layout

10.7(L) x 2.4(W) x 3.0(H)m [35 x 8 x 10 ft]
Reflectances: 80/50/20
Maintenance Factor: 0.75
Mounting Height: 2.3m [7'-6"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	605	21	31
0-40	952	33	48
0-60	1579	55	80
0-90	1965	68	100
90-120	0	0	0
90-130	0	0	0
90-150	0	0	0
90-180	0	0	0
0-180	1965	68	100

T8 - 1 Lamp



Photometric Report: File # FS4W-1T8-N-A-D
Efficiency: 67.8%
100% Direct
Lamp: 1- F32 T8 Lamp
Control: Asymmetric reflector

Coefficients of Utilization
Zonal Cavity Method

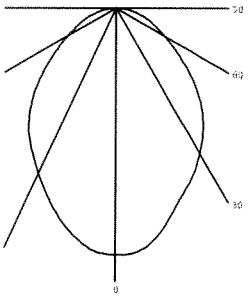
Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	80	80	80	80	78	78	78	78	75	75	75
1	74	70	68	65	72	69	66	64	66	64	62
2	67	62	57	53	65	60	56	53	58	55	52
3	61	54	49	45	60	53	48	44	51	47	43
4	56	48	43	38	55	47	42	38	46	41	37
5	52	43	37	33	51	43	37	33	41	36	32
6	48	39	33	29	47	39	33	29	37	32	29
7	45	36	30	26	43	35	30	26	34	29	25
8	42	33	27	23	41	32	27	23	31	26	23
9	39	30	25	21	38	30	24	21	29	24	21
10	37	28	22	19	36	27	22	19	27	22	19

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

Photometrics

Distribution Curve



Candlepower Summary

Angle	0.0	22.5	45	67.5	90	Output Lumens
0	1655	1655	1655	1655	1655	10
5	1639	1664	1629	1642	1639	79
10	1526	1566	1563	1579	1526	148
15	1431	1468	1427	1483	1431	206
20	1310	1349	1289	1338	1310	248
25	1174	1241	1166	1242	1174	279
30	1026	1109	1019	1112	1026	292
35	890	995	885	987	890	295
40	735	883	739	885	735	286
45	601	783	593	782	601	267
50	466	651	466	655	466	235
55	379	509	380	512	379	200
60	310	388	308	389	310	166
65	242	302	244	304	242	136
70	184	237	185	237	184	109
75	129	167	130	160	129	78
80	82	97	78	100	82	48
85	36	42	36	41	36	21
90	4	4	4	3	4	2

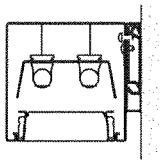
Corridor Layout

10.7(L) x 2.4(W) x 3.0(H)m [35 x 8 x 10 ft]
Reflectances: 80/50/20
Maintenance Factor: 0.85
Mounting Height: 2.3m [7'-6"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	1110	19	36
0-40	1697	29	55
0-60	2627	45	85
0-90	3103	54	100
90-120	1	0	0
90-130	1	0	0
90-150	1	0	0
90-180	1	0	0
0-180	3104	54	100

T5 - 2 Lamps



Photometric Report: File # FS4W-2T5-N-SB-D
Efficiency: 53.3%
100% Direct
Lamps: 2- F28 T5 Lamps
Control: Solid cross blade baffle

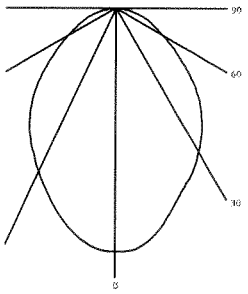
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	64	64	64	64	62	62	62	62	59	59	59
1	59	56	54	52	57	55	53	52	53	51	50
2	54	50	47	44	52	49	46	43	47	44	42
3	50	44	40	37	48	44	40	37	42	39	36
4	46	40	35	32	45	39	35	32	38	34	32
5	42	36	31	28	41	35	31	28	34	31	28
6	39	33	28	25	38	32	28	25	31	27	25
7	37	30	25	22	36	29	25	22	29	25	22
8	34	27	23	20	33	27	23	20	26	23	20
9	32	25	21	18	31	25	21	18	24	21	18
10	30	23	19	17	30	23	19	17	23	19	17

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

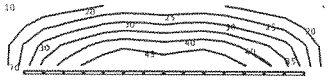
Distribution Curve



Candlepower Summary

Angle	0.0	22.5	45	67.5	90	Output Lumens
0	1503	1503	1503	1503	1503	10
5	1502	1490	1494	1482	1502	79
10	1401	1418	1400	1413	1401	148
15	1305	1308	1311	1322	1305	206
20	1185	1199	1181	1213	1185	248
25	1051	1115	1053	1111	1051	279
30	925	1019	920	1013	925	292
35	792	924	791	920	792	295
40	669	814	662	808	669	286
45	537	687	537	686	537	267
50	431	551	427	552	431	235
55	343	439	339	433	343	200
60	278	337	279	336	278	166
65	219	262	217	261	219	136
70	165	206	163	203	165	109
75	117	144	115	144	117	78
80	70.7	87.7	71	87	70.7	48
85	33	37.7	32.2	37.1	33	21
90	3.14	3.1	2.77	3.25	3.14	2

Corridor Layout

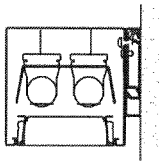


10.7(L) x 2.4(W) x 3.0(H)m [35 x 8 x 10 ft]
Reflectances: 80/50/20
Maintenance Factor: 0.75
Mounting Height: 2.3m [7'-6"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	1003	17	36
0-40	1537	27	55
0-60	2360	41	85
0-90	2779	48	100
90-120	1	0	0
90-130	1	0	0
90-150	2	0	0
90-180	2	0	0
0-180	2781	48	100

T8 - 2 Lamps



Photometric Report: File # FSW-2T8-N-SB-D
Efficiency: 47.9%
100% Direct
Lamps: 2- F32 T8 Lamps
Control: Solid cross blade baffle

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	57	57	57	57	55	55	55	55	53	53	53
1	52	50	49	47	51	49	48	46	47	46	45
2	48	45	42	39	47	44	41	39	42	40	38
3	44	40	36	33	43	39	36	33	38	35	32
4	41	36	32	29	40	35	31	29	34	31	28
5	38	32	28	25	37	32	28	25	31	27	25
6	35	29	25	22	34	29	25	22	28	25	22
7	33	27	23	20	32	26	23	20	26	22	20
8	31	25	21	18	30	24	21	18	24	20	18
9	29	23	19	16	28	22	19	16	22	19	16
10	27	21	17	15	26	21	17	15	20	17	15

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

SK & Associates	Description : BALLAST FOR FP18D Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FP18D

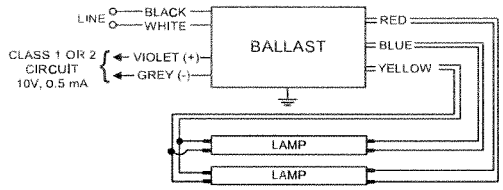
ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
* F54T5/HO	2	54	50/10	1.05	24/125	0.03/1.00	10	0.98	1.7	0.80
F54T5/HO/ES (49W)	2	49	50/10	0.98	24/117	0.03/1.00	10	0.98	1.7	0.85
FC12T5/HO	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79
FT55W/2G11	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79

Wiring Diagram



Diag. 56A

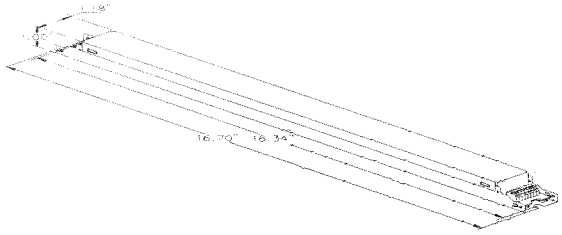
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0	0
White	0	0
Blue	0	0
Red	0	0
Yellow	0	0
Gray	0	0
Violet	0	0

	in.	cm.
Yellow/Blue	0	0
Blue/White	0	0
Brown	0	0
Orange	0	0
Orange/Black	0	0
Black/White	0	0
Red/White	0	0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 02/28/12

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 847-768-7768
Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors or integral leads color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

2.2 VZT-4PSP32-G ballast shall provide Independent Lamp Operation (ILO) allowing remaining lamp(s) to maintain full light output when one or more lamps fail.

2.3 Ballast shall be provided with integral protection circuitry to withstand connection of low voltage control leads to mains power supply. In this event, ballast shall default to maximum light output.

2.4 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.5 Ballast shall operate from 50/60 Hz input source of 120V or 277V or 347V with sustained variations of +/- 10% (voltage and frequency). IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency).

2.6 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.7 Ballast shall have a Power Factor greater than 0.98 at full light output and greater than 0.90 throughout the dimming range for primary lamp.

2.8 Ballast shall have a minimum ballast factor of 1.00 (120V and 277V 1-3 lamp models) or 0.88 (120V and 277V 4 lamp models and 347V 2-3 lamp models) or 1.18 (277V 4 lamp HL models) at maximum light output and 0.03 at minimum light output for primary lamp.

2.9 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.10 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage and 100% power.

2.11 Ballast shall have a Class A sound rating.

2.12 Ballast shall have a minimum starting temperature of 10C (50F) for primary lamp.

2.13 Ballast shall provide Lamp EOL Protection Circuit for all T5, T5/HO and CFL lamps.

2.14 Ballast shall control lamp light output from 100% - 3% relative light output for series operation T8 and CFL lamps, 100% - 10% relative light output for parallel operation T8 and 100% - 1% relative light output for T5/HO lamps.

2.15 Ballast shall ignite the lamps at any light output setting without first going to another output setting.

2.16 Ballast shall tolerate sustained open circuit and short circuit output conditions.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

3.6 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be controlled by a Class 1 or Class 2 low voltage 0-10VDC controller.

4.5 Ballast shall be Philips Advance part # _____ or approved equal.

Revised 02/28/12

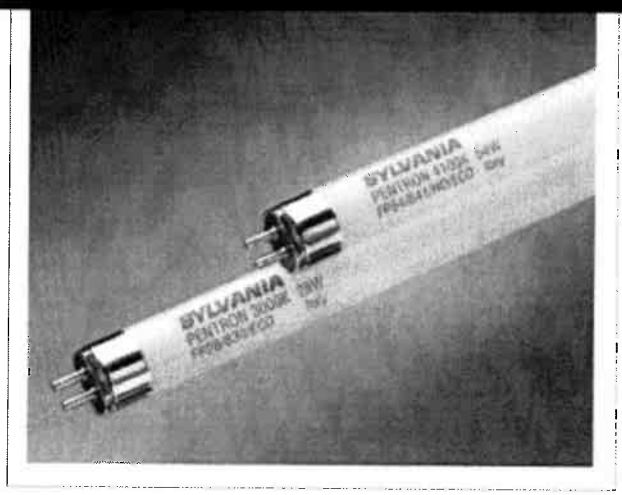
Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

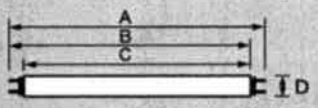
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

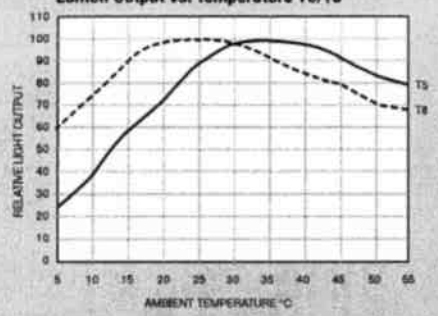
Technical Information

Dimensions



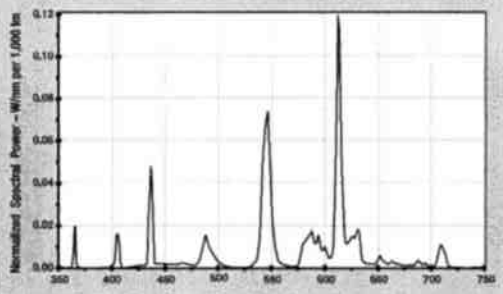
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

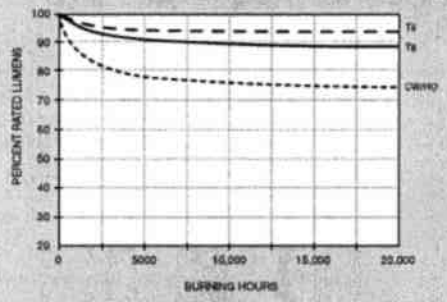


Spectral Power Distributions

PENTRON 830

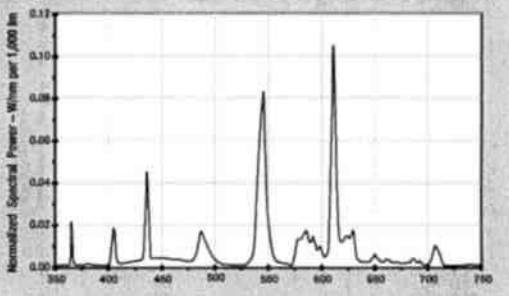


Fluorescent Lamp Lumen Maintenance

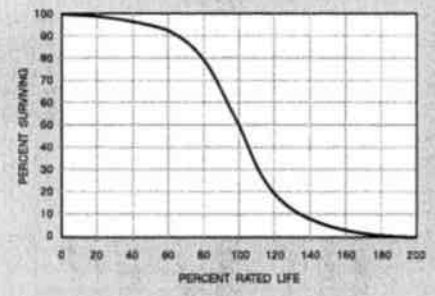


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

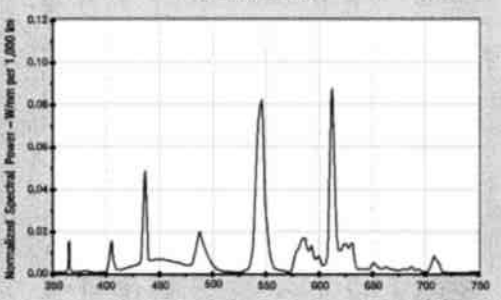
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

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OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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Mississauga, ON L5S 1S4

Trade
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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

www.sylvania.com

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SK & Associates	Description : S8A-1-T5HO-4-VD-SB-Y-W-E-1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP4H**

Ordering Guide

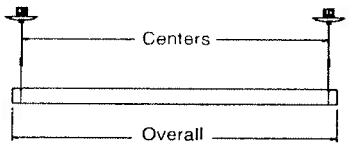
Boxer S8A Series 16

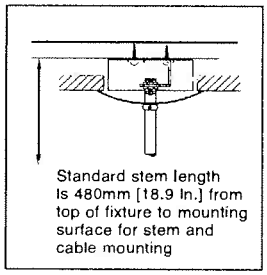
Pendant Variable Distribution

Mounting Information

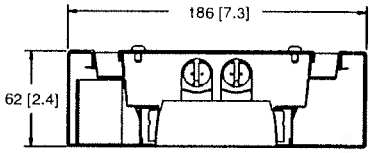
Nominal Length	Overall mm [in]	Centers mm [in]
4' T5-T8	1289 [50.8]	1219 [48.0]
8' T5-T8	2508 [98.8]	2438 [96.0]

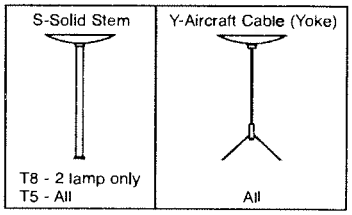
All luminaires in this series are modular. There are no start, intermediate or end units. Luminaires are provided with through wiring, quick connectors and end caps.





Standard stem length is 480mm [18.9 In.] from top of fixture to mounting surface for stem and cable mounting





Photometrics on reverse

Part number example

S8A	2	T8	8	VD	SSL	Y	W	E	1	277	N
Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage	Options

Number of Lamps
- 2
- 1

Lamp Type
- T8 32W
- T5 28W
- T5HO 54W

Length
- 4
- 8
- 12 (8'+4')
- 16 (2x8')
- 20 (2x8'+4')
- 24 (3x8')
- 28 (3x8'+4')
- 32 (4x8')
- 36 (4x8'+4')
- 40 (5x8')
- 44 (5x8'+4')
- 48 (6x8')

Control Up
- VD* Variable Optics Deflector FULLY OPEN (*) Shipped fully open unless ordered as indicated below
- VD1 1/4 Closed
- VD2 1/2 Closed
- VD3 3/4 Closed
- VD4 Fully closed

Control Down
- SB Solid Cross Blade Baffle
- PB Perforated Cross Blade Baffle
- SL Specular Parabolic Louver
- SSL Semi Specular Parabolic Louver
- /O Opal Overlay for use with any of the above controls
- ML Micro Linear Lens
- FL Frosted Lens

Mounting
- S Solid Stem *(Not available with 1-T8 lamp)*
- Y Yoke Aircraft Cable
- Additional mounting options available

Finish
- W White
- C Custom Finish *For custom Finish specify RAL#*

Ballast
- Standard
- E Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO
- Dimming *120v/277v dimming*
- D1 Advance Mark 7 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- D2 Advance Mark 10 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- D3 Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO)
- D4 Lutron Hi-lume (1/2 Lamp T8, T5HO)
- D5 Lutron Eco-System (T5-T5HO-T8)
- Battery Pack Options *(120v/277v)*
- BN1 Bodine B50LP (T8)
- BN3 Bodine LP500 (T5)
- BN4 Bodine LP600 (T5/T5HO/T8)

Circuitry
- 1 1 Circuit (Standard)
- LR Left/Right Switching
- IO In/Out Switching (3 Lamp)
- /EN Emergency/ Night Light
- Consult factory

Voltage
- 120
- 277
- 347

Options
- N None
- O Occupancy Sensor
- D Daylight Sensor
- DOS Daylight/ Occupancy Sensor

Please refer to circuitry and sensor options guide for complete details

R1-12-09

Approvals

METALUMEN

570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589
www.metalumen.com

Signature

Date

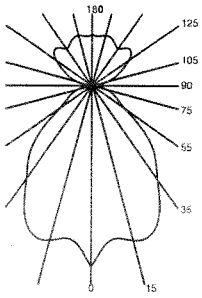
Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
FSC

Photometrics

Boxer S8A Series 16

Pendant Variable Distribution

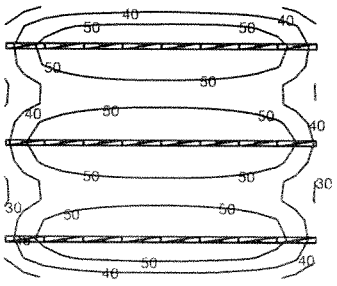
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	1033	1033	1033	6
5	866	894	912	80
15	763	834	915	237
25	630	743	879	347
35	477	585	651	361
45	327	403	481	312
55	217	231	229	204
65	143	137	146	140
75	78	73	89	83
85	30	30	26	24
90	12	6	3	4
95	32	25	16	20
105	81	91	91	94
115	131	165	165	155
125	178	221	251	195
135	223	241	296	194
145	259	255	260	162
155	293	280	282	131
165	292	309	297	86
175	294	297	282	26
180	292	292	292	2

Room Layout

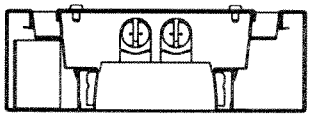


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.85
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	670	12	23
0- 40	1031	18	36
0- 60	1547	27	54
0- 90	1795	31	63
90-120	271	5	10
90-130	466	8	16
90-150	822	14	29
90-180	1066	18	37
0-180	2861	49	100

T5 - 2 Lamps



Photometric Report: File # S8A-2T5-4-VD-SB
Efficiency: 49.3 %
63% Direct : 37% Indirect
Model Shown: 2- F28 T5 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

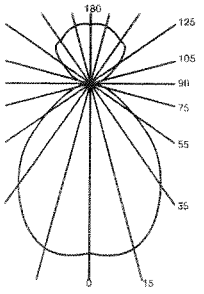
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	54	54	54	54	51	51	51	51	44	44	44
1	50	48	46	44	46	45	43	42	39	38	37
2	45	42	39	37	43	39	37	35	35	33	31
3	42	37	34	31	39	35	32	29	31	29	27
4	38	33	29	27	36	31	28	25	28	25	23
5	35	30	26	23	33	28	25	22	25	22	20
6	33	27	23	20	31	26	22	19	23	20	18
7	30	24	21	18	29	23	20	17	21	18	16
8	28	22	19	16	27	21	18	15	19	16	14
9	26	20	17	14	25	19	16	14	18	15	13
10	25	19	15	13	23	18	15	13	16	14	12

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

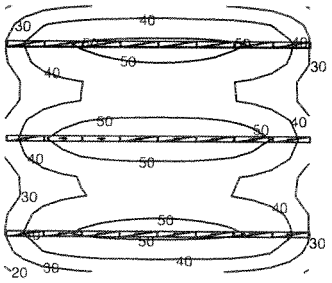
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	900	900	900	5
5	859	884	915	79
15	771	834	905	237
25	638	727	809	336
35	490	569	657	359
45	336	400	490	316
55	224	241	282	222
65	143	138	148	141
75	78	73	82	81
85	34	31	28	25
90	14	7	3	4
95	32	22	17	19
105	80	67	62	73
115	130	128	117	125
125	179	193	179	167
135	223	239	260	186
145	260	270	279	169
155	292	299	298	137
165	311	314	316	89
175	317	320	318	29
180	314	314	314	2

Room Layout

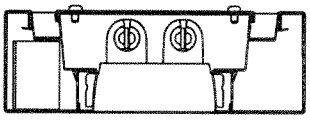


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.75
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	657	11	24
0- 40	1016	18	36
0- 60	1553	27	56
0- 90	1802	31	64
90-120	219	4	8
90-130	386	7	14
90-150	741	13	27
90-180	998	17	36
0-180	2800	48	100

T8 - 2 Lamps



Photometric Report: File # S8A-2T8-4-VD-SB
Efficiency: 48.3%
64% Direct : 36% Indirect
Model Shown: 2- F32 T8 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	53	53	53	53	50	50	50	50	44	44	44
1	49	47	45	43	46	44	42	41	39	38	37
2	45	41	38	36	42	39	36	34	34	32	31
3	41	37	33	30	38	34	31	29	31	28	26
4	38	33	29	26	35	31	27	25	27	25	23
5	35	29	25	23	33	28	24	22	25	22	20
6	32	26	23	20	30	25	22	19	22	20	18
7	30	24	20	18	28	23	19	17	21	18	16
8	28	22	18	16	26	21	17	15	19	16	14
9	26	20	16	14	24	19	16	14	17	15	13
10	24	18	15	13	23	18	14	12	16	13	11

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

SK & Associates	Description : PHOTOMETRIC REPORT FOR FP4H Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP4H**

S8A-1T5HO-4-N-SL-X-W.rpt

Wed Sep 19 08:27:11 2007

IESNA:LM-63-1995
Photopia 2.0.0.17 PHOTOMETRIC REPORT
PROJECT: S8A-1T5HO-4-N-SL-X-W
OPTIONS:
  Spawning 1 rays for each reaction.
  Writing 250 rays to a DXF file.
  Random number generator seed: 8.
  Tracing 10 reflections.
  Stop tracing ray at 1.0% of initial magnitude.
  Tracing 5000004 initial lamp rays.
  Photometric test distance of 7.00 meters.

LUMENS EXITING SYSTEM:

Lumens(%)	Reflection
2454(55.8%)	0
838(19.1%)	1
353(8.0%)	2
136(3.1%)	3
46(1.0%)	4
20(0.5%)	5
10(0.2%)	6
6(0.1%)	7
3(0.1%)	8
2(0.1%)	9
1(0.0%)	10
3874(88.1%)	Total

LUMEN INTERACTION WITH SYSTEM:

Absorbed(%)	Incident(%)	Layer Name
2(0.0%)	21(0.5%)	BODY
23(0.5%)	369(8.4%)	LAMP-F54T5HO1
1(0.0%)	15(0.4%)	LAMP-F54T5HO2
27(0.6%)	78(1.8%)	LHDRBRKT
152(3.5%)	1013(23.0%)	LOUVERBLADE
72(1.6%)	447(10.2%)	LOUVERRAIL
116(2.6%)	774(17.6%)	RF-0101-004_P5
116(2.6%)	774(17.6%)	RF-0101-004_P5b
510(11.6%)	3495(79.5%)	Total

Absorbed(%)	Incident(%)	Material Name
24(0.6%)	385(8.8%)	PHOSGLAS
29(0.7%)	99(2.3%)	PAINT006
456(10.4%)	3010(68.4%)	SPEC85
510(11.6%)	3495(79.5%)	Total

UNACCOUNTED LUMENS:

reached interreflection limit:	14.12 (0.3%)
fell below continuation minimum:	0.00 (0.0%)
could not find in/out refractor facet:	0.00 (0.0%)
reached try limit for scatter bounce:	0.00 (0.0%)
lost elsewhere(i.e. outside distrib):	0.00 (0.0%)

Number of Lamps: 1 Lumens per Lamp: 4400
Ballast Factor: 1.00 Ballast-Lamp Photometric Factor: 1.00
Luminaire Width: 3.0209 Length: 3.6381 Height: 3.0683
Photometry Type: C Units: meters

Candela Distribution:

	0.00	22.50	45.00	67.50	90.00
0.00	451	451	451	451	451

5.00	463	459	453	459	465
15.00	430	437	452	464	470
25.00	386	401	441	524	579
35.00	322	369	542	687	699
45.00	248	357	435	257	183
55.00	148	191	69.0	18.0	10.0
65.00	5.00	11.0	43.0	87.0	123
75.00	0.000	1.00	2.00	6.00	9.00
85.00	1.00	1.00	1.00	0.000	0.000
90.00	15.0	10.0	3.00	1.00	0.000
95.00	71.0	193	211	157	137
105.00	114	267	549	740	778
115.00	187	309	515	655	741
125.00	274	347	542	695	725
135.00	353	406	499	626	690
145.00	419	456	514	561	583
155.00	474	489	533	559	572
165.00	512	515	528	546	557
175.00	524	524	533	526	530
180.00	531	531	531	531	531

Zonal Lumens

Cone	Between	Lumens
0.0	0.0- 2.5	2.70
5.0	2.5- 10.0	41.05
15.0	10.0- 20.0	127.77
25.0	20.0- 30.0	213.90
35.0	30.0- 40.0	331.14
45.0	40.0- 50.0	244.82
55.0	50.0- 60.0	80.07
65.0	60.0- 70.0	50.87
75.0	70.0- 80.0	3.57
85.0	80.0- 87.5	0.51
90.0	87.5- 92.5	2.95
95.0	92.5-100.0	135.83
105.0	100.0-110.0	529.49
115.0	110.0-120.0	482.16
125.0	120.0-130.0	467.31
135.0	130.0-140.0	397.39
145.0	140.0-150.0	319.13
155.0	150.0-160.0	243.47
165.0	160.0-170.0	150.49
175.0	170.0-177.5	47.20
180.0	177.5-180.0	3.18

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0- 30	385	8.8	9.9
0- 40	717	16.3	18.5
0- 60	1041	23.7	26.9
0- 90	1098	25.0	28.3
90-120	1149	26.1	29.7
90-130	1616	36.7	41.7
90-150	2333	53.0	60.2
90-180	2777	63.1	71.7
0-180	3875	88.1	100.0

Total Luminaire Optical Efficiency = 88.1%

Luminaire Spacing Criterion:

0 deg	90 deg
1.17	1.63

Average Luminaire Luminance (cd/m^2):

	0	45	90
0	41.04	41.04	41.04
45	17.31	24.18	11.68
50	13.98	13.90	6.18
55	10.65	3.80	0.65
60	5.66	3.11	4.39
65	0.38	2.42	8.33
70	0.20	1.30	4.63
75	0.00	0.12	0.66
80	0.05	0.09	0.35
85	0.10	0.07	0.00

Coefficients of Utilization - Zonal Cavity Method:

pfc = 0.20

pcc	.8				.7				.5			.3			.1			0
pw	.7	.5	.3	.1	.7	.5	.3	.1	.5	.3	.1	.5	.3	.1	.5	.3	.1	0
RCR																		
0	90	90	90	90	81	81	81	81	63	63	63	46	46	46	31	31	31	24
1	83	79	76	74	74	71	69	66	56	54	53	42	41	40	29	28	28	22
2	76	70	65	61	68	63	59	55	50	47	45	37	36	34	26	25	24	19
3	70	62	56	51	62	56	51	47	44	41	38	33	31	29	24	22	21	17
4	64	55	49	44	57	50	44	40	39	36	33	30	28	26	21	20	19	15
5	59	49	42	37	52	44	39	34	35	31	28	27	24	22	19	18	16	13
6	54	44	37	32	48	40	34	30	32	28	25	24	22	20	18	16	15	12
7	50	40	33	28	44	36	30	26	29	25	22	22	19	17	16	14	13	10
8	46	36	29	25	41	32	27	23	26	22	19	20	17	15	15	13	12	9
9	43	33	26	22	38	30	24	20	24	20	17	18	16	14	13	12	10	8
10	40	30	24	20	36	27	22	18	22	18	15	17	14	12	12	11	9	8

SK & Associates	Description : **BALLAST SPEC FOR FP4H** Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP4H**

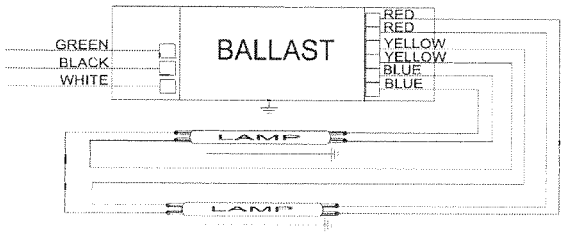
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.52	62	1.02	10	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	1.00	120	1.00	10	0.98	1.7	0.83
F54T5/HO/ES (49W)	1	49	-20/-29	0.52	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	1.00	111	1.00	10	0.98	1.7	0.90
F58T8	1	58	-20/-29	0.49	58	1.00	10	0.99	1.7	1.72
F58T8	2	58	-20/-29	0.97	116	1.00	10	0.99	1.7	0.86
FC12T5/HO	1	55	-20/-29	0.46	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.89	106	0.85	10	0.98	1.7	0.80
FT36W/2G11	1	36	-20/-29	0.39	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.75	89	1.20	10	0.98	1.7	1.35
FT50W/2G11	1	50	-20/-29	0.51	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.99	118	1.10	10	0.98	1.7	0.93
FT55W/2G11	1	55	-20/-29	0.49	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.94	112	0.90	10	0.98	1.7	0.80

Wiring Diagram



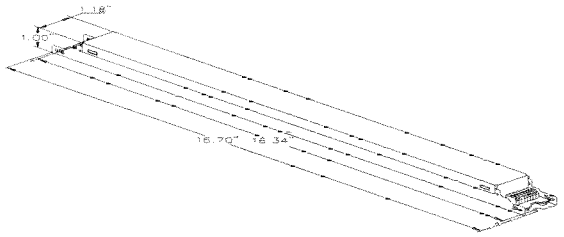
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31.0	78.7
White	31.0	78.7
Blue	28.0	71.1
Red	28.0	71.1
Yellow	48.0	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 847-768-7768
Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

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ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

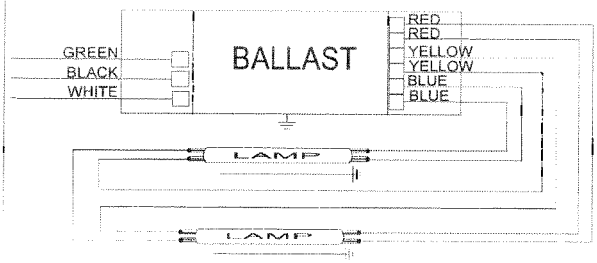
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.23	62	1.02	15	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	0.43	117	1.00	10	0.98	1.7	0.85
F54T5/HO/ES (49W)	1	49	-20/-29	0.23	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	0.43	108	1.00	10	0.98	1.7	0.93
F58T8	1	58	-20/-29	0.22	59	1.00	10	0.97	1.7	1.69
F58T8	2	58	-20/-29	0.42	114	1.00	10	0.99	1.7	0.88
FC12T5/HO	1	55	-20/-29	0.21	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.38	103	0.85	10	0.98	1.7	0.83
FT36W/2G11	1	36	-20/-29	0.18	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.32	86	1.20	10	0.98	1.7	1.40
FT50W/2G11	1	50	-20/-29	0.23	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.43	115	1.10	10	0.98	1.7	0.96
FT55W/2G11	1	55	-20/-29	0.22	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.41	109	0.90	10	0.98	1.7	0.83

Wiring Diagram



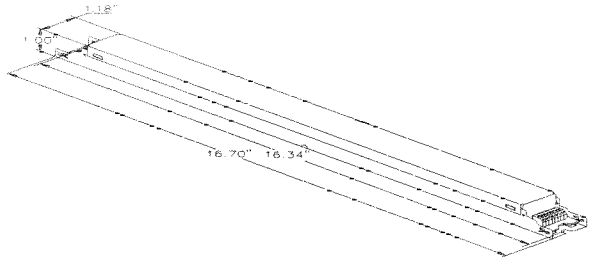
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31	78.7
White	31	78.7
Blue	28	71.1
Red	28	71.1
Yellow	48	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

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Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

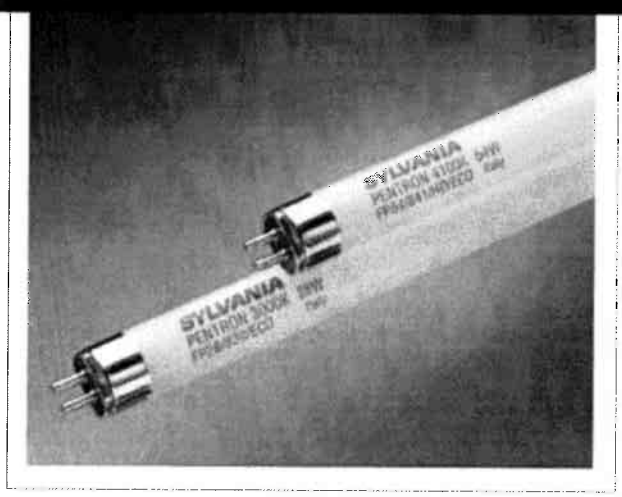
Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide Improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

ECOLOGIC

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

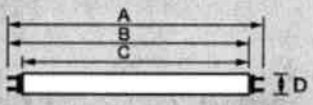
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

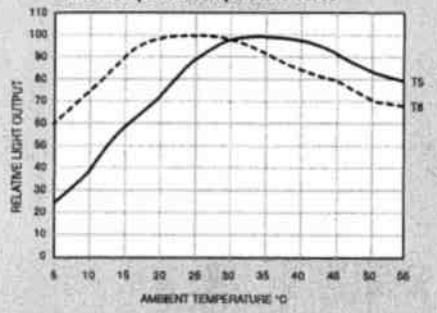
Technical Information

Dimensions



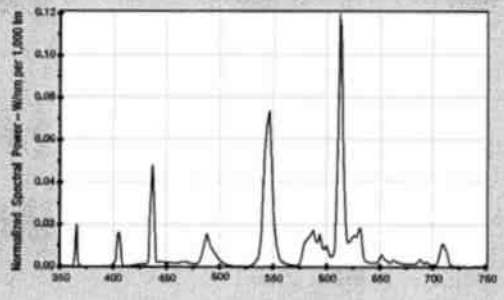
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5



Spectral Power Distributions

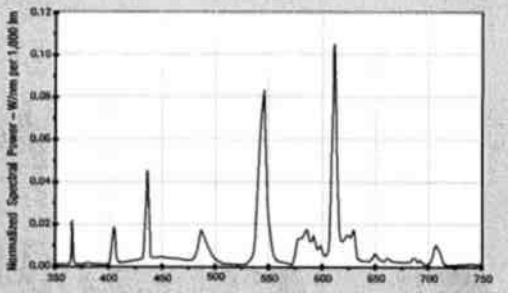
PENTRON 830



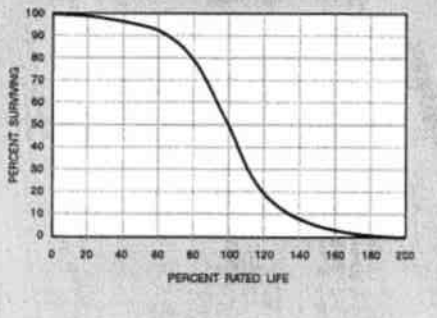
Fluorescent Lamp Lumen Maintenance

* Lumen output continues to decrease throughout the life of a fluorescent lamp.

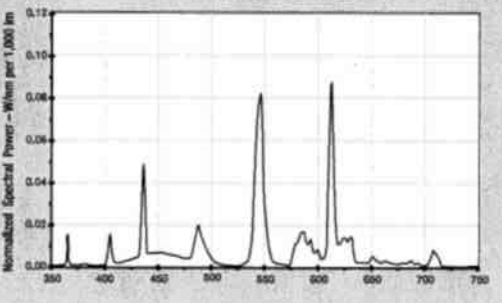
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
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Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
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2001 Drew Road
Mississauga, ON L5S 1S4

Trade
Phone: 1-800-263-2852
Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

www.sylvania.com

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SK Associates	Description : S8A-2-T5HO-8-VD-SB-Y-W-E-LR-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8**

Ordering Guide

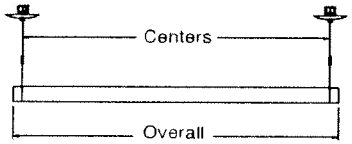
Boxer S8A Series 16

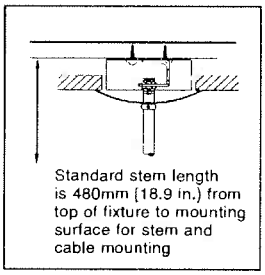
Pendant Variable Distribution

Mounting Information

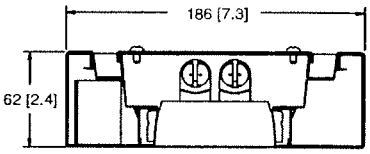
Nominal Length	Overall mm [in]	Centers mm [in]
4' T5-T8	1289 [50.8]	1219 [48.0]
8' T5-T8	2508 [98.8]	2438 [96.0]

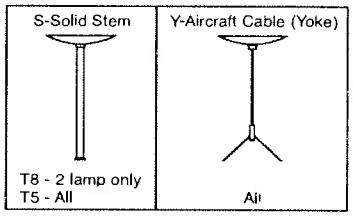
All luminaires in this series are modular. There are no start, intermediate or end units. Luminaires are provided with through wiring, quick connectors and end caps.





Standard stem length is 480mm [18.9 in.] from top of fixture to mounting surface for stem and cable mounting





Photometrics on reverse

Part number example: S8A — 2 — T8 — 8 — VD — SSL — Y — W — E — 1 — 277 — N

Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage	Options
S8A											

Number of Lamps
- 2

Lamp Type
- T8 32W
- T5 28W
- T5HO 54W

Length
- 4
- 8
- 12 (8'+4')
- 16 (2x8')
- 20 (2x8'+4')
- 24 (3x8')
- 28 (3x8'+4')
- 32 (4x8')
- 36 (4x8'+4')
- 40 (5x8')
- 44 (5x8'+4')
- 48 (6x8')

Control Up
- VD* Variable Optics Deflector FULLY OPEN
  (*) Shipped fully open unless ordered as indicated below
- VD1 1/4 Closed
- VD2 1/2 Closed
- VD3 3/4 Closed
- VD4 Fully closed

Control Down
- SB Solid Cross Blade Baffle
- PB Perforated Cross Blade Baffle
- SL Specular Parabolic Louver
- SSL Semi Specular Parabolic Louver
- /O Opal Overlay for use with any of the above controls
- ML Micro Linear Lens
- FL Frosted Lens

Mounting
- S Solid Stem *(Not available with 1-T8 lamp)*
- Y Yoke Aircraft Cable
- Additional mounting options available

Finish
- W White
- C Custom Finish *For custom Finish specify RAL#*

Ballast
- Standard
- E Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO

Dimming *120v/277v dimming*
- D1 Advance Mark 7 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- D2 Advance Mark 10 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- D3 Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO)
- D4 Lutron Hi-lume (1/2 Lamp T8, T5HO)
- D5 Lutron Eco-System (T5-T5HO-T8)

Battery Pack Options *(120v/277v)*
- BN1 Bodine B50LP (T8)
- BN3 Bodine LP500 (T5)
- BN4 Bodine LP600 (T5/T5HO/T8)

Circuitry
- 1 1 Circuit (Standard)
- LR Left/Right Switching
- IO In/Out Switching (3 Lamp)
- /EN Emergency/ Night Light

Consult factory

Voltage
- 120
- 277
- 347

Options
- N None
- O Occupancy Sensor
- D Daylight Sensor
- DOS Daylight/ Occupancy Sensor

Please refer to circuitry and sensor options guide for complete details

R1-12-09

Approvals

METALUMEN

570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589
www.metalumen.com

Signature

Date

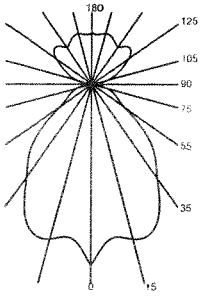
FSC Mixed Sources

Photometrics

Boxer S8A Series 16

Pendant Variable Distribution

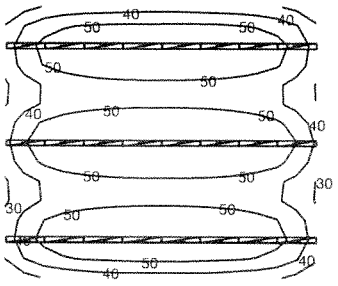
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	1033	1033	1033	6
5	866	894	912	80
15	763	834	915	237
25	630	743	879	347
35	477	585	651	361
45	327	403	481	312
55	217	231	229	204
65	143	137	146	140
75	78	73	89	83
85	30	30	26	24
90	12	6	3	4
95	32	25	16	20
105	81	91	91	94
115	131	165	165	155
125	178	221	251	195
135	223	241	296	194
145	259	255	260	162
155	293	280	282	131
165	292	309	297	86
175	294	297	282	26
180	292	292	292	2

Room Layout

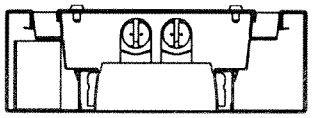


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.85
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	670	12	23
0- 40	1031	18	36
0- 60	1547	27	54
0- 90	1795	31	63
90-120	271	5	10
90-130	466	8	16
90-150	822	14	29
90-180	1066	18	37
0-180	2861	49	100

T5 - 2 Lamps



Photometric Report: File # S8A-2T5-4-VD-SB
Efficiency: 49.3 %
63% Direct : 37% Indirect
Model Shown: 2- F28 T5 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

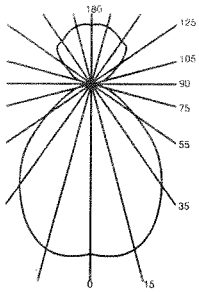
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	54	54	54	54	51	51	51	51	44	44	44
1	50	48	46	44	46	45	43	42	39	38	37
2	45	42	39	37	43	39	37	35	35	33	31
3	42	37	34	31	39	35	32	29	31	29	27
4	38	33	29	27	36	31	28	25	28	25	23
5	35	30	26	23	33	28	25	22	25	22	20
6	33	27	23	20	31	26	22	19	23	20	18
7	30	24	21	18	29	23	20	17	21	18	16
8	28	22	19	16	27	21	18	15	19	16	14
9	26	20	17	14	25	19	16	14	18	15	13
10	25	19	15	13	23	18	15	13	16	14	12

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at www.metalumen.com/ies

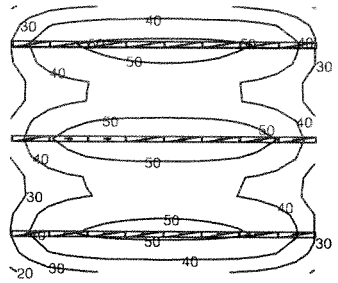
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	900	900	900	5
5	859	884	915	79
15	771	834	905	237
25	638	727	809	336
35	490	569	657	359
45	336	400	490	315
55	224	241	282	222
65	143	138	148	141
75	78	73	82	81
85	34	31	28	25
90	14	7	3	4
95	32	22	17	19
105	80	67	62	73
115	130	128	117	125
125	179	193	179	167
135	223	239	260	186
145	260	270	279	169
155	292	299	298	137
165	311	314	316	89
175	317	320	318	29
180	314	314	314	2

Room Layout

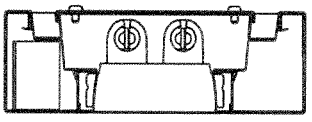


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.75
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	657	11	24
0- 40	1016	18	36
0- 60	1553	27	56
0- 90	1802	31	64
90-120	219	4	8
90-130	386	7	14
90-150	741	13	27
90-180	998	17	36
0-180	2800	48	100

T8 - 2 Lamps



Photometric Report: File # S8A-2T8-4-VD-SB
Efficiency: 48.3%
64% Direct : 36% Indirect
Model Shown: 2- F32 T8 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	53	53	53	53	50	50	50	50	44	44	44
1	49	47	45	43	46	44	42	41	39	38	37
2	45	41	38	36	42	39	36	34	34	32	31
3	41	37	33	30	38	34	31	29	31	28	26
4	38	33	29	26	35	31	27	25	27	25	23
5	35	29	25	23	33	28	24	22	25	22	20
6	32	26	23	20	30	25	22	19	22	20	18
7	30	24	20	18	28	23	19	17	21	18	16
8	28	22	18	16	26	21	17	15	19	16	14
9	26	20	16	14	24	19	16	14	17	15	13
10	24	18	15	13	23	18	14	12	16	13	11

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

SK & Associates	Description : PHOTOMETRICS FOR 2-LAMP S8A Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8**

S8A-2T5HO-4-N-SL-X-W.rpt

Thu Feb 14 10:19:28 2008

IESNA:LM-63-1995
Photopia 2.0.0.17 PHOTOMETRIC REPORT
PROJECT: S8A-2T5HO-4-N-SL-X-W
OPTIONS:
  Spawning 1 rays for each reaction.
  Writing 250 rays to a DXF file.
  Random number generator seed: 8.
  Tracing 10 reflections.
  Stop tracing ray at 1.0% of initial magnitude.
  Tracing 10000008 initial lamp rays.
  Photometric test distance of 7.00 meters.

LUMENS EXITING SYSTEM:

Lumens(%)	Reflection
4602(52.3%)	0
1660(18.9%)	1
753(8.6%)	2
289(3.3%)	3
146(1.7%)	4
77(0.9%)	5
45(0.5%)	6
29(0.3%)	7
20(0.2%)	8
14(0.2%)	9
10(0.1%)	10
7650(86.9%)	Total

LUMEN INTERACTION WITH SYSTEM:

Absorbed(%)	Incident(%)	Layer Name
3(0.0%)	33(0.4%)	BODY
179(2.0%)	2844(32.3%)	LAMP-F54T5HO1
6(0.1%)	109(1.2%)	LAMP-F54T5HO2
50(0.6%)	136(1.5%)	LHDRBRKT
323(3.7%)	2153(24.5%)	LOUVERBLADE
149(1.7%)	928(10.5%)	LOUVERRAIL
190(2.2%)	1267(14.4%)	RF-0101-004_P5
190(2.2%)	1268(14.4%)	RF-0101-004_P5b
1093(12.4%)	8742(99.3%)	Total

Absorbed(%)	Incident(%)	Material Name
186(2.1%)	2954(33.6%)	PHOSGLAS
53(0.6%)	169(1.9%)	PAINT006
853(9.7%)	5618(63.8%)	SPEC85
1093(12.4%)	8742(99.3%)	Total

UNACCOUNTED LUMENS:

reached interreflection limit:	56.00	(0.6%)
fell below continuation minimum:	0.00	(0.0%)
could not find in/out refractor facet:	0.00	(0.0%)
reached try limit for scatter bounce:	0.00	(0.0%)
lost elsewhere(i.e. outside distrib):	0.00	(0.0%)

Number of Lamps: 2 Lumens per Lamp: 4400
Ballast Factor: 1.00 Ballast-Lamp Photometric Factor: 1.00
Luminaire Width: 2.9788 Length: 3.7033 Height: 3.0538
Photometry Type: C Units: meters

Candela Distribution:

	0.00	22.50	45.00	67.50	90.00
0.00	997	997	997	997	997

5.00	1009	1013	1024	1031	1024
15.00	957	976	1055	1145	1187
25.00	866	941	1129	1177	1173
35.00	742	906	960	914	942
45.00	596	747	729	775	784
55.00	362	392	290	140	68.0
65.00	12.0	27.0	83.0	157	214
75.00	1.00	1.00	3.00	12.0	19.0
85.00	2.00	2.00	1.00	0.000	0.000
90.00	25.0	13.0	3.00	1.00	0.000
95.00	161	272	253	193	170
105.00	270	519	791	928	944
115.00	434	694	947	1105	1212
125.00	613	765	1180	1294	1309
135.00	773	867	1120	1447	1517
145.00	909	978	1073	1212	1309
155.00	1008	1063	1124	1170	1184
165.00	1089	1110	1143	1170	1182
175.00	1112	1117	1135	1157	1144
180.00	1120	1120	1120	1120	1120

Zonal Lumens

Cone	Between	Lumens
0.0	0.0- 2.5	5.96
5.0	2.5- 10.0	91.37
15.0	10.0- 20.0	301.04
25.0	20.0- 30.0	493.70
35.0	30.0- 40.0	568.83
45.0	40.0- 50.0	569.41
55.0	50.0- 60.0	232.59
65.0	60.0- 70.0	94.30
75.0	70.0- 80.0	6.88
85.0	80.0- 87.5	0.82
90.0	87.5- 92.5	4.04
95.0	92.5-100.0	180.45
105.0	100.0-110.0	752.44
115.0	110.0-120.0	885.66
125.0	120.0-130.0	942.02
135.0	130.0-140.0	886.55
145.0	140.0-150.0	686.62
155.0	150.0-160.0	515.28
165.0	160.0-170.0	323.05
175.0	170.0-177.5	101.49
180.0	177.5-180.0	6.70

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0- 30	892	10.1	11.7
0- 40	1461	16.6	19.1
0- 60	2263	25.7	29.6
0- 90	2367	26.9	30.9
90-120	1821	20.7	23.8
90-130	2763	31.4	36.1
90-150	4336	49.3	56.7
90-180	5282	60.0	69.1
0-180	7649	86.9	100.0

Total Luminaire Optical Efficiency = 86.9%

Luminaire Spacing Criterion:

0 deg	90 deg
1.20	1.44

Average Luminaire Luminance (cd/m^2):

	0	45	90
0	90.38	90.38	90.38
45	41.88	40.49	49.63
50	34.07	28.08	27.04
55	26.27	15.98	4.36
60	13.96	10.35	9.21
65	0.93	4.68	14.35
70	0.53	2.48	8.09
75	0.09	0.18	1.38
80	0.14	0.12	0.73
85	0.20	0.07	0.00

Coefficients of Utilization - Zonal Cavity Method:

pfc = 0.20

pcc	.8				.7				.5			.3			.1			0
pw	.7	.5	.3	.1	.7	.5	.3	.1	.5	.3	.1	.5	.3	.1	.5	.3	.1	0
RCR																		
0	89	89	89	89	80	80	80	80	63	63	63	47	47	47	33	33	33	26
1	82	79	76	73	74	71	68	66	56	55	53	43	42	41	30	30	29	24
2	75	69	65	61	67	63	59	55	50	47	45	38	37	35	27	26	26	21
3	69	61	56	51	62	56	51	47	45	41	38	34	32	30	25	24	22	18
4	63	55	48	43	57	49	44	40	40	36	33	31	28	26	22	21	20	16
5	58	49	42	37	52	44	39	34	36	32	29	28	25	23	20	19	17	14
6	53	44	37	32	48	40	34	30	32	28	25	25	22	20	19	17	15	13
7	49	39	33	28	44	36	30	26	29	25	22	23	20	18	17	15	14	11
8	46	36	29	25	41	32	27	23	26	22	19	21	18	16	15	14	12	10
9	42	32	26	22	38	30	24	20	24	20	17	19	16	14	14	12	11	9
10	40	30	24	20	36	27	22	18	22	18	15	18	15	13	13	11	10	8

SK & Associates	Description : **BALLAST SPEC FOR FP8** Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8**

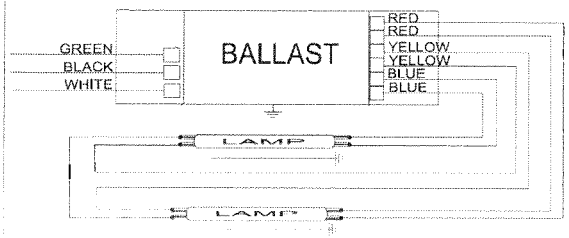
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.52	62	1.02	10	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	1.00	120	1.00	10	0.98	1.7	0.83
F54T5/HO/ES (49W)	1	49	-20/-29	0.52	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	1.00	111	1.00	10	0.98	1.7	0.90
F58T8	1	58	-20/-29	0.49	58	1.00	10	0.99	1.7	1.72
F58T8	2	58	-20/-29	0.97	116	1.00	10	0.99	1.7	0.86
FC12T5/HO	1	55	-20/-29	0.46	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.89	106	0.85	10	0.98	1.7	0.80
FT36W/2G11	1	36	-20/-29	0.39	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.75	89	1.20	10	0.98	1.7	1.35
FT50W/2G11	1	50	-20/-29	0.51	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.99	118	1.10	10	0.98	1.7	0.93
FT55W/2G11	1	55	-20/-29	0.49	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.94	112	0.90	10	0.98	1.7	0.80

Wiring Diagram



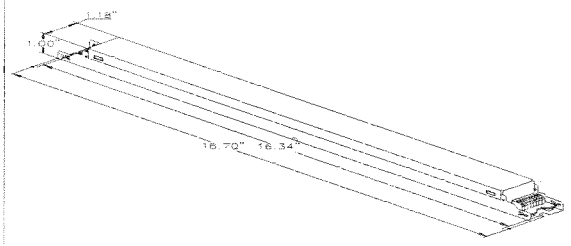
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31.0	78.7
White	31.0	78.7
Blue	28.0	71.1
Red	28.0	71.1
Yellow	48.0	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

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ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 847-768-7768
Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

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ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

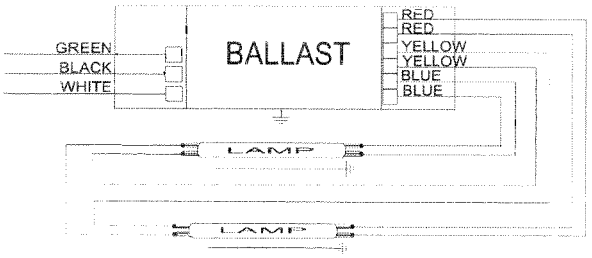
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.23	62	1.02	15	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	0.43	117	1.00	10	0.98	1.7	0.85
F54T5/HO/ES (49W)	1	49	-20/-29	0.23	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	0.43	108	1.00	10	0.98	1.7	0.93
F58T8	1	58	-20/-29	0.22	59	1.00	10	0.97	1.7	1.69
F58T8	2	58	-20/-29	0.42	114	1.00	10	0.99	1.7	0.88
FC12T5/HO	1	55	-20/-29	0.21	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.38	103	0.85	10	0.98	1.7	0.83
FT36W/2G11	1	36	-20/-29	0.18	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.32	86	1.20	10	0.98	1.7	1.40
FT50W/2G11	1	50	-20/-29	0.23	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.43	115	1.10	10	0.98	1.7	0.96
FT55W/2G11	1	55	-20/-29	0.22	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.41	109	0.90	10	0.98	1.7	0.83

Wiring Diagram



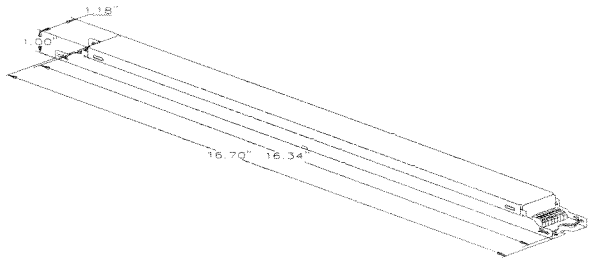
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31	78.7
White	31	78.7
Blue	28	71.1
Red	28	71.1
Yellow	48	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

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ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

SK Associates	Description : S8A-2-T5HO-8-VD-SB-Y-W-E-LR-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8H**

Ordering Guide

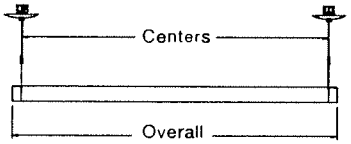
Boxer S8A Series 16

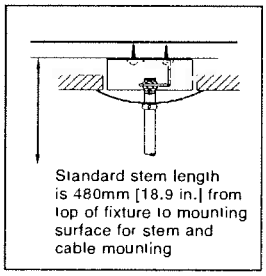
Pendant Variable Distribution

Mounting Information

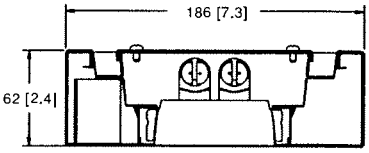
Nominal Length	Overall mm [in]	Centers mm [in]
4' T5-T8	1289 [50.8]	1219 [48.0]
8' T5-T8	2508 [98.8]	2438 [96.0]

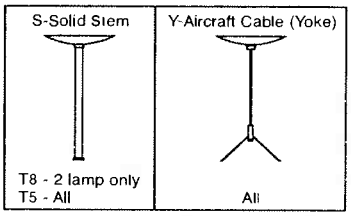
All luminaires in this series are modular. There are no start, intermediate or end units. Luminaires are provided with through wiring, quick connectors and end caps.





Standard stem length is 480mm [18.9 in.] from top of fixture to mounting surface for stem and cable mounting





Photometrics on reverse

Part number example

S8A — 2 — T8 — 8 — VD — SSL — Y — W — E — 1 — 277 — N

Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage	Options
S8A											

Number of Lamps	Length	Control Up	Control Down	Mounting	Ballast	Circuitry	Voltage
2	4 8 12 (8'+4') 16 (2x8') 20 (2x8'+4') 24 (3x8') 28 (3x8'+4') 32 (4x8') 36 (4x8'+4') 40 (5x8') 44 (5x8'+4') 48 (6x8')	VD* Variable Optics Deflector FULLY OPEN (*) Shipped fully open unless ordered as indicated below VD1 1/4 Closed VD2 1/2 Closed VD3 3/4 Closed VD4 Fully closed	SB Solid Cross Blade Baffle PB Perforated Cross Blade Baffle SL Specular Parabolic Louver SSL Semi Specular Parabolic Louver /O Opal Overlay for use with any of the above controls ML Micro Linear Lens FL Frosted Lens	S Solid Stem *(Not available with 1-T8 lamp)* Y Yoke Aircraft Cable Additional mounting options available **Finish** W White C Custom Finish *For custom Finish specify RAL#*	Standard E Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO *Dimming 120v/277v dimming* D1 Advance Mark 7 (1/2/3 Lamp T8, 1/2 Lamp T5HO) D2 Advance Mark 10 (1/2/3 Lamp T8, 1/2 Lamp T5HO) D3 Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO) D4 Lutron Hi-lume (1/2 Lamp T8, T5HO) D5 Lutron Eco-System (T5-T5HO-T8) Battery Pack Options *(120v/277v)* BN1 Bodine B50LP (T8) BN3 Bodine LP500 (T5) BN4 Bodine LP600 (T5/T5HO/T8)	1 1 Circuit (Standard) LR Left/Right Switching IO In/Out Switching (3 Lamp) /EN Emergency/ Night Light Consult factory	120 277 347

Lamp Type	Options
T8 32W T5 28W T5HO 54W	N None O Occupancy Sensor D Daylight Sensor DOS Daylight/ Occupancy Sensor

Please refer to circuitry and sensor options guide for complete details

R1-12-09

Approvals

METALUMEN

570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589
www.metalumen.com

Signature

Date

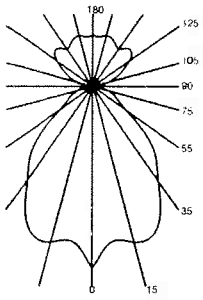
FSC Mixed Sources

Photometrics

Boxer S8A Series 16

Pendant Variable Distribution

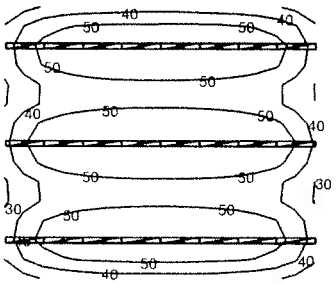
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	1033	1033	1033	6
5	866	894	912	80
15	763	834	915	237
25	630	743	879	347
35	477	585	651	361
45	327	403	481	312
55	217	231	229	204
65	143	137	146	140
75	78	73	89	83
85	30	30	26	24
90	12	6	3	4
95	32	25	16	20
105	81	91	91	94
115	131	165	165	155
125	178	221	251	195
135	223	241	296	194
145	259	255	260	162
155	293	280	282	131
165	292	309	297	86
175	294	297	282	26
180	292	292	292	2

Room Layout

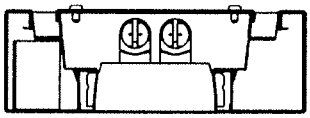


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.85
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	670	12	23
0- 40	1031	18	36
0- 60	1547	27	54
0- 90	1795	31	63
90-120	271	5	10
90-130	466	8	16
90-150	822	14	29
90-180	1066	18	37
0-180	2861	49	100

T5 - 2 Lamps



Photometric Report: File # S8A-2T5-4-VD-SB
Efficiency: 49.3 %
63% Direct : 37% Indirect
Model Shown: 2- F28 T5 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

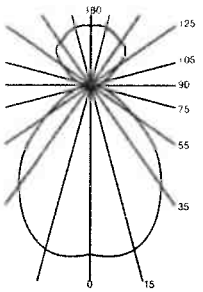
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	54	54	54	54	51	51	51	51	44	44	44
1	50	48	46	44	46	45	43	42	39	38	37
2	45	42	39	37	43	39	37	35	35	33	31
3	42	37	34	31	39	35	32	29	31	29	27
4	38	33	29	27	36	31	28	25	28	25	23
5	35	30	26	23	33	28	25	22	25	22	20
6	33	27	23	20	31	26	22	19	23	20	18
7	30	24	21	18	29	23	20	17	21	18	16
8	28	22	19	16	27	21	18	15	19	16	14
9	26	20	17	14	25	19	16	14	18	15	13
10	25	19	15	13	23	18	15	13	16	14	12

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

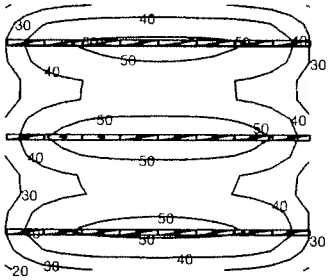
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	900	900	900	5
5	859	884	915	79
15	771	834	905	237
25	638	727	809	336
35	490	569	657	359
45	336	400	490	315
55	224	241	282	222
65	143	138	148	141
75	78	73	82	81
85	34	31	28	25
90	14	7	3	4
95	32	22	17	19
105	80	67	62	73
115	130	128	117	125
125	179	193	179	167
135	223	239	260	186
145	260	270	279	169
155	292	299	298	137
165	311	314	316	89
175	317	320	318	29
180	314	314	314	2

Room Layout

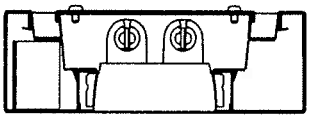


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.75
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	657	11	24
0- 40	1016	18	36
0- 60	1553	27	56
0- 90	1802	31	64
90-120	219	4	8
90-130	386	7	14
90-150	741	13	27
90-180	998	17	36
0-180	2800	48	100

T8 - 2 Lamps



Photometric Report: File # S8A-2T8-4-VD-SB
Efficiency: 48.3%
64% Direct : 36% Indirect
Model Shown: 2- F32 T8 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	53	53	53	53	50	50	50	50	44	44	44
1	49	47	45	43	46	44	42	41	39	38	37
2	45	41	38	36	42	39	36	34	34	32	31
3	41	37	33	30	38	34	31	29	31	28	26
4	38	33	29	26	35	31	27	25	27	25	23
5	35	29	25	23	33	28	24	22	25	22	20
6	32	26	23	20	30	25	22	19	22	20	18
7	30	24	20	18	28	23	19	17	21	18	16
8	28	22	18	16	26	21	17	15	19	16	14
9	26	20	16	14	24	19	16	14	17	15	13
10	24	18	15	13	23	18	14	12	16	13	11

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metslumen.com/ies**

SK & Associates	Description : PHOTOMETRICS FOR 2-LAMP S8A Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8H**

S8A-2T5HO-4-N-SL-X-W.rpt

Thu Feb 14 10:19:28 2008

IESNA:LM-63-1995
Photopia 2.0.0.17 PHOTOMETRIC REPORT
PROJECT: S8A-2T5HO-4-N-SL-X-W
OPTIONS:
  Spawning 1 rays for each reaction.
  Writing 250 rays to a DXF file.
  Random number generator seed: 8.
  Tracing 10 reflections.
  Stop tracing ray at 1.0% of initial magnitude.
  Tracing 10000008 initial lamp rays.
  Photometric test distance of 7.00 meters.

LUMENS EXITING SYSTEM:

Lumens(%)	Reflection
4602(52.3%)	0
1660(18.9%)	1
753(8.6%)	2
289(3.3%)	3
146(1.7%)	4
77(0.9%)	5
45(0.5%)	6
29(0.3%)	7
20(0.2%)	8
14(0.2%)	9
10(0.1%)	10
7650(86.9%)	Total

LUMEN INTERACTION WITH SYSTEM:

Absorbed(%)	Incident(%)	Layer Name
3(0.0%)	33(0.4%)	BODY
179(2.0%)	2844(32.3%)	LAMP-F54T5HO1
6(0.1%)	109(1.2%)	LAMP-F54T5HO2
50(0.6%)	136(1.5%)	LHDRBRKT
323(3.7%)	2153(24.5%)	LOUVERBLADE
149(1.7%)	928(10.5%)	LOUVERRAIL
190(2.2%)	1267(14.4%)	RF-0101-004_P5
190(2.2%)	1268(14.4%)	RF-0101-004_P5b
1093(12.4%)	8742(99.3%)	Total

Absorbed(%)	Incident(%)	Material Name
186(2.1%)	2954(33.6%)	PHOSGLAS
53(0.6%)	169(1.9%)	PAINT006
853(9.7%)	5618(63.8%)	SPEC85
1093(12.4%)	8742(99.3%)	Total

UNACCOUNTED LUMENS:

reached interreflection limit:	56.00	(0.6%)
fell below continuation minimum:	0.00	(0.0%)
could not find in/out refractor facet:	0.00	(0.0%)
reached try limit for scatter bounce:	0.00	(0.0%)
lost elsewhere(i.e. outside distrib):	0.00	(0.0%)

Number of Lamps: 2 Lumens per Lamp: 4400
Ballast Factor: 1.00 Ballast-Lamp Photometric Factor: 1.00
Luminaire Width: 2.9788 Length: 3.7033 Height: 3.0538
Photometry Type: C Units: meters

Candela Distribution:

	0.00	22.50	45.00	67.50	90.00
0.00	997	997	997	997	997

5.00	1009	1013	1024	1031	1024
15.00	957	976	1055	1145	1187
25.00	866	941	1129	1177	1173
35.00	742	906	960	914	942
45.00	596	747	729	775	784
55.00	362	392	290	140	68.0
65.00	12.0	27.0	83.0	157	214
75.00	1.00	1.00	3.00	12.0	19.0
85.00	2.00	2.00	1.00	0.000	0.000
90.00	25.0	13.0	3.00	1.00	0.000
95.00	161	272	253	193	170
105.00	270	519	791	928	944
115.00	434	694	947	1105	1212
125.00	613	765	1180	1294	1309
135.00	773	867	1120	1447	1517
145.00	909	978	1073	1212	1309
155.00	1008	1063	1124	1170	1184
165.00	1089	1110	1143	1170	1182
175.00	1112	1117	1135	1157	1144
180.00	1120	1120	1120	1120	1120

Zonal Lumens

Cone	Between	Lumens
0.0	0.0- 2.5	5.96
5.0	2.5- 10.0	91.37
15.0	10.0- 20.0	301.04
25.0	20.0- 30.0	493.70
35.0	30.0- 40.0	568.83
45.0	40.0- 50.0	569.41
55.0	50.0- 60.0	232.59
65.0	60.0- 70.0	94.30
75.0	70.0- 80.0	6.88
85.0	80.0- 87.5	0.82
90.0	87.5- 92.5	4.04
95.0	92.5-100.0	180.45
105.0	100.0-110.0	752.44
115.0	110.0-120.0	885.66
125.0	120.0-130.0	942.02
135.0	130.0-140.0	886.55
145.0	140.0-150.0	686.62
155.0	150.0-160.0	515.28
165.0	160.0-170.0	323.05
175.0	170.0-177.5	101.49
180.0	177.5-180.0	6.70

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0- 30	892	10.1	11.7
0- 40	1461	16.6	19.1
0- 60	2263	25.7	29.6
0- 90	2367	26.9	30.9
90-120	1821	20.7	23.8
90-130	2763	31.4	36.1
90-150	4336	49.3	56.7
90-180	5282	60.0	69.1
0-180	7649	86.9	100.0

Total Luminaire Optical Efficiency = 86.9%

Luminaire Spacing Criterion:

0 deg	90 deg
1.20	1.44

Average Luminaire Luminance (cd/m^2):

	0	45	90
0	90.38	90.38	90.38
45	41.88	40.49	49.63
50	34.07	28.08	27.04
55	26.27	15.98	4.36
60	13.96	10.35	9.21
65	0.93	4.68	14.35
70	0.53	2.48	8.09
75	0.09	0.18	1.38
80	0.14	0.12	0.73
85	0.20	0.07	0.00

Coefficients of Utilization - Zonal Cavity Method:

pfc = 0.20

pcc	.8				.7				.5			.3			.1			0
pw	.7	.5	.3	.1	.7	.5	.3	.1	.5	.3	.1	.5	.3	.1	.5	.3	.1	0
RCR																		
0	89	89	89	89	80	80	80	80	63	63	63	47	47	47	33	33	33	26
1	82	79	76	73	74	71	68	66	56	55	53	43	42	41	30	30	29	24
2	75	69	65	61	67	63	59	55	50	47	45	38	37	35	27	26	26	21
3	69	61	56	51	62	56	51	47	45	41	38	34	32	30	25	24	22	18
4	63	55	48	43	57	49	44	40	40	36	33	31	28	26	22	21	20	16
5	58	49	42	37	52	44	39	34	36	32	29	28	25	23	20	19	17	14
6	53	44	37	32	48	40	34	30	32	28	25	25	22	20	19	17	15	13
7	49	39	33	28	44	36	30	26	29	25	22	23	20	18	17	15	14	11
8	46	36	29	25	41	32	27	23	26	22	19	21	18	16	15	14	12	10
9	42	32	26	22	38	30	24	20	24	20	17	19	16	14	14	12	11	9
10	40	30	24	20	36	27	22	18	22	18	15	18	15	13	13	11	10	8

SK & Associates	Description : BALLAST SPEC FOR FP8H Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FP8H

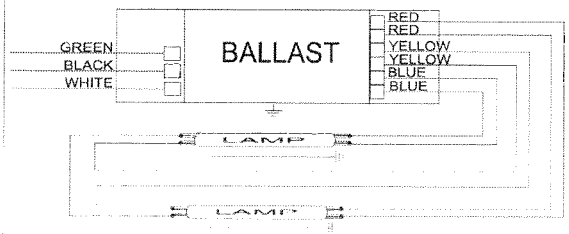
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.52	62	1.02	10	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	1.00	120	1.00	10	0.98	1.7	0.83
F54T5/HO/ES (49W)	1	49	-20/-29	0.52	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	1.00	111	1.00	10	0.98	1.7	0.90
F58T8	1	58	-20/-29	0.49	58	1.00	10	0.99	1.7	1.72
F58T8	2	58	-20/-29	0.97	116	1.00	10	0.99	1.7	0.86
FC12T5/HO	1	55	-20/-29	0.46	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.89	106	0.85	10	0.98	1.7	0.80
FT36W/2G11	1	36	-20/-29	0.39	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.75	89	1.20	10	0.98	1.7	1.35
FT50W/2G11	1	50	-20/-29	0.51	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.99	118	1.10	10	0.98	1.7	0.93
FT55W/2G11	1	55	-20/-29	0.49	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.94	112	0.90	10	0.98	1.7	0.80

Wiring Diagram



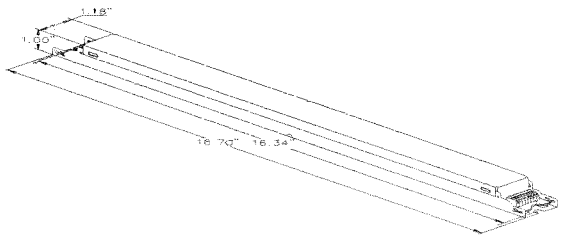
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31.0	78.7
White	31.0	78.7
Blue	28.0	71.1
Red	28.0	71.1
Yellow	48.0	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

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ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
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Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@120V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

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TELEPHONE: (847)390-5000 FAX: (847)768-7768

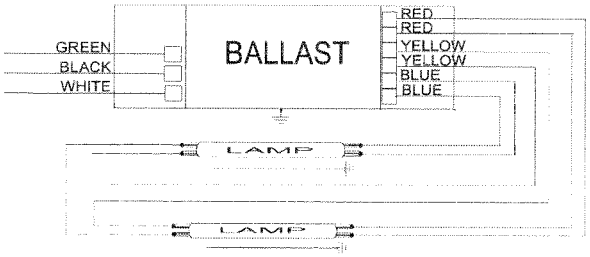
ADVANCE TRANSFORMER CO.

Electrical Specifications

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F54T5/HO	1	54	-20/-29	0.23	62	1.02	15	0.96	1.7	1.65
* F54T5/HO	2	54	-20/-29	0.43	117	1.00	10	0.98	1.7	0.85
F54T5/HO/ES (49W)	1	49	-20/-29	0.23	58	1.02	10	0.98	1.7	1.76
F54T5/HO/ES (49W)	2	49	-20/-29	0.43	108	1.00	10	0.98	1.7	0.93
F58T8	1	58	-20/-29	0.22	59	1.00	10	0.97	1.7	1.69
F58T8	2	58	-20/-29	0.42	114	1.00	10	0.99	1.7	0.88
FC12T5/HO	1	55	-20/-29	0.21	55	0.87	15	0.96	1.7	1.58
FC12T5/HO	2	55	-20/-29	0.38	103	0.85	10	0.98	1.7	0.83
FT36W/2G11	1	36	-20/-29	0.18	46	1.22	20	0.96	1.7	2.65
FT36W/2G11	2	36	-20/-29	0.32	86	1.20	10	0.98	1.7	1.40
FT50W/2G11	1	50	-20/-29	0.23	61	1.12	15	0.96	1.7	1.84
FT50W/2G11	2	50	-20/-29	0.43	115	1.10	10	0.98	1.7	0.96
FT55W/2G11	1	55	-20/-29	0.22	58	0.92	15	0.96	1.7	1.59
FT55W/2G11	2	55	-20/-29	0.41	109	0.90	10	0.98	1.7	0.83

Wiring Diagram



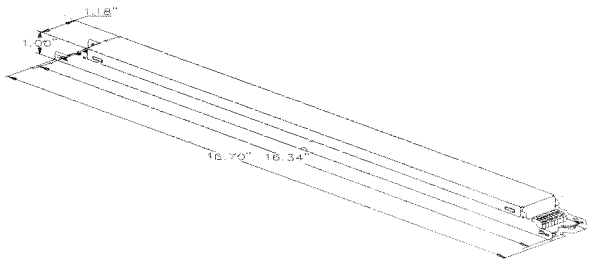
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	31	78.7
White	31	78.7
Blue	28	71.1
Red	28	71.1
Yellow	48	121.9
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White		0
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 03/11/09

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ADVANCE TRANSFORMER CO.

ICN-2S54@277V	
Brand Name	**CENTIUM T5**
Ballast Type	**Electronic**
Starting Method	**Programmed Start**
Lamp Connection	**Series/Parallel**
Input Voltage	**120-277**
Input Frequency	**50/60 HZ**
Status	**Active**

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance

2.1 Ballast shall be Programmed Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency).

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.0 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.13 Four-lamp ballast shall have (semi-independent or independent) lamp operation.

Section III - Regulatory

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, for Non-Consumer equipment.

3.6 Ballast shall comply with UL Type CC rating.

3.7 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

Revised 03/11/09

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PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps

Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

ECOLOGIC

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

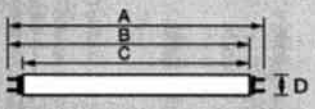
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

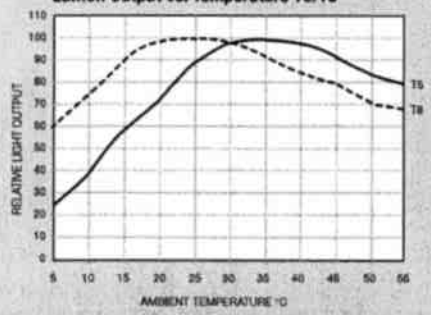
Technical Information

Dimensions

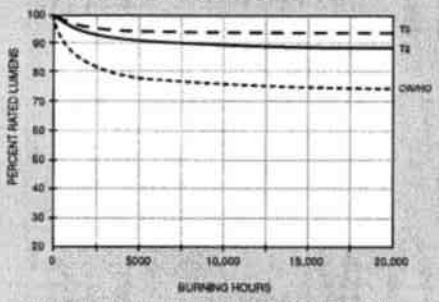


Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

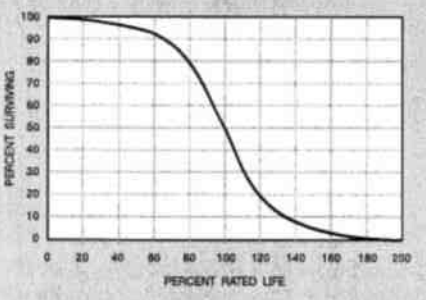


Fluorescent Lamp Lumen Maintenance



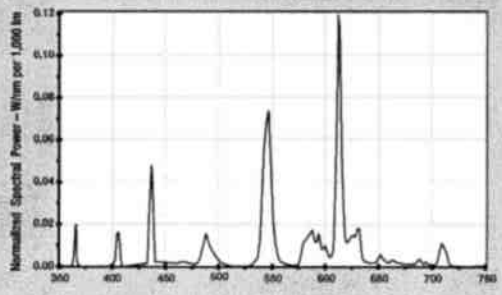
* Lumen output continues to decrease throughout the life of a fluorescent lamp.

Typical Fluorescent Lamp Mortality

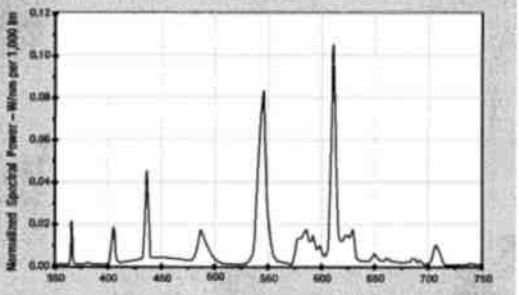


Spectral Power Distributions

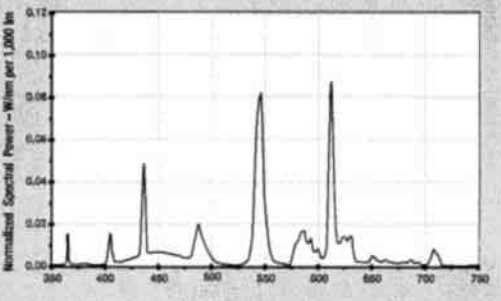
PENTRON 830



PENTRON 835



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
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OEM/Special Markets
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Fax: 1-800-762-7192

Display/Optic
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Fax: 1-800-762-7192

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Mississauga, ON L5S 1S4

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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

www.sylvania.com

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ECOLOGIC, ECO, OCTRON and PENTRON are registered trademarks of OSRAM SYLVANIA Inc.
QUICKTRONIC is a registered trademark of OSRAM GmbH.

SK & Associates	Description : S8A-2-T5HO-8-VD-SB-Y-W-E-D1-1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8D**

Ordering Guide

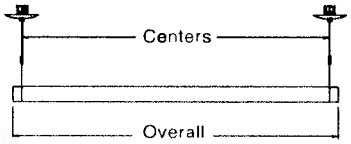
Boxer S8A Series 16

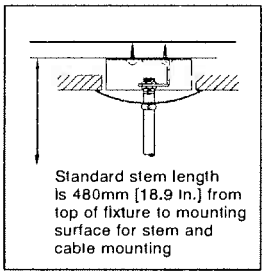
Pendant Variable Distribution

Mounting Information

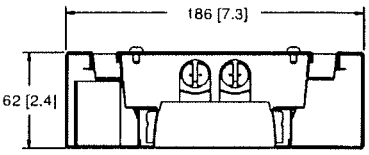
Nominal Length	Overall mm [in]	Centers mm [in]
4' T5-T8	1289 [50.8]	1219 [48.0]
8' T5-T8	2508 [98.8]	2438 [96.0]

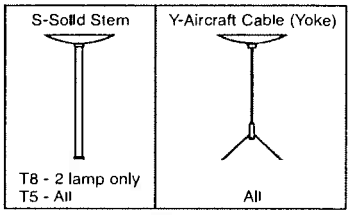
All luminaires in this series are modular. There are no start, intermediate or end units. Luminaires are provided with through wiring, quick connectors and end caps.





Standard stem length is 480mm [18.9 in.] from top of fixture to mounting surface for stem and cable mounting





Photometrics on reverse

Part number example

S8A — 2 — T8 — 8 — VD — SSL — Y — W — E — 1 — 277 — N

Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage	Options
S8A											

Number of Lamps

2

Lamp Type

T8 32W

T5 28W

T5HO 54W

Length

4

8

12 (8'+4')

16 (2x8')

20 (2x8'+4')

24 (3x8')

28 (3x8'+4')

32 (4x8')

36 (4x8'+4')

40 (5x8')

44 (5x8'+4')

48 (6x8')

Control Up

VD* Variable Optics Deflector FULLY OPEN

(*) Shipped fully open unless ordered as indicated below

VD1 1/4 Closed

VD2 1/2 Closed

VD3 3/4 Closed

VD4 Fully closed

Control Down

SB Solid Cross Blade Baffle

PB Perforated Cross Blade Baffle

SL Specular Parabolic Louver

SSL Semi Specular Parabolic Louver

/O Opal Overlay for use with any of the above controls

ML Micro Linear Lens

FL Frosted Lens

Mounting

S Solid Stem *(Not available with 1-T8 lamp)*

Y Yoke Aircraft Cable

Additional mounting options available

Finish

W White

C Custom Finish *For custom Finish specify RAL#*

Ballast

Standard

E Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO

Dimming *120v/277v dimming*

D1 Advance Mark 7 (1/2/3 Lamp T8, 1/2 Lamp T5HO)

D2 Advance Mark 10 (1/2/3 Lamp T8, 1/2 Lamp T5HO)

D3 Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO)

D4 Lutron Hi-lume (1/2 Lamp T8, T5HO)

D5 Lutron Eco-System (T5-T5HO-T8)

Battery Pack Options *(120v/277v)*

BN1 Bodine B50LP (T8)

BN3 Bodine LP500 (T5)

BN4 Bodine LP600 (T5/T5HO/T8)

Circuitry

1 1 Circuit (Standard)

LR Left/Right Switching

IO In/Out Switching (3 Lamp)

/EN Emergency/ Night Light

Consult factory

Voltage

120

277

347

Options

N None

O Occupancy Sensor

D Daylight Sensor

DOS Daylight/ Occupancy Sensor

Please refer to circuitry and sensor options guide for complete details

R1-12-09

Approvals

METALUMEN

570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589

www.metalumen.com

Signature

Date

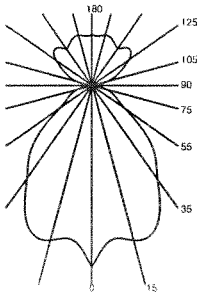
Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
www.fsc.org Cert no
FSC

Photometrics

Boxer S8A Series 16

Pendant Variable Distribution

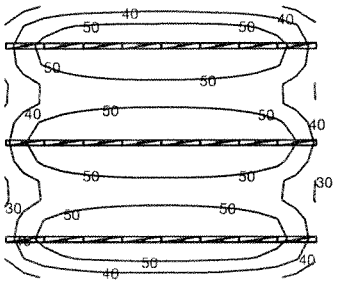
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	1033	1033	1033	6
5	866	894	912	80
15	763	834	915	237
25	630	743	879	347
35	477	585	651	361
45	327	403	481	312
55	217	231	229	204
65	143	137	146	140
75	78	73	89	83
85	30	30	26	24
90	12	6	3	4
95	32	25	16	20
105	81	91	91	94
115	131	165	165	155
125	178	221	251	195
135	223	241	296	194
145	259	255	260	162
155	293	280	282	131
165	292	309	297	86
175	294	297	282	26
180	292	292	292	2

Room Layout

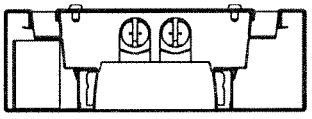


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.85
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	670	12	23
0- 40	1031	18	36
0- 60	1547	27	54
0- 90	1795	31	63
90-120	271	5	10
90-130	466	8	16
90-150	822	14	29
90-180	1066	18	37
0-180	2861	49	100

T5 - 2 Lamps



Photometric Report: File # S8A-2T5-4-VD-SB
Efficiency: 49.3 %
63% Direct : 37% Indirect
Model Shown: 2- F28 T5 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

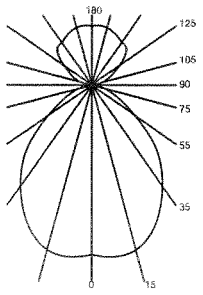
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	54	54	54	54	51	51	51	51	44	44	44
1	50	48	46	44	46	45	43	42	39	38	37
2	45	42	39	37	43	39	37	35	35	33	31
3	42	37	34	31	39	35	32	29	31	29	27
4	38	33	29	27	36	31	28	25	28	25	23
5	35	30	26	23	33	28	25	22	25	22	20
6	33	27	23	20	31	26	22	19	23	20	18
7	30	24	21	18	29	23	20	17	21	18	16
8	28	22	19	16	27	21	18	15	19	16	14
9	26	20	17	14	25	19	16	14	18	15	13
10	25	19	15	13	23	18	15	13	16	14	12

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

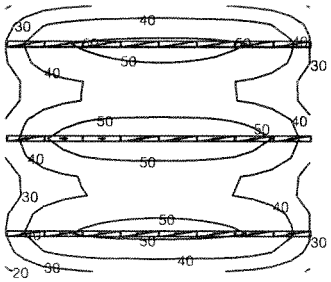
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	900	900	900	5
5	859	884	915	79
15	771	834	905	237
25	638	727	809	336
35	490	569	657	359
45	336	400	490	315
55	224	241	282	222
65	143	138	148	141
75	78	73	82	81
85	34	31	28	25
90	14	7	3	4
95	32	22	17	19
105	80	67	62	73
115	130	128	117	125
125	179	193	179	167
135	223	239	260	186
145	260	270	279	169
155	292	299	298	137
165	311	314	316	89
175	317	320	318	29
180	314	314	314	2

Room Layout

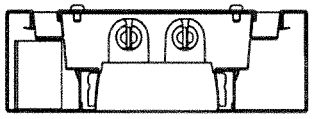


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.75
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	657	11	24
0- 40	1016	18	36
0- 60	1553	27	56
0- 90	1802	31	64
90-120	219	4	8
90-130	386	7	14
90-150	741	13	27
90-180	998	17	36
0-180	2800	48	100

T8 - 2 Lamps



Photometric Report: File # S8A-2T8-4-VD-SB
Efficiency: 48.3%
64% Direct : 36% Indirect
Model Shown: 2- F32 T8 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	53	53	53	53	50	50	50	50	44	44	44
1	49	47	45	43	46	44	42	41	39	38	37
2	45	41	38	36	42	39	36	34	34	32	31
3	41	37	33	30	38	34	31	29	31	28	26
4	38	33	29	26	35	31	27	25	27	25	23
5	35	29	25	23	33	28	24	22	25	22	20
6	32	26	23	20	30	25	22	19	22	20	18
7	30	24	20	18	28	23	19	17	21	18	16
8	28	22	18	16	26	21	17	15	19	16	14
9	26	20	16	14	24	19	16	14	17	15	13
10	24	18	15	13	23	18	14	12	16	13	11

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

SK & Associates	Description : PHOTOMETRICS FOR 2-LAMP S8A Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8D**

S8A-2T5HO-4-N-SL-X-W.rpt

Thu Feb 14 10:19:28 2008

IESNA:LM-63-1995
Photopia 2.0.0.17 PHOTOMETRIC REPORT
PROJECT: S8A-2T5HO-4-N-SL-X-W
OPTIONS:
  Spawning 1 rays for each reaction.
  Writing 250 rays to a DXF file.
  Random number generator seed: 8.
  Tracing 10 reflections.
  Stop tracing ray at 1.0% of initial magnitude.
  Tracing 10000008 initial lamp rays.
  Photometric test distance of 7.00 meters.

LUMENS EXITING SYSTEM:

Lumens	(%)	Reflection
4602	(52.3%)	0
1660	(18.9%)	1
753	(8.6%)	2
289	(3.3%)	3
146	(1.7%)	4
77	(0.9%)	5
45	(0.5%)	6
29	(0.3%)	7
20	(0.2%)	8
14	(0.2%)	9
10	(0.1%)	10
7650	(86.9%)	Total

LUMEN INTERACTION WITH SYSTEM:

Absorbed	(%)	Incident	(%)	Layer Name
3	(0.0%)	33	(0.4%)	BODY
179	(2.0%)	2844	(32.3%)	LAMP-F54T5HO1
6	(0.1%)	109	(1.2%)	LAMP-F54T5HO2
50	(0.6%)	136	(1.5%)	LHDRBRKT
323	(3.7%)	2153	(24.5%)	LOUVERBLADE
149	(1.7%)	928	(10.5%)	LOUVERRAIL
190	(2.2%)	1267	(14.4%)	RF-0101-004_P5
190	(2.2%)	1268	(14.4%)	RF-0101-004_P5b
1093	(12.4%)	8742	(99.3%)	Total
Absorbed	(%)	Incident	(%)	Material Name
186	(2.1%)	2954	(33.6%)	PHOSGLAS
53	(0.6%)	169	(1.9%)	PAINT006
853	(9.7%)	5618	(63.8%)	SPEC85
1093	(12.4%)	8742	(99.3%)	Total

UNACCOUNTED LUMENS:

reached interreflection limit:	56.00	(0.6%)
fell below continuation minimum:	0.00	(0.0%)
could not find in/out refractor facet:	0.00	(0.0%)
reached try limit for scatter bounce:	0.00	(0.0%)
lost elsewhere(i.e. outside distrib):	0.00	(0.0%)

Number of Lamps: 2 Lumens per Lamp: 4400
Ballast Factor: 1.00 Ballast-Lamp Photometric Factor: 1.00
Luminaire Width: 2.9788 Length: 3.7033 Height: 3.0538
Photometry Type: C Units: meters

Candela Distribution:

	0.00	22.50	45.00	67.50	90.00
0.00	997	997	997	997	997

5.00	1009	1013	1024	1031	1024
15.00	957	976	1055	1145	1187
25.00	866	941	1129	1177	1173
35.00	742	906	960	914	942
45.00	596	747	729	775	784
55.00	362	392	290	140	68.0
65.00	12.0	27.0	83.0	157	214
75.00	1.00	1.00	3.00	12.0	19.0
85.00	2.00	2.00	1.00	0.000	0.000
90.00	25.0	13.0	3.00	1.00	0.000
95.00	161	272	253	193	170
105.00	270	519	791	928	944
115.00	434	694	947	1105	1212
125.00	613	765	1180	1294	1309
135.00	773	867	1120	1447	1517
145.00	909	978	1073	1212	1309
155.00	1008	1063	1124	1170	1184
165.00	1089	1110	1143	1170	1182
175.00	1112	1117	1135	1157	1144
180.00	1120	1120	1120	1120	1120

Zonal Lumens

Cone	Between	Lumens
0.0	0.0- 2.5	5.96
5.0	2.5- 10.0	91.37
15.0	10.0- 20.0	301.04
25.0	20.0- 30.0	493.70
35.0	30.0- 40.0	568.83
45.0	40.0- 50.0	569.41
55.0	50.0- 60.0	232.59
65.0	60.0- 70.0	94.30
75.0	70.0- 80.0	6.88
85.0	80.0- 87.5	0.82
90.0	87.5- 92.5	4.04
95.0	92.5-100.0	180.45
105.0	100.0-110.0	752.44
115.0	110.0-120.0	885.66
125.0	120.0-130.0	942.02
135.0	130.0-140.0	886.55
145.0	140.0-150.0	686.62
155.0	150.0-160.0	515.28
165.0	160.0-170.0	323.05
175.0	170.0-177.5	101.49
180.0	177.5-180.0	6.70

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0- 30	892	10.1	11.7
0- 40	1461	16.6	19.1
0- 60	2263	25.7	29.6
0- 90	2367	26.9	30.9
90-120	1821	20.7	23.8
90-130	2763	31.4	36.1
90-150	4336	49.3	56.7
90-180	5282	60.0	69.1
0-180	7649	86.9	100.0

Total Luminaire Optical Efficiency = 86.9%

Luminaire Spacing Criterion:

0 deg	90 deg
1.20	1.44

Average Luminaire Luminance (cd/m^2):

	0	45	90
0	90.38	90.38	90.38
45	41.88	40.49	49.63
50	34.07	28.08	27.04
55	26.27	15.98	4.36
60	13.96	10.35	9.21
65	0.93	4.68	14.35
70	0.53	2.48	8.09
75	0.09	0.18	1.38
80	0.14	0.12	0.73
85	0.20	0.07	0.00

Coefficients of Utilization - Zonal Cavity Method:

pfc = 0.20

pcc	.8				.7				.5			.3			.1			0
pw	.7	.5	.3	.1	.7	.5	.3	.1	.5	.3	.1	.5	.3	.1	.5	.3	.1	0
RCR																		
0	89	89	89	89	80	80	80	80	63	63	63	47	47	47	33	33	33	26
1	82	79	76	73	74	71	68	66	56	55	53	43	42	41	30	30	29	24
2	75	69	65	61	67	63	59	55	50	47	45	38	37	35	27	26	26	21
3	69	61	56	51	62	56	51	47	45	41	38	34	32	30	25	24	22	18
4	63	55	48	43	57	49	44	40	40	36	33	31	28	26	22	21	20	16
5	58	49	42	37	52	44	39	34	36	32	29	28	25	23	20	19	17	14
6	53	44	37	32	48	40	34	30	32	28	25	25	22	20	19	17	15	13
7	49	39	33	28	44	36	30	26	29	25	22	23	20	18	17	15	14	11
8	46	36	29	25	41	32	27	23	26	22	19	21	18	16	15	14	12	10
9	42	32	26	22	38	30	24	20	24	20	17	19	16	14	14	12	11	9
10	40	30	24	20	36	27	22	18	22	18	15	18	15	13	13	11	10	8

SK & Associates	Description : BALLAST SPEC FOR FP8D Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FP8D

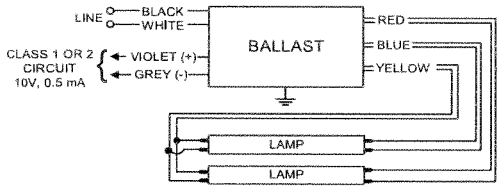
ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
* F54T5/HO	2	54	50/10	1.05	24/125	0.03/1.00	10	0.98	1.7	0.80
F54T5/HO/ES (49W)	2	49	50/10	0.98	24/117	0.03/1.00	10	0.98	1.7	0.85
FC12T5/HO	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79
FT55W/2G11	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79

Wiring Diagram



Diag. 56A

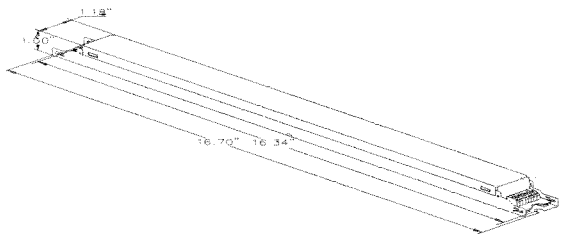
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0	0
White	0	0
Blue	0	0
Red	0	0
Yellow	0	0
Gray	0	0
Violet	0	0

	in.	cm.
Yellow/Blue	0	0
Blue/White	0	0
Brown	0	0
Orange	0	0
Orange/Black	0	0
Black/White	0	0
Red/White	0	0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 02/28/12

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
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Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors or integral leads color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

2.2 VZT-4PSP32-G ballast shall provide Independent Lamp Operation (ILO) allowing remaining lamp(s) to maintain full light output when one or more lamps fail.

2.3 Ballast shall be provided with integral protection circuitry to withstand connection of low voltage control leads to mains power supply. In this event, ballast shall default to maximum light output.

2.4 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.5 Ballast shall operate from 50/60 Hz input source of 120V or 277V or 347V with sustained variations of +/- 10% (voltage and frequency). IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency).

2.6 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.7 Ballast shall have a Power Factor greater than 0.98 at full light output and greater than 0.90 throughout the dimming range for primary lamp.

2.8 Ballast shall have a minimum ballast factor of 1.00 (120V and 277V 1-3 lamp models) or 0.88 (120V and 277V 4 lamp models and 347V 2-3 lamp models) or 1.18 (277V 4 lamp HL models) at maximum light output and 0.03 at minimum light output for primary lamp.

2.9 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.10 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage and 100% power.

2.11 Ballast shall have a Class A sound rating.

2.12 Ballast shall have a minimum starting temperature of 10C (50F) for primary lamp.

2.13 Ballast shall provide Lamp EOL Protection Circuit for all T5, T5/HO and CFL lamps.

2.14 Ballast shall control lamp light output from 100% - 3% relative light output for series operation T8 and CFL lamps, 100% - 10% relative light output for parallel operation T8 and 100% - 1% relative light output for T5/HO lamps.

2.15 Ballast shall ignite the lamps at any light output setting without first going to another output setting.

2.16 Ballast shall tolerate sustained open circuit and short circuit output conditions.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

3.6 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be controlled by a Class 1 or Class 2 low voltage 0-10VDC controller.

4.5 Ballast shall be Philips Advance part # _____ or approved equal.

Revised 02/28/12

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

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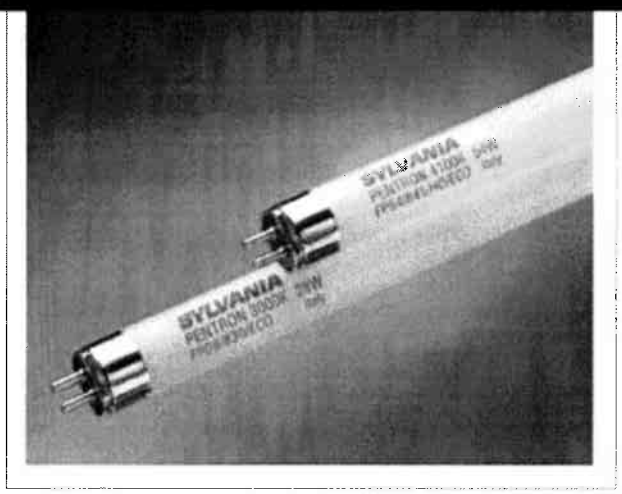
www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Minlature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Minlature BI-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Minlature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Minlature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

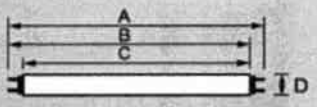
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

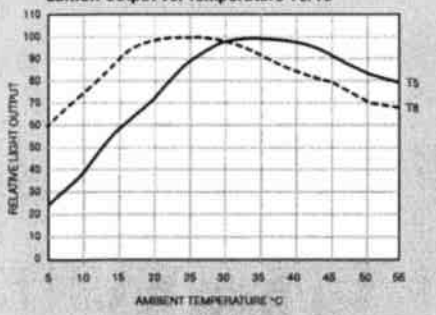
Technical Information

Dimensions



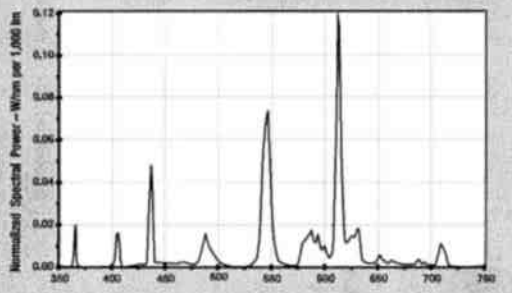
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

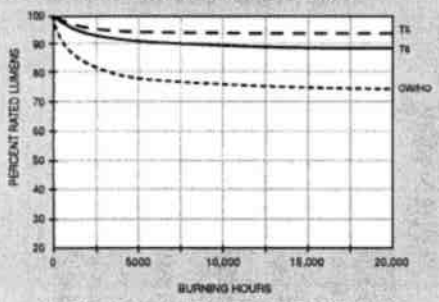


Spectral Power Distributions

PENTRON 830

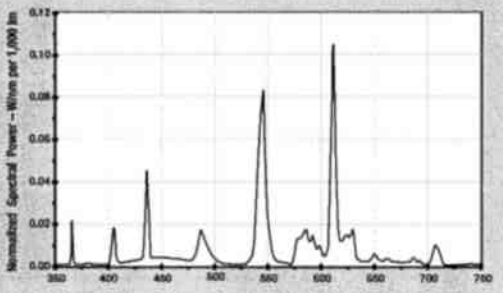


Fluorescent Lamp Lumen Maintenance

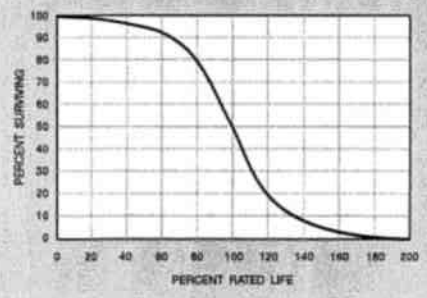


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

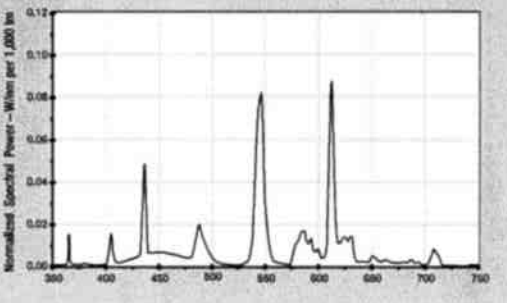
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

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SK & Associates	Description : S8A-2-T5HO-8-VD-SB-Y-W-E-D1-1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8HD**

Ordering Guide

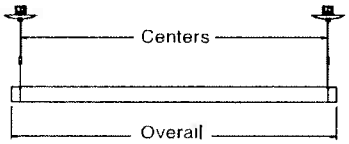
Boxer S8A Series 16

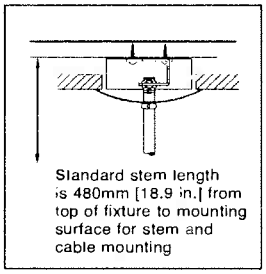
Pendant Variable Distribution

Mounting Information

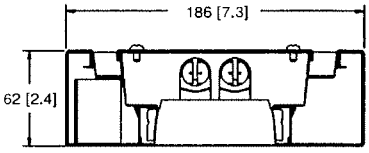
Nominal Length	Overall mm [in]	Centers mm [in]
4' T5-T8	1289 [50.8]	1219 [48.0]
8' T5-T8	2508 [98.8]	2438 [96.0]

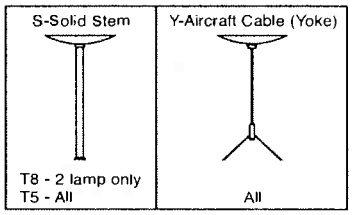
All luminaires in this series are modular. There are no start, intermediate or end units. Luminaires are provided with through wiring, quick connectors and end caps.





Standard stem length is 480mm [18.9 in.] from top of fixture to mounting surface for stem and cable mounting





Photometrics on reverse

Part number example

S8A — 2 — T8 — 8 — VD — SSL — Y — W — E — 1 — 277 — N

Model	Number of Lamps	Lamp Type	Length	Control Up	Control Down	Mounting	Finish	Ballast	Circuitry	Voltage	Options
S8A											

Number of Lamps

- **2**

Lamp Type

- **T8** 32W
- **T5** 28W
- **T5HO** 54W

Length

- **4**
- **8**
- **12** (8'+4')
- **16** (2x8')
- **20** (2x8'+4')
- **24** (3x8')
- **28** (3x8'+4')
- **32** (4x8')
- **36** (4x8'+4')
- **40** (5x8')
- **44** (5x8'+4')
- **48** (6x8')

Control Up

- **VD*** Variable Optics Deflector FULLY OPEN
  (*) Shipped fully open unless ordered as indicated below
- **VD1** 1/4 Closed
- **VD2** 1/2 Closed
- **VD3** 3/4 Closed
- **VD4** Fully closed

Control Down

- **SB** Solid Cross Blade Baffle
- **PB** Perforated Cross Blade Baffle
- **SL** Specular Parabolic Louver
- **SSL** Semi Specular Parabolic Louver
- **/O** Opal Overlay for use with any of the above controls
- **ML** Micro Linear Lens
- **FL** Frosted Lens

Mounting

- **S** Solid Stem *(Not available with 1-T8 lamp)*
- **Y** Yoke Aircraft Cable
- Additional mounting options available

Finish

- **W** White
- **C** Custom Finish *For custom Finish specify RAL#*

Ballast

Standard

- **E** Electronic Instant Start T8 Programmed Rapid Start -T5/T5HO

Dimming *120v/277v dimming*

- **D1** Advance Mark 7 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- **D2** Advance Mark 10 (1/2/3 Lamp T8, 1/2 Lamp T5HO)
- **D3** Lutron Eco 10 (1/2 Lamp T8, 1/2 Lamp T5/T5HO)
- **D4** Lutron Hi-lume (1/2 Lamp T8, T5HO)
- **D5** Lutron Eco-System (T5-T5HO-T8)

Battery Pack Options *(120v/277v)*

- **BN1** Bodine B50LP (T8)
- **BN3** Bodine LP500 (T5)
- **BN4** Bodine LP600 (T5/T5HO/T8)

Circuitry

- **1** 1 Circuit (Standard)
- **LR** Left/RIght Switching
- **IO** In/Out Switching (3 Lamp)
- **/EN** Emergency/ Night Light
- Consult factory

Voltage

- **120**
- **277**
- **347**

Options

- **N** None
- **O** Occupancy Sensor
- **D** Daylight Sensor
- **DOS** Daylight/ Occupancy Sensor

Please refer to circuitry and sensor options guide for complete details

R1-12-09

Approvals

METALUMEN

570 Southgate Drive, Guelph, Ontario N1G 4P6
Mailing Address: P. O. Box 1779, Guelph, Ontario N1H 6Z9
T: 800-621-6785 T: 519-822-4381 F: 519-822-4589
www.metalumen.com

Signature

Date

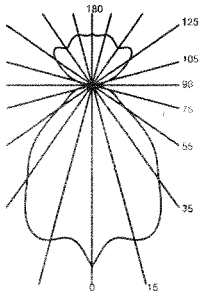
Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
FSC

Photometrics

Boxer S8A Series 16

Pendant Variable Distribution

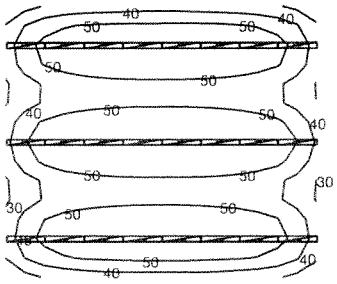
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	1033	1033	1033	6
5	866	894	912	80
15	763	834	915	237
25	630	743	879	347
35	477	585	651	361
45	327	403	481	312
55	217	231	229	204
65	143	137	146	140
75	78	73	89	83
85	30	30	26	24
90	12	6	3	4
95	32	25	16	20
105	81	91	91	94
115	131	165	165	155
125	178	221	251	195
135	223	241	296	194
145	259	255	260	162
155	293	280	282	131
165	292	309	297	86
175	294	297	282	26
180	292	292	292	2

Room Layout

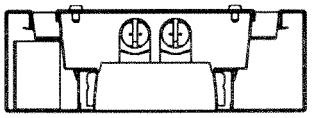


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.85
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	670	12	23
0- 40	1031	18	36
0- 60	1547	27	54
0- 90	1795	31	63
90-120	271	5	10
90-130	466	8	16
90-150	822	14	29
90-180	1066	18	37
0-180	2861	49	100

T5 - 2 Lamps



Photometric Report: File # S8A-2T5-4-VD-SB
Efficiency: 49.3 %
63% Direct : 37% Indirect
Model Shown: 2- F28 T5 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

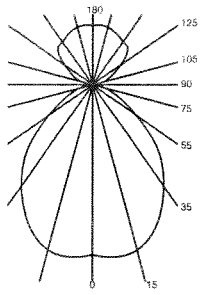
Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	54	54	54	54	51	51	51	51	44	44	44
1	50	48	46	44	46	45	43	42	39	38	37
2	45	42	39	37	43	39	37	35	35	33	31
3	42	37	34	31	39	35	32	29	31	29	27
4	38	33	29	27	36	31	28	25	28	25	23
5	35	30	26	23	33	28	25	22	25	22	20
6	33	27	23	20	31	26	22	19	23	20	18
7	30	24	21	18	29	23	20	17	21	18	16
8	28	22	19	16	27	21	18	15	19	16	14
9	26	20	17	14	25	19	16	14	18	15	13
10	25	19	15	13	23	18	15	13	16	14	12

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

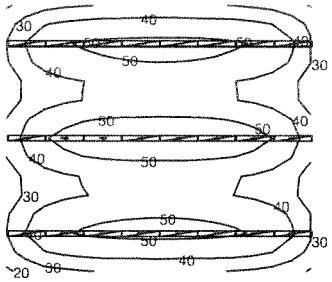
Distribution Curve



Candlepower Summary

Angle	0.0	45	90	Output Lumens
0	900	900	900	5
5	859	884	915	79
15	771	834	905	237
25	638	727	809	336
35	490	569	657	359
45	336	400	490	315
55	224	241	282	222
65	143	138	148	141
75	78	73	82	81
85	34	31	28	25
90	14	7	3	4
95	32	22	17	19
105	80	67	62	73
115	130	128	117	125
125	179	193	179	167
135	223	239	260	186
145	260	270	279	169
155	292	299	298	137
165	311	314	316	89
175	317	320	318	29
180	314	314	314	2

Room Layout

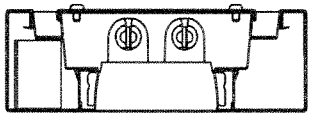


10.7(L) x 9.1(W) x 3.0(H)m [35 x 30 x 10 ft]
Reflectances: 80/50/20
Maintenance factor: 0.75
Fixture spacing: 3.0m [10'-0"]
Pendant length: 457mm [18"]

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0- 30	657	11	24
0- 40	1016	18	36
0- 60	1553	27	56
0- 90	1802	31	64
90-120	219	4	8
90-130	386	7	14
90-150	741	13	27
90-180	998	17	36
0-180	2800	48	100

T8 - 2 Lamps



Photometric Report: File # S8A-2T8-4-VD-SB
Efficiency: 48.3%
64% Direct : 36% Indirect
Model Shown: 2- F32 T8 Lamps
Variable Deflector-up (fully open) : Solid cross blade baffle-down

Coefficients of Utilization
Zonal Cavity Method

Effective Floor Cavity Reflectance = .20

RC	80				70				50		
RW	70	50	30	10	70	50	30	10	50	30	10
RCR											
0	53	53	53	53	50	50	50	50	44	44	44
1	49	47	45	43	46	44	42	41	39	38	37
2	45	41	38	36	42	39	36	34	34	32	31
3	41	37	33	30	38	34	31	29	31	28	26
4	38	33	29	26	35	31	27	25	27	25	23
5	35	29	25	23	33	28	24	22	25	22	20
6	32	26	23	20	30	25	22	19	22	20	18
7	30	24	20	18	28	23	19	17	21	18	16
8	28	22	18	16	26	21	17	15	19	16	14
9	26	20	16	14	24	19	16	14	17	15	13
10	24	18	15	13	23	18	14	12	16	13	11

Laboratory results may not be representative of field performance. Ballast factors have not been applied. Additional IES files with lamping and control options available on line at **www.metalumen.com/ies**

SK & Associates	Description : BALLAST SPEC FOR FP8HD Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE:

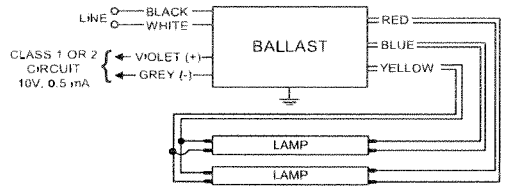
ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
* F54T5/HO	2	54	50/10	1.05	24/125	0.03/1.00	10	0.98	1.7	0.80
F54T5/HO/ES (49W)	2	49	50/10	0.98	24/117	0.03/1.00	10	0.98	1.7	0.85
FC12T5/HO	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79
FT55W/2G11	2	55	50/10	0.96	24/114	0.03/0.90	10	0.98	1.7	0.79

Wiring Diagram



Diag. 56A

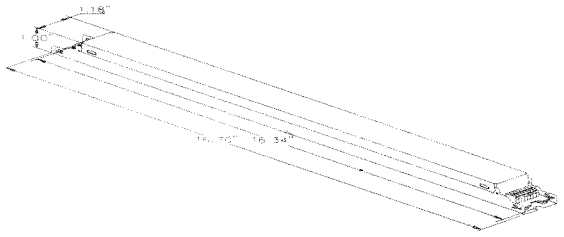
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0	0
White	0	0
Blue	0	0
Red	0	0
Yellow	0	0
Gray	0	0
Violet	0	0

	in.	cm.
Yellow/Blue	0	0
Blue/White	0	0
Brown	0	0
Orange	0	0
Orange/Black	0	0
Black/White	0	0
Red/White	0	0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 02/28/12

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 847-768-7768
Corporate Offices: Phone: 800-322-2086

ADVANCE TRANSFORMER CO.

Electrical Specifications

RZT-2S54	
Brand Name	**MARK 7 0-10V**
Ballast Type	**Electronic Dimming**
Starting Method	**Programmed Start**
Lamp Connection	**Series**
Input Voltage	**120**
Input Frequency	**50/60 HZ**
Status	**Active**

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors or integral leads color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

2.2 VZT-4PSP32-G ballast shall provide Independent Lamp Operation (ILO) allowing remaining lamp(s) to maintain full light output when one or more lamps fail.

2.3 Ballast shall be provided with integral protection circuitry to withstand connection of low voltage control leads to mains power supply. In this event, ballast shall default to maximum light output.

2.4 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.5 Ballast shall operate from 50/60 Hz input source of 120V or 277V or 347V with sustained variations of +/- 10% (voltage and frequency). IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency).

2.6 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.7 Ballast shall have a Power Factor greater than 0.98 at full light output and greater than 0.90 throughout the dimming range for primary lamp.

2.8 Ballast shall have a minimum ballast factor of 1.00 (120V and 277V 1-3 lamp models) or 0.88 (120V and 277V 4 lamp models and 347V 2-3 lamp models) or 1.18 (277V 4 lamp HL models) at maximum light output and 0.03 at minimum light output for primary lamp.

2.9 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.10 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage and 100% power.

2.11 Ballast shall have a Class A sound rating.

2.12 Ballast shall have a minimum starting temperature of 10C (50F) for primary lamp.

2.13 Ballast shall provide Lamp EOL Protection Circuit for all T5, T5/HO and CFL lamps.

2.14 Ballast shall control lamp light output from 100% - 3% relative light output for series operation T8 and CFL lamps, 100% - 10% relative light output for parallel operation T8 and 100% - 1% relative light output for T5/HO lamps.

2.15 Ballast shall ignite the lamps at any light output setting without first going to another output setting.

2.16 Ballast shall tolerate sustained open circuit and short circuit output conditions.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

3.6 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be controlled by a Class 1 or Class 2 low voltage 0-10VDC controller.

4.5 Ballast shall be Philips Advance part # _____ or approved equal.

Revised 02/28/12

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD - ROSEMONT, ILLINOIS 60018
TELEPHONE: (847)390-5000 FAX: (847)768-7768

SK & Associates	Description : PHOTOMETRICS FOR 2-LAMP S8A Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FP8HD**

S8A-2T5HO-4-N-SL-X-W.rpt

Thu Feb 14 10:19:28 2008

IESNA:LM-63-1995
Photopia 2.0.0.17 PHOTOMETRIC REPORT
PROJECT: S8A-2T5HO-4-N-SL-X-W
OPTIONS:
  Spawning 1 rays for each reaction.
  Writing 250 rays to a DXF file.
  Random number generator seed: 8.
  Tracing 10 reflections.
  Stop tracing ray at 1.0% of initial magnitude.
  Tracing 10000008 initial lamp rays.
  Photometric test distance of 7.00 meters.

LUMENS EXITING SYSTEM:

Lumens(%)	Reflection
4602(52.3%)	0
1660(18.9%)	1
753(8.6%)	2
289(3.3%)	3
146(1.7%)	4
77(0.9%)	5
45(0.5%)	6
29(0.3%)	7
20(0.2%)	8
14(0.2%)	9
10(0.1%)	10
7650(86.9%)	Total

LUMEN INTERACTION WITH SYSTEM:

Absorbed(%)	Incident(%)	Layer Name
3(0.0%)	33(0.4%)	BODY
179(2.0%)	2844(32.3%)	LAMP-F54T5HO1
6(0.1%)	109(1.2%)	LAMP-F54T5HO2
50(0.6%)	136(1.5%)	LHDRBRKT
323(3.7%)	2153(24.5%)	LOUVERBLADE
149(1.7%)	928(10.5%)	LOUVERRAIL
190(2.2%)	1267(14.4%)	RF-0101-004_P5
190(2.2%)	1268(14.4%)	RF-0101-004_P5b
1093(12.4%)	8742(99.3%)	Total

Absorbed(%)	Incident(%)	Material Name
186(2.1%)	2954(33.6%)	PHOSGLAS
53(0.6%)	169(1.9%)	PAINT006
853(9.7%)	5618(63.8%)	SPEC85
1093(12.4%)	8742(99.3%)	Total

UNACCOUNTED LUMENS:

reached interreflection limit:	56.00 (	0.6%)
fell below continuation minimum:	0.00 (	0.0%)
could not find in/out refractor facet:	0.00 (	0.0%)
reached try limit for scatter bounce:	0.00 (	0.0%)
lost elsewhere(i.e. outside distrib):	0.00 (	0.0%)

Number of Lamps: 2 Lumens per Lamp: 4400
Ballast Factor: 1.00 Ballast-Lamp Photometric Factor: 1.00
Luminaire Width: 2.9788 Length: 3.7033 Height: 3.0538
Photometry Type: C Units: meters

Candela Distribution:

	0.00	22.50	45.00	67.50	90.00
0.00	997	997	997	997	997

5.00	1009	1013	1024	1031	1024
15.00	957	976	1055	1145	1187
25.00	866	941	1129	1177	1173
35.00	742	906	960	914	942
45.00	596	747	729	775	784
55.00	362	392	290	140	68.0
65.00	12.0	27.0	83.0	157	214
75.00	1.00	1.00	3.00	12.0	19.0
85.00	2.00	2.00	1.00	0.000	0.000
90.00	25.0	13.0	3.00	1.00	0.000
95.00	161	272	253	193	170
105.00	270	519	791	928	944
115.00	434	694	947	1105	1212
125.00	613	765	1180	1294	1309
135.00	773	867	1120	1447	1517
145.00	909	978	1073	1212	1309
155.00	1008	1063	1124	1170	1184
165.00	1089	1110	1143	1170	1182
175.00	1112	1117	1135	1157	1144
180.00	1120	1120	1120	1120	1120

Zonal Lumens

Cone	Between	Lumens
0.0	0.0- 2.5	5.96
5.0	2.5- 10.0	91.37
15.0	10.0- 20.0	301.04
25.0	20.0- 30.0	493.70
35.0	30.0- 40.0	568.83
45.0	40.0- 50.0	569.41
55.0	50.0- 60.0	232.59
65.0	60.0- 70.0	94.30
75.0	70.0- 80.0	6.88
85.0	80.0- 87.5	0.82
90.0	87.5- 92.5	4.04
95.0	92.5-100.0	180.45
105.0	100.0-110.0	752.44
115.0	110.0-120.0	885.66
125.0	120.0-130.0	942.02
135.0	130.0-140.0	886.55
145.0	140.0-150.0	686.62
155.0	150.0-160.0	515.28
165.0	160.0-170.0	323.05
175.0	170.0-177.5	101.49
180.0	177.5-180.0	6.70

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0- 30	892	10.1	11.7
0- 40	1461	16.6	19.1
0- 60	2263	25.7	29.6
0- 90	2367	26.9	30.9
90-120	1821	20.7	23.8
90-130	2763	31.4	36.1
90-150	4336	49.3	56.7
90-180	5282	60.0	69.1
0-180	7649	86.9	100.0

Total Luminaire Optical Efficiency = 86.9%

Luminaire Spacing Criterion:

0 deg	90 deg
1.20	1.44

Average Luminaire Luminance (cd/m^2):

	0	45	90
0	90.38	90.38	90.38
45	41.88	40.49	49.63
50	34.07	28.08	27.04
55	26.27	15.98	4.36
60	13.96	10.35	9.21
65	0.93	4.68	14.35
70	0.53	2.48	8.09
75	0.09	0.18	1.38
80	0.14	0.12	0.73
85	0.20	0.07	0.00

Coefficients of Utilization - Zonal Cavity Method:

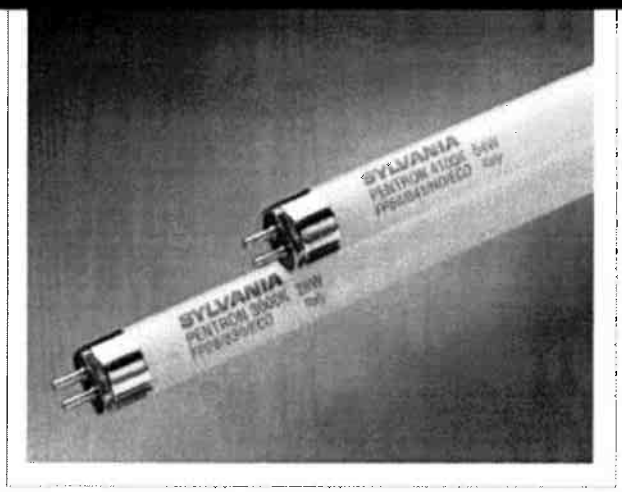
pfc = 0.20

pcc	.8				.7				.5			.3			.1			0
pw	.7	.5	.3	.1	.7	.5	.3	.1	.5	.3	.1	.5	.3	.1	.5	.3	.1	0
RCR																		
0	89	89	89	89	80	80	80	80	63	63	63	47	47	47	33	33	33	26
1	82	79	76	73	74	71	68	66	56	55	53	43	42	41	30	30	29	24
2	75	69	65	61	67	63	59	55	50	47	45	38	37	35	27	26	26	21
3	69	61	56	51	62	56	51	47	45	41	38	34	32	30	25	24	22	18
4	63	55	48	43	57	49	44	40	40	36	33	31	28	26	22	21	20	16
5	58	49	42	37	52	44	39	34	36	32	29	28	25	23	20	19	17	14
6	53	44	37	32	48	40	34	30	32	28	25	25	22	20	19	17	15	13
7	49	39	33	28	44	36	30	26	29	25	22	23	20	18	17	15	14	11
8	46	36	29	25	41	32	27	23	26	22	19	21	18	16	15	14	12	10
9	42	32	26	22	38	30	24	20	24	20	17	19	16	14	14	12	11	9
10	40	30	24	20	36	27	22	18	22	18	15	18	15	13	13	11	10	8

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

ECOLOGIC®

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 BI-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

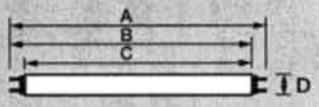
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

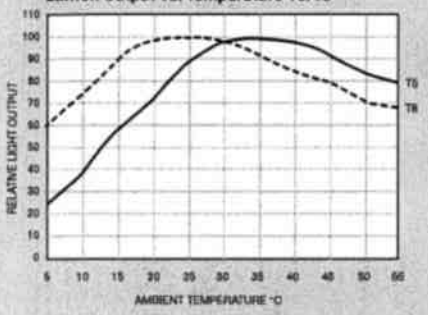
Technical Information

Dimensions



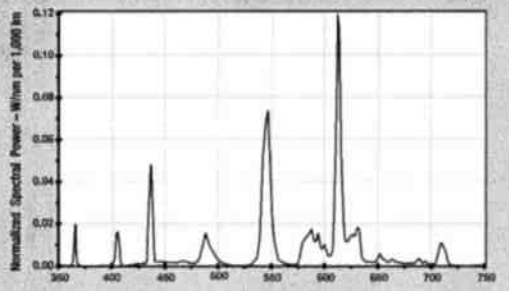
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

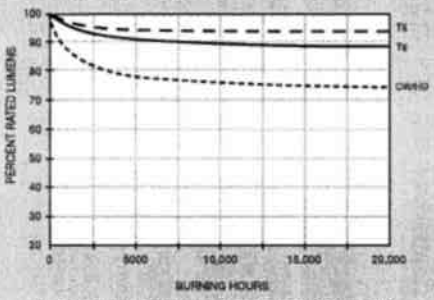


Spectral Power Distributions

PENTRON 830

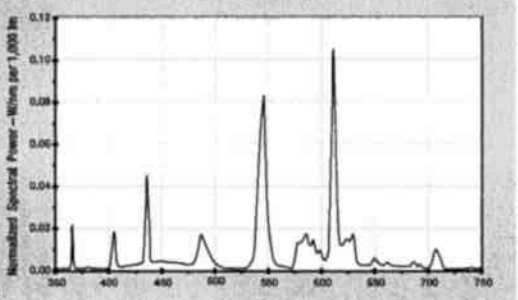


Fluorescent Lamp Lumen Maintenance

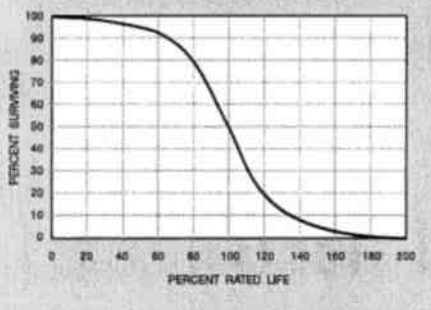


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

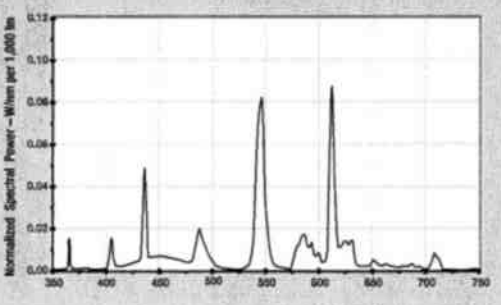
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
OSRAM SYLVANIA LTD.
2001 Drew Road
Mississauga, ON L5S 1S4

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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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SK & Associates	Description : 20-4-154T5H-A-EB1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FS4**

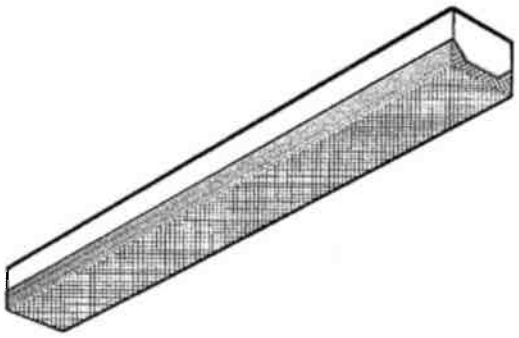
CEILING OR WALL MOUNT **WRAP AROUND**

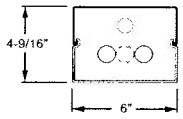
SERIES **20**

JOB _____

TYPE _____

VOLTAGE _____





SPECIFICATIONS

- HOUSING – 22-gauge die-formed C.R.S.
- SHIELDING – Acrylic prismatic diffuser.
- FINISH – 92% minimum average reflective white powder coat with multi-stage iron/phosphate prepared metal.
- ELECTRICAL – Electronic ballast standard, instant start T8, programmed start T5, rated Class P.
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations.
- MOUNTING – Surface or suspended.

FEATURES

- Diffuser provides uniform distribution and low brightness side illumination.
- Continuous diffuser support system along luminaire sides.
- Universal lamp bracket allows for field conversion from 1 to 2 lamps (or 2 to 1).
- 7/8" K.O. in ends for continuous row mounting.
- Wireway is accessible without the use of tools.
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimal ballast noise.
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.

SUBMITTAL INFORMATION

NOMINAL LENGTH
2 = 2 ft.
3 = 3 ft.
4 = 4 ft.
8 = 8 ft.

TOTAL LAMPS
1, 2, or 4

SHIELDING
A = Acrylic pattern 12 lens

20-4-232-A-OPTIONS-EB2

LUMINAIRE SERIES

EM7A = Emergency battery pack (870A) or equivalent

BALLAST TYPE: (dependent on specified lamp type)
EB1 = 1-lamp electronic ballast
EB2 = 2-lamp electronic ballast
EB4 = 4-lamp electronic ballast
EB2/2 = (2) 2-lamp electronic ballasts

LAMP WATTAGE/TYPE
14T5S = 2', 14-watt T5
17 = 2', 17-watt T8
24T5H = 2', 24-watt T5HO
25 = 3', 25-watt T8
28T5S = 4', 28-watt T5
32 = 4', 32-watt T8
54T5H = 4', 54-watt T5HO

For more options, accessories, and product details, refer to Information Section.

Williams
FLUORESCENT LIGHTING

20 SERIES

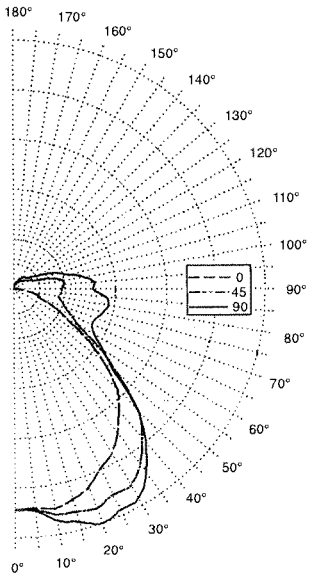
PHOTOMETRY INFORMATION

Williams Catalog #20-4-232-A-EB2-120
Test Report #9966.0, Dated 7/23/98

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1207.	1207.	1207.	
5	1199.	1207.	1216.	115.2
15	1187.	1256.	1313.	355.0
25	1081.	1237.	1329.	565.0
35	959.	1168.	1223.	709.7
45	781.	940.	937.	700.1
55	478.	556.	586.	486.5
65	256.	341.	460.	345.7
75	130.	266.	492.	303.6
85	43.	256.	497.	290.2
90	22.	256.	424.	
95	11.	266.	435.	263.2
105	9.	226.	314.	204.3
115	0.	114.	207.	117.0
125	0.	81.	119.	64.9
135	0.	66.	90.	44.7
145	0.	57.	81.	32.1
155	0.	39.	54.	16.2
165	0.	30.	39.	6.1
175	0.	0.	0.	.0
180	0.	0.	0.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1035.	17.5	22.4
0 - 40	1745.	29.6	37.8
0 - 60	2932.	49.7	63.5
0 - 90	3871.	65.6	83.8
90 - 120	585.	9.9	12.7
90 - 130	649.	11.0	14.1
90 - 150	726.	12.3	15.7
90 - 180	749.	12.7	16.2
Total Luminaire			
0 - 180	4620.	78.3	100.0

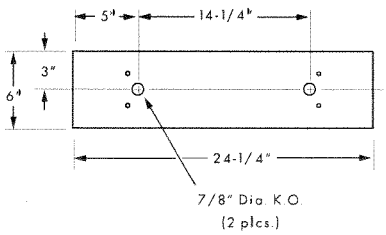
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY = 78.3 %**
SPACING CRITERIA: ACROSS= 1.5 ALONG= 1.3

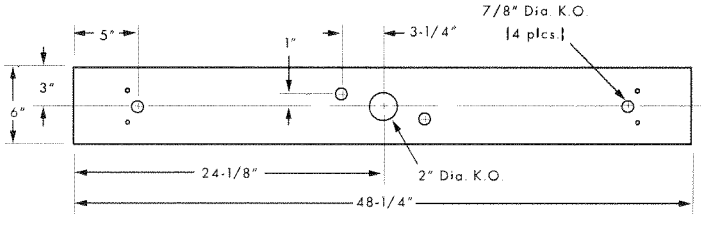
ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	.90	.90	.90	.87	.87	.87	.80	.80	.80
1	.82	.78	.74	.78	.75	.71	.69	.66	.64
2	.74	.68	.63	.71	.65	.61	.61	.57	.53
3	.68	.60	.54	.65	.58	.52	.54	.49	.45
4	.63	.54	.47	.60	.52	.46	.48	.43	.39
5	.58	.48	.41	.55	.46	.40	.43	.38	.34
6	.53	.43	.36	.51	.42	.35	.39	.33	.29
7	.49	.39	.32	.47	.37	.31	.35	.30	.26
8	.45	.35	.28	.43	.34	.28	.32	.26	.22
9	.42	.31	.25	.40	.30	.24	.28	.23	.19
10	.39	.28	.22	.37	.27	.22	.26	.21	.17

MOUNTING

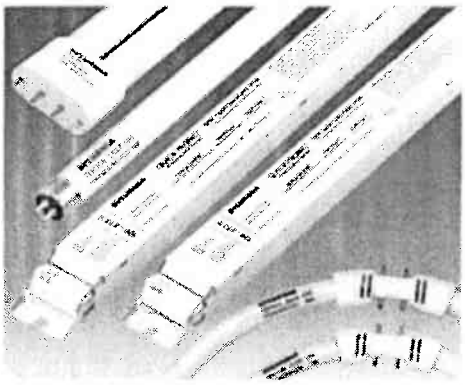




8' fixture (96-1/2" actual length) repeats same pattern both ends.

Williams
H.E. WILLIAMS, INC.
H.E. Williams, Inc. • Carthage, Missouri • www.**hewilliams**.com • 417-358-4065 • Fax: 417-358-6015
Information contained herein is subject to change without notice.

SK & Associates	Description : T5HO SINGLE LAMP BALLAST Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FS4



Product Number: 49120

Order Abbreviation: QTP 1X54T5HO/UNV PSN

General Description: 1- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

Product Information	
Abbrev. With Packaging Info.	QTP1X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	14.1340
Ballast Width W (in)	1.1810
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	1
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	60

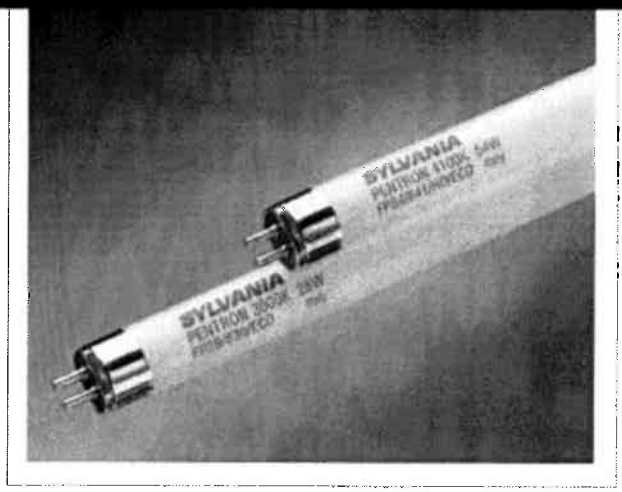
Footnotes

- Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations.
- Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware
- Remote Mounting up to 18 feet
- Remote Mounting up to 12 feet
- Remote Mounting up to 10 feet
- Remote mounting defined by harness length
- Complies with FCC 47 CFR Part 18, Non-Consumer
- Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp).
- Wiring diagram applies to instant start standard, low power (LP), PLUS, and HD10 ballast types.
- Oil Filled Capacitor
- Product contains installation instructions

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature BI-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

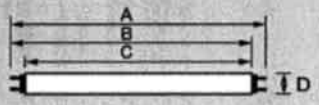
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

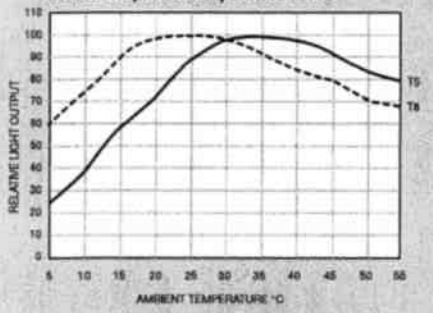
Technical Information

Dimensions



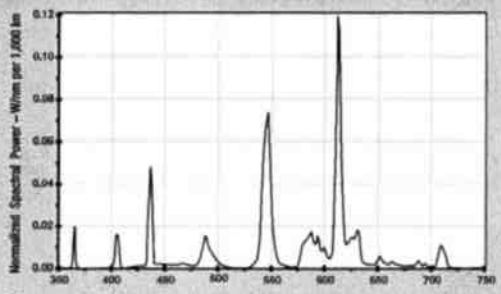
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

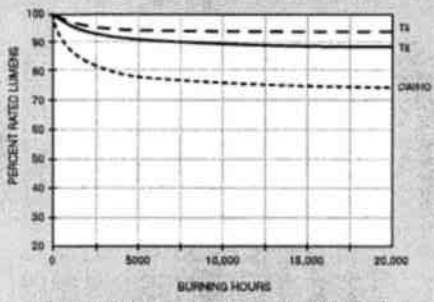


Spectral Power Distributions

PENTRON 830

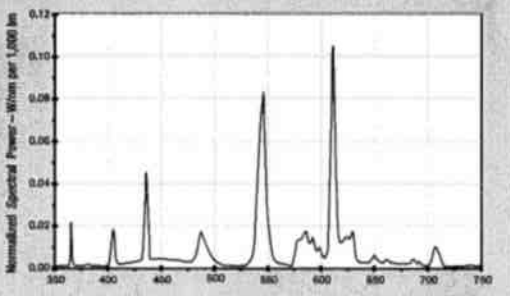


Fluorescent Lamp Lumen Maintenance

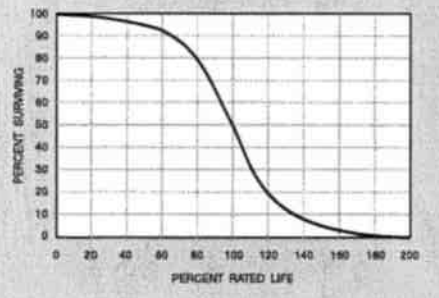


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

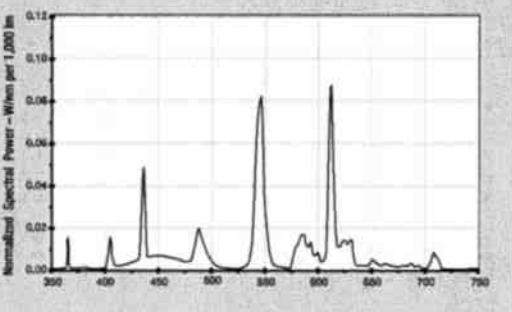
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

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Danvers, MA 01923

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Phone: 1-800-255-5042
Fax: 1-800-255-5043

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Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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2001 Drew Road
Mississauga, ON L5S 1S4

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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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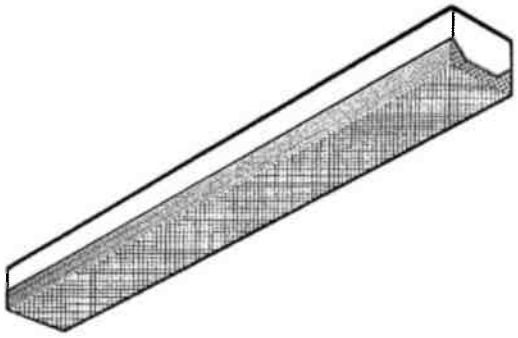
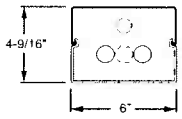
SK & Associates	Description : 20-8-254T5H-A-EB2-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FS8**

CEILING OR WALL MOUNT **WRAP AROUND**

VOLTAGE TYPE JOB SERIES **20**





SPECIFICATIONS

- HOUSING — 22-gauge die-formed C.R.S.
- SHIELDING — Acrylic prismatic diffuser.
- FINISH — 92% minimum average reflective white powder coat with multi-stage iron/phosphate prepared metal.
- ELECTRICAL — Electronic ballast standard, instant start T8, programmed start T5, rated Class P.
- LABELS — UL/CUL listed as fluorescent luminaire suitable for dry or damp locations.
- MOUNTING — Surface or suspended.

FEATURES

- Diffuser provides uniform distribution and low brightness side illumination.
- Continuous diffuser support system along luminaire sides.
- Universal lamp bracket allows for field conversion from 1 to 2 lamps (or 2 to 1).
- 7/8" K.O. in ends for continuous row mounting.
- Wireway is accessible without the use of tools.
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimal ballast noise.
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.

SUBMITTAL INFORMATION

NOMINAL LENGTH
2 = 2 ft.
3 = 3 ft.
4 = 4 ft.
8 = 8 ft.

TOTAL LAMPS
2 or 4

SHIELDING
A = Acrylic pattern 12 lens

20-4-232-A-OPTIONS-EB2

LUMINAIRE SERIES

EM7A = Emergency battery pack (B70A) or equivalent

BALLAST TYPE: (dependent on specified lamp type)
EB1 = 1-lamp electronic ballast
EB2 = 2-lamp electronic ballast
EB4 = 4-lamp electronic ballast
EB2/2 = (2) 2-lamp electronic ballasts

LAMP WATTAGE/TYPE
14T5S = 2', 14-watt T5
17 = 2', 17-watt T8
24T5H = 2', 24-watt T5HO
25 = 3', 25-watt T8
28T5S = 4', 28-watt T5
32 = 4', 32-watt T8
54T5H = 4', 54-watt T5HO

For more options, accessories, and product details, refer to Information Section.

Williams
FLUORESCENT LIGHTING

20 SERIES

PHOTOMETRY INFORMATION

Williams Catalog #20-4-232-A-EB2-120
Test Report #9966.0, Dated 7/23/98

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1207.	1207.	1207.	
5	1199.	1207.	1216.	115.2
15	1187.	1256.	1313.	355.0
25	1081.	1237.	1329.	565.0
35	959.	1168.	1223.	709.7
45	781.	940.	937.	700.1
55	478.	556.	586.	486.5
65	256.	341.	460.	345.7
75	130.	266.	492.	303.6
85	43.	256.	497.	290.2
90	22.	256.	424.	
95	11.	266.	435.	263.2
105	9.	226.	314.	204.3
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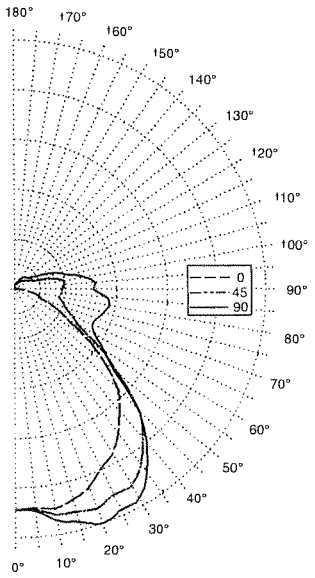


LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1035.	17.5	22.4
0 - 40	1745.	29.6	37.8
0 - 60	2932.	49.7	63.5
0 - 90	3871.	65.6	83.8
90 - 120	585.	9.9	12.7
90 - 130	649.	11.0	14.1
90 - 150	726.	12.3	15.7
90 - 180	749.	12.7	16.2
Total Luminaire			
0 - 180	4620.	78.3	100.0

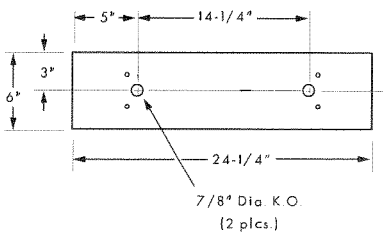
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY = 78.3 %**
SPACING CRITERIA: ACROSS= 1.5 ALONG= 1.3

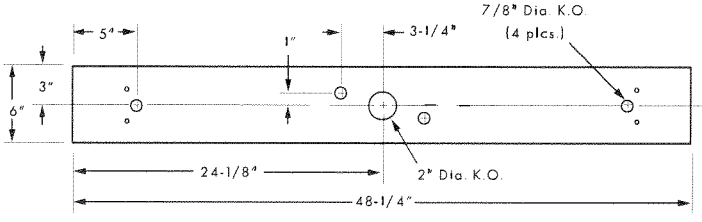
ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	90	90	90	87	87	87	80	80	80
1	82	78	74	78	75	71	69	66	64
2	74	68	63	71	65	61	61	57	53
3	68	60	54	65	58	52	54	49	45
4	63	54	47	60	52	46	48	43	39
5	58	48	41	55	46	40	43	38	34
6	53	43	36	51	42	35	39	33	29
7	49	39	32	47	37	31	35	30	26
8	45	35	28	43	34	28	32	26	22
9	42	31	25	40	30	24	28	23	19
10	39	28	22	37	27	22	26	21	17

MOUNTING



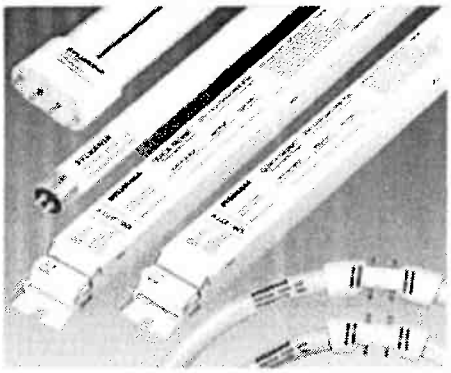


8' fixture (96-1/2" actual length) repeats same pattern both ends.

Williams
H.E. WILLIAMS, INC.
H.E. Williams, Inc. • Carthage, Missouri • www.**hewilliams**.com • 417-358-4065 • Fax: 417-358-6015
Information contained herein is subject to change without notice.

SK & Associates	Description : T5HO TWO LAMP BALLAST Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: FS8

Product Details



Product Number: 49130

Order Abbreviation: QTP 2X54T5HO/UNV PSN

General Description: 2- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

Product Information	
Abbrev. With Packaging Info.	QTP2X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	16.6540
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	-20
Starting Temperature - Celsius	-29
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	121.5

Footnotes
• Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations. • Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware • Remote Mounting up to 18 feet • Remote Mounting up to 12 feet • Remote Mounting up to 10 feet • Remote mounting defined by harness length • Complies with FCC 47 CFR Part 18, Non-Consumer • Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp). • Wiring diagram applies to instant start standard, low power (LP), PLUS, and HD10 ballast types. • Oil Filled Capacitor • Product contains installation instructions

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps

Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000'	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000'	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000'	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000'	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000'	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

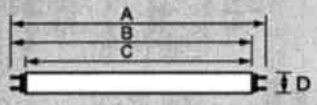
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

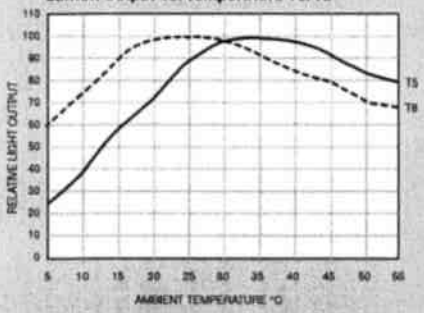
Technical Information

Dimensions



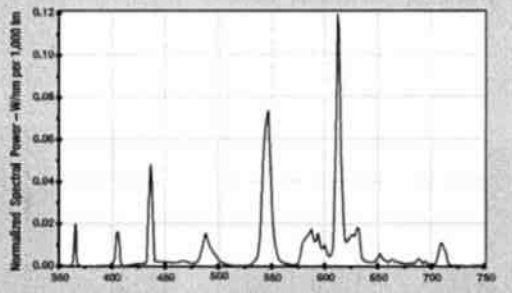
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

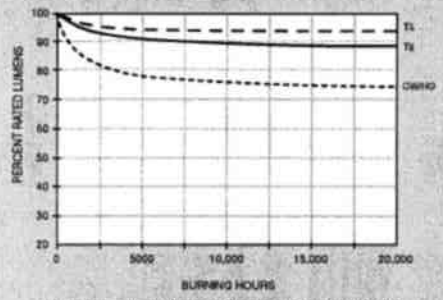


Spectral Power Distributions

PENTRON 830

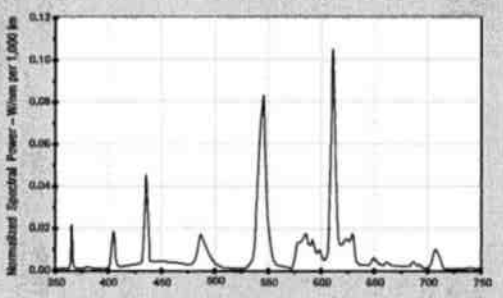


Fluorescent Lamp Lumen Maintenance

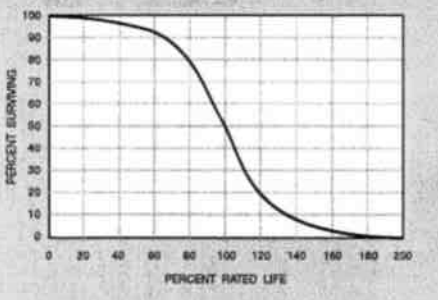


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

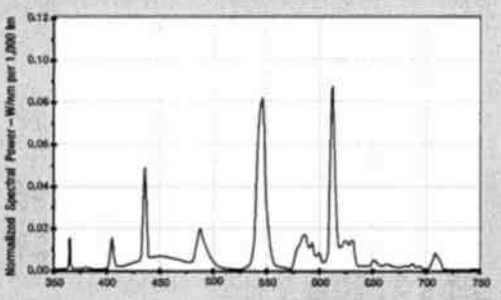
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
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Trade
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Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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Mississauga, ON L5S 1S4

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Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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QUICKTRONIC is a registered trademark of OSRAM GmbH.

SK & Associates	Description : WMA-4-254T5H-A-DL-CT-EB1/1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FW4**

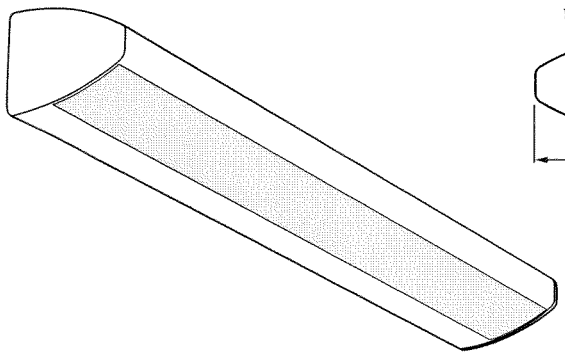
ARCHITECTURAL **WALL MOUNT**

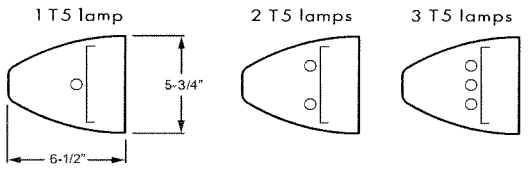
SERIES **WMA** T5

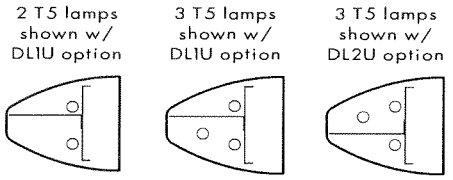
JOB

TYPE

VOLT







SPECIFICATIONS

- FIXTURE CHANNEL — 20-gauge C.R.S.
- FRONT HOUSING & END CAPS — Marine grade extruded aluminum with die-cast aluminum end caps.
- SHIELDING — #12 pattern, .125" acrylic.
- REFLECTIVE SURFACES — 92% minimum average reflective white powder coat on interior steel components.
- FINISH — Non-glare white polyester powder coated exterior textured finish with multi-stage iron/phosphate prepared metal.
- ELECTRICAL — Electronic ballast standard, programmed start T5, rated Class P.
- LABELS — UL/CUL listed as fluorescent luminaire suitable for dry or damp locations.
- MOUNTING — Wall.

FEATURES

- Available in various uplight, downlight, closed-top, and divided lamp options.
- Pull switches and grounded convenience outlet options available (120V only).
- Various housing color options available, including optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- Tool-less access to lamps by removing front housing from fixture channel.
- Die-cast aluminum end caps.
- Keyhole mounting for easy installation.
- Tamper-resistant screws available.
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.

ORDERING INFORMATION

Submittal

	SERIES	NOM. LENGTH	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST	VOLTAGE
EXAMPLE:	WMA	- 4	- 2	54T5H	- A	- OPTIONS	- EB2	- UNV

SERIES

WMA	Architectural Wall Mount

NOMINAL LENGTH

2	2'
3	3'
4	4'

TOTAL LAMPS

1, 2, or 3

LAMP WATTAGE/TYPE

2' WMA LAMP OPTIONS:

14T5S	2', 14-watt T5
24T5H	2', 24-watt T5HO

3' WMA LAMP OPTIONS:

21T5S	3', 21-watt T5
39T5H	3', 39-watt T5HO

4' WMA LAMP OPTIONS:

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO

SHIELDING

A	A12125, #12 pattern acrylic, .125" thick

OPTIONS

PSR*	Single-circuit pull switch on right (120V only)
PS2R	Two-circuit, 4-position pull switch on right (120V only; requires two ballasts per fixture)
PSL*	Single-circuit pull switch on left (120V only)
PS2L	Two-circuit, 4-position pull switch on left (120V only; requires two ballasts per fixture)
GCOL	Grounded Convenience Outlet on left (120V only)
GCOR	Grounded Convenience Outlet on right (120V only)
DL*	Divided Light with one lamp up, one lamp down (2-lamp fixture only, requires two ballasts, not available in 2' unit)
DL1U*	Divided Light with one lamp up (3-lamp fixture only, requires two ballasts, not available in 2' unit)
DL2U*	Divided Light with two lamps up (3-lamp fixture only, requires two ballasts, not available in 2' unit)
CT	Closed-Top
TP	Tamper-resistant (Holt Head) screws to secure front shield assembly to fixture housing
TPST**	1/4" drive socket (Holt Head) for tamper-resistant screws
AMW	Anti-microbial White finish

BALLAST TYPE

EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast
EB3	3-lamp electronic ballast (4' T5HO lamp only)
EB2/1	(1) 2-lamp & (1) 1-lamp electronic ballast
EB1/1	(2) 1-lamp electronic ballasts

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V

* When Divided Light unit is equipped with single circuit pull switch (PS), pull switch operates the down light.

** Tamper-proof tool is required for tamper-proof fixture. Please specify quantity.

Note: For more options/accessories, ballast combinations, and product details, please consult factory.

Williams
FLUORESCENT LIGHTING

WMA SERIES T5

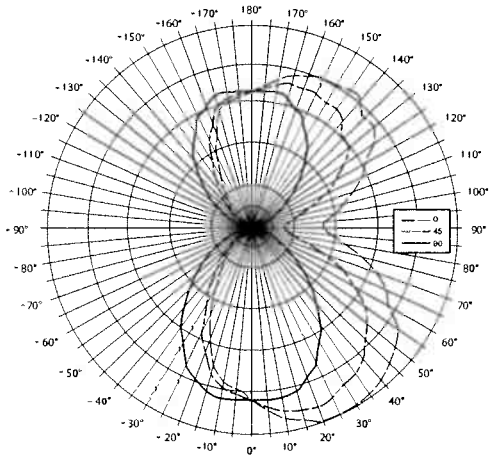
PHOTOMETRY INFORMATION

Williams Catalog #WMA-4-254T5H-A-DL1U
Test Report #14045.0, Dated 04/23/08

Lamp Type: FP54T5HO/835
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	135	180	TOTAL LUMENS
0	1304.	1304.	1304.	1304.	1304.	
5	1391.	1364.	1309.	1267.	1234.	125.6
15	1510.	1437.	1289.	1158.	1091.	367.6
25	1566.	1436.	1151.	872.	735.	533.1
35	1535.	1363.	921.	545.	397.	592.4
45	1461.	1217.	661.	327.	252.	585.7
55	1349.	1045.	422.	134.	105.	523.3
65	1123.	762.	231.	67.	40.	405.2
75	854.	444.	140.	17.	14.	266.3
85	613.	278.	42.	18.	28.	186.8
90	553.	260.	0.	27.	34.	
95	565.	270.	18.	15.	31.	172.4
105	738.	389.	104.	20.	14.	231.9
115	925.	648.	183.	54.	40.	341.2
125	1137.	879.	350.	113.	88.	440.7
135	1200.	980.	544.	272.	219.	487.9
145	1286.	1113.	758.	456.	330.	490.0
155	1264.	1143.	934.	731.	609.	432.8
165	1204.	1141.	1048.	962.	912.	297.9
175	1087.	1071.	1048.	1023.	1005.	99.8
180	1043.	1043.	1043.	1043.	1043.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1026.	10.3	15.6
0 - 40	1619.	16.2	24.6
0 - 60	2728.	27.3	41.4
0 - 90	3586.	35.9	54.5
90 - 120	746.	7.5	11.3
90 - 130	1186.	11.9	18.0
90 - 150	2164.	21.6	32.9
90 - 180	2995.	29.9	45.5
0 - 180	6581.	65.8	100.0

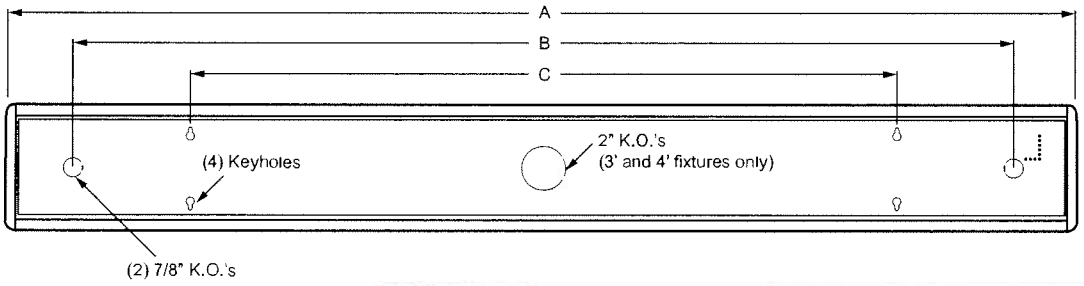
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY** = **65.8%**

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

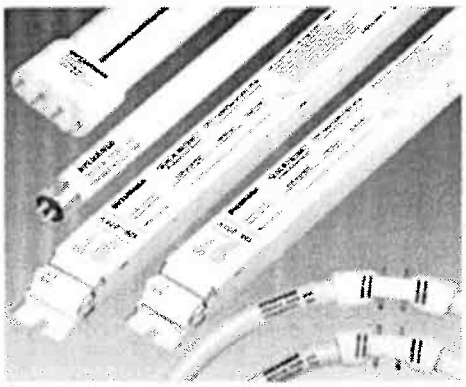
CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	.71	.71	.71	.66	.66	.66	.56	.56	.56
1	.65	.62	.59	.60	.57	.55	.49	.47	.46
2	.59	.54	.50	.55	.50	.47	.43	.40	.38
3	.54	.48	.43	.50	.44	.40	.38	.35	.32
4	.49	.42	.37	.46	.39	.35	.34	.31	.28
5	.45	.38	.32	.42	.35	.30	.30	.27	.24
6	.42	.34	.28	.39	.32	.27	.27	.24	.21
7	.39	.30	.25	.36	.28	.24	.25	.21	.18
8	.36	.27	.22	.33	.26	.21	.22	.19	.16
9	.33	.25	.20	.30	.23	.19	.20	.16	.14
10	.31	.23	.18	.28	.21	.17	.18	.15	.12

BACK VIEW



Nominal Fixture Length	A	B	C
2' Unit	25-1/8" O.C.	20-1/2" O.C.	16" O.C.
3' Unit	37-1/8" O.C.	32-1/2" O.C.	32" O.C.
4' Unit	49-1/8" O.C.	42-1/2" O.C.	32" O.C.

Williams
H.E. WILLIAMS, INC.



Product Number: 49120

Order Abbreviation: QTP 1X54T5HO/UNV PSN

General Description: 1- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

Product Information	
Abbrev. With Packaging Info.	QTP1X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	14.1340
Ballast Width W (in)	1.1810
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	1
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	60

Footnotes
• Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations. • Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware • Remote Mounting up to 18 feet • Remote Mounting up to 12 feet • Remote Mounting up to 10 feet • Remote mounting defined by harness length • Complies with FCC 47 CFR Part 18, Non-Consumer • Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp). • Wiring diagram applies to instant start standard, low power (LP), PLUS, and HD10 ballast types. • Oil Filled Capacitor • Product contains installation instructions

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/ECO	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

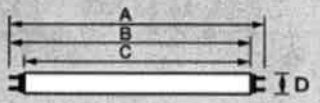
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

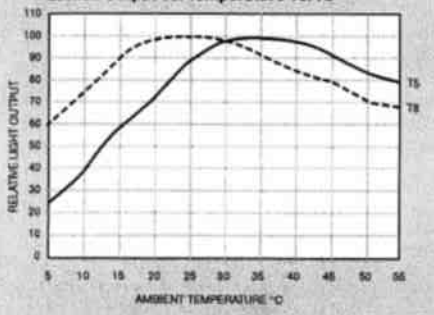
Technical Information

Dimensions



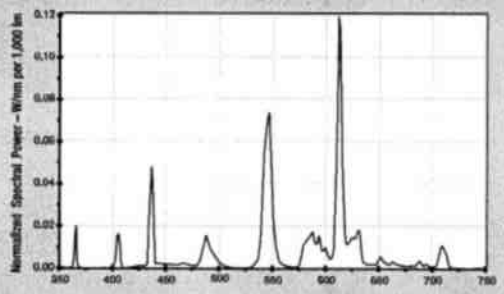
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

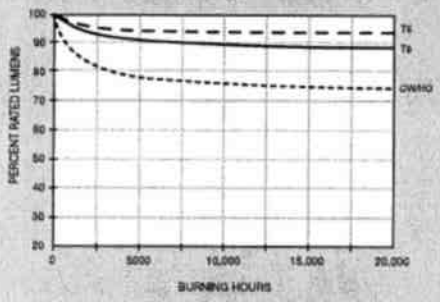


Spectral Power Distributions

PENTRON 830

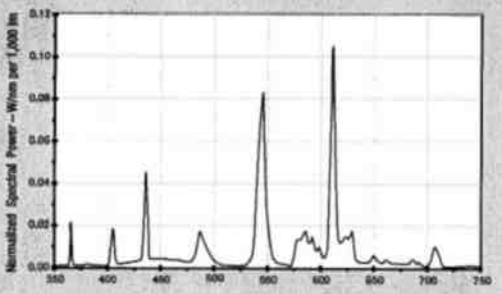


Fluorescent Lamp Lumen Maintenance

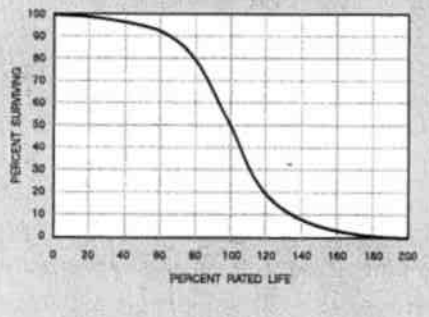


* Lumen output continues to decrease throughout the life of a fluorescent lamp.

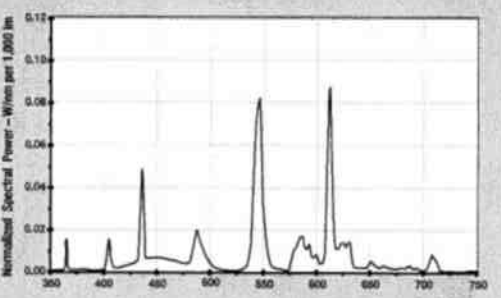
PENTRON 835



Typical Fluorescent Lamp Mortality



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
OSRAM SYLVANIA LTD.
2001 Drew Road
Mississauga, ON L5S 1S4

Trade
Phone: 1-800-263-2852
Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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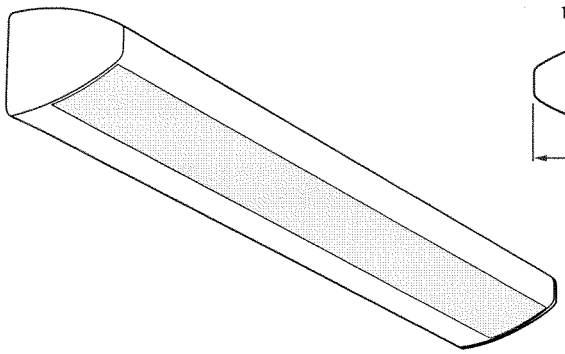
QUICKTRONIC is a registered trademark of OSRAM GmbH.

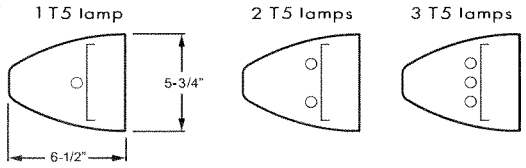
SK & Associates	Description : WMA-4-254T5H-A-DL-CT-EB1/1-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **FW8**

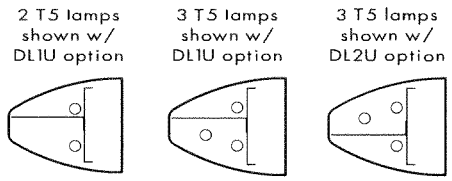
ARCHITECTURAL **WALL MOUNT**

WMA
T5

VOLT TYPE JOB SERIES







SPECIFICATIONS

- FIXTURE CHANNEL – 20-gauge C.R.S.
- FRONT HOUSING & END CAPS – Marine grade extruded aluminum with die-cast aluminum end caps.
- SHIELDING – #12 pattern, .125" acrylic.
- REFLECTIVE SURFACES – 92% minimum average reflective white powder coat on interior steel components.
- FINISH – Non-glare white polyester powder coated exterior textured finish with multi-stage iron/phosphate prepared metal.
- ELECTRICAL – Electronic ballast standard, programmed start T5, rated Class P.
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations.
- MOUNTING – Wall.

FEATURES

- Available in various uplight, downlight, closed-top, and divided lamp options.
- Pull switches and grounded convenience outlet options available (120V only).
- Various housing color options available, including optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- Tool-less access to lamps by removing front housing from fixture channel.
- Die-cast aluminum end caps.
- Keyhole mounting for easy installation.
- Tamper-resistant screws available.
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.

ORDERING INFORMATION

Submittal

	SERIES	NOM. LENGTH	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST	VOLTAGE
EXAMPLE:	WMA	- 4	- 2	54T5H	- A	- OPTIONS	- EB2	- UNV

SERIES

WMA	Architectural Wall Mount

NOMINAL LENGTH

2	2'
3	3'
4	4'

TOTAL LAMPS

1, 2, or 3	

LAMP WATTAGE/TYPE

2' WMA LAMP OPTIONS:

14T5S	2', 14-watt T5
24T5H	2', 24-watt T5HO

3' WMA LAMP OPTIONS:

21T5S	3', 21-watt T5
39T5H	3', 39-watt T5HO

4' WMA LAMP OPTIONS:

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO

SHIELDING

A	A12125, #12 pattern acrylic, .125" thick

OPTIONS

PSR*	Single-circuit pull switch on right (120V only)
PS2R	Two-circuit, 4-position pull switch on right (120V only; requires two ballasts per fixture)
PSL*	Single-circuit pull switch on left (120V only)
PS2L	Two-circuit, 4-position pull switch on left (120V only; requires two ballasts per fixture)
GCOL	Grounded Convenience Outlet on left (120V only)
GCOR	Grounded Convenience Outlet on right (120V only)
DL*	Divided Light with one lamp up, one lamp down (2-lamp fixture only, requires two ballasts, not available in 2' unit)
DL1U*	Divided Light with one lamp up (3-lamp fixture only, requires two ballasts, not available in 2' unit)
DL2U*	Divided Light with two lamps up (3-lamp fixture only, requires two ballasts, not available in 2' unit)
CT	Closed-Top
TP	Tamper-resistant (Holt Head) screws to secure front shield assembly to fixture housing
TPST**	1/4" drive socket (Holt Head) for tamper-resistant screws
AMW	Anti-microbial White finish

BALLAST TYPE

EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast
EB3	3-lamp electronic ballast (4' T5HO lamp only)
EB2/1	(1) 2-lamp & (1) 1-lamp electronic ballast
EB1/1	(2) 1-lamp electronic ballasts

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V

* When Divided Light unit is equipped with single circuit pull switch (PS), pull switch operates the down light.

** Tamper-proof tool is required for tamper-proof fixture. Please specify quantity.

Note: For more options/accessories, ballast combinations, and product details, please consult factory.

Williams
FLUORESCENT LIGHTING

WMA SERIES
T5

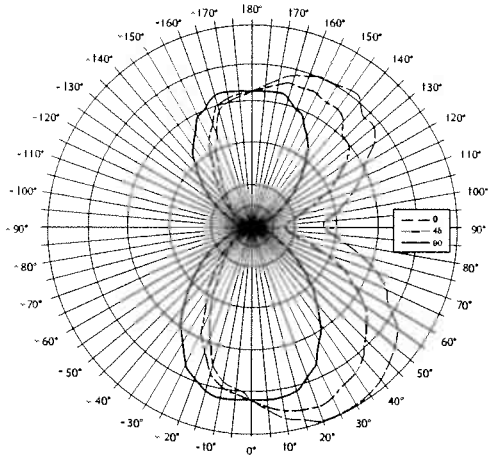
PHOTOMETRY INFORMATION

Williams Catalog #WMA-4-254T5H-A-DL1U
Test Report #14045.0, Dated 04/23/08

Lamp Type: FP54T5HO/835
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	135	180	TOTAL LUMENS
0	1304.	1304.	1304.	1304.	1304.	
5	1391.	1364.	1309.	1267.	1234.	125.6
15	1510.	1437.	1289.	1158.	1091.	367.6
25	1566.	1436.	1151.	872.	735.	533.1
35	1535.	1363.	921.	545.	397.	592.4
45	1461.	1217.	661.	327.	252.	585.7
55	1349.	1045.	422.	134.	105.	523.3
65	1123.	762.	231.	67.	40.	405.2
75	854.	444.	140.	17.	14.	266.3
85	613.	278.	42.	18.	28.	186.8
90	553.	260.	0.	27.	34.	
95	565.	270.	18.	15.	31.	172.4
105	738.	389.	104.	20.	14.	231.9
115	925.	648.	183.	54.	40.	341.2
125	1137.	879.	350.	113.	88.	440.7
135	1200.	980.	544.	272.	219.	487.9
145	1286.	1113.	758.	456.	330.	490.0
155	1264.	1143.	934.	731.	609.	432.8
165	1204.	1141.	1048.	962.	912.	297.9
175	1087.	1071.	1048.	1023.	1005.	99.8
180	1043.	1043.	1043.	1043.	1043.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1026.	10.3	15.6
0 - 40	1619.	16.2	24.6
0 - 60	2728.	27.3	41.4
0 - 90	3586.	35.9	54.5
90 - 120	746.	7.5	11.3
90 - 130	1186.	11.9	18.0
90 - 150	2164.	21.6	32.9
90 - 180	2995.	29.9	45.5
0 - 180	6581.	65.8	100.0

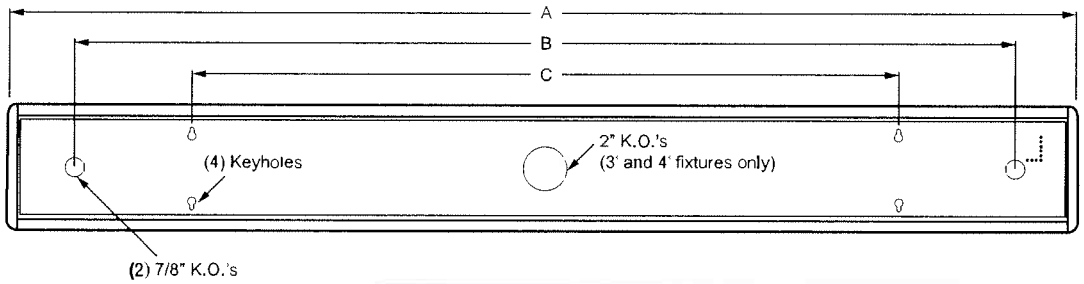
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY** = **65.8%**

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	.71	.71	.71	.66	.66	.66	.56	.56	.56
1	.65	.62	.59	.60	.57	.55	.49	.47	.46
2	.59	.54	.50	.55	.50	.47	.43	.40	.38
3	.54	.48	.43	.50	.44	.40	.38	.35	.32
4	.49	.42	.37	.46	.39	.35	.34	.31	.28
5	.45	.38	.32	.42	.35	.30	.30	.27	.24
6	.42	.34	.28	.39	.32	.27	.27	.24	.21
7	.39	.30	.25	.36	.28	.24	.25	.21	.18
8	.36	.27	.22	.33	.26	.21	.22	.19	.16
9	.33	.25	.20	.30	.23	.19	.20	.16	.14
10	.31	.23	.18	.28	.21	.17	.18	.15	.12

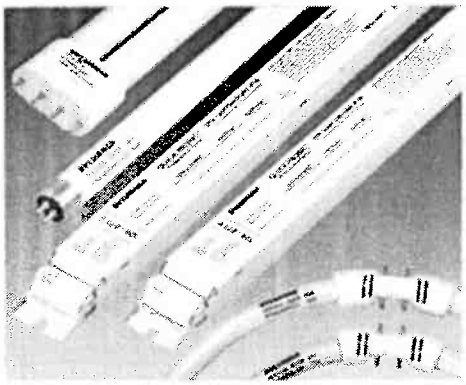
BACK VIEW



Nominal Fixture Length	A	B	C
2' Unit	25-1/8" O.C.	20-1/2" O.C.	16" O.C.
3' Unit	37-1/8" O.C.	32-1/2" O.C.	32" O.C.
4' Unit	49-1/8" O.C.	42-1/2" O.C.	32" O.C.

Williams
H.E. WILLIAMS, INC.
H.E. Williams, Inc. • Carthage, Missouri • www.**hewilliams**.com • 417-358-4065 • Fax: 417-358-6015

Information contained herein is subject to change without notice.



Product Number: 49120

Order Abbreviation: QTP 1X54T5HO/UNV PSN

General Description: 1- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

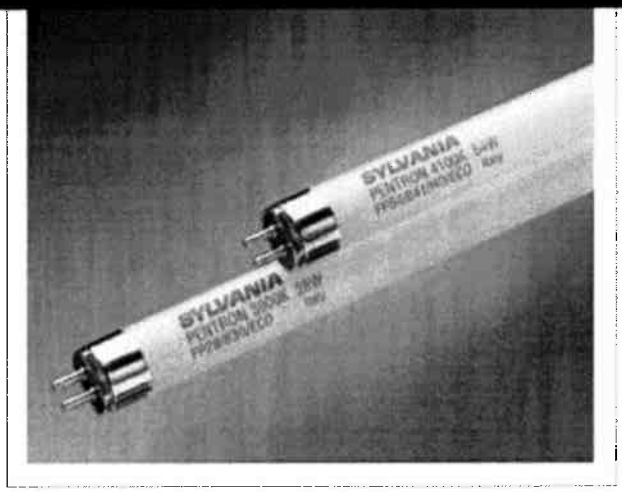
Product Information	
Abbrev. With Packaging Info.	QTP1X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	14.1340
Ballast Width W (in)	1.1810
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	1
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	60

Footnotes
• Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations. • Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware • Remote Mounting up to 18 feet • Remote Mounting up to 12 feet • Remote Mounting up to 10 feet • Remote mounting defined by harness length • Complies with FCC 47 CFR Part 18, Non-Consumer • Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp) • Wiring diagram applies to instant start standard, low power (LP), PLUS, and HD10 ballast types. • Oil Filled Capacitor • Product contains installation instructions

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps



Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

ECOLOGIC

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/EC0	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/EC0	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/EC0	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/EC0	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/EC0	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/EC0	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

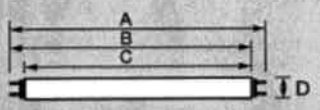
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

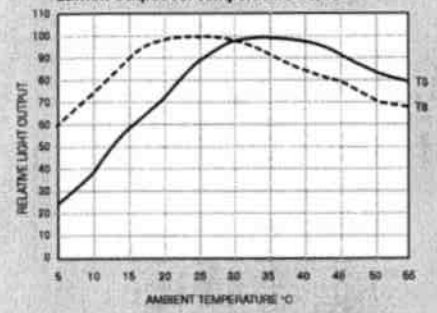
Technical Information

Dimensions

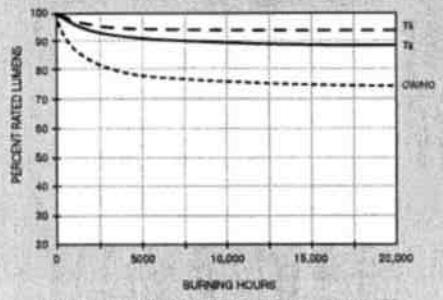


Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

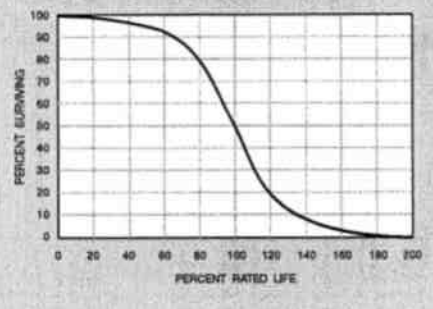


Fluorescent Lamp Lumen Maintenance



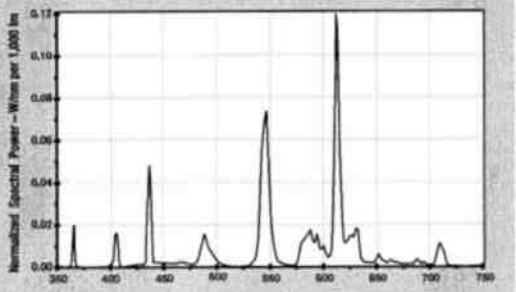
* Lumen output continues to decrease throughout the life of a fluorescent lamp.

Typical Fluorescent Lamp Mortality

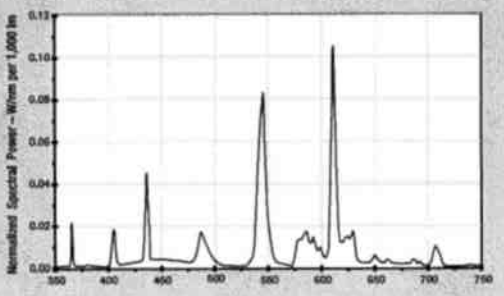


Spectral Power Distributions

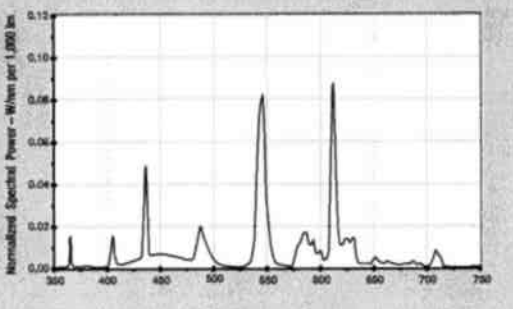
PENTRON 830



PENTRON 835



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
OSRAM SYLVANIA LTD.
2001 Drew Road
Mississauga, ON L5S 1S4

Trade
Phone: 1-800-263-2852
Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

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SK & Associates	Description : 85-4-228T5S-EB2-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: I4

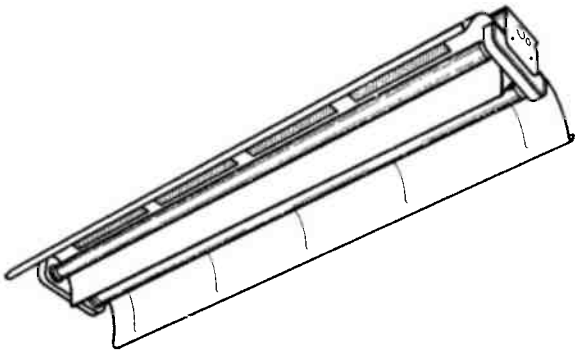
2 LAMP PREMIUM TURRET **"V" STYLE INDUSTRIAL**

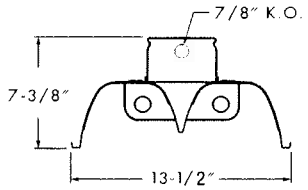
85 SERIES

JOB

TYPE

VOLTAGE





SPECIFICATIONS

- HOUSING – 20 gauge die formed, ribbed C.R.S.
- FINISH – White powder coating with 5-stage iron/phosphate prepared metal. 92% minimum average reflectance
- REFLECTOR – 22 gauge die formed, ribbed C.R.S. with deep center "V", white powder coat finish. 16% uplight component standard
- ELECTRICAL – Electronic ballast standard, rated Class P
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations
- MOUNTING – Surface or suspended

FEATURES

- 16% uplight component softly illuminates ceiling for a pleasing, ambient effect
- Factory mounted, pre-wired sockets cut installation time
- Spring-loaded, turret style sockets enclosed in heavy-duty steel housing
- Hinging/locking lamp bracket cuts installation time
- Reflector secured to housing with captive bolts and nuts
- Channel connector furnished for continuous row applications
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimal ballast noise
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion

SUBMITTAL INFORMATION

TOTAL LAMPS
2 or 4

NOMINAL LENGTH
4 = 4 ft.
8 = 8 ft.

LUMINAIRE SERIES

EM7 = Emergency battery pack (B70A) or equivalent
WG11 = 11 Ga. white powder coat wireguard
WG14 = 14 Ga. white powder coat wireguard

For more options, accessories, and product details, refer to Information Section

VOLTAGE
120 = 120V
277 = 277V

85-4-232-OPTIONS-EB2-120

LAMP WATTAGE/TYPE
32 = 4', 32 watt T8
40T12 = 4', 40 watt T12
48SL = 4', 39 watt T8, slimline
48HO = 4', 60 watt T12, HO
59 = 8', 59 watt T8, slimline
86 = 8', 86 watt T8, HO
96SL = 8', 75 watt T12, slimline
96HO = 8', 110 watt T12, HO
96VHO = 8' 215 watt T12, VHO
28T5H = 4' 28 watt T5S

BALLAST TYPE (dependent on specified lamp type)
EB2 = 2 lamp electronic ballast
EB2/2 = (2) 2 lamp electronic ballasts
EBLH2 = 2 lamp electronic ballast, <10% THD
MB2 = 2 lamp magnetic ballast
MBLO2 = 2 lamp magnetic ballast, 0°F starting

T8: EB defaults to instant start
T12: MB defaults to rapid start

Williams FLUORESCENT LIGHTING

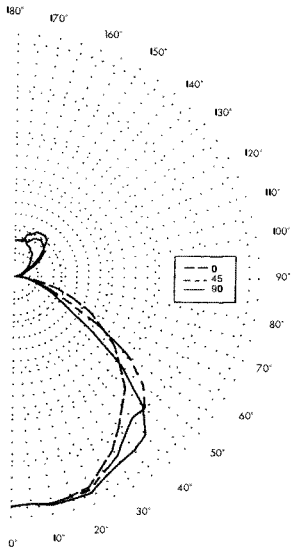
85 SERIES — PHOTOMETRY INFORMATION

Williams Catalog #85-4-232-EB2-120
Test Report #8886.0, Dated 06/05/96

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1571.	1571.	1571.	
5	1558.	1556.	1555.	148.5
15	1544.	1549.	1570.	439.9
25	1429.	1464.	1495.	676.5
35	1250.	1320.	1436.	836.6
45	1068.	1257.	1238.	931.1
55	827.	949.	640.	741.2
65	568.	403.	304.	463.8
75	288.	168.	147.	208.8
85	59.	59.	48.	64.2
90	0.	0.	0.	
95	0.	26.	24.	25.4
105	20.	53.	57.	53.8
115	59.	100.	81.	96.8
125	102.	205.	161.	155.8
135	146.	273.	273.	190.2
145	200.	304.	346.	179.2
155	227.	288.	337.	129.8
165	266.	259.	297.	78.1
175	250.	253.	255.	24.2
180	248.	248.	248.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1265.	21.4	23.2
0 - 40	2102.	35.6	38.6
0 - 60	3774.	64.0	69.3
0 - 90	4511.	76.5	82.9
90 - 120	176.	3.0	3.2
90 - 130	332.	5.6	6.1
90 - 150	701.	11.9	12.9
90 - 180	933.	15.8	17.1
Total Luminaire 0-180	5444.	92.3	100.0

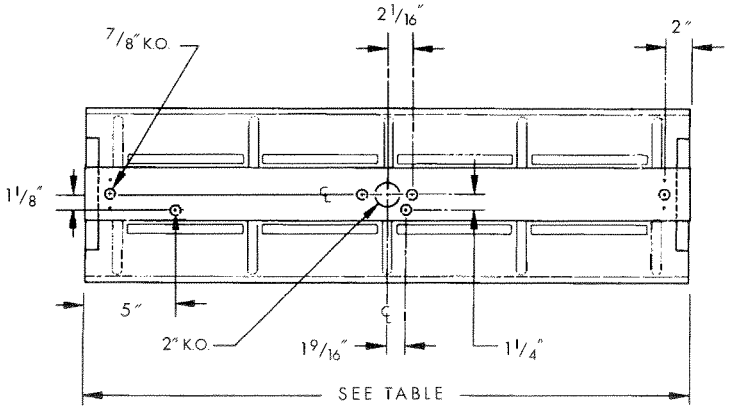
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY** = **92.3** %
SPACING CRITERIA: ACROSS= 1.4 ALONG= 1.3

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	106	106	106	102	102	102	94	94	94
1	98	94	91	94	90	87	84	81	79
2	90	83	78	86	80	75	74	70	67
3	83	74	67	79	71	65	66	61	57
4	76	66	58	73	64	57	59	54	49
5	69	58	51	66	56	49	53	47	42
6	64	52	44	61	51	43	47	41	37
7	59	47	39	56	45	38	42	36	32
8	54	42	34	52	41	34	38	32	27
9	50	38	30	47	36	29	34	28	24
10	46	34	27	44	33	26	31	25	21

BACK VIEW

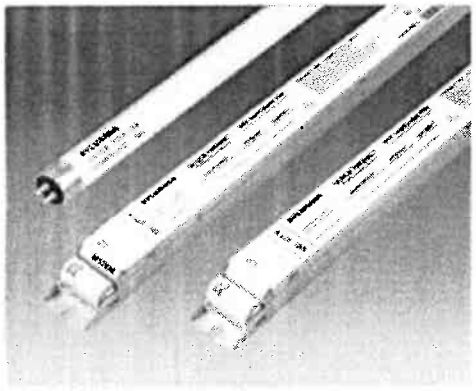


NOMINAL SIZE	UNIT LENGTH
4' T8, T12	49-7/8"
4' SL, HO, VHO	48"
8' T8, T12	99-7/8"
8' SL, HO, VHO, 59 WATT, 86 WATT	96"

Williams
H.E. WILLIAMS, INC.

H.E. Williams, Inc. • Carthage, Missouri • www.hewilliams.com • 417-358-4065 • Fax: 417-358-6015
Information contained herein is subject to change without notice.

SK & Associates	Description : T5 TWO LAMP BALLAST	TYPE:
	Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL	I4
Product Details	Notes:	Page 1 of 1



Product Number: 49180

Order Abbreviation: QTP 2X28T5/UNV PSN

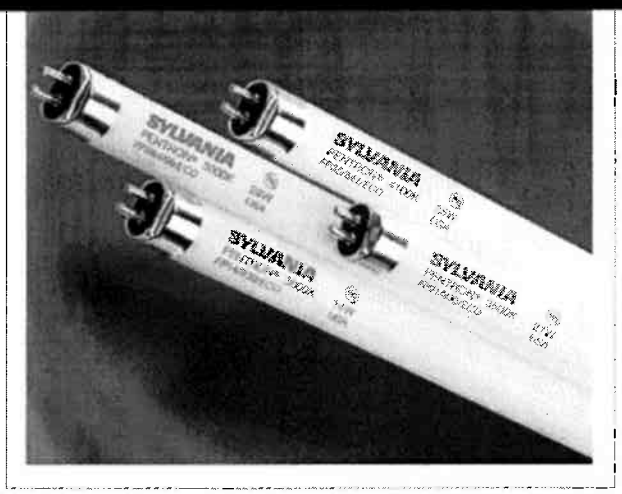
General Description: 2-lamp Universal Voltage electronic ballast for 28W T5 lamp, packaged 10 pieces per case

Product Information	
Abbrev. With Packaging Info.	QTP2X28T5UNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8270
Ballast Length L (in)	14.1730
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP28T5
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	80

www.sylvania.com

PENTRON® ECOLOGIC®

T5 Linear Fluorescent Lamps



PENTRON ECOLOGIC T5 lamps offer a high quality lighting solution for linear fluorescent applications where luminaire design flexibility is important. These lamps are available in 2, 3, 4 and 5-foot lengths and offer a wide range of color temperatures: 2700K, 3000K, 3500K, 4100K, 5000K and 6500K. When paired with a QUICKTRONIC T5 ballast, these systems are covered by the comprehensive QUICK 60+® system warranty.

Key Features & Benefits

- High Performance T5 lamps
  - Up to 104 LPW
  - 95% lumen maintenance
  - Peak lumen output at 35°C (95°F)
  - Dimmable
  - Ideal for occupancy sensor applications
- PENTRON 4-foot average rated life increased:
  - 30,000 hrs. @12 hours/start
  - 25,000 hrs. @3 hours/start
- TCLP and RoHS compliant
- Made in the USA
- Lead free glass
- Greater luminaire design flexibility
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- QUICK 60+ system warranty offered when paired with QUICKTRONIC T5 electronic ballast

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local and state regulations.

RoHS compliant
This light source meets restrictions on hazardous substances.

MADE IN USA

Product Offering

Ordering Abbreviation	Watts	CCT
FP14/800/ECO	14	2700K, 3000K, 3500K, 4100K, 6500K
FP21/800/ECO	21	2700K, 3000K, 3500K, 4100K, 6500K
FP28/800/ECO	28	2700K, 3000K, 3500K, 4100K, 5000K, 6500K
FP35/800/ECO	35	2700K, 3000K, 3500K, 4100K

Application Information

Applications

- Cove and valance
- Direct / indirect luminaires
- Facade luminaires
- Low profile surface mount
- Shallow recessed fixtures
- Showcase
- Signage

Application Notes

1. PENTRON ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Fixture Description:	Type
Project/Job:	
SYLVANIA lamp:	
SYLVANIA ballast:	
Notes:	

Ordering Information

Item Number	Ordering Abbreviation	Base	Watt	Nominal Length (in)	Initial Lumens @ 25°C	Mean Lumens @ 25°C	Initial Lumens @ 35°C	Mean Lumens @ 35°C	Bulb	MOL (mm)	Programmed 3 hrs/start	Rapid Start 12 hrs/start	CCT	CRI
20973	FP14/827/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	2700K	85
20907	FP14/830/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	24	1,100	1,045	1,300	1,235	T5	563.2	20,000	22,000	6500K	85
20974	FP21/827/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	2700K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	36	1,750	1,665	2,000	1,900	T5	863.2	20,000	22,000	6500K	85
20975	FP28/827/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	2700K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	48	2,545	2,420	2,840	2,700	T5	1,163.20	25,000	30,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	48	2,400	2,280	2,750	2,615	T5	1,163.20	25,000	30,000	6500K	85
20870	FP35/827/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	2700K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	4100K	85

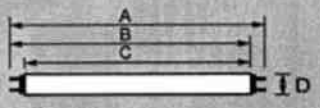
Ordering Guide

FP	14	/	8	30	/	ECO®
Fluorescent PENTRON® T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	27 = 2700K CCT, 30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

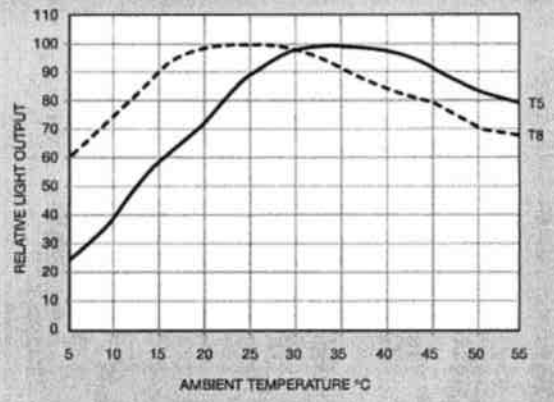
Technical Information

Dimensions

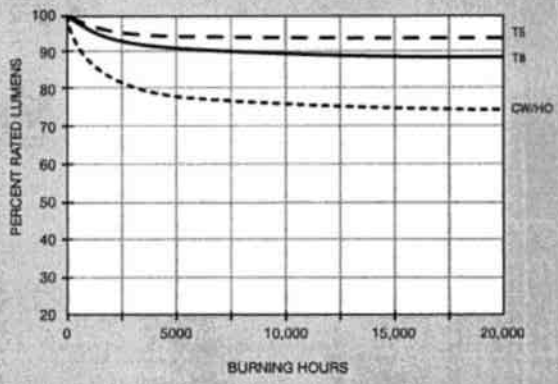
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)



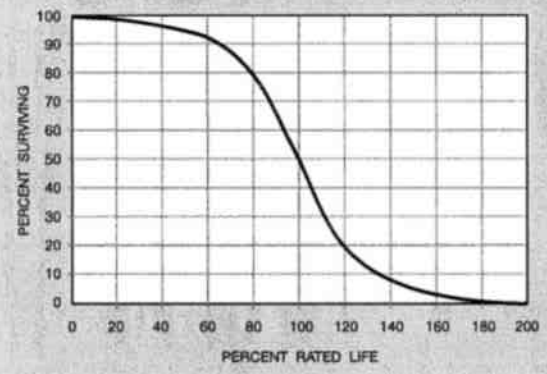
Lumen Output vs. Temperature T8/T5



Fluorescent Lamp Lumen Maintenance



Typical Fluorescent Lamp Mortality



Related Literature

For optimum system performance and warranty pair with QUICKTRONIC® electronic ballast systems:

Ballast Technology Applications & Specification Guide (Literature Code: ECS-Electronic2009)

QUICK 60+® System Warranty (Literature Code: ECS140)

Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (2700K, 3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

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QUICKTRONIC is a registered trademark of OSRAM GmbH.

SK & Associates	Description : 85-4-228T5S-EBD2-UNV-DIM(0-10V) Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **I4D**

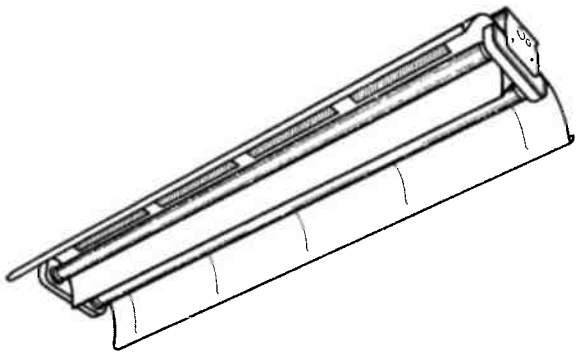
2 LAMP PREMIUM TURRET **"V" STYLE INDUSTRIAL**

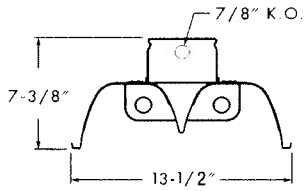
SERIES **85**

JOB

TYPE

VOLTAGE





SPECIFICATIONS

- HOUSING – 20 gauge die formed, ribbed C.R.S.
- FINISH – White powder coating with 5-stage iron/phosphate prepared metal. 92% minimum average reflectance
- REFLECTOR – 22 gauge die formed, ribbed C.R.S. with deep center "V", white powder coat finish. 16% uplight component standard
- ELECTRICAL – Electronic ballast standard, rated Class P
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations
- MOUNTING – Surface or suspended

FEATURES

- 16% uplight component softly illuminates ceiling for a pleasing, ambient effect
- Factory mounted, pre-wired sockets cut installation time
- Spring-loaded, turret style sockets enclosed in heavy-duty steel housing
- Hinging/locking lamp bracket cuts installation time
- Reflector secured to housing with captive bolts and nuts
- Channel connector furnished for continuous row applications
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimal ballast noise
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion

SUBMITTAL INFORMATION

TOTAL LAMPS
2 or 4

NOMINAL LENGTH
4 = 4 ft.
8 = 8 ft.

LUMINAIRE SERIES

EM7 = Emergency battery pack (B70A) or equivalent
WG11 = 11 Ga. white powder coat wireguard
WG14 = 14 Ga. white powder coat wireguard

For more options, accessories, and product details, refer to Information Section

VOLTAGE
120 = 120V
277 = 277V

85-4-232-OPTIONS-EB2-120

LAMP WATTAGE/TYPE
32 = 4', 32 watt T8
40T12 = 4', 40 watt T12
48SL = 4', 39 watt T8, slimline
48HO = 4', 60 watt T12, HO
59 = 8', 59 watt T8, slimline
86 = 8', 86 watt T8, HO
96SL = 8', 75 watt T12, slimline
96HO = 8', 110 watt T12, HO
96VHO = 8' 215 watt T12, VHO
28T5S = 4', 28 watt T5S

BALLAST TYPE (dependent on specified lamp type)
EB2 = 2 lamp electronic ballast
EB2/2 = (2) 2 lamp electronic ballasts
EBLH2 = 2 lamp electronic ballast, <10% THD
MB2 = 2 lamp magnetic ballast
MBLO2 = 2 lamp magnetic ballast, 0°F starting
EBD2 = (2) 2-lamp electronic dimming ballast
DIM = 0-10V

Williams FLUORESCENT LIGHTING

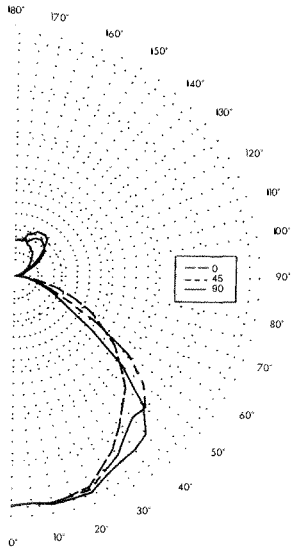
85 SERIES — PHOTOMETRY INFORMATION

Williams Catalog #85-4-232-EB2-120
Test Report #8886.0, Dated 06/05/96

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1571.	1571.	1571.	
5	1558.	1556.	1555.	148.5
15	1544.	1549.	1570.	439.9
25	1429.	1464.	1495.	676.5
35	1250.	1320.	1436.	836.6
45	1068.	1257.	1238.	931.1
55	827.	949.	640.	741.2
65	568.	403.	304.	463.8
75	288.	168.	147.	208.8
85	59.	59.	48.	64.2
90	0.	0.	0.	
95	0.	26.	24.	25.4
105	20.	53.	57.	53.8
115	59.	100.	81.	96.8
125	102.	205.	161.	155.8
135	146.	273.	273.	190.2
145	200.	304.	346.	179.2
155	227.	288.	337.	129.8
165	266.	259.	297.	78.1
175	250.	253.	255.	24.2
180	248.	248.	248.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1265.	21.4	23.2
0 - 40	2102.	35.6	38.6
0 - 60	3774.	64.0	69.3
0 - 90	4511.	76.5	82.9
90 - 120	176.	3.0	3.2
90 - 130	332.	5.6	6.1
90 - 150	701.	11.9	12.9
90 - 180	933.	15.8	17.1
Total Luminaire 0-180	5444.	92.3	100.0

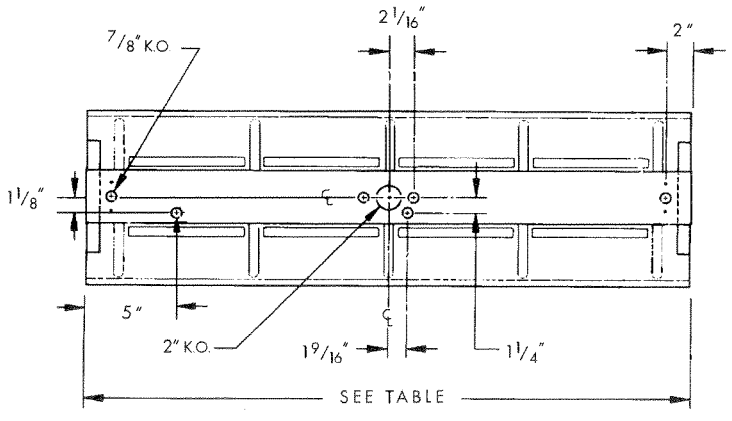
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY** = **92.3 %**
SPACING CRITERIA: ACROSS= 1.4 ALONG= 1.3

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	106	106	106	102	102	102	94	94	94
1	98	94	91	94	90	87	84	81	79
2	90	83	78	86	80	75	74	70	67
3	83	74	67	79	71	65	66	61	57
4	76	66	58	73	64	57	59	54	49
5	69	58	51	66	56	49	53	47	42
6	64	52	44	61	51	43	47	41	37
7	59	47	39	56	45	38	42	36	32
8	54	42	34	52	41	34	38	32	27
9	50	38	30	47	36	29	34	28	24
10	46	34	27	44	33	26	31	25	21

BACK VIEW



NOMINAL SIZE	UNIT LENGTH
4' T8, T12	49-7/8"
4' SL, HO, VHO	48"
8' T8, T12	99-7/8"
8' SL, HO, VHO, 59 WATT, 86 WATT	96"

Williams
H.E. WILLIAMS, INC.

Information contained herein is subject to change without notice.

SK & Associates	Description : 85-8-428T5S-EB2/2-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: I8

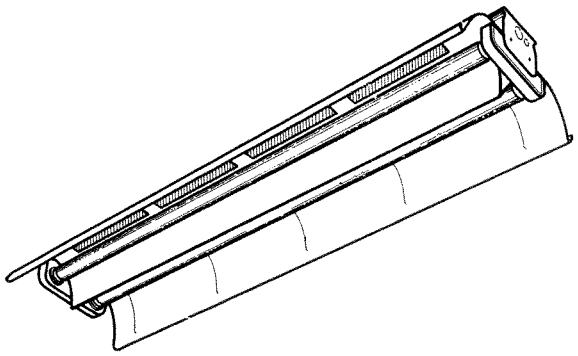
2 LAMP PREMIUM TURRET **"V" STYLE INDUSTRIAL**

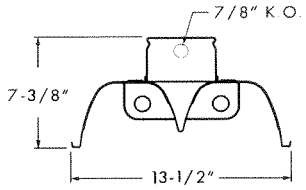
SERIES **85**

JOB

TYPE

VOLTAGE





SPECIFICATIONS

- HOUSING – 20 gauge die formed, ribbed C.R.S.
- FINISH – White powder coating with 5-stage iron/phosphate prepared metal. 92% minimum average reflectance
- REFLECTOR – 22 gauge die formed, ribbed C.R.S. with deep center "V", white powder coat finish. 16% uplight component standard
- ELECTRICAL – Electronic ballast standard, rated Class P
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations
- MOUNTING – Surface or suspended

FEATURES

- 16% uplight component softly illuminates ceiling for a pleasing, ambient effect
- Factory mounted, pre-wired sockets cut installation time
- Spring-loaded, turret style sockets enclosed in heavy-duty steel housing
- Hinging/locking lamp bracket cuts installation time
- Reflector secured to housing with captive bolts and nuts
- Channel connector furnished for continuous row applications
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimal ballast noise
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion

SUBMITTAL INFORMATION

TOTAL LAMPS
2 or 4

NOMINAL LENGTH
4 = 4 ft.
8 = 8 ft.

LUMINAIRE SERIES

EM7 = Emergency battery pack (B70A) or equivalent
WG11 = 11 Ga. white powder coat wireguard
WG14 = 14 Ga. white powder coat wireguard

For more options, accessories, and product details, refer to Information Section

VOLTAGE
120 = 120V
277 = 277V

85-4-232-OPTIONS-EB2-120

LAMP WATTAGE/TYPE
32 = 4', 32 watt T8
40T12 = 4', 40 watt T12
48SL = 4', 39 watt T8, slimline
48HO = 4', 60 watt T12, HO
59 = 8', 59 watt T8, slimline
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BALLAST TYPE (dependent on specified lamp type)
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EB2/2 = (2) 2 lamp electronic ballasts
EBLH2 = 2 lamp electronic ballast, <10% THD
MB2 = 2 lamp magnetic ballast
MBLO2 = 2 lamp magnetic ballast, 0°F starting

T8: EB defaults to instant start
T12: MB defaults to rapid start

Williams
FLUORESCENT LIGHTING

85 SERIES

PHOTOMETRY INFORMATION

Williams Catalog #85-4-232-EB2-120
Test Report #8886.0, Dated 06/05/96

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

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65	568.	403.	304.	463.8
75	288.	168.	147.	208.8
85	59.	59.	48.	64.2
90	0.	0.	0.	
95	0.	26.	24.	25.4
105	20.	53.	57.	53.8
115	59.	100.	81.	96.8
125	102.	205.	161.	155.8
135	146.	273.	273.	190.2
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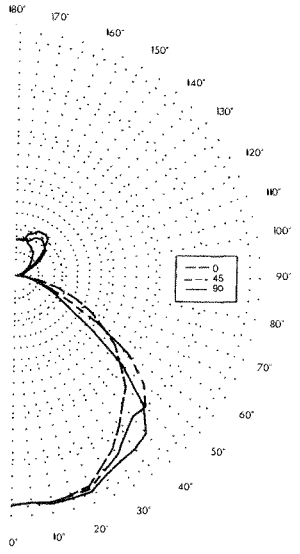
175	250.	253.	255.	24.2
180	248.	248.	248.	



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WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
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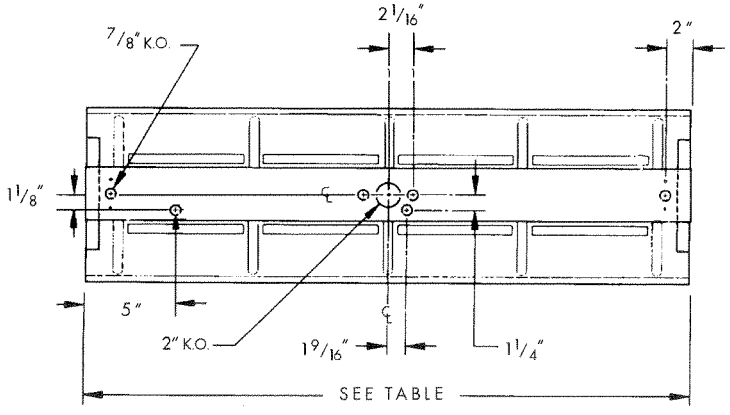
1	98	94	91	94	90	87	84	81	79
2	90	83	78	86	80	75	74	70	67
3	83	74	67	79	71	65	66	61	57
4	76	66	58	73	64	57	59	54	49
5	69	58	51	66	56	49	53	47	42
6	64	52	44	61	51	43	47	41	37
7	59	47	39	56	45	38	42	36	32
8	54	42	34	52	41	34	38	32	27
9	50	38	30	47	36	29	34	28	24
10	46	34	27	44	33	26	31	25	21

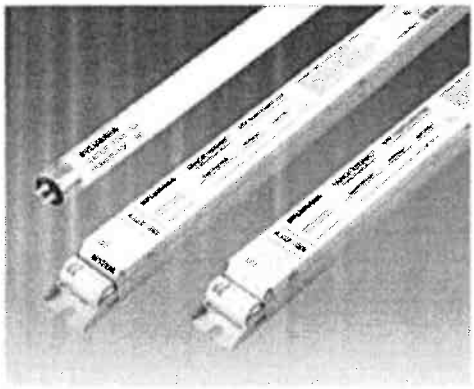
BACK VIEW



NOMINAL SIZE	UNIT LENGTH
4' T8, T12	49-7/8"
4' SL, HO, VHO	48"
8' T8, T12	99-7/8"
8' SL, HO, VHO, 59 WATT, 86 WATT	96"

Williams
H.E. WILLIAMS, INC.

SK & Associates	Description : T5 TWO LAMP BALLAST	TYPE:
	Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL	I8
Product Details	Notes:	Page 1 of 1



Product Number: 49180

Order Abbreviation: QTP 2X28T5/UNV PSN

General Description: 2-lamp Universal Voltage electronic ballast for 28W T5 lamp, packaged 10 pieces per case

Product Information	
Abbrev. With Packaging Info.	QTP2X28T5UNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8270
Ballast Length L (in)	14.1730
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP28T5
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	80

www.sylvania.com

PENTRON® ECOLOGIC®
T5 Linear Fluorescent Lamps

PENTRON ECOLOGIC T5 lamps offer a high quality lighting solution for linear fluorescent applications where luminaire design flexibility is important. These lamps are available in 2, 3, 4 and 5-foot lengths and offer a wide range of color temperatures: 2700K, 3000K, 3500K, 4100K, 5000K and 6500K. When paired with a QUICKTRONIC T5 ballast, these systems are covered by the comprehensive QUICK 60+® system warranty.

Key Features & Benefits

- High Performance T5 lamps
  - Up to 104 LPW
  - 95% lumen maintenance
  - Peak lumen output at 35°C (95°F)
  - Dimmable
  - Ideal for occupancy sensor applications
- PENTRON 4-foot average rated life increased:
  - 30,000 hrs. @12 hours/start
  - 25,000 hrs. @3 hours/start
- TCLP and RoHS compliant
- Made in the USA
- Lead free glass
- Greater luminaire design flexibility
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- QUICK 60+ system warranty offered when paired with QUICKTRONIC T5 electronic ballast

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local and state regulations.

RoHS compliant
This light source meets restrictions on hazardous substances.

MADE IN USA

Product Offering

Ordering Abbreviation	Watts	CCT
FP14/800/ECO	14	2700K, 3000K, 3500K, 4100K, 6500K
FP21/800/ECO	21	2700K, 3000K, 3500K, 4100K, 6500K
FP28/800/ECO	28	2700K, 3000K, 3500K, 4100K, 5000K, 6500K
FP35/800/ECO	35	2700K, 3000K, 3500K, 4100K

Application Information

Applications

- Cove and valance
- Direct / indirect luminaires
- Facade luminaires
- Low profile surface mount
- Shallow recessed fixtures
- Showcase
- Signage

Application Notes

1. PENTRON ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Fixture Description:	Type
Project/Job:	
SYLVANIA lamp:	
SYLVANIA ballast:	
Notes:	

Ordering Information

Item Number	Ordering Abbreviation	Base	Watt	Nominal Length (in)	Initial Lumens @ 25°C	Mean Lumens @ 25°C	Initial Lumens @ 35°C	Mean Lumens @ 35°C	Bulb	MOL (mm)	Programmed 3 hrs/start	Rapid Start 12 hrs/start	CCT	CRI
20973	FP14/827/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	2700K	85
20907	FP14/830/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	24	1,100	1,045	1,300	1,235	T5	563.2	20,000	22,000	6500K	85
20974	FP21/827/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	2700K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	36	1,750	1,665	2,000	1,900	T5	863.2	20,000	22,000	6500K	85
20975	FP28/827/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	2700K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	48	2,545	2,420	2,840	2,700	T5	1,163.20	25,000	30,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	48	2,400	2,280	2,750	2,615	T5	1,163.20	25,000	30,000	6500K	85
20870	FP35/827/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	2700K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	4100K	85

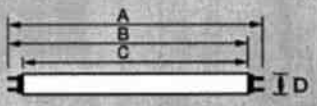
Ordering Guide

FP	14	/	8	30	/	ECO®
Fluorescent PENTRON® T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	27 = 2700K CCT, 30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

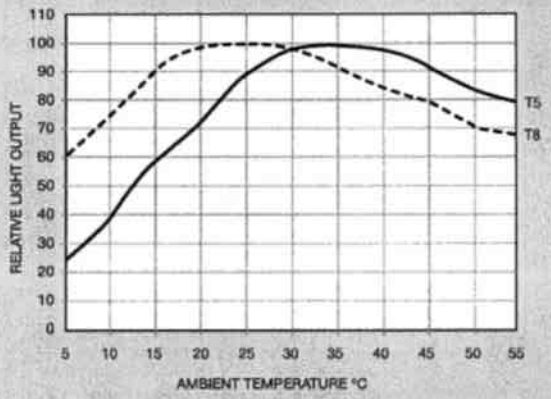
Technical Information

Dimensions

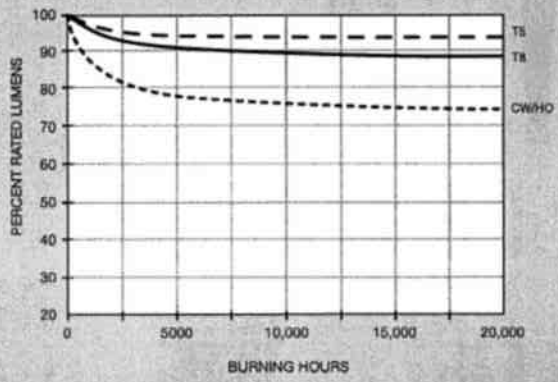
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)



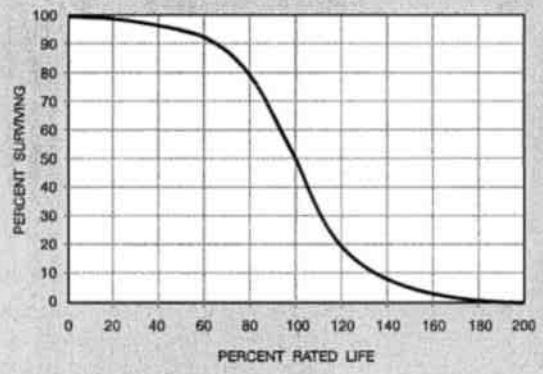
Lumen Output vs. Temperature T8/T5



Fluorescent Lamp Lumen Maintenance



Typical Fluorescent Lamp Mortality



Related Literature

For optimum system performance and warranty pair with QUICKTRONIC® electronic ballast systems:

Ballast Technology Applications & Specification Guide (Literature Code: ECS-Electronic2009)

QUICK 60+® System Warranty (Literature Code: ECS140)

Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (2700K, 3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
OSRAM SYLVANIA LTD.
2001 Drew Road
Mississauga, ON L5S 1S4

Trade
Phone: 1-800-263-2852
Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

www.sylvania.com

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SK & Associates	Description : 85-8-428T5S-EBD2-UNV-DIM(0-10V) Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: I8D

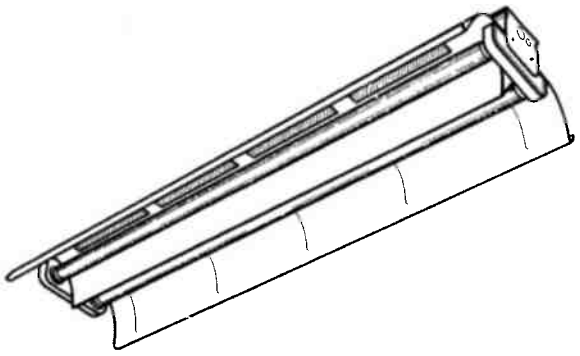
2 LAMP PREMIUM TURRET "V" STYLE INDUSTRIAL

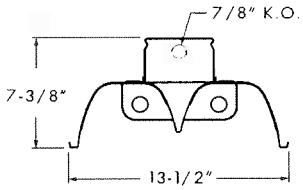
SERIES 85

JOB _____

TYPE _____

VOLTAGE _____





SPECIFICATIONS

- HOUSING – 20 gauge die formed, ribbed C.R.S.
- FINISH – White powder coating with 5-stage iron/phosphate prepared metal. 92% minimum average reflectance
- REFLECTOR – 22 gauge die formed, ribbed C.R.S. with deep center "V", white powder coat finish. 16% uplight component standard
- ELECTRICAL – Electronic ballast standard, rated Class P
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations
- MOUNTING – Surface or suspended

FEATURES

- 16% uplight component softly illuminates ceiling for a pleasing, ambient effect
- Factory mounted, pre-wired sockets cut installation time
- Spring-loaded, turret style sockets enclosed in heavy-duty steel housing
- Hinging/locking lamp bracket cuts installation time
- Reflector secured to housing with captive bolts and nuts
- Channel connector furnished for continuous row applications
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation and minimol ballast noise
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion

SUBMITTAL INFORMATION

TOTAL LAMPS
2 or 4

NOMINAL LENGTH
4 = 4 ft.
8 = 8 ft.

LUMINAIRE SERIES

EM7 = Emergency battery pack (B70A) or equivalent
WG11 = 11 Ga. white powder coat wireguard
WG14 = 14 Ga. white powder coat wireguard

For more options, accessories, and product details, refer to Information Section

VOLTAGE
120 = 120V
277 = 277V

85-4-232-OPTIONS-EB2-120

LAMP WATTAGE/TYPE
32 = 4', 32 watt T8
40T12 = 4', 40 watt T12
48SL = 4', 39 watt T8, slimline
48HO = 4', 60 watt T12, HO
59 = 8', 59 watt T8, slimline
86 = 8', 86 watt T8, HO
96SL = 8', 75 watt T12, slimline
96HO = 8', 110 watt T12, HO
96VHO = 8' 215 watt T12, VHO
28T5S = 8', 28 watt T5S

BALLAST TYPE (dependent on specified lamp type)
EB2 = 2 lamp electronic ballast
EB2/2 = (2) 2 lamp electronic ballasts
EBLH2 = 2 lamp electronic ballast, <10% THD
MB2 = 2 lamp magnetic ballast
MBLO2 = 2 lamp magnetic ballast, 0°F starting
EBD2 = (2) 2l lamp electronic dimming ballasts
DIM = 0-10V Dim

Williams FLUORESCENT LIGHTING

85 SERIES

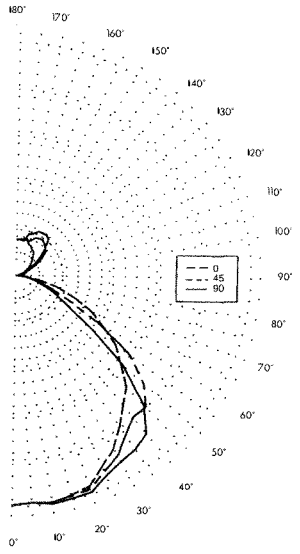
PHOTOMETRY INFORMATION

Williams Catalog #85-4-232-EB2-120
Test Report #8886.0, Dated 06/05/96

Lamp Type: F32T8/SPX35/RS
Lamp Quantity: 2

CANDLEPOWER DISTRIBUTION

VERT. ANG.	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1571.	1571.	1571.	
5	1558.	1556.	1555.	148.5
15	1544.	1549.	1570.	439.9
25	1429.	1464.	1495.	676.5
35	1250.	1320.	1436.	836.6
45	1068.	1257.	1238.	931.1
55	827.	949.	640.	741.2
65	568.	403.	304.	463.8
75	288.	168.	147.	208.8
85	59.	59.	48.	64.2
90	0.	0.	0.	
95	0.	26.	24.	25.4
105	20.	53.	57.	53.8
115	59.	100.	81.	96.8
125	102.	205.	161.	155.8
135	146.	273.	273.	190.2
145	200.	304.	346.	179.2
155	227.	288.	337.	129.8
165	266.	259.	297.	78.1
175	250.	253.	255.	24.2
180	248.	248.	248.	



LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	1265.	21.4	23.2
0 - 40	2102.	35.6	38.6
0 - 60	3774.	64.0	69.3
0 - 90	4511.	76.5	82.9
90 - 120	176.	3.0	3.2
90 - 130	332.	5.6	6.1
90 - 150	701.	11.9	12.9
90 - 180	933.	15.8	17.1
Total Luminaire 0-180	5444.	92.3	100.0

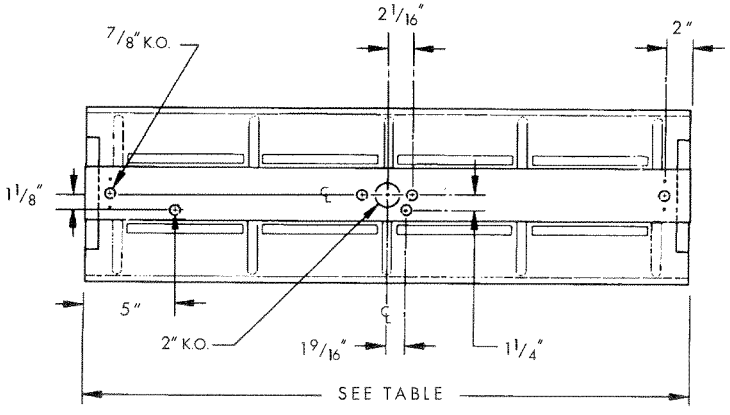
TOTAL LUMINAIRE
OPTICAL **EFFICIENCY** = **92.3** %
SPACING CRITERIA: ACROSS= 1.4 ALONG= 1.3

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = .20

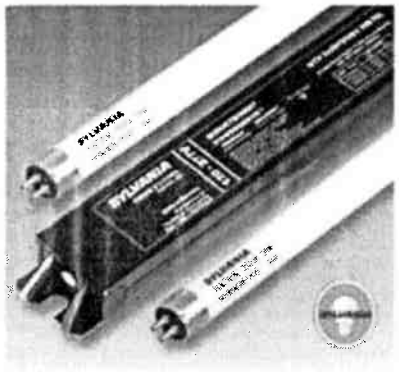
CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	106	106	106	102	102	102	94	94	94
1	98	94	91	94	90	87	84	81	79
2	90	83	78	86	80	75	74	70	67
3	83	74	67	79	71	65	66	61	57
4	76	66	58	73	64	57	59	54	49
5	69	58	51	66	56	49	53	47	42
6	64	52	44	61	51	43	47	41	37
7	59	47	39	56	45	38	42	36	32
8	54	42	34	52	41	34	38	32	27
9	50	38	30	47	36	29	34	28	24
10	46	34	27	44	33	26	31	25	21

BACK VIEW



NOMINAL SIZE	UNIT LENGTH
4' T8, T12	49-7/8"
4' SL, HO, VHO	48"
8' T8, T12	99-7/8"
8' SL, HO, VHO, 59 WATT, 86 WATT	96"

Williams
H.E. WILLIAMS, INC.



Product Number: 50726

Order Abbreviation: QTP 2X28T5/UNV DIM-TCL

General Description: 2-lamp universal voltage electronic dimming ballast for 28W T5 lamps

Product Information	
Abbrev. With Packaging Info.	QTP2X28T5UNVDIMTCL10/CS 1/SKU
Ballast Factor	1.00
Ballast Height H (in)	1.0000
Ballast Length L (in)	16.7320
Ballast Width W (in)	1.6800
Circuit Type	Series
Family Brand Name	QUICKTRONIC POWERSENSE
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600V
Power Factor	>0.94
Primary Lamp Type	FP28
Sound Rating	A
Starting Method	PROStart
Starting Temperature - Fahrenheit	50
Starting Temperature - Celsius	10
Total Harmonic Distortion (THD)	<10%
Wiring Method	Leads
Total Maximum Wattage	61

www.sylvania.com

PENTRON® ECOLOGIC®
T5 Linear Fluorescent Lamps

PENTRON ECOLOGIC T5 lamps offer a high quality lighting solution for linear fluorescent applications where luminaire design flexibility is important. These lamps are available in 2, 3, 4 and 5-foot lengths and offer a wide range of color temperatures: 2700K, 3000K, 3500K, 4100K, 5000K and 6500K. When paired with a QUICKTRONIC T5 ballast, these systems are covered by the comprehensive QUICK 60+® system warranty.

Key Features & Benefits

- High Performance T5 lamps
  - Up to 104 LPW
  - 95% lumen maintenance
  - Peak lumen output at 35°C (95°F)
  - Dimmable
  - Ideal for occupancy sensor applications
- PENTRON 4-foot average rated life increased:
  - 30,000 hrs. @12 hours/start
  - 25,000 hrs. @3 hours/start
- TCLP and RoHS compliant
- Made in the USA
- Lead free glass
- Greater luminaire design flexibility
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- QUICK 60+ system warranty offered when paired with QUICKTRONIC T5 electronic ballast

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local and state regulations.

RoHS compliant
This light source meets restrictions on hazardous substances.

MADE IN USA

Product Offering

Ordering Abbreviation	Watts	CCT
FP14/800/ECO	14	2700K, 3000K, 3500K, 4100K, 6500K
FP21/800/ECO	21	2700K, 3000K, 3500K, 4100K, 6500K
FP28/800/ECO	28	2700K, 3000K, 3500K, 4100K, 5000K, 6500K
FP35/800/ECO	35	2700K, 3000K, 3500K, 4100K

Application Information

Applications

- Cove and valance
- Direct / indirect luminaires
- Facade luminaires
- Low profile surface mount
- Shallow recessed fixtures
- Showcase
- Signage

Application Notes

1. PENTRON ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Fixture Description:	Type
Project/Job:	
SYLVANIA lamp:	
SYLVANIA ballast:	
Notes:	

Ordering Information

Item Number	Ordering Abbreviation	Base	Watt	Nominal Length (In)	Initial Lumens @ 25°C	Mean Lumens @ 25°C	Initial Lumens @ 35°C	Mean Lumens @ 35°C	Bulb	MOL (mm)	Programmed 3 hrs/start	Rapid Start 12 hrs/start	CCT	CRI
20973	FP14/827/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	2700K	85
20907	FP14/830/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	24	1,100	1,045	1,300	1,235	T5	563.2	20,000	22,000	6500K	85
20974	FP21/827/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	2700K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	36	1,750	1,665	2,000	1,900	T5	863.2	20,000	22,000	6500K	85
20975	FP28/827/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	2700K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	48	2,545	2,420	2,840	2,700	T5	1,163.20	25,000	30,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	48	2,400	2,280	2,750	2,615	T5	1,163.20	25,000	30,000	6500K	85
20870	FP35/827/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	2700K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	4100K	85

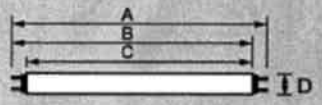
Ordering Guide

FP	14	/	8	30	/	ECO®
Fluorescent PENTRON® T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	27 = 2700K CCT, 30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

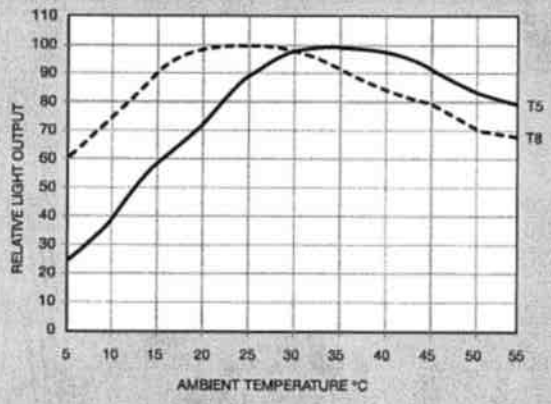
Technical Information

Dimensions

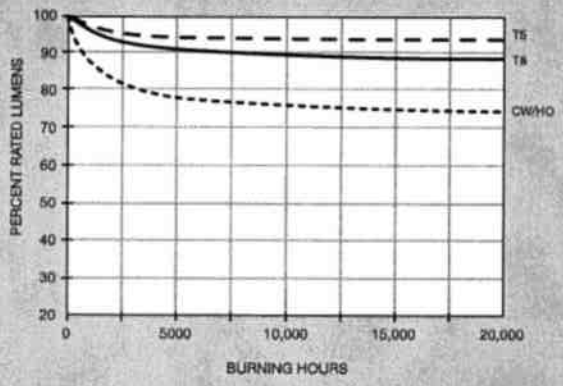
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847,1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)



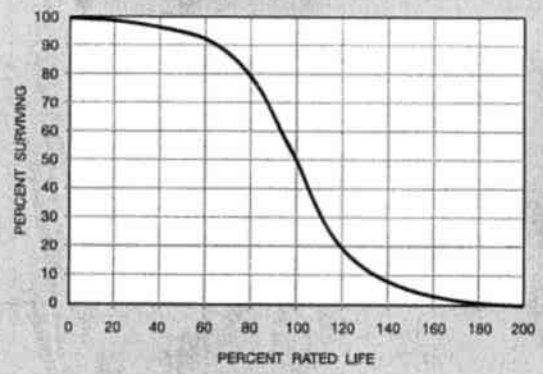
Lumen Output vs. Temperature T8/T5



Fluorescent Lamp Lumen Maintenance



Typical Fluorescent Lamp Mortality



Related Literature

For optimum system performance and warranty pair with QUICKTRONIC® electronic ballast systems:

Ballast Technology Applications & Specification Guide (Literature Code: ECS-Electronic2009)
QUICK 60+® System Warranty (Literature Code: ECS140)

Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (2700K, 3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

Canada
OSRAM SYLVANIA LTD.
2001 Drew Road
Mississauga, ON L5S 1S4

Trade
Phone: 1-800-263-2852
Fax: 1-800-667-6772

OEM/Special Markets/Display/Optic
Phone: 1-800-265-2852
Fax: 1-800-667-6772

www.sylvania.com

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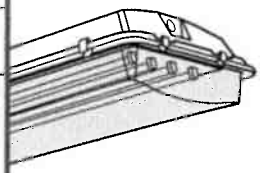
ENCLOSED INDUSTRIAL — EGL

SUBMITTAL:

JOB:

TYPE: JC4 **VOLTAGE:**

T5

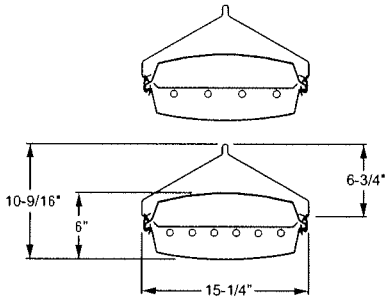


EXAMPLE **EGL - 4 - 6 54T5H - HIA - OPTIONS - EB2/2/2 - UNV**

EGL	4	6	54T5H	HIA	OPTIONS	EB2/2/2	UNV
SERIES	NOMINAL LENGTH	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS/ ACCESSORIES	BALLAST TYPE	VOLTAGE

FEATURES

- NEMA 4X, IP66, IP67, and NSF/ANSI Standard 2–Splash Zone certified.
- Hose-down tested at 1500 PSI @ 1.4 GPM to withstand water penetration.
- Can operate up to 40°C/104°F with high-ambient (HA/40C) option.[1]
- Up to **91.3% optical efficiency.**
- Precisely formed lens provides maximum efficiency/reduced glare.
- Seamless closed-cell gasket poured and formed in place.
- Liquid-tight power entry.
- A curved-top housing without flanges reduces dust build-up.
- Optional 100% polycarbonate lens available.
- Wide variety of cord and receptacle options.
- High-performance highly specular aluminum reflector system optional.
- All internal parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.



Shown with V-hook (standard)

ORDERING INFORMATION

SERIES

EGL	Enclosed Industrial

NOMINAL LENGTH

4	4'

TOTAL LAMPS

4 or 6

LAMP WATTAGE/TYPE

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO

SHIELDING

HIA	High-impact acrylic (standard)
HIAFR	High-impact frosted acrylic
PC	100% polycarbonate lens

OPTIONS/ACCESSORIES[2]

3WC6	3-wire, 6' STOW cord
3WC20	3-wire, 20' STOW cord
4WC6	4-wire, 6' STOW cord
4WC20	4-wire, 20' STOW cord
3WMR	3-wire mini-male receptacle only
3WMRC6	3-wire mini-male receptacle with 6' STOW cord
3WMRC20	3-wire mini-male receptacle with 20' STOW cord
4WMR	4-wire mini-male receptacle only
4WMRC6	4-wire mini-male receptacle with 6' STOW cord
4WMRC20	4-wire mini-male receptacle with 20' STOW cord

OPTIONS/ACCESSORIES (Continued)

HA/40C[1,2]	High-ambient, 40°C max. operating temp.[1,2]
REFL SPEC95	Highly specular aluminum reflector
GMF[3]	Fuse, slow blow (specify voltage)[3]
GLR[3]	Fuse, fast blow (specify voltage)[3]
TP[4]	Tamper-resistant (holt head) screws[4]
SSMB	Stainless steel ceiling mount brackets (two per fixture), see back for details

OCCUPANCY SENSORS

Occupancy sensor must be specified from the following (specify voltage):

OCCWS HB350W-L3W/120
OCCWS HB350W-L3W/277
OCCWS HB350W-L4W/120
OCCWS HB350W-L4W/277

Fixture is IP65 certified when specified with occupancy sensor.

BALLAST TYPE

EB4	4-lamp electronic ballast
EB2/2	(2) 2-lamp electronic ballasts
EBHA2/2	(2) 2-lamp high-ambient electronic ballasts
EB4/2	(1) 4-lamp and (1) 2-lamp electronic ballast
EB2/2/2	(3) 2-lamp electronic ballasts

VOLTAGE

120	120V	**347**	347V
208	208V	**480**	480V (T5HO only)
240	240V	**HRV**	347-480V (T5HO only)
277	277V		
UNV	120-277V		

SPECIFICATIONS

Enclosure – Outer housing consists of 5VA (f1) fiberglass, rated for flame and weather resistance.
Internal Housing – 22-gauge die-formed C.R.S.
Latching – Stainless steel latches.
Reflective Surfaces – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal.
Shielding – High-impact acrylic (HIA) diffuser.
Electrical – Electronic ballast standard, program start T5, rated Class P.
Mounting – Suspended with stainless steel V-hooks (standard) or optional ceiling mount brackets. Stem or surface mount not available.
Labels & Certifications – UL/CUL listed as fluorescent luminaire suitable for dry, damp, or wet locations[2]; NSF/ANSI Standard 2–Splash Zone certified, IP66 and IP67 certified (IP65 with occupancy sensor option), and rated for NEMA 4X.

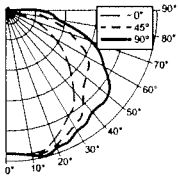
[1] Amalgam lamps recommended. HA/40C option not available with EM ballast. 4-lamp fixture with EBHA2/2 ballast type only.
[2] When specifying EM option, EM ballast for enclosed and gasketed fixtures is required for fixture to be suitable for wet locations. Not available with HA/40C option.
[3] Two (2) fuses required when specifying 208V or 240V.
[4] This option requires a tamper-resistant tool (must be ordered separately). Please specify quantity required per project.

PHOTOMETRY – 6 LAMPS

Catalog #: **EGL-4-654T5H-HIA-WHT**

TEST REPORT INFORMATION

- Test Report #: 14276.0
- Date: 09/02/08
- Lamp Type: FP54T5HO/835/C
- Lamp Quantity: 6



Note: Test performed using amalgam lamps in a still air environment at an ambient temperature of 25°C.

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	5153.	17.5	21.1
0 - 40	8789.	29.9	36.0
0 - 60	16660.	56.7	68.2
0 - 90	23762.	80.8	97.2
Total Luminaire:			
0 - 180	24441.	83.1	100.0

Total Luminaire Optical Efficiency: **83.1%**
IES Spacing Criteria: End = 1.3, Diagonal = 1.4, Across = 1.5

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	6431.	6431.	6431.	
5	6479.	6484.	6491.	618.9
15	6492.	6613.	6761.	1676.5
25	5848.	6250.	6518.	2657.5
35	5243.	5846.	6222.	3635.8
45	4113.	4891.	5977.	3878.6
55	3057.	4492.	5645.	3992.6
65	1850.	3634.	4666.	3377.4
75	804.	2480.	3178.	2377.4
85	214.	1341.	2024.	1347.5
90	134.	1193.	1501.	

ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	.98	.98	.98	.96	.96	.96	.91	.91	.91
	1	.89	.84	.80	.86	.82	.79	.78	.75	.72
	2	.80	.73	.67	.78	.71	.65	.68	.63	.59
	3	.73	.64	.57	.71	.62	.56	.59	.54	.49
	4	.67	.58	.48	.64	.55	.48	.52	.46	.41
	5	.60	.49	.41	.58	.48	.41	.46	.39	.34
	6	.55	.44	.36	.54	.43	.35	.41	.34	.30
	7	.51	.39	.31	.49	.38	.31	.37	.30	.25
	8	.47	.35	.27	.45	.34	.27	.33	.26	.22
	9	.43	.31	.24	.42	.31	.24	.29	.23	.19
	10	.40	.28	.21	.39	.28	.21	.27	.21	.17

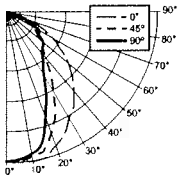
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – 4 LAMPS

Catalog #: **EGL-4-454T5H-HIA-REFL SPEC95**

TEST REPORT INFORMATION

- Test Report #: 14275.0
- Date: 09/03/08
- Lamp Type: FP54T5HO/835/C
- Lamp Quantity: 4



Note: Test performed using amalgam lamps in a still air environment at an ambient temperature of 25°C.

LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	6576.	33.6	36.7
0 - 40	9818.	50.1	54.9
0 - 60	15030.	76.7	84.0
0 - 90	17724.	90.4	99.0
Total Luminaire:			
0 - 180	17900.	91.3	100.0

Total Luminaire Optical Efficiency: **91.3%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.0, Across = 0.9

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	9070.	9070.	9070.	
5	9142.	9069.	8979.	864.9
15	9158.	8735.	8313.	2474.9
25	8265.	7026.	5710.	3236.1
35	7110.	4704.	3852.	3242.6
45	5659.	3074.	3098.	2882.4
55	4097.	2256.	2393.	2328.8
65	2381.	1601.	1738.	1675.2
75	887.	750.	758.	772.9
85	136.	238.	244.	246.6
90	71.	131.	89.	

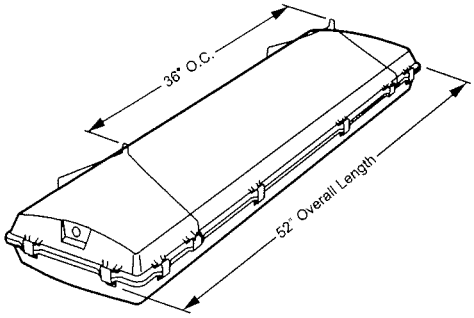
ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	1.09	1.09	1.09	1.06	1.06	1.06	1.01	1.01	1.01
	1	1.01	.97	.94	.98	.95	.92	.91	.89	.87
	2	.93	.87	.82	.91	.85	.80	.82	.78	.74
	3	.86	.78	.72	.84	.77	.71	.74	.69	.65
	4	.80	.70	.63	.78	.69	.63	.67	.61	.57
	5	.74	.63	.56	.72	.62	.55	.60	.54	.50
	6	.68	.57	.50	.67	.57	.50	.55	.49	.44
	7	.63	.52	.45	.62	.51	.44	.50	.44	.39
	8	.59	.47	.40	.57	.47	.40	.45	.39	.35
	9	.54	.43	.36	.53	.42	.36	.41	.35	.31
	10	.51	.39	.32	.50	.39	.32	.38	.32	.28

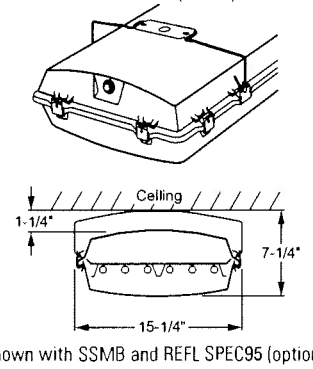
Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

STANDARD MOUNTING



OPTIONAL MOUNTING (SSMB)



Shown with SSMB and REFL SPEC95 (options)

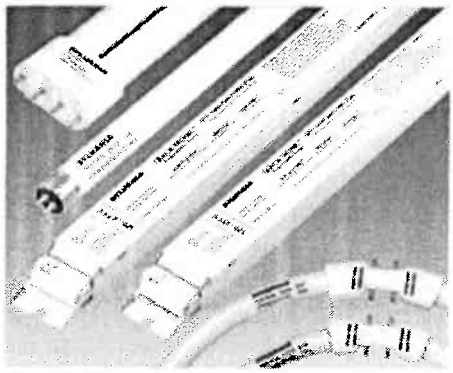
Mounting Details – Fixture furnished with four (4) stainless steel hanger brackets and two (2) stainless steel V-hooks for suspended mounting with chain or aircraft cable. Optional stainless steel ceiling mount brackets available.

Power Supply – Fixture has holes in each end suitable for 1/2" electrical trade size liquid-tight connectors. Power supply must be with flexible liquid-tight conduit or cord rated for wet location use.

Information contained herein is subject to change without notice.

SK & Associates	Description : T5HO TWO LAMP BALLAST Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: JC4

Product Details



Product Number: 49130

Order Abbreviation: QTP 2X54T5HO/UNV PSN

General Description: 2- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

Product Information	
Abbrev. With Packaging Info.	QTP2X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	16.6540
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	-20
Starting Temperature - Celsius	-29
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	121.5

Footnotes
• Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations. • Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware • Remote Mounting up to 18 feet • Remote Mounting up to 12 feet • Remote Mounting up to 10 feet • Remote mounting defined by harness length • Complies with FCC 47 CFR Part 18, Non-Consumer • Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp). • Wiring diagram applies to tnstant start standard, low power (LP), PLUS, and HD10 ballast types. • Oil Filled Capacitor • Product contains installation instructions

www.sylvania.com

PENTRON® & PENTRON HO ECOLOGIC®

High Output T5 Linear Fluorescent Lamps

Key Features & Benefits

- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Passes Federal TCLP test*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 5000K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 40,000 hrs. @12 hours/start
  - 30,000 hrs. @3 hours/start
  - all others rated for 25,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

SYLVANIA PENTRON and PENTRON HO ECO — A new product line of slender, 5/8" diameter, T5 linear fluorescent lamps with improved system performance characteristics compared to T8 & T12 technology.

Engineered with thermal characteristics which provide improved lumen output in luminaires. 93% lumen maintenance assures light levels remain high over the long life. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local & state regulations.

Product Offering

Wattage		Lamp Length	
PENTRON	PENTRON HO	Nominal	MOL
14	24	2ft	563.2 mm (22.17")
21	39	3ft	863.2 mm (33.89")
28	54	4ft	1163.2 mm (45.80")
35	80	5ft	1463.2 mm (57.61")

Application Information

Applications

- Cove and valance
- Indirect lighting
- Low profile surface mount
- Shallow recessed fixtures
- Showcase lighting
- Sign lighting
- Any place controlled, high-efficiency light is desired

Application Notes

1. PENTRON and PENTRON HO ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Catalog # Type

Project

Comments

Prepared by Date

Ordering Information

PENTRON®

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20907	FP14/830/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3000K	85
20908	FP14/835/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	3500K	85
20914	FP14/841/EC0	Miniature Bi-Pin	14	1,200	1,350	T5	563.2	20,000	4100K	85
20988	FP14/865/EC0	Miniature Bi-Pin	14	1,100	1,300	T5	563.2	20,000	6500K	85
20919	FP21/830/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3000K	85
20921	FP21/835/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	3500K	85
20924	FP21/841/EC0	Miniature Bi-Pin	21	1,900	2,100	T5	863.2	20,000	4100K	85
20989	FP21/865/EC0	Miniature Bi-Pin	21	1,750	2,000	T5	863.2	20,000	6500K	85
20868	FP28/830/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3000K	85
20901	FP28/835/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	3500K	85
20902	FP28/841/EC0	Miniature Bi-Pin	28	2,600	2,900	T5	1,163.2	25,000	4100K	85
22203	FP28/850/EC0	Miniature Bi-Pin	28	2,545	2,840	T5	1,163.2	25,000	5000K	85
20990	FP28/865/EC0	Miniature Bi-Pin	28	2,400	2,750	T5	1,163.2	25,000	6500K	85
20925	FP35/830/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3000K	85
20926	FP35/835/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	3500K	85
20927	FP35/841/EC0	Miniature Bi-Pin	35	3,300	3,650	T5	1,463.2	20,000	4100K	85

*Based on 3 hrs. per start on electronic programmed start.

PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	MOL (mm)	Average Rated Life (hrs.)*	Color Temp	CRI
20928	FP24/830/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3000K	85
20929	FP24/835/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	3500K	85
20931	FP24/841/HO/EC0	Miniature Bi-Pin	24	1,750	2,000	T5	563.2	25,000	4100K	85
20932	FP39/830/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3000K	85
20933	FP39/835/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	3500K	85
20934	FP39/841/HO/EC0	Miniature Bi-Pin	39	3,100	3,500	T5	863.2	25,000	4100K	85
20903	FP54/830/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3000K	85
20904	FP54/835/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	3500K	85
20906	FP54/841/HO/EC0	Miniature Bi-Pin	54	4,450	5,000	T5	1,163.2	30,000[1]	4100K	85
20949	FP54/850/HO/EC0	Miniature Bi-Pin	54	4,360	4,900	T5	1,163.2	30,000[1]	5000K	85
20862	FP54/865/HO/EC0	Miniature Bi-Pin	54	4,050	4,750	T5	1,163.2	30,000[1]	6500K	85
20935	FP80/830/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3000K	85
20936	FP80/835/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	3500K	85
20937	FP80/841/HO/EC0	Miniature Bi-Pin	80	6,150	7,000	T5	1,463.2	25,000	4100K	85

*Based on 3 hrs. per start on electronic programmed rapid start.

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 40,000 hrs.

Ordering Guide

PENTRON® FP28/830

FP	28	/	8	30	/	ECO®
Fluorescent PENTRON T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

PENTRON HO FP80/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent PENTRON T5 HO	Wattage: 24, 39, 54 or 80 watts		8 = 85 CRI	30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		High Output		ECOLOGIC

System Comparison*

T12/SS vs. OCTRON® T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4,660	0.85	3,960	100%	55
F032/841	T8	2	System 32	0.90	59	5,310	0.92	4,890	123%	83
FP28/841	T5	2	System PS	1.0	62	5,200	0.93	4,836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4,450	0.93	4,140	105%	68

T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

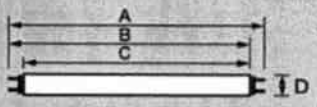
Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7,520	0.82	6,170	100%	51
F096/841	T8	1	System 59	1.13	70	6,670	0.92	6,140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6,150	0.93	5,720	93%	64

* Comparison at 25°C.

For complete energy saving system details, refer to our OSRAM SYLVANIA "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" on www.sylvania.com.

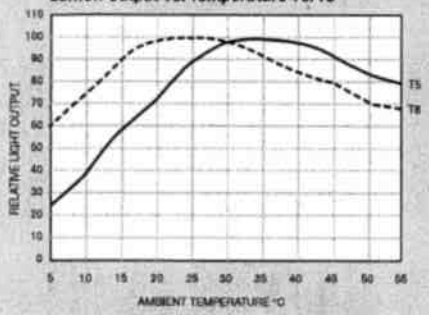
Technical Information

Dimensions

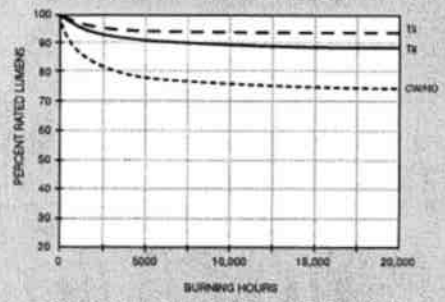


Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14 & FP24/HO	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)

Lumen Output vs. Temperature T8/T5

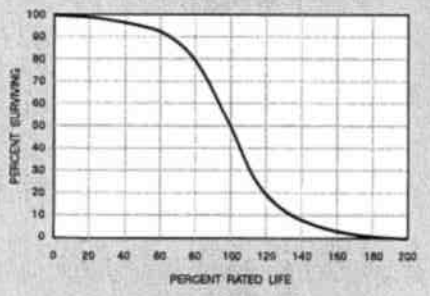


Fluorescent Lamp Lumen Maintenance



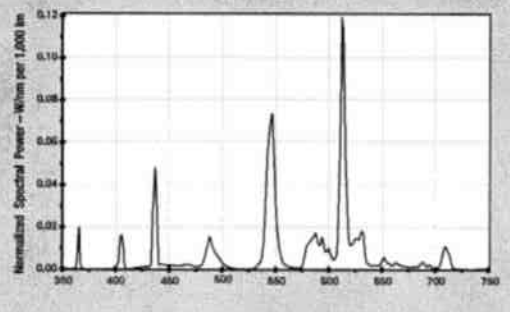
* Lumen output continues to decrease throughout the life of a fluorescent lamp.

Typical Fluorescent Lamp Mortality

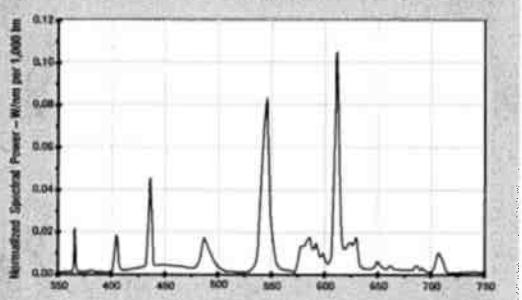


Spectral Power Distributions

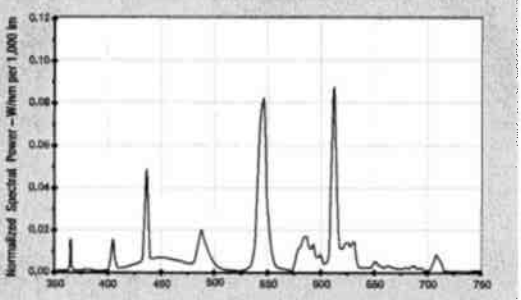
PENTRON 830



PENTRON 835



PENTRON 841



Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECOLOGIC® lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K and 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

United States
OSRAM SYLVANIA
100 Endicott Street
Danvers, MA 01923

Trade
Phone: 1-800-255-5042
Fax: 1-800-255-5043

National Accounts
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OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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Mississauga, ON L5S 1S4

Trade
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OEM/Special Markets/Display/Optic
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Fax: 1-800-667-6772

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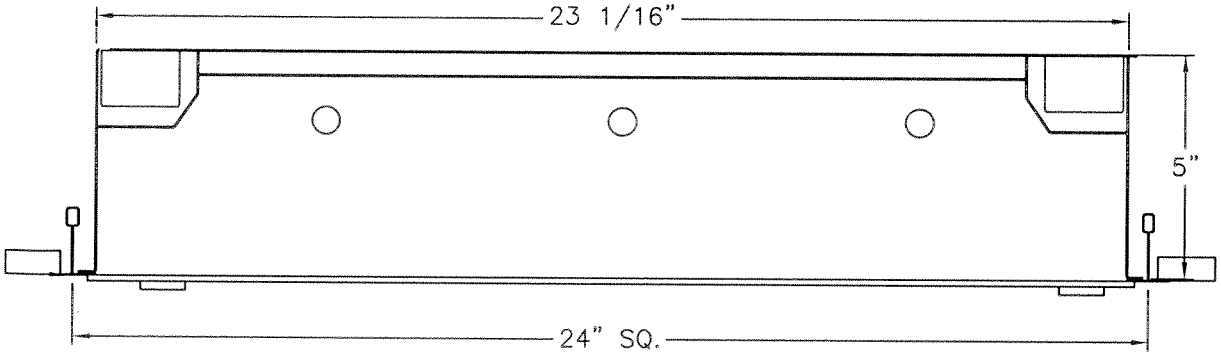
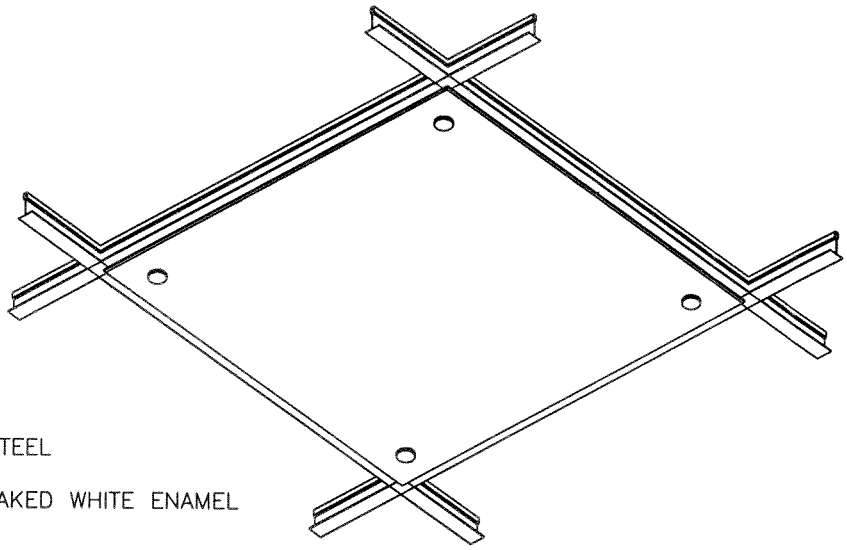
MODEL No.: Z1127-D-314T5-WA-G-2X2-W-UNIV

TYPE: R22



CROSS SECTION



SPECIFICATIONS

LIGHTING	D– DIRECT
MOUNTING	G– STANDARD CEILING T GRID (15/16" W X 1 1/2"H)
SIZE	2' X 2'
HOUSING	DIE FORM No. 20 GA. CRS. STEEL SEAM WELDED ALLROUND FINISH: W–POWDER COATED BAKED WHITE ENAMEL
REFLECTOR	DIE FORMED No. 20 GA CRS. FINISH– BAKED WHITE ENAMEL
SHIELDING	WHITE OPAL ACRYLIC SECURED W/(4) DECORATIVE ROUND NUTS.
LAMP	(3) F14 T5 LAMP (BY OTHERS)
BALLAST	CBM–ETL CERTIFIED, CLASS P, UNIVERSAL VOLTAGE. (BALLAST SUITABLE FOR 120V TO 277V)
WIRING	SINGLE CIRCUIT

2X2 INDIVIDUAL

QTY.80

c UL us LISTED SUITABLE FOR WET LOCATIONS

REV	DESCRIPTION	BY	DATE
3			
2			
1			

NOTE: ALL SPECIFICATIONS MUST BE CHECKED AND SIGNED OFF PRIOR TO PRODUCTION

ZOOM LIGHTING RESERVES THE RIGHT TO MAKE ANY MECHANICAL OR MATERIAL CHANGES TO THE FIXTURES WHICH DOES NOT AFFECT THE APPEARANCE OR PERFORMANCE OF THE PRODUCT.

NOTE: CEILING AND WALLS MUST BE ADEQUATELY REINFORCED TO SUPPORT THE FIXTURE WEIGHT. ZOOM LIGHTING IS NOT RESPONSIBLE FOR IMPROPER REINFORCEMENT

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PROJECT: NORFOLK AGGIE			
MODEL NO.: Z1127-D-314T5-WA-G-2X2-W-UNIV			
DRAWN BY: KO	APPROVED BY:	DATE: 12-26-12	SCALE: NTS
TYPE:	CUSTOMER ORDER #		
FILE NAME: Z1127-D-314T5-WA-G-2X2			
ORDER #:	SHEET 1 OF 1		

ZOOM LIGHTING LTD.
ONE BRIDAL AVE WEST WARWICK, RI 02893
Tel. (401) 262-0225
Fax. (401) 615-9109
E-mail INFO@ZOOMLIGHTING.COM
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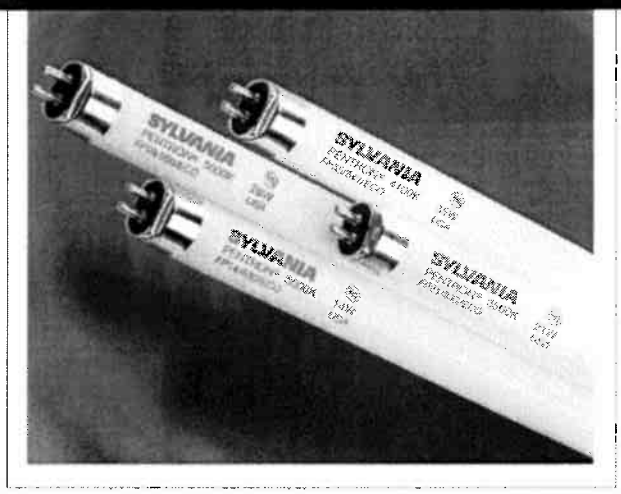
www.sylvania.com

PENTRON® ECOLOGIC®
T5 Linear Fluorescent Lamps



PENTRON ECOLOGIC T5 lamps offer a high quality lighting solution for linear fluorescent applications where luminaire design flexibility is important. These lamps are available in 2, 3, 4 and 5-foot lengths and offer a wide range of color temperatures: 2700K, 3000K, 3500K, 4100K, 5000K and 6500K. When paired with a QUICKTRONIC T5 ballast, these systems are covered by the comprehensive QUICK 60+® system warranty.

Key Features & Benefits

- High Performance T5 lamps
  - Up to 104 LPW
  - 95% lumen maintenance
  - Peak lumen output at 35°C (95°F)
  - Dimmable
  - Ideal for occupancy sensor applications
- PENTRON 4-foot average rated life increased:
  - 30,000 hrs. @12 hours/start
  - 25,000 hrs. @3 hours/start
- TCLP and RoHS compliant
- Made in the USA
- Lead free glass
- Greater luminaire design flexibility
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- QUICK 60+ system warranty offered when paired with QUICKTRONIC T5 electronic ballast

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.

* Regulations may vary. Check your local and state regulations.

RoHS compliant
This light source meets restrictions on hazardous substances.

MADE IN USA

Product Offering

Ordering Abbreviation	Watts	CCT
FP14/800/ECO	14	2700K, 3000K, 3500K, 4100K, 6500K
FP21/800/ECO	21	2700K, 3000K, 3500K, 4100K, 6500K
FP28/800/ECO	28	2700K, 3000K, 3500K, 4100K, 5000K, 6500K
FP35/800/ECO	35	2700K, 3000K, 3500K, 4100K

Application Information

Applications

- Cove and valance
- Direct / indirect luminaires
- Facade luminaires
- Low profile surface mount
- Shallow recessed fixtures
- Showcase
- Signage

Application Notes

1. PENTRON ECO lamps are about 2" shorter than T8 & T12 Bi-Pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.

Specification Data

Fixture Description:	Type
Project/Job:	
SYLVANIA lamp:	
SYLVANIA ballast:	
Notes:	

Ordering Information

Item Number	Ordering Abbreviation	Base	Watt	Nominal Length (in)	Initial Lumens @ 25°C	Mean Lumens @ 25°C	Initial Lumens @ 35°C	Mean Lumens @ 35°C	Bulb	MOL (mm)	Programmed 3 hrs/start	Rapid Start 12 hrs/start	CCT	CRI
20973	FP14/827/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	2700K	85
20907	FP14/830/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	24	1,200	1,140	1,350	1,285	T5	563.2	20,000	22,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	24	1,100	1,045	1,300	1,235	T5	563.2	20,000	22,000	6500K	85
20974	FP21/827/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	2700K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	36	1,900	1,805	2,100	1,995	T5	863.2	20,000	22,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	36	1,750	1,665	2,000	1,900	T5	863.2	20,000	22,000	6500K	85
20975	FP28/827/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	2700K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	48	2,600	2,470	2,900	2,755	T5	1,163.20	25,000	30,000	4100K	85
22203	FP28/850/ECO	Miniature Bi-Pin	28	48	2,545	2,420	2,840	2,700	T5	1,163.20	25,000	30,000	5000K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	48	2,400	2,280	2,750	2,615	T5	1,163.20	25,000	30,000	6500K	85
20870	FP35/827/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	2700K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	60	3,300	3,135	3,650	3,470	T5	1,463.20	20,000	22,000	4100K	85

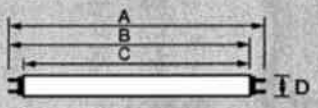
Ordering Guide

FP	14	/	8	30	/	ECO®
Fluorescent PENTRON® T5	Wattage: 14, 21, 28 or 35 watts		8 = 85 CRI	27 = 2700K CCT, 30 = 3000K CCT 35 = 3500K CCT, 41 = 4100K CCT 50 = 5000K CCT, 65 = 6500K CCT		ECOLOGIC®

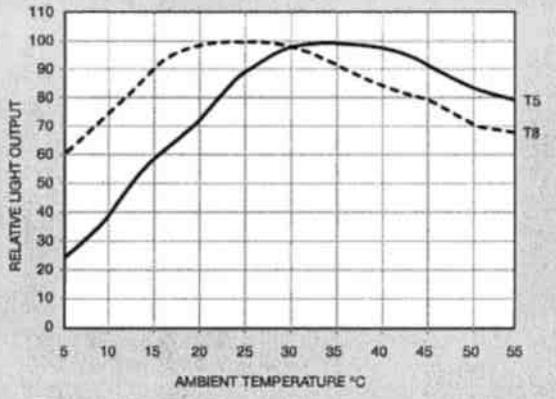
Technical Information

Dimensions

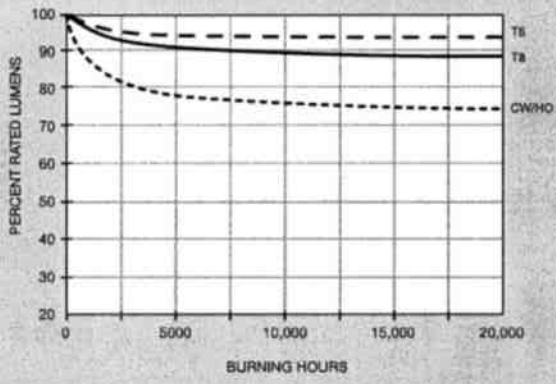
Ordering Abbreviation	(A) Max. Overall Overall Length mm (in.)	(B) Base Face to Opposite Pin mm (in.)	(C) Base Face to Base Face mm (in.)	(D) Max. Outside Diameter mm (in.)
FP14	563.2 (22.17)	553.7 - 556.1 (21.80 - 21.89)	547.1 - 549.0 (21.54 - 21.61)	17.0 (0.67)
FP21	863.2 (33.89)	853.7 - 856.1 (33.61 - 33.70)	847.1 - 849.0 (33.35 - 33.43)	17.0 (0.67)
FP28	1163.2 (45.80)	1153.7 - 1156.1 (45.42 - 45.52)	1147.1 - 1149.0 (45.16 - 45.24)	17.0 (0.67)
FP35	1463.2 (57.61)	1453.7 - 1456.1 (57.23 - 57.33)	1447.1 - 1449.0 (56.97- 57.05)	17.0 (0.67)



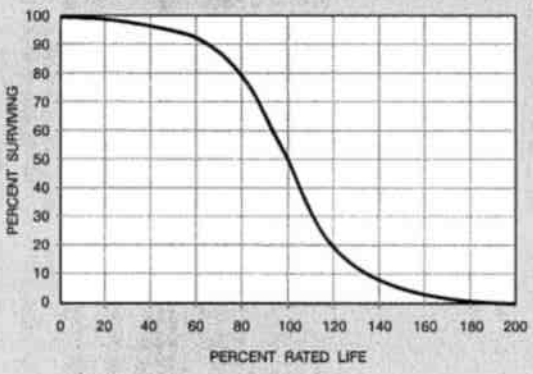
Lumen Output vs. Temperature T8/T5



Fluorescent Lamp Lumen Maintenance



Typical Fluorescent Lamp Mortality



Related Literature

For optimum system performance and warranty pair with QUICKTRONIC® electronic ballast systems:

Ballast Technology Applications & Specification Guide (Literature Code: ECS-Electronic2009)

QUICK 60+® System Warranty (Literature Code: ECS140)

Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (2700K, 3000K, 3500K, 4100K, 5000K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

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SK & Associates	Description : DIG-S22-224T5H-WPR/SPLIT-EB2-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: RDI2

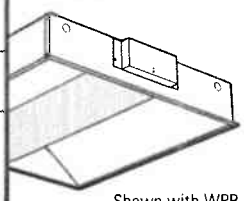
RECESSED DIRECT/INDIRECT — DI

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2x2



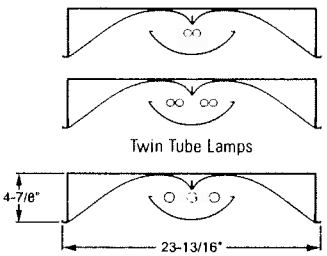
Shown with WPR

EXAMPLE: **DI G - S 2 2 - 2 40TT - AD - OPTIONS - EB2 - UNV**

DI	G	S	2	2	2	40TT	AD	OPTIONS	EB2	UNV
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

- Acrylic diffuser option provides up to 81% fixture efficiency.
- Matte white overlay and highly reflective non-glare white powder coated reflectors and end plates provide soft, uniform illumination and increased efficiency.
- Lamps shielded from direct view by diffuser.
- Shallow housing depth.
- Steel lamp retaining clips standard—no plastic clip breakage.
- Ballast accessible from room side of fixture.
- Aesthetically pleasing slot grid option available.
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation.
- Optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- This fixture is proudly made in the USA.



Twin Tube Lamps

T5 or T8 Lamps
Shown with WPR

ORDERING INFORMATION

SERIES
DI	Recessed Direct/Indirect

CEILING TYPE
G	NEMA Type "G"
SG	Screw slot NEMA Type "SS" (earthquake clips included)

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE
S	Static, no air capability

NOMINAL WIDTH
2	2'

NOMINAL LENGTH
2	2'

TOTAL LAMPS
1, 2, or 3	(3 lamps in T5 or T8 only)

LAMP WATTAGE/TYPE
14T5S	2', 14-watt T5
17	2', 17-watt T8
24T5H	2', 24-watt T5HO
40TT	2', 40-watt long twin tube (1- or 2-lamp only)
50TT	2', 50-watt long twin tube (1- or 2-lamp only)
55TT	2', 55-watt long twin tube (1- or 2-lamp only)

SHIELDING
See back for shielding details.

WPR	White perforated round
WP	White perforated flat
AD	Acrylic
WPRL	White perforated with round louver
WPASL	White perforated with aluminum solid louver
WPR/SLT/LW	White slot-perforated lengthwise round
WPR/SPLIT	White perforated round with split
WPR/ACRY/ CTR/CLR	White perforated round with center clear acrylic (consult factory for additional colors)

OPTIONS
For generic EM ballast options (must specify voltage), see Fluorescent Information section.

AMW	Anti-microbial white finish
DUSTCOVER	Dust and debris cover (WPR only)
EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE
EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast
EB3	3-lamp electronic ballast
EB2/1	(1) 2-lamp and (1) 1-lamp electronic ballast

VOLTAGE
120	120V
277	277V
UNV	120-277V
347	347V

SPECIFICATIONS

Housing – 20-gauge die-formed C.R.S.
Reflector – Precision die-formed C.R.S. with highly reflective non-glare matte white polyester powder coated finish.
Shielding – Die-formed C.R.S., 50% open perforation, white polyester powder coated diffuser with matte white acrylic overlay.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
T8	•	
40TT	○	
50TT		•
55TT		•

Mounting – NEMA Type "G" standard. NEMA Type "SS" available (earthquake clips included). For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

2x2

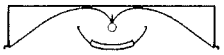
SHIELDING OPTIONS

Shown with WPR or WRP/SLT/LW

Shown with WP

Shown with AD

Shown with WPRL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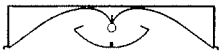

Shown with WPR/SPLIT

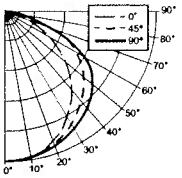
Shown with WPR/ACRY/CTR

PHOTOMETRY – DI WITH WPR OPTION

Catalog #: **DIG-S22-240TT-WPR**

TEST REPORT INFORMATION

- Test Report #: 13831.0
- Date: 12/12/07
- Lamp Type: F40TT/2G11
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1060.	16.8	26.3
0 - 40	1756.	27.9	43.5
0 - 60	3218.	51.1	79.8
0 - 90	4035.	64.1	100.0
Total Luminaire:			
0 - 180	4035.	64.1	100.0

Total Luminaire Optical Efficiency: **64.1%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.4

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1344.	1344.	1344.	
5	1344.	1337.	1338.	127.7
15	1287.	1298.	1312.	367.9
25	1175.	1224.	1258.	564.2
35	1012.	1118.	1181.	696.0
45	808.	987.	1085.	749.8
55	574.	826.	936.	712.8
65	334.	613.	636.	548.7
75	141.	235.	253.	236.4
85	24.	29.	37.	31.8
90	0	0	0	

ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	.76	.76	.76	.74	.74	.74	.71	.71	.71
	1	.70	.68	.65	.69	.66	.64	.64	.62	.60
	2	.64	.60	.55	.63	.58	.55	.56	.53	.50
	3	.59	.53	.48	.58	.52	.47	.50	.46	.43
	4	.54	.47	.41	.53	.46	.41	.44	.40	.36
	5	.49	.41	.35	.48	.40	.35	.39	.34	.31
	6	.45	.37	.31	.44	.36	.31	.35	.30	.26
	7	.41	.33	.27	.40	.32	.27	.31	.26	.23
	8	.38	.29	.24	.37	.29	.24	.28	.23	.20
	9	.35	.26	.21	.34	.26	.21	.25	.20	.17
	10	.32	.24	.19	.32	.23	.18	.23	.18	.15

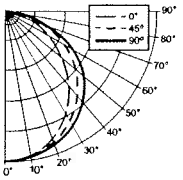
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – DI WITH AD OPTION

Catalog #: **DIG-S22-240TT-AD**

TEST REPORT INFORMATION

- Test Report #: 14229.0
- Date: 08/05/08
- Lamp Type: F40TT/2G11
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1422.	22.6	27.6
0 - 40	2333.	37.0	45.4
0 - 60	4128.	65.5	80.3
0 - 90	5143.	81.6	100.0
Total Luminaire:			
0 - 180	5143.	81.6	100.0

Total Luminaire Optical Efficiency: **81.6%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.3

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1813.	1813.	1813.	
5	1809.	1804.	1803.	172.3
15	1727.	1746.	1761.	494.9
25	1567.	1635.	1682.	754.5
35	1333.	1463.	1548.	911.8
45	1040.	1237.	1355.	944.1
55	733.	968.	1102.	850.2
65	466.	660.	757.	634.7
75	218.	327.	360.	327.4
85	35.	52.	55.	52.9
90	0.	0.	0.	

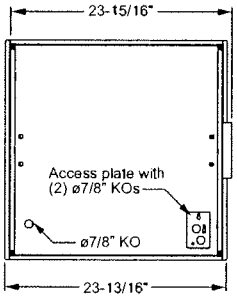
ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	.97	.97	.97	.95	.95	.95	.91	.91	.91
	1	.90	.86	.83	.88	.84	.81	.81	.79	.76
	2	.82	.76	.71	.80	.74	.70	.72	.68	.64
	3	.75	.67	.61	.73	.66	.60	.64	.59	.55
	4	.69	.60	.53	.67	.59	.52	.57	.51	.47
	5	.63	.53	.46	.61	.52	.45	.50	.44	.40
	6	.58	.47	.40	.56	.47	.40	.45	.39	.35
	7	.53	.42	.35	.52	.42	.35	.41	.34	.30
	8	.49	.38	.31	.48	.37	.31	.36	.30	.26
	9	.45	.34	.27	.44	.34	.27	.33	.27	.22
	10	.42	.31	.24	.41	.30	.24	.30	.24	.20

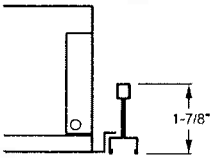
Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW

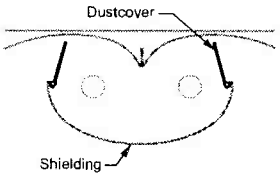


SLOT GRID (Williams' SG)

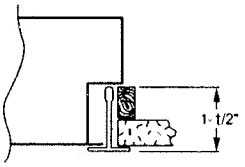


Screw Slot NEMA Type "SS"

DUSTCOVER OPTION



DRYWALL KIT (DFK)

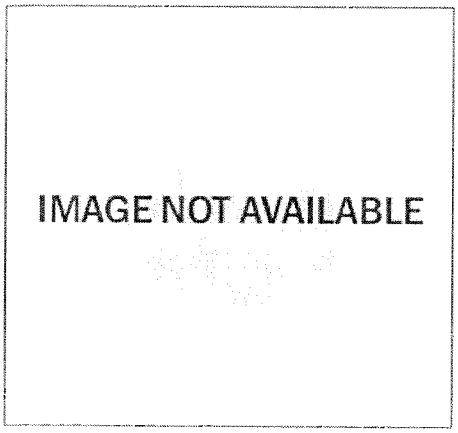


When using the DFK with Williams DI fixture, the structure surrounding the DFK at each end of fixture is to extend no more than 1-1/2" from the bottom of the "T" as shown.

Williams FLUORESCENT LIGHTING

H.E. Williams, Inc. • Carthage, Missouri • www.hewilliams.com • 417-358-4065 • Fax: 417-358-6015

Information contained herein is subject to change without notice.



Product Number: 51478

Order Abbreviation: QHE 2X39-24T5HO/UNV PSN

General Description: High Efficiency 2x39 24 Ballast

Product Information	
Abbrev. With Packaging Info.	QHE2X3924T5HOUNVPSN 10/CS 1/SKU
Ballast Height H (in)	0.8270
Ballast Length L (in)	14.1730
Ballast Width W (in)	1.1810
Family Brand Name	QUICKTRONIC High-Efficiency
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Total Maximum Wattage	78

Return to: Pentron HO

Print Page

IMAGE NOT AVAILABLE

Product Number:	20929
Order Abbreviation:	FP24/835/HO/ECO
General Description:	24W, T5 PENTRON high output (HO) fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

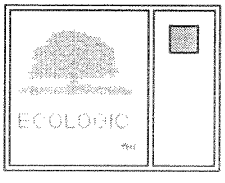
Product Information

Abbrev. With Packaging Info.	FP24835HOECO 40/CS 1/SKU
Actual Length (in)	22.173
Actual Length (mm)	563.19
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.670
Diameter (mm)	17.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	1760
Initial Lumens at 35C	2000
Mean Lumens at 25C	1627
Mean Lumens at 35C	1860
Nominal Length (in)	24.000
Nominal Length (mm)	609.60
Nominal Wattage (W)	24.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



Footnotes

SK & Associates	Description : DIG-S24-254T5H-WPR/SPLIT-EB2-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **RDI4**

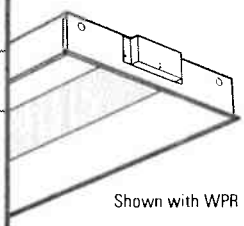
RECESSED DIRECT/INDIRECT — DI

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2x4



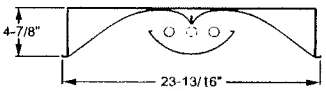
Shown with WPR

EXAMPLE: **DI G - S 2 4 - 2 32 - AD - OPTIONS - EB2 - UNV**

DI	G	S	2	4	2	32	AD	OPTIONS	EB2	UNV
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

- Acrylic diffuser option provides up to 88% fixture efficiency.
- Matte white overlay and highly reflective non-glare white powder coated reflectors and end plates provide soft, uniform illumination and increased efficiency.
- Lamps shielded from direct view by diffuser.
- Shallow housing depth.
- Ballast accessible from room side of fixture.
- Aesthetically pleasing slot grid option available.
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation.
- Optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- This fixture is proudly made in the USA.



Shown with WPR

ORDERING INFORMATION

SERIES

DI	Recessed Direct/Indirect

CEILING TYPE

G	NEMA Type "G"
SG	Screw slot NEMA Type "SS" (earthquake clips included)

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

4	4'

TOTAL LAMPS

1, 2, or 3

LAMP WATTAGE/TYPE

28T5S	4', 28-watt T5
32	4', 32-watt T8
54T5H	4', 54-watt T5HO

SHIELDING

See back for shielding details.

WPR	White perforated round
WP	White perforated flat
AD	Acrylic
WPRL	White perforated with round louver
WPASL	White perforated with aluminum solid louver
WPR/SLT/LW	White slot-perforated lengthwise round
WPR/SPLIT	White perforated round with split
WPR/ACRY/ CTR/CLR	White perforated round with center clear acrylic (consult factory for additional colors)

OPTIONS

For generic EM ballast options (must specify voltage), see Fluorescent Information section.

AMW	Anti-microbial white finish
DUSTCOVER	Dust and debris cover (WPR only)
EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE

EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast
EB3	3-lamp electronic ballast
EB2/1	(1) 2-lamp and (1) 1-lamp electronic ballast

VOLTAGE

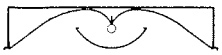
120	120V
277	277V
UNV	120-277V
347	347V

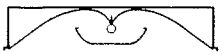
SPECIFICATIONS

Housing – 20-gauge die-formed C.R.S.
Reflector – Precision die-formed C.R.S. with highly reflective non-glare matte white polyester powder coated finish.
Shielding – Die-formed C.R.S., 50% open perforation, white polyester powder coated diffuser with matte white acrylic overlay.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, instant start T8, program start T5, rated Class P.
Mounting – NEMA Type "G" standard. NEMA Type "SS" available (earthquake clips included). For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

2x4

SHIELDING OPTIONS


Shown with WPR or WRP/SLT/LW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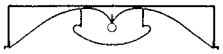
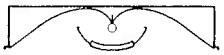

Shown with AD

Shown with WPRL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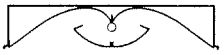
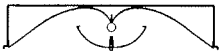

Shown with WPR/SPLIT

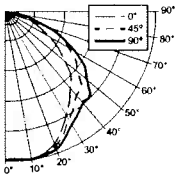

Shown with WPR/ACRY/CTR/CLR

PHOTOMETRY – DI WITH WPR OPTION

Catalog #: **DIG-S24-232-WPR**

TEST REPORT INFORMATION

- Test Report #: 13833.0
- Date: 12/10/07
- Lamp Type: F32T8
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1146.	19.4	27.1
0 - 40	1862.	31.6	44.1
0 - 60	3377.	57.2	80.0
0 - 90	4223.	71.6	100.0
Total Luminaire:			
0 - 180	4223.	71.6	100.0

Total Luminaire Optical Efficiency: **71.6%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.3

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1432.	1432.	1432.	
5	1433.	1433.	1433.	136.8
15	1412.	1425.	1439.	403.8
25	1270.	1308.	1348.	605.5
35	1068.	1140.	1213.	715.9
45	895.	1036.	1153.	797.9
55	620.	822.	933.	717.4
65	378.	601.	610.	545.2
75	177.	256.	248.	257.5
85	36.	42.	44.	43.1
90	4.	3.	3.	

ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling .80 / Wall .70	.50	.30	Ceiling .70 / Wall .70	.50	.30	Ceiling .50 / Wall .50	.30	.10
0	.85	.85	.85	.83	.83	.83	.80	.80	.80
1	.79	.76	.73	.77	.74	.71	.71	.69	.67
2	.72	.67	.62	.70	.65	.61	.63	.59	.56
3	.66	.59	.53	.64	.58	.53	.56	.51	.48
4	.61	.52	.46	.59	.51	.46	.50	.45	.41
5	.55	.46	.40	.54	.45	.39	.44	.39	.35
6	.51	.41	.35	.49	.41	.35	.39	.34	.30
7	.47	.37	.31	.45	.36	.30	.35	.30	.26
8	.43	.33	.27	.42	.33	.27	.32	.26	.22
9	.39	.30	.24	.38	.29	.23	.28	.23	.19
10	.37	.27	.21	.36	.26	.21	.26	.21	.17

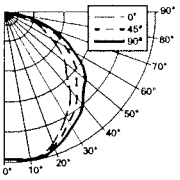
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – DI WITH AD OPTION

Catalog #: **DIG-S24-232-AD**

TEST REPORT INFORMATION

- Test Report #: 14225.0
- Date: 07/25/08
- Lamp Type: F32T8
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1418.	24.0	27.1
0 - 40	2319.	39.3	44.3
0 - 60	4105.	69.6	78.4
0 - 90	5235.	88.7	100.0
Total Luminaire:			
0 - 180	5235.	88.7	100.0

Total Luminaire Optical Efficiency: **88.7%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.3

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1759.	1759.	1759.	
5	1771.	1766.	1763.	168.6
15	1752.	1769.	1784.	501.2
25	1565.	1614.	1666.	747.8
35	1339.	1439.	1527.	901.6
45	1028.	1188.	1309.	912.4
55	792.	986.	1124.	873.2
65	510.	697.	787.	670.6
75	257.	364.	404.	374.1
85	62.	84.	82.	85.9
90	0.	0.	0.	

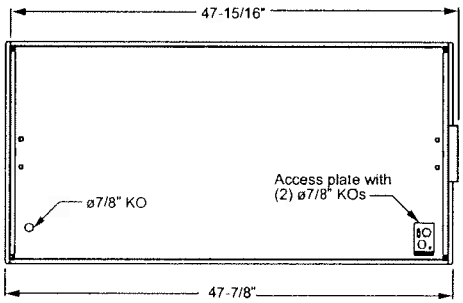
ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling .80 / Wall .70	.50	.30	Ceiling .70 / Wall .70	.50	.30	Ceiling .50 / Wall .50	.30	.10
0	1.06	1.06	1.06	1.03	1.03	1.03	.99	.99	.99
1	.97	.93	.90	.95	.91	.88	.87	.85	.82
2	.89	.82	.76	.87	.80	.75	.77	.73	.69
3	.81	.72	.66	.79	.71	.65	.68	.63	.58
4	.75	.64	.57	.73	.63	.56	.61	.55	.50
5	.68	.57	.49	.66	.56	.48	.54	.47	.42
6	.62	.51	.43	.61	.50	.42	.48	.42	.37
7	.58	.46	.38	.56	.45	.37	.43	.37	.32
8	.53	.41	.33	.52	.40	.33	.39	.32	.28
9	.49	.37	.29	.47	.36	.29	.35	.28	.24
10	.45	.33	.26	.44	.33	.26	.32	.25	.21

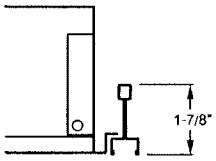
Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW

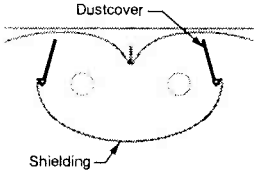


SLOT GRID (Williams' SG)

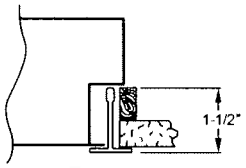


Screw Slot NEMA Type "SS"

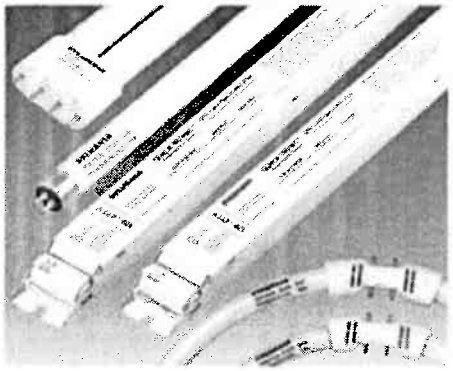
DUSTCOVER OPTION



DRYWALL KIT (DFK)



When using the DFK with Williams DI fixture, the structure surrounding the DFK at each end of fixture is to extend no more than 1-1/2" from the bottom of the "T" as shown.



Product Number: 49130

Order Abbreviation: QTP 2X54T5HO/UNV PSN

General Description: 2- Lamp universal voltage electronic ballast for 54W T5 HO lamp. Packaged 10 pieces per case with wires

Product Information	
Abbrev. With Packaging Info	QTP2X54T5HOUNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8660
Ballast Length L (in)	16.6540
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.50
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP54T5HO
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	-20
Starting Temperature - Celsius	-29
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	121.5

Footnotes

- Data based on primary lamp types. See OSRAM SYLVANIA System Performance Guide for data on other lamp combinations.
- Product is a kit containing the core & coil, capacitor, ingitor (where required), brackets and mounting hardware
- Remote Mounting up to 18 feet
- Remote Mounting up to 12 feet
- Remote Mounting up to 10 feet
- Remote mounting defined by harness length
- Complies with FCC 47 CFR Part 18, Non-Consumer
- Remote Mounting up to 19 feet (keep red wires short for 1&2 lamp).
- Wiring diagram applies to instant start standard, low power (LP), PLUS, and HD10 ballast types.
- Oil Filled Capacitor
- Product contains installation instructions

Browse Catalog

- Pentron Standard
- Pentron Premier
- Pentron HO
- Pentron C (amalgam) HO

Return to Pentron HO | Print Page

IMAGE NOT AVAILABLE

Product Number: 20904

Order Abbreviation: FP54/835/HO/ECO

General Description: 54W, T5 PENTRON high output (HO) fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP54835HOECO 40/CS 1/SKU
Actual Length (in)	45.256
Actual Length (mm)	1149.50
Average Rated Life (hr)	25000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	4450
Initial Lumens at 35C	5000
Mean Lumens at 25C	4138
Mean Lumens at 35C	4650
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	54.00

Additional Product Information
Product Documents, Graphs, and Images
Packaging Information
Compatible Products **(if applicable)**

SK & Associates	Description : DIG-S24-254T5H-WPR/SPLIT-EBD*AD7-120 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **RDI4D**

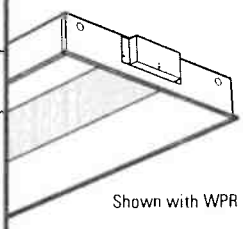
RECESSED DIRECT/INDIRECT — DI

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2x4



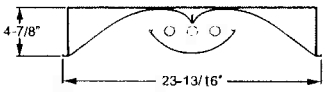
Shown with WPR

EXAMPLE: **DI G - S 2 4 - 2 32 - AD - OPTIONS - EB2 - UNV**

DI	G	S	2	4	2	32	AD	OPTIONS	EB2	UNV
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

- Acrylic diffuser option provides up to 88% fixture efficiency.
- Matte white overlay and highly reflective non-glare white powder coated reflectors and end plates provide soft, uniform illumination and increased efficiency.
- Lamps shielded from direct view by diffuser.
- Shallow housing depth.
- Ballast accessible from room side of fixture.
- Aesthetically pleasing slot grid option available.
- Ballast secured by two captive bolts and nuts to ensure a tight, reliable fit for maximum heat dissipation.
- Optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- This fixture is proudly made in the USA.



Shown with WPR

ORDERING INFORMATION

SERIES

DI	Recessed Direct/Indirect

CEILING TYPE

G	NEMA Type "G"
SG	Screw slot NEMA Type "SS" (earthquake clips included)

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

4	4'

TOTAL LAMPS

1, 2, or 3

LAMP WATTAGE/TYPE

28T5S	4', 28-watt T5
32	4', 32-watt T8
54T5H	4', 54-watt T5HO

SHIELDING

See back for shielding details.

WPR	White perforated round
WP	White perforated flat
AD	Acrylic
WPRL	White perforated with round louver
WPASL	White perforated with aluminum solid louver
WPR/SLT/LW	White slot-perforated lengthwise round
WPR/SPLIT	White perforated round with split
WPR/ACRY/ CTR/CLR	White perforated round with center clear acrylic (consult factory for additional colors)

OPTIONS

For generic EM ballast options (must specify voltage), see Fluorescent Information section.

AMW	Anti-microbial white finish
DUSTCOVER	Dust and debris cover (WPR only)
EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE

EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast
EB3	3-lamp electronic ballast

ADVANCE MARK 7 DIMMING BALLAST last

VOLTAGE

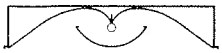
120	120V
277	277V
UNV	120-277V
347	347V

SPECIFICATIONS

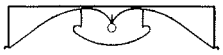
Housing – 20-gauge die-formed C.R.S.
Reflector – Precision die-formed C.R.S. with highly reflective non-glare matte white polyester powder coated finish.
Shielding – Die-formed C.R.S., 50% open perforation, white polyester powder coated diffuser with matte white acrylic overlay.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, instant start T8, program start T5, rated Class P.
Mounting – NEMA Type "G" standard. NEMA Type "SS" available (earthquake clips included). For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

2x4

SHIELDING OPTIONS

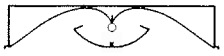

Shown with WPR or WRP/SLT/LW

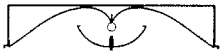
Shown with WP


Shown with AD

Shown with WPRL

Shown with WPASL


Shown with WPR/SPLIT

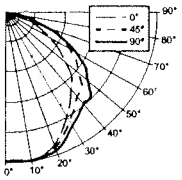

Shown with WPR/ACRY/CTR/CLR

PHOTOMETRY – DI WITH WPR OPTION

Catalog #: **DIG-S24-232-WPR**

TEST REPORT INFORMATION

- Test Report #: 13833.0
- Date: 12/10/07
- Lamp Type: F32T8
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1146.	19.4	27.1
0 - 40	1862.	31.6	44.1
0 - 60	3377.	57.2	80.0
0 - 90	4223.	71.6	100.0
Total Luminaire:			
0 - 180	4223.	71.6	100.0

Total Luminaire Optical Efficiency: **71.6%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.3

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1432.	1432.	1432.	
5	1433.	1433.	1433.	136.8
15	1412.	1425.	1439.	403.8
25	1270.	1308.	1348.	605.5
35	1068.	1140.	1213.	715.9
45	895.	1036.	1153.	797.9
55	620.	822.	933.	717.4
65	378.	601.	610.	545.2
75	177.	256.	248.	257.5
85	36.	42.	44.	43.1
90	4.	3.	3.	

ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	.85	.85	.85	.83	.83	.83	.80	.80	.80
	1	.79	.76	.73	.77	.74	.71	.71	.69	.67
	2	.72	.67	.62	.70	.65	.61	.63	.59	.56
	3	.66	.59	.53	.64	.58	.53	.56	.51	.48
	4	.61	.52	.46	.59	.51	.46	.50	.45	.41
	5	.55	.46	.40	.54	.45	.39	.44	.39	.35
	6	.51	.41	.35	.49	.41	.35	.39	.34	.30
	7	.47	.37	.31	.45	.36	.30	.35	.30	.26
	8	.43	.33	.27	.42	.33	.27	.32	.26	.22
	9	.39	.30	.24	.38	.29	.23	.28	.23	.19
	10	.37	.27	.21	.36	.26	.21	.26	.21	.17

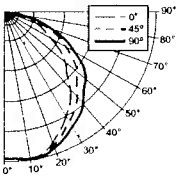
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – DI WITH AD OPTION

Catalog #: **DIG-S24-232-AD**

TEST REPORT INFORMATION

- Test Report #: 14225.0
- Date: 07/25/08
- Lamp Type: F32T8
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1418.	24.0	27.1
0 - 40	2319.	39.3	44.3
0 - 60	4105.	69.6	78.4
0 - 90	5235.	88.7	100.0
Total Luminaire:			
0 - 180	5235.	88.7	100.0

Total Luminaire Optical Efficiency: **88.7%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.3, Across = 1.3

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1759.	1759.	1759.	
5	1771.	1766.	1763.	168.6
15	1752.	1769.	1784.	501.2
25	1565.	1614.	1666.	747.8
35	1339.	1439.	1527.	901.6
45	1028.	1188.	1309.	912.4
55	792.	986.	1124.	873.2
65	510.	697.	787.	670.6
75	257.	364.	404.	374.1
85	62.	84.	82.	85.9
90	0.	0.	0.	

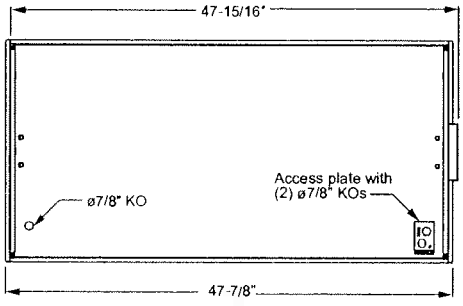
ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	1.06	1.06	1.06	1.03	1.03	1.03	.99	.99	.99
	1	.97	.93	.90	.95	.91	.88	.87	.85	.82
	2	.89	.82	.76	.87	.80	.75	.77	.73	.69
	3	.81	.72	.66	.79	.71	.65	.68	.63	.58
	4	.75	.64	.57	.73	.63	.56	.61	.55	.50
	5	.68	.57	.49	.66	.56	.48	.54	.47	.42
	6	.62	.51	.43	.61	.50	.42	.48	.42	.37
	7	.58	.46	.38	.56	.45	.37	.43	.37	.32
	8	.53	.41	.33	.52	.40	.33	.39	.32	.28
	9	.49	.37	.29	.47	.36	.29	.35	.28	.24
	10	.45	.33	.26	.44	.33	.26	.32	.25	.21

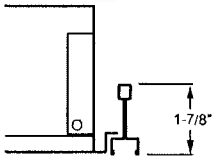
Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW

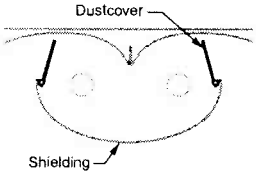


SLOT GRID (Williams' SG)

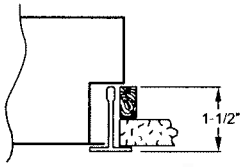


Screw Slot NEMA Type "SS"

DUSTCOVER OPTION



DRYWALL KIT (DFK)



When using the DFK with Williams DI fixture, the structure surrounding the DFK at each end of fixture is to extend no more than 1-1/2" from the bottom of the "T" as shown.

Williams FLUORESCENT LIGHTING

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Information contained herein is subject to change without notice.

SK & Associates	Description : ADVANCE MARK 7 - 2/F54 LAMPING Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: RDI4D

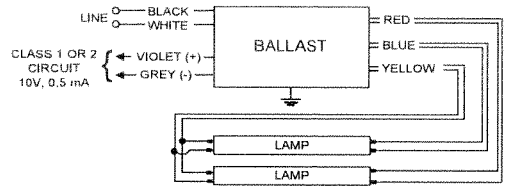
PHILIPS
ADVANCE

VZT-2S54	
Brand Name	MARK 7 0-10V
Ballast Type	Electronic Dimming
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (Watts) (min/max)	Ballast Factor (min/max)	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
* F54T5/HO	2	54	50/10	0.45	24/125	0.03/1.00	10	0.98	1.7	0.80
F54T5/HO/ES (49W)	2	49	50/10	0.42	24/117	0.03/1.00	10	0.98	1.7	0.85
FC12T5/HO	2	55	50/10	0.42	24/114	0.03/0.90	10	0.98	1.7	0.79
FT55W/2G11	2	55	50/10	0.42	24/114	0.03/0.90	10	0.98	1.7	0.79

Wiring Diagram



Diag. 56A

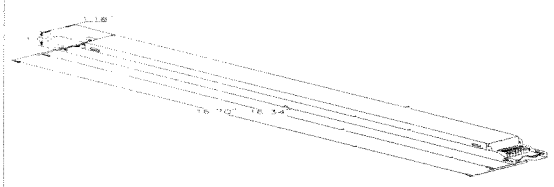
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0	0
White	0	0
Blue	0	0
Red	0	0
Yellow	0	0
Gray	0	0
Violet	0	0

	in.	cm.
Yellow/Blue	0	0
Blue/White	0	0
Brown	0	0
Orange	0	0
Orange/Black	0	0
Black/White	0	0
Red/White	0	0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 01/07/2011

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

PHILIPS LIGHTING ELECTRONICS N.A.
10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Tel: 800-322-2086 · Fax: 888-423-1882 · www.philips.com/advance
Customer Support/Technical Service: 800-372-3331 · OEM Support: 866-915-5886

PHILIPS
ADVANCE

VZT-2S54	
Brand Name	MARK 7 0-10V
Ballast Type	Electronic Dimming
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors or integral leads color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

2.2 VZT-4PSP32-G ballast shall provide Independent Lamp Operation (ILO) allowing remaining lamp(s) to maintain full light output when one or more lamps fail.

2.3 Ballast shall be provided with integral protection circuitry to withstand connection of low voltage control leads to mains power supply. In this event, ballast shall default to maximum light output.

2.4 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.5 Ballast shall operate from 50/60 Hz input source of 120V or 277V with sustained variations of +/- 10% (voltage and frequency). IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency).

2.6 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.7 Ballast shall have a Power Factor greater than 0.98 at full light output and greater than 0.90 throughout the dimming range for primary lamp.

2.8 Ballast shall have a minimum ballast factor of 1.00 (1-3 lamp models) or 0.88 (4-lamp models with 1.18 for HL versions) at maximum light output and 0.03 at minimum light output for primary lamp.

2.9 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less.

2.10 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage and 100% power.

2.11 Ballast shall have a Class A sound rating.

2.12 Ballast shall have a minimum starting temperature of 10C (50F) for primary lamp.

2.13 Ballast shall provide Lamp EOL Protection Circuit for all T5, T5/HO and CFL lamps.

2.14 Ballast shall control lamp light output from 100% - 3% relative light output for series operation T8 and CFL lamps, 100% - 10% relative light output for parallel operation T8 and 100% - 1% relative light output for T5/HO lamps.

2.15 Ballast shall ignite the lamps at any light output setting without first going to another output setting.

2.16 Ballast shall tolerate sustained open circuit and short circuit output conditions.

2.17 For parallel operation ballasts, lamps shall be switched off when ballast receives a control signal <0.4VDC and restrike when ballast receives a signal >1.0VDC.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

3.6 Ballast shall comply with NEMA 410 for in-rush current limits.

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9001 Quality System Standards.

4.2 Ballast shall carry a ____ warranty from date of manufacture against defects in material or workmanship for operation at a maximum case temperature of ____ (Go to our web site for up to date warranty information: www.philips.com/advancewarranty.

4.3 Manufacturer shall have a twenty-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be controlled by a Class 1 or Class 2 low voltage 0-10VDC controller.

4.5 Ballast shall be Philips Advance part # _____ or approved equal.

Revised 01/07/2011

Data is based upon tests performed by Philips Lighting Electronics N.A. in a controlled environment and is representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

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Browse Catalog

Pentron Standard

Pentron Premier

Pentron HO

Pentron C (amalgam) HO

Return to Pentron HO | Print Page

Product Number: 20904

Order Abbreviation: FP54/835/HO/ECO

General Description: 54W, T5 PENTRON high output (HO) fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP54835HOECO 40/CS 1/SKU
Actual Length (in)	45.256
Actual Length (mm)	1149.50
Average Rated Life (hr)	25000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	4450
Initial Lumens at 35C	5000
Mean Lumens at 25C	4138
Mean Lumens at 35C	4650
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	54.00

Additional Product Information
Product Documents, Graphs, and Images
Packaging Information
Compatible Products **(if applicable)**

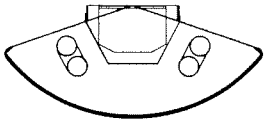
Arioso® SCONCE

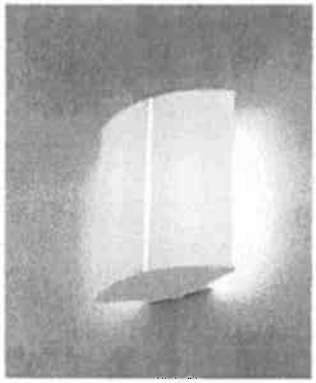
Arioso Sconce is a surface mounted wall or ceiling direct/indirect luminaire that offers soft, subtle lighting and a contemporary design.

ARIOSO SCONCE—PRODUCT AVAILABILITY

Family	Lamps/ Cross Section	Lamps/ Fixture	Lamp Type	Length in. (mm)	Width in. (mm)	Height in. (mm)
AVS	2	2	CF18	12-1/4" (311)	9" (229)	4" (102)
AVS	2	2	CF40, CF50, CF55	23-3/8" (594)	9" (229)	4" (102)
AVS	2 2	2 4	28, 32, 54HO CF40, CF50, CF55	48-1/2" (1232)	9" (229)	4" (102)

DIMENSIONS





Features

- Direct lighting component is provided by a perforated metal cover with a white acrylic overlay that minimizes lamp images.
- Suitable for wall or ceiling mount applications.
- ADA compliant when wall mounted.
- Can be surface mounted or mounted to 4" octagonal junction box.
- Matte white finish.
- UL listed for damp locations. Units incorporating emergency ballasts UL listed for dry locations.
- Consult factory for row mount applications.

AVS

ARIOSO SCONCE

SAMPLE CATALOG NUMBER: AVS2CF40-PMW-UNV-1/2-EB

AVS – **PMW** – – –

FAMILY
AVS – Arioso Sconce

LAMP TYPE/WATTAGE
CF18 – 18wT5 (12")
28 – 28wT5 (46")
32 – 32wT8 (48")
54HO – 54wT5HO (46")
CF40 – 40wT5 (24")
CF50 – 50wT5 (24")
CF55 – 55wT5 (24")

VOLTAGE
120
277
347
UNV – Universal voltage, 120-277 volt

NO. OF LAMPS
(not included)
2
4

SHIELDING
PMW – Perforated metal with white overlay
SPMW – Two-piece perforated metal with white overlays

OPTIONS
1/2 – One 2-lamp ballast (electronic or non-standard)
2/1 – Two 1-lamp ballasts (electronic or non-standard)
2/2 – Two 2-lamp ballasts (electronic or non-standard)
EB – Electronic ballast, <20% THD
EB10I – Electronic ballast, instant start, <10% THD
EB10R – Electronic ballast, program rapid start, <10% THD
EBD – Electronic dimming ballast
E1 – DEB-1 emerg. ballast, T8 or CF, 350-450 lumens (UL dry loc.)
E7 – DEB-7 emerg. ballast, 390-700 lumens (UL dry loc.)
E5 – DEB-5 emerg. ballast, T8 or CF, 1100-1400 lumens (UL dry loc.)
E5ST – DEB-5ST emerg. ballast with self test, T8 or CF, 1100-1400 lumens (UL dry loc.)
GLR# – Fusing, fast blow (# = number of ballasts)
LPT735 – Installed lamps, 70+ CRI, 3500K (See page 189 for other lamps)

For other Arioso sconce products, see the following poges.

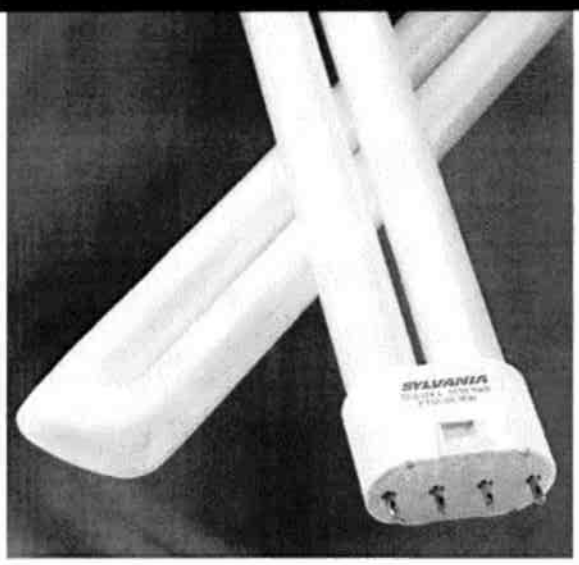
See pages 188-192 for option info. See pages 202-203 for ballast and lamp info.

FT40DL/RS/835
TYPE SC1D LAMP

www.sylvania.com

DULUX® L ECOLOGIC®

T5 Compact Fluorescent Lamps



Key Features & Benefits

- High lumen single-ended twin-tube lamps
- 18 through 80 Watts
- 2' x 2' fixture provides equal lumen output to a 2' x 4' fixture
- 50, 55 & 80 Watt lamps provide high lumen output for indirect and higher mounting height applications
- 3000K, 3500K, 4100K
- Excellent color rendition, CRI of 82
- Operate on QUICKTRONIC® systems with QUICKSENSE circuitry
- Passes Federal TCLP tests

ECOLOGIC

SYLVANIA DULUX® L T5 lamps are high lumen, single-ended twin-tube lamps that provide lumen outputs similar to 2', 3' and 4' linear fluorescent lamps, yet are half the length. With lumen outputs up to 6000 and lamp efficacies up to 87 lumens per watt, these compact lamps can be used in indirect as well as direct applications.

QUICKTRONIC® ballasts are available to operate FT24DL, FT36DL, FT40DL/RS, FT55DL and FT80DL lamps. The QUICKSENSE® circuitry in these ballasts provides the end-of-life protection required by NEMA* for these lamps. The QUICK 60+® warranty program applies to DULUX L lamp/QUICKTRONIC® ballasts installations.

*NEMA: National Electrical Manufacturers Association

Product Offering

Lamp Type	Watts	Lumens
FT18DL	18	1250
FT18DL/RS	18	1250
FT24DL	24/27	1800
FT36DL	36/39	2900
FT40DL/RS	40	3150
FT50DL/RS	50	4300
FT55DL	55	4800
FT80DL	80	6000

Application Information

Applications

Recessed and surface mounted fixtures
Indirect fixtures
Wall sconces, wall washing fixtures
Stage and set lighting
Sign lighting
Portable sports lighting
Task lighting
Landscape lighting

Application Notes

1. The FT18DL and FT18DL/RS lamps are not electrically interchangeable.
2. The FT24DL, FT36DL, FT40DL/RS, FT50DL/RS and FT55DL lamps: various methods of operation (preheat, rapid start, instant start, programmed start) possible.
3. FT80DL designed for high frequency rapid start, programmed rapid start and dimming ballasts.
4. Lamp life may vary with method of operation.
5. FT24DL: 27W on RS ballasts
6. FT36DL: 39W on RS ballasts

System Comparison

Lamp Type	No. of Lamps	System Watts	Ballast Factor	System Lumens	Mean System Lumens	Mean LPW
FB40/CW/SS ES MAG	2	72	.88	4576	3890	54
FB40/700 Std. MAG	2	96	.95	5795	5100	53
FB40/700 ES MAG	2	86	.95	5795	5216	61
FB031/800 IS	3	84	.90	7358	6769	81
FB031/800 PLUS	3	109	1.18	9647	8875	81
FT40DL/800 40DL	3	110	.96	9072	8165	74

Ordering Information

Item Number	Ordering Abbreviation	Watts	Volts	Lumens	Avg. Rated Life (hrs.)	Color Temp.	CRI	Base
20587	FT18DL/830/ECO	18	61	1250	12,000	3000K	82	2G11
20588	FT18DL/835/ECO	18	61	1250	12,000	3500K	82	2G11
20589	FT18DL/841/ECO	18	61	1250	12,000	4100K	82	2G11
20595	FT18DL/830/RS/ECO	18	76	1250	20,000	3000K	82	2G11
20594	FT18DL/835/RS/ECO	18	76	1250	20,000	3500K	82	2G11
20593	FT18DL/841/RS/ECO	18	76	1250	20,000	4100K	82	2G11
20597	FT24DL/830/ECO	24	91	1800	12,000	3000K	82	2G11
20580	FT24DL/835/ECO	24	91	1800	12,000	3500K	82	2G11
20596	FT24DL/841/ECO	24	91	1800	12,000	4100K	82	2G11
20581	FT36DL/830/ECO	36	112	2900	12,000	3000K	82	2G11
20582	FT36DL/835/ECO	36	112	2900	12,000	3500K	82	2G11
20583	FT36DL/841/ECO	36	112	2900	12,000	4100K	82	2G11
20584	FT40DL/830/RS/ECO	40	152**	3150	20,000*	3000K	82	2G11
20585	FT40DL/835/RS/ECO	40	152**	3150	20,000*	3500K	82	2G11
20586	FT40DL/841/RS/ECO	40	152**	3150	20,000*	4100K	82	2G11
20576	FT40DL/850/RS/ECO	40	152**	3150	20,000*	5000K	82	2G11
20280	FT50DL/830/RS/ECO	50	123	4300	14,000	3000K	82	2G11
20278	FT50DL/835/RS/ECO	50	123	4300	14,000	3500K	82	2G11
20276	FT50DL/841/RS/ECO	50	123	4300	14,000	4100K	82	2G11
20590	FT55DL/830/ECO	55	100	4800	12,000	3000K	82	2G11
20591	FT55DL/835/ECO	55	100	4800	12,000	3500K	82	2G11
20592	FT55DL/841/ECO	55	100	4800	12,000	4100K	82	2G11
20572	FT80DL/830/ECO	80	145**	6000	12,000	3000K	82	2G11
20622	FT80DL/835/ECO	80	145**	6000	12,000	3500K	82	2G11
20624	FT80DL/841/ECO	80	145**	6000	12,000	4100K	82	2G11

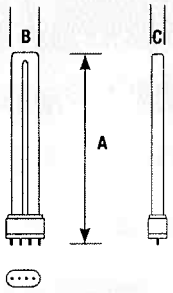
* Avg. Rated Life on instant start ballast = 15,000 hrs.
** At rated line voltage and nominal lamp current at 25kHz

Ordering Guide

FT	40	DL	/	8	35	/	RS
Fluorescent Tubular	Wattage: 18, 24, 36, 40 50, 55 & 80	DULUX Long		82 CRI	30=3000K 35=3500K 41=4100K 50=5000K		Rapid Start

Lamp Dimensions

Ordering Abbreviation	(A) MOL In. (mm)	(B) Diameter in. (mm)	(C) Base Width In. (mm)
FT18DL	9.0 (225.0)	1.6 (40.0)	0.8 (20)
FT18DL/RS	10.5 (268.0)	1.6 (40.0)	0.8 (20)
FT24DL	12.9 (320.0)	1.6 (40.0)	0.8 (20)
FT36DL	16.6 (415.0)	1.6 (40.0)	0.8 (20)
FT40DL	22.4 (570.0)	1.6 (40.0)	0.8 (20)
FT50DL	22.6 (570.0)	1.6 (40.0)	0.8 (20)
FT55DL	21.1 (535.0)	1.6 (40.0)	0.8 (20)
FT80DL	22.6 (570.0)	1.6 (40.0)	0.8 (20)



Specification Data

Catalog #

Type

Project

Comments

Prepared by

Date

Sample Specification

Lamp(s) shall be DULUX L T5 lamp(s). Lamp(s) shall have a correlated color temperature of (3000K, 3500K, 4100K, 5000K) and a CRI of 82. The DULUX L T5 (24, 36, 40, 55, 80) shall be operated on QUICKTRONIC electronic high frequency (System PHO 39/24, System 40DL, System PHO 54, System PHO80) ballasts with QUICKSENSE circuitry. The manufacturer shall provide a complete system warranty covering lamps and ballasts.

OSRAM SYLVANIA
National Customer
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18725 N. Union Street
Westfield, IN 46074 USA

Industrial Commercial
Phone: 1-800-255-5042
Fax: 1-800-255-5043

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Phone: 1-800-562-4671
Fax: 1-800-562-4674

OEM/Special Markets
Phone: 1-800-762-7191
Fax: 1-800-762-7192

Display/Optic
Phone: 1-888-677-2627
Fax: 1-800-762-7192

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Headquarters
2001 Drew Road
Mississauga, ON L5S 1S4

Industrial Commercial
Phone: 1-800-263-2852
Fax: 1-800-667-6772

Special Markets
Phone: 1-800-265-2852
Fax: 1-800-667-6772

Visit our website: www.sylvania.com

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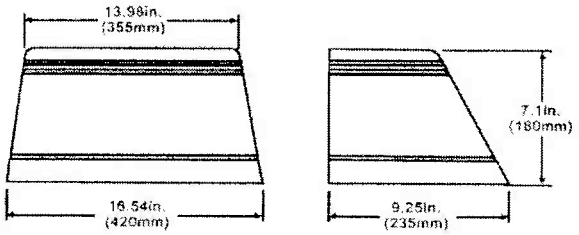
SK & Associates	Description : CWPBLED48UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: SL3

8. LED — LED Cut-Off Wall Pack — CWPBLED

DIMENSIONS



Dimensions are subject to change. For critical applications, verify all dimensions with factory.

UL LISTED

Available in 30 and 48 watt. LED technology offers an unprecedented lamp life. This fixture is virtually maintenance-free. A 24W LED is comparable to 70-100W HID. A 48W LED is comparable to 150-175W HID.

HOUSING
Die cast aluminum housing.

ELECTRICAL
Highest quality driver, emitters and power supply for long life.

LED COLOR
Standard in 5000K. Consult factory for other Kelvin temperatures.

FINISH
Exterior housing is finished in architectural bronze as standard. Custom colors available.

CERTIFICATION
Suitable for wet location. Made in USA. ARRA and BAA compliant. UL listed. 3 year warranty.

ORDERING

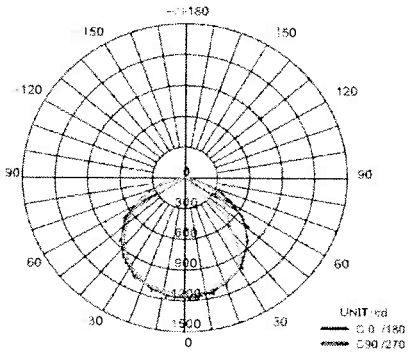
_____ - _____ - _____

MODEL	WATTAGE	VOLTAGE
CWPBLED	24 30 48	UNV (120/277)

Consult factory for other wattages.

OPTIONS

EM - Emergency
PC – Photocell (Specify Voltage)
TP – Tamperproof Hardware
CC – Custom Color (specify color)



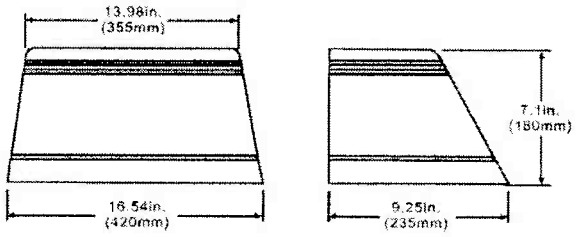
Average Beam Angle(50%): 108.0°

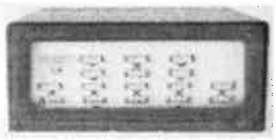
JOB NAME:
FIXTURE TYPE:
MODEL NO:

SK & Associates	Description : CWPBLED24UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: SL4

8. LED — LED Cut-Off Wall Pack — CWPBLED

DIMENSIONS





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UL LISTED

ORDERING

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HOUSING
Die cast aluminum housing.

ELECTRICAL
Highest quality driver, emitters and power supply for long life.

LED COLOR
Standard in 5000K. Consult factory for other Kelvin temperatures.

FINISH
Exterior housing is finished in architectural bronze as standard. Custom colors available.

CERTIFICATION
Suitable for wet location. Made in USA. ARRA and BAA compliant. UL listed. 3 year warranty.

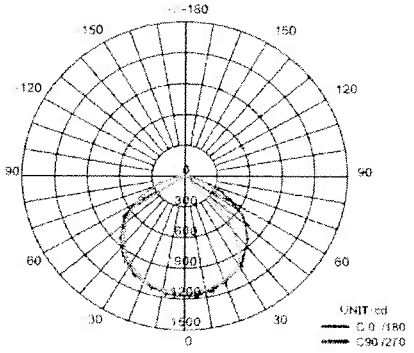
_____ - _____ - _____

MODEL	WATTAGE	VOLTAGE
CWPBLED	24	UNV (120/277)
	30	
	48	

Consult factory for other wattages.

OPTIONS

EM - Emergency
PC – Photocell (Specify Voltage)
TP – Tamperproof Hardware
CC – Custom Color (specify color)



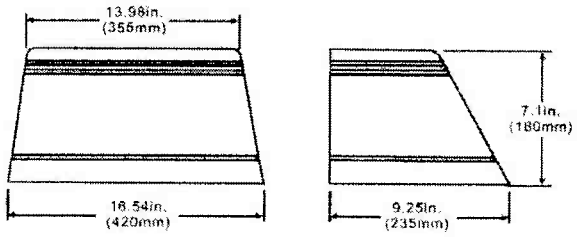
Average Beam Angle(50%): 108.0°

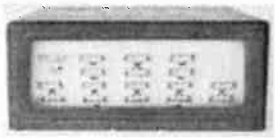
JOB NAME:
FIXTURE TYPE:
MODEL NO:

SK & Associates	Description : CWPBLED48UNV-EM Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: SL4E

8. LED — LED Cut-Off Wall Pack — CWPBLED

DIMENSIONS





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CERTIFICATION
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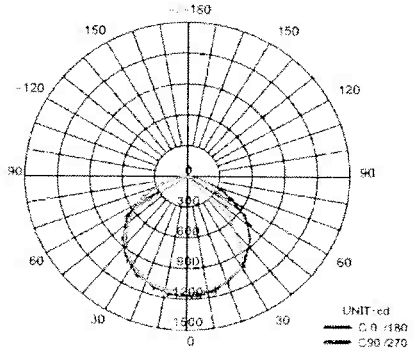
_____ - _____ - _____

MODEL	WATTAGE	VOLTAGE
CWPBLED	24 30 48	UNV (120/277)

Consult factory for other wattages.

OPTIONS

EM - Emergency
PC – Photocell (Specify Voltage)
TP – Tamperproof Hardware
CC – Custom Color (specify color)



Average Beam Angle(50%): 108.0°

JOB NAME:
FIXTURE TYPE:
MODEL NO:

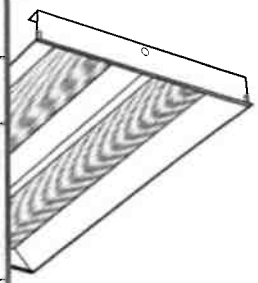
HIGH EFFICIENCY TROFFER — HET

SUBMITTAL:

JOB:

TYPE: TD25 **VOLTAGE:**

2' Wide T5

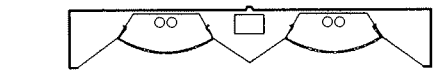


EXAMPLE **HET G - S 2 4 - 2 28T5S - A - OPTIONS - EB2 - UNV**

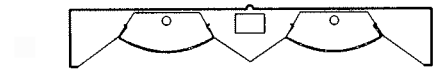
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

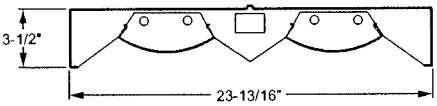
- Attractive and efficient architectural troffer delivers comfortable, uniform illumination.
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort.
- One-piece diffusers eliminate the need for separate overlays.
- Shallow fixture depth allows for use in limited plenum applications.
- Companion HET/HES products available in Surface Mount and Williams Downlighting Recessed Fluorescent sections.
- Tool-less access to electrical from room side of fixture.
- Integral T-bar clips quickly secure fixture to structure.
- This fixture is proudly made in the USA.



Twin Tube lamps



T5S or T5H lamps



T5S lamps only

SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding – Ribbed acrylic diffuser.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
40TT	•	

Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

ORDERING INFORMATION

SERIES
HET High Efficiency Troffer

CEILING TYPE
G NEMA Type "G"
For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE
S Static, no air capability

NOMINAL WIDTH
2 2'

NOMINAL LENGTH
2 2'
4 4'

TOTAL LAMPS
2 or 4 (4-lamp available with T5S only)

LAMP WATTAGE/TYPE
2' LAMP OPTIONS
14T5S 2', 14-watt T5
24T5H 2', 24-watt T5HO (2-lamp cross-section only)
40TT 2', 40-watt long twin tube (2-lamp cross-section only)

4' LAMP OPTIONS
28T5S 4', 28-watt T5
54T5H 4', 54-watt T5HO (2-lamp cross-section only)

SHIELDING
A Acrylic lens

OPTIONS
For generic **EM ballast** options (must specify voltage), see Fluorescent Information section.
EQCLIPS Earthquake clips (4 per fixture)

BALLAST TYPE
EB2 2-lamp electronic ballast
EBSD(95)2 2-lamp electronic ballast, step-dimming, .95 ballast factor (T5S only)
EBSD(115)2 2-lamp electronic ballast, step-dimming, 1.15 ballast factor (T5S only)
EB2/2 (2) 2-lamp electronic ballasts (T5S only)
EBSD(95)2/2 (2) 2-lamp electronic ballasts, step-dimming, .95 ballast factor, (T5S only)
EBSD(115)2/2 (2) 2-lamp electronic ballasts, step-dimming, 1.15 ballast factor (T5S only)

VOLTAGE
120 120V
277 277V
UNV 120-277V
347 347V

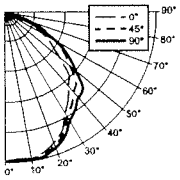
2' Wide T5

PHOTOMETRY – HET 2x4

Catalog #: **HETG-S24-228T5S-A**

TEST REPORT INFORMATION

- Test Report #: 13351.0
- Date: 12/12/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



CANDLEPOWER DISTRIBUTION

ZONAL CAVITY COEFFICIENTS

LUMEN SUMMARY

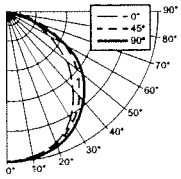
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – HET 2x2

Catalog #: **HETG-S22-224T5H-A**

TEST REPORT INFORMATION

- Test Report #: 13152.0
- Date: 06/26/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



CANDLEPOWER DISTRIBUTION

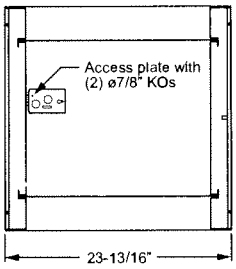
Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1238.	1238.	1238.	
5	1240.	1228.	1236.	117.7
15	1189.	1190.	1203.	338.2
25	1091.	1115.	1139.	515.7
35	931.	990.	1028.	619.2
45	728.	817.	886.	629.8
55	498.	627.	698.	550.9
65	297.	411.	365.	364.0
75	130.	154.	112.	147.6
85	16.	11.	6.	12.5
90	0.	0.	0.	

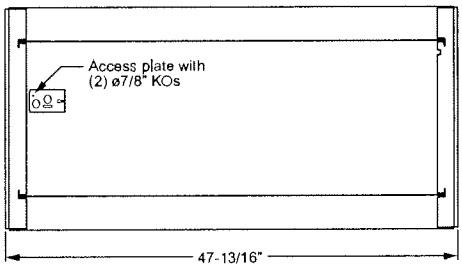
ZONAL CAVITY COEFFICIENTS

Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW





Information contained herein is subject to change without notice.

SK & Associates	Description : STEP DIMMING SPEC 2/F14T5 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD25**

Universal Lighting Technologies

BallaSTAR®

B228PU95S50D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency, step-dimming electronic ballast
Primary application: (2) F28T5
Secondary applications: (2) F21T5; (2) F14T5

- Line Voltage: 108vac - 305vac, 50/60Hz
- Series Lamp Operation
- Programmed Rapid Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Power Level	Input Watts	Nominal Line Amps	Ballast Factor	Ballast Efficacy Factor	Power Factor	THD %	Crest Factor
F28T5	2	120	100%	60	0.509	0.95	1.58	> 0.95	< 10%	> 1.7
F28T5	2	120	50%	28	0.237	0.34	1.21	> 0.95	< 10%	> 1.7
F28T5	2	277	100%	59	0.218	0.95	1.61	> 0.95	< 10%	> 1.7
F28T5	2	277	50%	28	0.105	0.34	1.21	> 0.95	< 10%	> 1.7
F21T5	2	120	100%	48	0.404	0.99	2.06	> 0.95	< 10%	> 1.7
F21T5	2	120	50%	21	0.179	0.36	1.73	> 0.95	< 10%	> 1.7
F21T5	2	277	100%	47	0.173	0.99	2.10	> 0.95	< 10%	> 1.7
F21T5	2	277	50%	22	0.082	0.36	1.65	> 0.95	< 10%	> 1.7
F14T5	2	120	100%	35	0.289	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	120	50%	16	0.132	0.37	2.30	> 0.95	< 10%	> 1.7
F14T5	2	277	100%	35	0.131	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	277	50%	16	0.063	0.37	2.29	> 0.90	< 10%	> 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits

Safety:
- No PCB's
- $_{c}UL_{us}$ (Class P, Type 1 Outdoor)
- Type CC
- End of lamp life protection with auto-restart

Application:
- Minimum Starting Temperature: 50° F, 10° C
- Maximum Ambient Temperature: 104° F, 40° C
- Maximum Case Temperature [at t_c]: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 8 ft. max. lead length, 18 AWG
- Tandem Wiring: Not Recommended

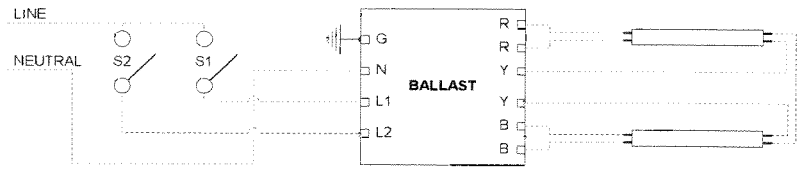
Physical Parameters

Length:	16.88"
Mounting:	16.28"
Width:	1.18"
Height:	1.00"
Weight:	1.25 lbs

Four Input Connectors: L1, L2, N, G
Six Load Connectors: (2) ea. Red, Blue, Yellow

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America



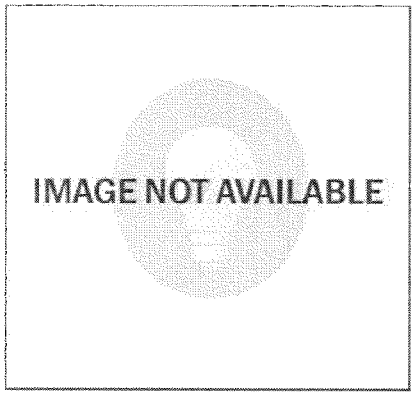
S1	S2	INPUT POWER
OPEN	OPEN	0%
OPEN	CLOSE	50%
CLOSE	OPEN	50%
CLOSE	CLOSE	100%

Ballast Must be Grounded

S1 & S2 must be wired on same phase.

SK & Associates	Description : FP14/835/ECO Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: TD25

Product Details



Product Number: 20908

Order Abbreviation: FP14/835/ECO

General Description: 14W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP14835ECO 40/CS 1/SKU
Actual Length (in)	22.173
Actual Length (mm)	563.19
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.669
Diameter (mm)	17.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	1200
Initial Lumens at 35C	1350
Mean Lumens at 25C	1116
Mean Lumens at 35C	1256
Nominal Length (in)	24.000
Nominal Length (mm)	609.60
Nominal Wattage (W)	14.00

ECOLOGIC™

Footnotes

- Approximate initial lumens after 100 hours operation.
- The life ratings of fluorescent lamps are based on 3 hr. burning cycles under specified conditions and with ballast meeting ANSI specifications. If burning cycle is increased, there will be a corresponding increase in the average hours life.
- Lumen output and life rated on high frequency operation.
- Minimum starting temperature is a function of the ballast; consult the ballast manufacturer.
- There is a NEMA supported, industry issue where T2, T4, and T5 fluorescent and compact fluorescent lamps operated on high frequency ballasts may experience an abnormal end-of-life phenomenon. This end-of-life phenomenon can resultin one or both of the following: 1. Bulb wall cracking near the lamp base. 2. The lamp can overheat in the base area and possibly melt the base and socket. NEMA recommends that high frequency compact fluorescent ballasts have an end-of-life shutdown circuit which will safely and reliably shut down the system in the rare event of an abnormal end-of-life failure mode described above. The final requirements of this system are yet to be defined by ANSI. For additional information refer to NEMA papers on their WEBSITE at www.NEMA.org.
- SYLVANIA ECOLOGIC fluorescent lamps are designed to pass the Federal Toxic Characteristic Leaching Procedure (TCLP) criteria for classification as non-hazardous waste in most states. TCLP test results are available upon request. Lamp disposal regulations may vary, check your local & state regulations. For more information, please visit www.lamprecycle.org

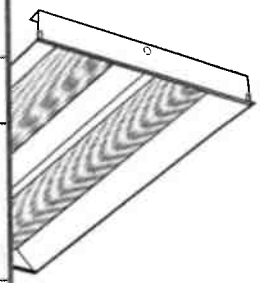
HIGH EFFICIENCY TROFFER — HET

SUBMITTAL:

JOB:

TYPE: TD25D **VOLTAGE:**

2' Wide T5

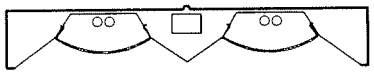


EXAMPLE **HET G - S 2 4 - 2 28T5S - A - OPTIONS - EB2 - UNV**

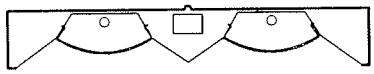
HET	G	S	2	4	2	28T5S	A	OPTIONS	EB2	UNV
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

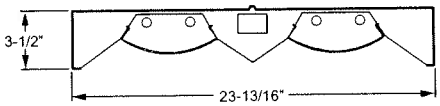
- Attractive and efficient architectural troffer delivers comfortable, uniform illumination.
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort.
- One-piece diffusers eliminate the need for separate overlays.
- Shallow fixture depth allows for use in limited plenum applications.
- Companion HET/HES products available in Surface Mount and Williams Downlighting Recessed Fluorescent sections.
- Tool-less access to electrical from room side of fixture.
- Integral T-bar clips quickly secure fixture to structure.
- This fixture is proudly made in the USA.



Twin Tube lamps



T5S or T5H lamps



T5S lamps only

ORDERING INFORMATION

SERIES

HET	High Efficiency Troffer

CEILING TYPE

G	NEMA Type "G"

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

2	2'
4	4'

TOTAL LAMPS

2 or 4	(4-lamp available with T5S only)

LAMP WATTAGE/TYPE

2' LAMP OPTIONS

14T5S	2', 14-watt T5
24T5H	2', 24-watt T5HO (2-lamp cross-section only)
40TT	2', 40-watt long twin tube (2-lamp cross-section only)

4' LAMP OPTIONS

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO (2-lamp cross-section only)

SHIELDING

A	Acrylic lens

OPTIONS

For generic **EM ballast** options (must specify voltage), see Fluorescent Information section.

EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE

EB2	2-lamp electronic ballast
EBSD(95)2	2-lamp electronic ballast, step-dimming, .95 ballast factor (T5S only)
EBSD(115)2	2-lamp electronic ballast, step-dimming, 1.15 ballast factor (T5S only)
EB2/2	(2) 2-lamp electronic ballasts (T5S only)
EBSD(95)2/2	(2) 2-lamp electronic ballasts, step-dimming, .95 ballast factor, (T5S only)
EBSD(115)2/2	(2) 2-lamp electronic ballasts, step-dimming, 1.15 ballast factor (T5S only)

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V

SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding – Ribbed acrylic diffuser.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
40TT	•	

Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

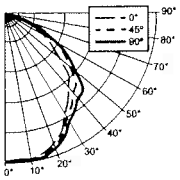
2' Wide T5

PHOTOMETRY – HET 2x4

Catalog #: **HETG-S24-228T5S-A**

TEST REPORT INFORMATION

- Test Report #: 13351.0
- Date: 12/12/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



CANDLEPOWER DISTRIBUTION

ZONAL CAVITY COEFFICIENTS

LUMEN SUMMARY

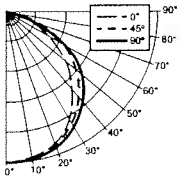
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – HET 2x2

Catalog #: **HETG-S22-224T5H-A**

TEST REPORT INFORMATION

- Test Report #: 13152.0
- Date: 06/26/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



CANDLEPOWER DISTRIBUTION

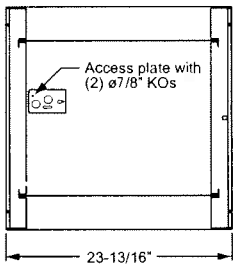
Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1238.	1238.	1238.	
5	1240.	1228.	1236.	117.7
15	1189.	1190.	1203.	338.2
25	1091.	1115.	1139.	515.7
35	931.	990.	1028.	619.2
45	728.	817.	886.	629.8
55	498.	627.	698.	550.9
65	297.	411.	365.	364.0
75	130.	154.	112.	147.6
85	16.	11.	6.	12.5
90	0.	0.	0.	

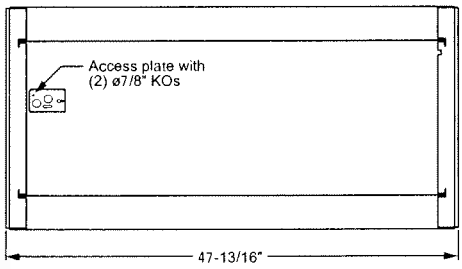
ZONAL CAVITY COEFFICIENTS

Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW





SK & Associates	Description : DIMMING SPEC SHEET FOR TD25D Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD25D**

Universal Lighting Technologies

SuperDim® A Triad® Brand

ANALOG DIMMING
ELECTRONIC BALLAST
0 to 10 vDC CONTROL

B214PUNVSV3-D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency dimming electronic ballast for (2) F14T5 lamps

- Line voltage: 120vac to 277vac, ±10%, 50-60Hz
- Auto Reset End of Lamp Life Shutdown Circuitry
- Series lamp operation
- Programmed rapid start
- Active power factor correction

Lamp		Input Voltage	Max/Min		Min Start Temp °F/°C	Full Bright			
Type	Qty		Ballast Factor	Input Power [Watts]		Line Current [Amps]	Max Thd [%]	Crest Factor	BEF
F14T5	2	120	1.00/.03	32/10	50/10	.27	<12	< 1.7	3.13
F14T5	2	277	1.00/.03	32/10	50/10	.12	<10	< 1.7	3.13

Data taken at 100% Light Level unless otherwise noted.

Application and operation performance specification information subject to change without notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 for EMI and RFI
  Non-Consumer Limits

Safety:
- No PCB's
- $_{c}UL_{us}$ LISTED
  (Class P, Type 1 Outdoor, Type CC)

Application:
- Minimum starting temperature: 50ºF (10ºC)
- Maximum case temperature: 167 ºF (75 ºC)
- Sound rating: Class A
- Remote mounting: 2 ft.
- Line voltage protection for control circuit
- Dimming range: 100% to 3% light output
- Line voltage protection for control circuit
- Maximum lead lengths: Yel: 4 ft
  Red: 6 ft
  Blue: 6 ft

Physical Parameters:
- Overall length: 16.88"
- Mounting length: 16.28"
- Width: 1.18"
- Height: 1.00"
- Weight: 1.25 lbs
- Carton Quantity 10

- Please review the SuperDim Application Notes at
  http://www.universalballast.com/techSupport/application-notes/superdim/index.html

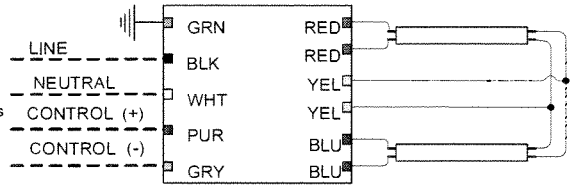
Warranty:
- Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of (5) years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Dimming Control Specifications:
- 10 to 0 vDC Voltage Control
- 10v = maximum output
- 0v = minimum output
- Can be wired as Class 1 or Class 2 Circuit
- Ballast will source a maximum of 250uA for control needs
- Built-in line voltage protection circuit: Deep-dimming condition when line voltage is applied to control leads

Manufactured in North America

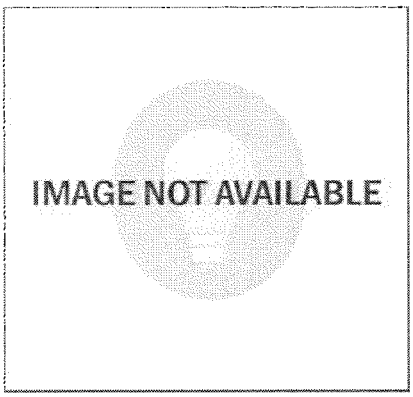
Ballast must be grounded in accordance with national and local electrical codes

Control Wiring
- Use Purple (+) & Gray (-) for connection to 0-10vDC.
- Ballast protected if line voltage is applied.
- Wiring Purple & Gray together provides 3% light output.
- Capping Purple & Gray separately provides 100% light output.



SK & Associates	Description : FP14/835/ECO Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: TD25D

Product Details



Product Number: 20908

Order Abbreviation: FP14/835/ECO

General Description: 14W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP14835ECO 40/CS 1/SKU
Actual Length (in)	22.173
Actual Length (mm)	563.19
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.669
Diameter (mm)	17.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	1200
Initial Lumens at 35C	1350
Mean Lumens at 25C	1116
Mean Lumens at 35C	1256
Nominal Length (in)	24.000
Nominal Length (mm)	609.60
Nominal Wattage (W)	14.00

ECOLOGIC™

Footnotes

- Approximate initial lumens after 100 hours operation.
- The life ratings of fluorescent lamps are based on 3 hr. burning cycles under specified conditions and with ballast meeting ANSI specifications. If burning cycle is increased, there will be a corresponding increase in the average hours life.
- Lumen output and life rated on high frequency operation.
- Minimum starting temperature is a function of the ballast; consult the ballast manufacturer.
- There is a NEMA supported, industry issue where T2, T4, and T5 fluorescent and compact fluorescent lamps operated on high frequency ballasts may experience an abnormal end-of-life phenomenon. This end-of-life phenomenon can resultin one or both of the following: 1. Bulb wall cracking near the lamp base. 2. The lamp can overheat in the base area and possibly melt the base and socket. NEMA recommends that high frequency compact fluorescent ballasts have an end-of-life shutdown circuit which will safely and reliably shut down the system in the rare event of an abnormal end-of-life failure mode described above. The final requirements of this system are yet to be defined by ANSI. For additional information refer to NEMA papers on their WEBSITE at www.NEMA.org.
- SYLVANIA ECOLOGIC fluorescent lamps are designed to pass the Federal Toxic Characteristic Leaching Procedure (TCLP) criteria for classification as non-hazardous waste in most states. TCLP test results are available upon request. Lamp disposal regulations may vary, check your local & state regulations. For more information, please visit www.lamprecycle.org

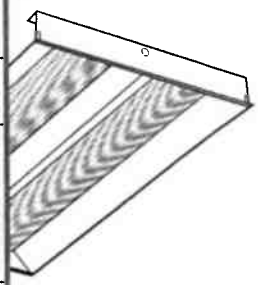
HIGH EFFICIENCY TROFFER — HET

SUBMITTAL:

JOB:

TYPE: TD5 **VOLTAGE:**

2' Wide T5

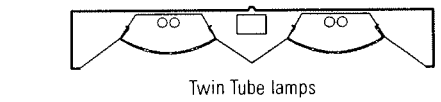


EXAMPLE HET G - S 2 4 - 2 28T5S - A - OPTIONS - EB2 - UNV

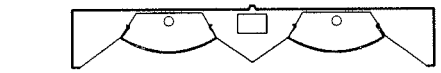
HET	G	S	2	4	2	28T5S	A	OPTIONS	EB2	UNV
SERIES	CEILING TYPE	FIX. STYLE	NOM. W.	NOM. L.	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST TYPE	VOLTAGE

FEATURES

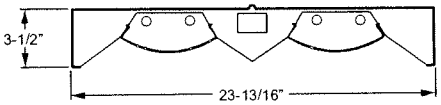
- Attractive and efficient architectural troffer delivers comfortable, uniform illumination.
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort.
- One-piece diffusers eliminate the need for separate overlays.
- Shallow fixture depth allows for use in limited plenum applications.
- Companion HET/HES products available in Surface Mount and Williams Downlighting Recessed Fluorescent sections.
- Tool-less access to electrical from room side of fixture.
- Integral T-bar clips quickly secure fixture to structure.
- This fixture is proudly made in the USA.



Twin Tube lamps



T5S or T5H lamps



T5S lamps only

ORDERING INFORMATION

SERIES

HET	High Efficiency Troffer

CEILING TYPE

G	NEMA Type "G"

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

2	2'
4	4'

TOTAL LAMPS

2 or 4	(4-lamp available with T5S only)

LAMP WATTAGE/TYPE

2' LAMP OPTIONS

14T5S	2', 14-watt T5
24T5H	2', 24-watt T5HO (2-lamp cross-section only)
40TT	2', 40-watt long twin tube (2-lamp cross-section only)

4' LAMP OPTIONS

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO (2-lamp cross-section only)

SHIELDING

A	Acrylic lens

OPTIONS

For generic **EM ballast** options (must specify voltage), see Fluorescent Information section.

EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE

EB2	2-lamp electronic ballast
EBSD(95)2	2-lamp electronic ballast, step-dimming, .95 ballast factor (T5S only)
EBSD(115)2	2-lamp electronic ballast, step-dimming, 1.15 ballast factor (T5S only)
EB2/2	(2) 2-lamp electronic ballasts (T5S only)
EBSD(95)2/2	(2) 2-lamp electronic ballasts, step-dimming, .95 ballast factor, (T5S only)
EBSD(115)2/2	(2) 2-lamp electronic ballasts, step-dimming, 1.15 ballast factor (T5S only)

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V

SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding – Ribbed acrylic diffuser.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
40TT	•	

Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

2' Wide T5

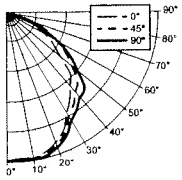
PHOTOMETRY – HET 2x4

Catalog #: **HETG-S24-228T5S-A**

TEST REPORT INFORMATION

- Test Report #: 13351.0
- Date: 12/12/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2

LUMEN SUMMARY



CANDLEPOWER DISTRIBUTION

ZONAL CAVITY COEFFICIENTS

Effective Floor Cavity Reflectance = .20

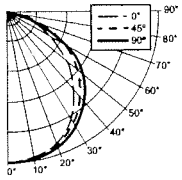
PHOTOMETRY – HET 2x2

Catalog #: **HETG-S22-224T5H-A**

TEST REPORT INFORMATION

- Test Report #: 13152.0
- Date: 06/26/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2

LUMEN SUMMARY



CANDLEPOWER DISTRIBUTION

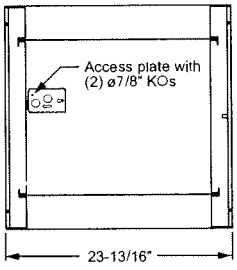
Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1238.	1238.	1238.	
5	1240.	1228.	1236.	117.7
15	1189.	1190.	1203.	338.2
25	1091.	1115.	1139.	515.7
35	931.	990.	1028.	619.2
45	728.	817.	886.	629.8
55	498.	627.	698.	550.9
65	297.	411.	365.	364.0
75	130.	154.	112.	147.6
85	16.	11.	6.	12.5
90	0.	0.	0.	

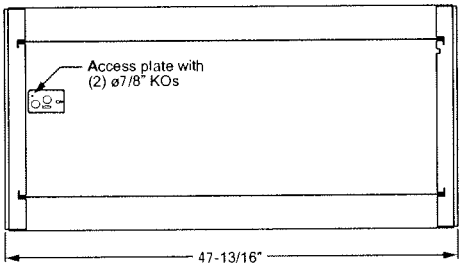
ZONAL CAVITY COEFFICIENTS

Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW





SK & Associates	Description : STEP DIMMING SPEC 2/F28T5 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: TD5

Universal Lighting Technologies

BallaSTAR®

B228PU95S50D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency, step-dimming electronic ballast
Primary application: (2) F28T5
Secondary applications: (2) F21T5; (2) F14T5

- Line Voltage: 108vac - 305vac, 50/60Hz
- Series Lamp Operation
- Programmed Rapid Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Power Level	Input Watts	Nominal Line Amps	Ballast Factor	Ballast Efficacy Factor	Power Factor	THD %	Crest Factor
F28T5	2	120	100%	60	0.509	0.95	1.58	> 0.95	< 10%	> 1.7
F28T5	2	120	50%	28	0.237	0.34	1.21	> 0.95	< 10%	> 1.7
F28T5	2	277	100%	59	0.218	0.95	1.61	> 0.95	< 10%	> 1.7
F28T5	2	277	50%	28	0.105	0.34	1.21	> 0.95	< 10%	> 1.7
F21T5	2	120	100%	48	0.404	0.99	2.06	> 0.95	< 10%	> 1.7
F21T5	2	120	50%	21	0.179	0.36	1.73	> 0.95	< 10%	> 1.7
F21T5	2	277	100%	47	0.173	0.99	2.10	> 0.95	< 10%	> 1.7
F21T5	2	277	50%	22	0.082	0.36	1.65	> 0.95	< 10%	> 1.7
F14T5	2	120	100%	35	0.289	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	120	50%	16	0.132	0.37	2.30	> 0.95	< 10%	> 1.7
F14T5	2	277	100%	35	0.131	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	277	50%	16	0.063	0.37	2.29	> 0.90	< 10%	> 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits

Safety:
- No PCB's
- $_{C}UL_{US}$ (Class P, Type 1 Outdoor)
- Type CC
- End of lamp life protection with auto-restart

Application:
- Minimum Starting Temperature: 50° F, 10° C
- Maximum Ambient Temperature: 104° F, 40° C
- Maximum Case Temperature [at t_1]: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 8 ft. max. lead length, 18 AWG
- Tandem Wiring: Not Recommended

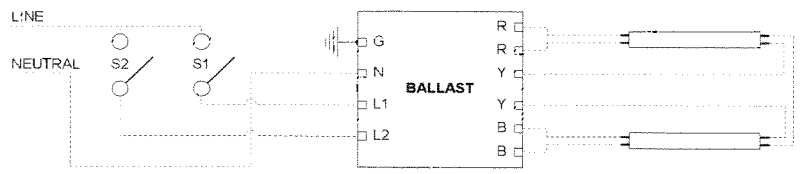
Physical Parameters

Length:	16.88"
Mounting:	16.28"
Width:	1.18"
Height:	1.00"
Weight:	1.25 lbs

Four Input Connectors: L1, L2, N, G
Six Load Connectors: (2) ea. Red, Blue, Yellow

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America



S1	S2	INPUT POWER
OPEN	OPEN	0%
OPEN	CLOSE	50%
CLOSE	OPEN	50%
CLOSE	CLOSE	100%

Ballast Must be Grounded

S1 & S2 must be wired on same phase.

SK & Associates	Description : FP28/835/ECO Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: TD5

Product Details

Return to: Pentron Standard | Print Page

IMAGE NOT AVAILABLE

Product Number:	20901
Order Abbreviation:	FP28/835/ECO
General Description:	28W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

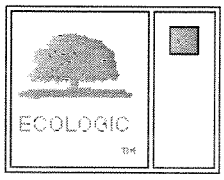
Product Information

Abbrev. With Packaging Info.	FP28835ECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2600
Initial Lumens at 35C	2900
Mean Lumens at 25C	2418
Mean Lumens at 35C	2697
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



Footnotes

SK & Associates	Description : HETF-S24-228T5S-A-EBSD(95)*AD-BD-2-UNV-DFK2448W Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD5A**

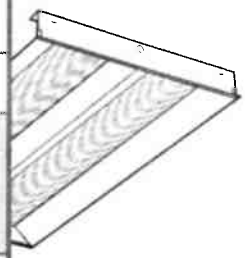
HIGH EFFICIENCY TROFFER — HET

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2' WIDE T5

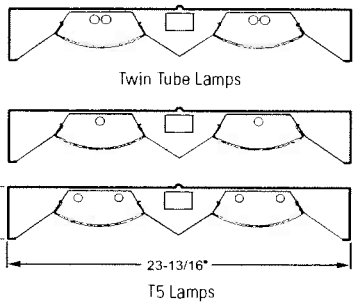


EXAMPLE: **HET G - S 2 4 - 2 28T5S - A - OPTIONS - EB2 - UNV**

SERIES | CEILING TYPE | FIX. STYLE | NOM. W. | NOM. L. | TOTAL LAMPS | WATTAGE/TYPE | SHIELDING | OPTIONS | BALLAST TYPE | VOLTAGE

FEATURES

- Attractive and efficient architectural troffer delivers comfortable, uniform illumination.
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort.
- One-piece diffusers eliminate the need for separate overlays.
- Shallow fixture depth allows for use in limited plenum applications.
- Companion HET 1' x 1' recessed downlight available in Williams Downlighting Recessed Fluorescent section.
- Optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- Tool-less access to electrical from room side of fixture.
- Integral T-bar clips quickly secure fixture to structure.
- This fixture is proudly made in the USA.



ORDERING INFORMATION

SERIES

HET	High Efficiency Troffer

CEILING TYPE

G	NEMA Type "G"

For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE

S	Static, no air capability

NOMINAL WIDTH

2	2'

NOMINAL LENGTH

~~**2**~~	2'
4	4'

TOTAL LAMPS

2 or **4**	(4-lamp available with T5S only)

LAMP WATTAGE/TYPE

2' LAMP OPTIONS

14T5S	2', 14-watt T5
24T5H	2', 24-watt T5HO (2-lamp cross-section only)
40TT	2', 40-watt long twin tube (2-lamp cross-section only)

4' LAMP OPTIONS

28T5S	4', 28-watt T5
54T5H	4', 54-watt T5HO (2-lamp cross-section only)

SHIELDING

A	Acrylic lens

OPTIONS

For generic EM ballast options (must specify voltage), see Fluorescent Information section.

AMW	Anti-microbial white finish
EQCLIPS	Earthquake clips (4 per fixture)

BALLAST TYPE

~~**EB2**~~	2-lamp electronic ballast
EBSD(95)2	2-lamp electronic ballast, step-dimming, .95 ballast factor (T5S only)
EBSD(115)2	2-lamp electronic ballast, step-dimming, 1.15 ballast factor (T5S only)
EB4	4-lamp electronic ballast
EB2/2	(2) 2-lamp electronic ballasts
EBSD(95)2/2	(2) 2-lamp electronic ballasts, step-dimming, .95 ballast factor, (T5S only)
EBSD(115)2/2	(2) 2-lamp electronic ballasts, step-dimming, 1.15 ballast factor (T5S only)

VOLTAGE

120	120V
~~**277**~~	277V
UNV	120-277V
~~**347**~~	347V

BD	Ballast Disconnect
AD	Advance
DFK2448W	Drywall Kit, 2'x4' white

SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding – Ribbed acrylic diffuser.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
40TT	•	

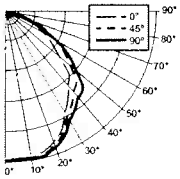
Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

PHOTOMETRY – HET 2x4

Catalog #: **HETG-S24-228T5S-A**

TEST REPORT INFORMATION

- Test Report #: 13351.0
- Date: 12/12/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1553.	26.8	30.0
0 - 40	2500.	43.1	48.3
0 - 60	4350.	75.0	84.1
0 - 90	5172.	89.2	100.0
Total Luminaire:			
0 - 180	5172.	89.2	100.0

Total Luminaire Optical Efficiency: **89.2%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.4, Across = 1.4

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1958.	1958.	1958.	
5	1933.	1934.	1935.	184.6
15	1925.	1940.	1957.	549.9
25	1728.	1769.	1812.	818.7
35	1431.	1510.	1583.	947.2
45	1177.	1317.	1439.	1016.1
55	778.	951.	1030.	833.2
65	471.	607.	534.	546.8
75	222.	239.	172.	236.7
85	47.	31.	27.	38.5
90	0.	0.	0.	

ZONAL CAVITY COEFFICIENTS

Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	1.06	1.06	1.06	1.04	1.04	1.04	.99	.99	.99
	1	.99	.95	.92	.96	.93	.90	.89	.87	.84
	2	.91	.84	.79	.89	.83	.78	.80	.76	.72
	3	.84	.75	.69	.82	.74	.68	.71	.66	.62
	4	.77	.67	.60	.75	.66	.59	.64	.58	.53
	5	.70	.60	.52	.69	.59	.52	.57	.51	.46
	6	.65	.53	.46	.63	.53	.45	.51	.45	.40
	7	.60	.48	.41	.58	.47	.40	.46	.40	.35
	8	.55	.43	.36	.54	.42	.35	.41	.35	.30
	9	.50	.39	.31	.49	.38	.31	.37	.31	.26
	10	.47	.35	.28	.46	.35	.28	.34	.27	.23

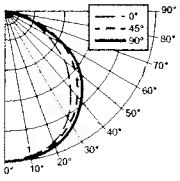
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – HET 2x2

Catalog #: **HETG-S22-224T5H-A**

TEST REPORT INFORMATION

- Test Report #: 13152.0
- Date: 06/26/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	972.	25.6	29.5
0 - 40	1591.	41.9	48.3
0 - 60	2772.	72.9	84.1
0 - 90	3296.	86.7	100.0
Total Luminaire:			
0 - 180	3296.	86.7	100.0

Total Luminaire Optical Efficiency: **86.7%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.2, Across = 1.1

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1238.	1238.	1238.	
5	1240.	1228.	1236.	117.7
15	1189.	1190.	1203.	338.2
25	1091.	1115.	1139.	515.7
35	931.	990.	1028.	619.2
45	728.	817.	886.	629.8
55	498.	627.	698.	550.9
65	297.	411.	365.	364.0
75	130.	154.	112.	147.6
85	16.	11.	6.	12.5
90	0.	0.	0.	

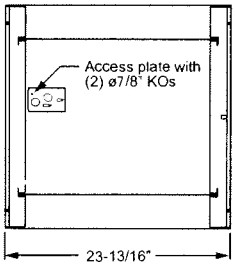
ZONAL CAVITY COEFFICIENTS

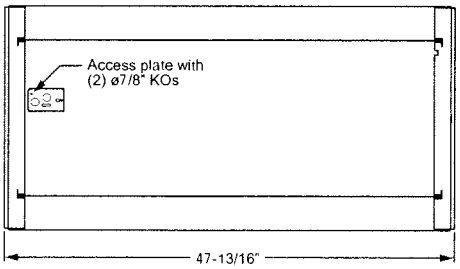
Room Cavity Ratio	Ceiling	.80			.70			.50		
	Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
	0	1.03	1.03	1.03	1.01	1.01	1.01	.96	.96	.96
	1	.96	.92	.89	.94	.90	.88	.87	.84	.82
	2	.88	.82	.77	.86	.81	.76	.78	.74	.70
	3	.81	.73	.67	.79	.72	.66	.69	.64	.60
	4	.75	.65	.58	.73	.64	.58	.62	.56	.52
	5	.68	.58	.50	.67	.57	.50	.55	.49	.44
	6	.63	.52	.44	.61	.51	.44	.49	.43	.39
	7	.58	.47	.39	.56	.46	.39	.45	.38	.34
	8	.53	.42	.34	.52	.41	.34	.40	.34	.29
	9	.49	.37	.30	.48	.37	.30	.36	.30	.25
	10	.45	.34	.27	.44	.33	.27	.33	.28	.22

Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW





SK & Associates	Description : STEP DIMMING SPEC 2/F28T5 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD5A**

Universal Lighting Technologies

BallaSTAR®

B228PU95S50D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency, step-dimming electronic ballast
Primary application: (2) F28T5
Secondary applications: (2) F21T5; (2) F14T5

- Line Voltage: 108vac - 305vac, 50/60Hz
- Series Lamp Operation
- Programmed Rapid Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Power Level	Input Watts	Nominal Line Amps	Ballast Factor	Ballast Efficacy Factor	Power Factor	THD %	Crest Factor
F28T5	2	120	100%	60	0.509	0.95	1.58	> 0.95	< 10%	> 1.7
F28T5	2	120	50%	28	0.237	0.34	1.21	> 0.95	< 10%	> 1.7
F28T5	2	277	100%	59	0.218	0.95	1.61	> 0.95	< 10%	> 1.7
F28T5	2	277	50%	28	0.105	0.34	1.21	> 0.95	< 10%	> 1.7
F21T5	2	120	100%	48	0.404	0.99	2.06	> 0.95	< 10%	> 1.7
F21T5	2	120	50%	21	0.179	0.36	1.73	> 0.95	< 10%	> 1.7
F21T5	2	277	100%	47	0.173	0.99	2.10	> 0.95	< 10%	> 1.7
F21T5	2	277	50%	22	0.082	0.36	1.65	> 0.95	< 10%	> 1.7
F14T5	2	120	100%	35	0.289	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	120	50%	16	0.132	0.37	2.30	> 0.95	< 10%	> 1.7
F14T5	2	277	100%	35	0.131	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	277	50%	16	0.063	0.37	2.29	> 0.90	< 10%	> 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits

Safety:
- No PCB's
- $_{c}UL_{us}$ (Class P, Type 1 Outdoor)
- Type CC
- End of lamp life protection with auto-restart

Application:
- Minimum Starting Temperature: 50° F, 10° C
- Maximum Ambient Temperature: 104° F, 40° C
- Maximum Case Temperature [at t_c]: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 8 ft. max. lead length, 18 AWG
- Tandem Wiring: Not Recommended

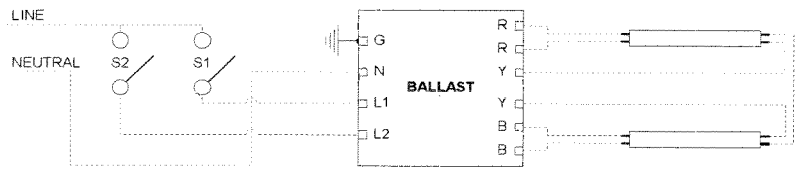
Physical Parameters

Length:	16.88"
Mounting:	16.28"
Width:	1.18"
Height:	1.00"
Weight:	1.25 lbs

Four Input Connectors: L1, L2, N, G
Six Load Connectors: (2) ea. Red, Blue, Yellow

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America

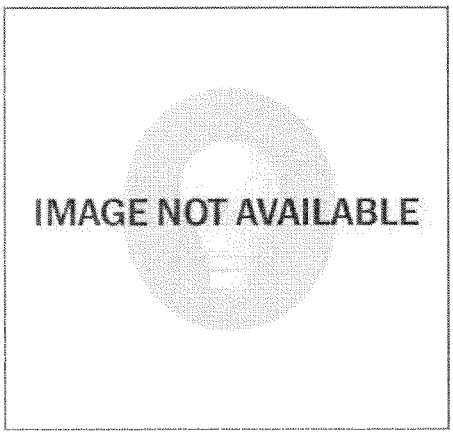


S1	S2	INPUT POWER
OPEN	OPEN	0%
OPEN	CLOSE	50%
CLOSE	OPEN	50%
CLOSE	CLOSE	100%

Ballast Must be Grounded

S1 & S2 must be wired on same phase.

Return to: Pentron Standard | Print Page



Product Number: 20901

Order Abbreviation: FP28/835/ECO

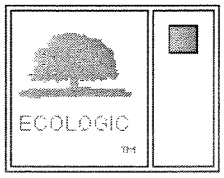
General Description: 28W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP28835ECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2600
Initial Lumens at 35C	2900
Mean Lumens at 25C	2418
Mean Lumens at 35C	2697
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



Footnotes

SK & Associates	Description : HETG-S24-228T5S-A-EBD2*UT-BD-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD5D**

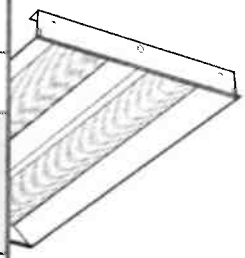
HIGH EFFICIENCY TROFFER — HET

SUBMITTAL:

JOB:

TYPE: **VOLTAGE:**

2' WIDE T5

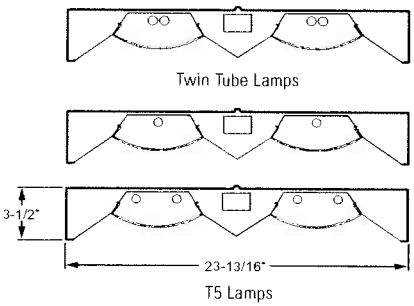


EXAMPLE **HET G - S 2 4 - 2 28T5S - A - OPTIONS - EB2 - UNV**

SERIES · CEILING TYPE · FIX. STYLE · NOM. W. · NOM. L. · TOTAL LAMPS · WATTAGE/TYPE · SHIELDING · OPTIONS · BALLAST TYPE · VOLTAGE

FEATURES

- Attractive and efficient architectural troffer delivers comfortable, uniform illumination.
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort.
- One-piece diffusers eliminate the need for separate overlays.
- Shallow fixture depth allows for use in limited plenum applications.
- Companion HET 1' x 1' recessed downlight available in Williams Downlighting Recessed Fluorescent section.
- Optional anti-microbial powder coating available to prevent the spread of dangerous micro-organisms and suppress the growth of mold and bacteria.
- Tool-less access to electrical from room side of fixture.
- Integral T-bar clips quickly secure fixture to structure.
- This fixture is proudly made in the USA.



SPECIFICATIONS

Housing – 22-gauge die-formed C.R.S.
Shielding – Ribbed acrylic diffuser.
Finish – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
Electrical – Electronic ballast standard, rated Class P.

Lamp	Instant Start	Program Start
T5		•
40TT	•	

Mounting – NEMA Type "G" standard. For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.
Labels – UL/CUL listed as recessed fluorescent luminaire suitable for dry or damp locations.

ORDERING INFORMATION

SERIES
HET — High Efficiency Troffer

CEILING TYPE
G — NEMA Type "G"
For flange installations use the Drywall Kit (DFK), ordered separately, see Fluorescent Information section.

FIXTURE STYLE
S — Static, no air capability

NOMINAL WIDTH
2 — 2'

NOMINAL LENGTH
2 — 2'
4 — 4'

TOTAL LAMPS
2 or 4 — (4-lamp available with T5S only)

LAMP WATTAGE/TYPE
2' LAMP OPTIONS
14T5S — 2', 14-watt T5
24T5H — 2', 24-watt T5HD (2-lamp cross-section only)
40TT — 2', 40-watt long twin tube (2-lamp cross-section only)

4' LAMP OPTIONS
28T5S — 4', 28-watt T5
54T5H — 4', 54-watt T5HD (2-lamp cross-section only)

SHIELDING
A — Acrylic lens

OPTIONS
For generic EM ballast options (must specify voltage), see Fluorescent Information section.
AMW — Anti-microbial white finish
EQCLIPS — Earthquake clips (4 per fixture)

BALLAST TYPE
UNIVERSAL 0-10 VOLT DIMMING BALLAST
EBSD(95)2 — 2-lamp electronic ballast, step-dimming, .95 ballast factor (T5S only)
EBSD(115)2 — 2-lamp electronic ballast, step-dimming, 1.15 ballast factor (T5S only)
EB4 — 4-lamp electronic ballast
EB2/2 — (2) 2-lamp electronic ballasts
EBSD(95)2/2 — (2) 2-lamp electronic ballasts, step-dimming, .95 ballast factor, (T5S only)
EBSD(115)2/2 — (2) 2-lamp electronic ballasts, step-dimming, 1.15 ballast factor (T5S only)

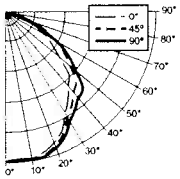
VOLTAGE
120 — 120V
277 — 277V
UNV — 120-277V
347 — 347V

PHOTOMETRY – HET 2x4

Catalog #: **HETG-S24-228T5S-A**

TEST REPORT INFORMATION

- Test Report #: 13351.0
- Date: 12/12/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	1553.	26.8	30.0
0 - 40	2500.	43.t	48.3
0 - 60	4350.	75.0	84.1
0 - 90	5t72.	89.2	100.0
Total Luminaire:			
0 - t80	5172.	89.2	100.0

Total Luminaire Optical Efficiency: **89.2%**
IES Spacing Criteria: End = t.2, Diagonal = 1.4, Across = 1.4

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1958.	1958.	1958.	
5	1933.	1934.	1935.	t84.6
15	1925.	1940.	1957.	549.9
25	t728.	1769.	t8t2.	8t8.7
35	1431.	1510.	1583.	947.2
45	1t77.	13t7.	1439.	1016.1
55	778.	951.	1030.	833.2
65	471.	607.	534.	546.8
75	222.	239.	172.	236.7
85	47.	3t.	27.	38.5
90	0.	0.	0.	

ZONAL CAVITY COEFFICIENTS

Ceiling	.80			.70			.50		
Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	1.06	1.06	1.06	1.04	1.04	1.04	.99	.99	.99
1	.99	.95	.92	.96	.93	.90	.89	.87	.84
2	.91	.84	.79	.89	.83	.78	.80	.76	.72
3	.84	.75	.69	.82	.74	.68	.71	.66	.62
4	.77	.67	.60	.75	.68	.59	.64	.58	.53
5	.70	.60	.52	.69	.59	.52	.57	.51	.46
6	.65	.53	.46	.63	.53	.45	.51	.45	.40
7	.60	.48	.41	.58	.47	.40	.46	.40	.35
8	.55	.43	.36	.54	.42	.35	.41	.35	.30
9	.50	.39	.31	.49	.38	.31	.37	.31	.26
10	.47	.35	.28	.46	.35	.28	.34	.27	.23

Room Cavity Ratio

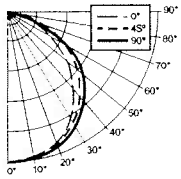
Effective Floor Cavity Reflectance = .20

PHOTOMETRY – HET 2x2

Catalog #: **HETG-S22-224T5H-A**

TEST REPORT INFORMATION

- Test Report #: 13152.0
- Date: 06/26/06
- Lamp Type: FP28T5/835
- Lamp Quantity: 2



LUMEN SUMMARY

Zone	Lumens	% Lamp	% Fixture
0 - 30	972.	25.6	29.5
0 - 40	t59t.	41.9	48.3
0 - 60	2772.	72.9	84.1
0 - 90	3296.	86.7	t00.0
Total Luminaire:			
0 - 180	3296.	86.7	100.0

Total Luminaire Optical Efficiency: **86.7%**
IES Spacing Criteria: End = 1.2, Diagonal = 1.2, Across = t.t

CANDLEPOWER DISTRIBUTION

Vertical Angle	Horizontal Angle 0°	45°	90°	Zonal Lumens
0	1238.	1238.	1238.	
5	1240.	t228.	1236.	tt7.7
15	1189.	1190.	1203.	338.2
25	t091.	11t5.	1t39.	5t5.7
35	931.	990.	1028.	619.2
45	728.	8t7.	886.	629.8
55	498.	627.	698.	550.9
65	297.	4t1.	365.	364.0
75	130.	154.	112.	147.6
85	16.	1t.	6.	12.5
90	0.	0.	0.	

ZONAL CAVITY COEFFICIENTS

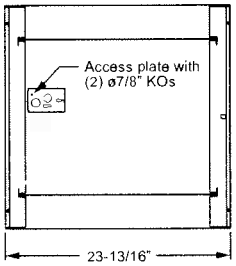
Ceiling	.80			.70			.50		
Wall	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	1.03	1.03	1.03	1.01	1.01	1.01	.96	.96	.96
1	.96	.92	.89	.94	.90	.88	.87	.84	.82
2	.88	.82	.77	.86	.81	.76	.78	.74	.70
3	.81	.73	.67	.79	.72	.66	.69	.64	.60
4	.75	.65	.58	.73	.64	.58	.62	.56	.52
5	.68	.58	.50	.67	.57	.50	.55	.49	.44
6	.63	.52	.44	.61	.51	.44	.49	.43	.39
7	.58	.47	.39	.56	.46	.39	.45	.38	.34
8	.53	.42	.34	.52	.41	.34	.40	.34	.29
9	.49	.37	.30	.48	.37	.30	.36	.30	.25
10	.45	.34	.27	.44	.33	.27	.33	.28	.22

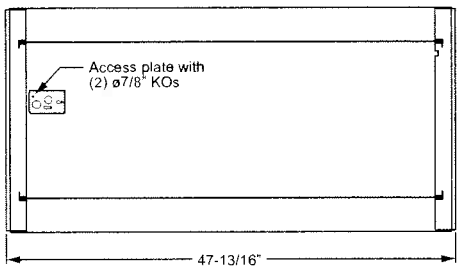
Room Cavity Ratio

Effective Floor Cavity Reflectance = .20

FIXTURE DETAILS

BACKVIEW





SK & Associates	Description : DIMMING SPEC SHEET FOR TD5D Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **TD5D**

Universal Lighting Technologies

SuperDim® A Triad® Brand

ANALOG DIMMING
ELECTRONIC BALLAST
0 to 10 vDC CONTROL

B228PUNVSV3-D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency dimming electronic ballast for (2) F28**T**5 lamps
Secondary Application: (2) F28T5ES (25W) and (2) F21T5 lamps

- Line voltage: 120vac to 277vac, ±10%, 50-60Hz
- Auto Reset End of Lamp Life Shutdown Circuitry
- Series lamp operation
- Programmed rapid start
- Active power factor correction

Lamp		Input Voltage	Max/Min		Min Start **T**emp °F/°C	Full Bright			
Type	Qty		Ballast Factor	Input Power [Watts]		Line Current [Amps]	Max Thd [%]	Crest Factor	BEF
F28T5	2	120	1.00/.03	63/9	50/10	0.53	< 10	< 1.7	1.59
F28T5	2	277	1.00/.03	61/9	50/10	0.22	< 10	< 1.7	1.64
F28T5ES (25W)	2	120	1.00/.03	57/10	50/10	0.48	< 10	< 1.7	1.75
F28T5ES (25W)	2	277	1.00/.03	56/10	50/10	0.20	< 10	< 1.7	1.80
F21T5	2	120	1.00/.03	47/10	50/10	0.39	< 10	< 1.7	2.13
F21T5	2	277	1.00/.03	46/10	50/10	0.17	< 10	< 1.7	2.17

Data taken at 100% Light Level unless otherwise noted.

Application and operation performance specification information subject to change without notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 for EMI and RFI
  Non-Consumer Limits

Safety:
- No PCB's
- $_{c}UL_{us}$ LISTED
  (Class P, Type 1 Outdoor, **T**ype CC)

Application:
- Minimum starting temperature: 50°F (10°C)
- Maximum case temperature: 167 °F (75 °C)
- Sound rating: Class A
- Remote mounting: 2 ft
- Line voltage protection for control circuit
- Dimming range: 100% to 3% light output
- Line voltage protection for control circuit
- Maximum lead lengths: Yel: 4 ft
  Red: 8 ft
  Blue: 8ft

Physical Parameters:
- Overall length: 16.88"
- Mounting length: 16.28"
- Width: 1.18"
- Height: 1.00"
- Weight: 1.25 lbs
- Carton Quantity 10

- Please review the SuperDim Application Notes at
  http://www.universalballast.com/techSupport/application-notes/superdim/index.html

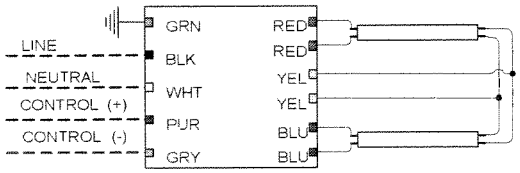
Warranty:
- Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of (5) years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLAST**x800 for technical assistance.

Dimming Control Specifications:
- 10 to 0 vDC Voltage Control
- 10v = maximum output
- 0v = minimum output
- Can be wired as Class 1 or Class 2 Circuit
- Ballast will source a maximum of 250uA for control needs
- Built-in line voltage protection circuit: Deep-dimming condition when line voltage is applied to control leads

Manufactured in North America

Ballast must be grounded in accordance with national and local electrical codes

Control Wiring
- Use Purple (+) & Gray (-) for connection to 0-10vDC.
- Ballast protected if line voltage is applied.
- Wiring Purple & Gray together provides 3% light output.
- Capping Purple & Gray separately provides 100% light output.



Return to: Pentron Standard | Print Page

IMAGE NOT AVAILABLE

Product Number:	20901
Order Abbreviation:	FP28/835/ECO
General Description:	28W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

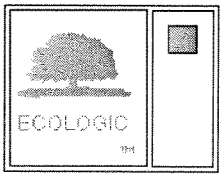
Product Information

Abbrev. With Packaging Info.	FP28835ECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2600
Initial Lumens at 35C	2900
Mean Lumens at 25C	2418
Mean Lumens at 35C	2697
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



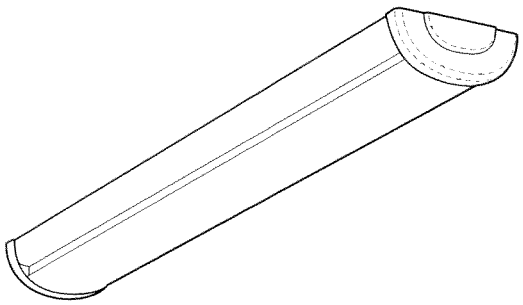
Footnotes

SK & Associates	Description : AV8-4-228T5S-WPC-EB2-BD-UNV Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: V4

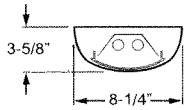
8" WIDE **ARCHITECTURAL VANDAL WRAP**

SERIES **AV8**

VOLTAGE TYPE JOB



1 lamp



2 lamps

SPECIFICATIONS

- HOUSING – Extruded, marine grade aluminum with die-cast end caps.
- SHIELDING – .150" thick polycarbonate lens. Lens is secured to housing with multiple tamper-resistant tri-groove screws.
- REFLECTIVE SURFACES – 92% minimum average reflective white powder coat on interior components.
- FINISH – Non-glare white polyester powder coated exterior textured finish with multi-stage iron/phosphate prepared metal.
- ELECTRICAL – Electronic ballast standard, instant start T8, programmed start T5, rated Class P.
- LABELS – UL/CUL listed as fluorescent luminaire suitable for dry or damp locations. UL/CUL listed for wet location under covered ceiling when specified with WET/CC option (surface mount only).
- MOUNTING – Surface, pendant, or corner.

FEATURES

- Ideal for schools, hallways, dormitories, locker rooms, or any other vandal prone areas.
- Marine grade aluminum housing designed to withstand harsh environments.
- Tamper-resistant screws provided to protect against vandals (optional TPST 1/4" drive socket available). Standard phillips head screws also provided.
- Die-cast end caps envelop the diffuser for added strength and durability.
- Extremely durable damage-resistant polycarbonate lens is standard.
- Versatile mounting options include surface, pendant, or vandal-resistant corner mount.
- Features easy row mount capability with integral alignment pieces.
- All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- This fixture is proudly made in the USA.

ORDERING INFORMATION

Submittal

	SERIES	NOM. LENGTH	TOTAL LAMPS	WATTAGE/ TYPE	SHIELDING	OPTIONS	BALLAST	VOLTAGE
EXAMPLE:	AV8	- 4	- 2	32	- CPC	- OPTIONS	- EB2	- UNV

SERIES

AV8	Architectural Vandal Wrap, 8" wide

NOMINAL LENGTH

4	4'
8	8'

TOTAL LAMPS

1 or 2	

LAMP WATTAGE/TYPE

28T5S	4', 28-watt T5
32	4', 32-watt T8
54T5H[1]	4', 54-watt T5HO[1]

SHIELDING

CPC	Clear polycarbonate lens, .150" thick
WPC	White polycarbonate lens, .150" thick

[1] T5H Fixtures are equipped with 90°C rated ballasts.

OPTIONS

EM packs must be low profile. Not available with generic EM ballast options.

WET/CC	Wet location under covered ceiling (surface mount only)
SWS(AV)12[2]	Pendant swivel stem mount with 12" stem[2]
SS(AV)12[2]	Pendant stem mount with 12" stem[2]
CMB	Vandal-resistant corner mount (For dry and damp location only)
C1B	Quick-connect, wiring harness, single circuit

[2] Two stem sets required for 4' fixture. One additional stem set required for each 4' length when row mounted.

BD	Ballast Disconnect

BALLAST TYPE[3]

Ballast size restricted. Ballast and/or EM ballast sizes restricted to maximum ballast cross-section of 1-3/4" W. x 1-1/4" H.

EB1	1-lamp electronic ballast
EB2	2-lamp electronic ballast

VOLTAGE

120	120V
277	277V
UNV	120 - 277V
347	347V

[3] This fixture requires a tamper-resistant tool (must be ordered separately). Please specify quantity required per project.

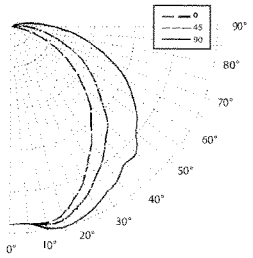
Williams FLUORESCENT LIGHTING

Wrap Around page 19

AV8 SERIES — PHOTOMETRY INFORMATION

Williams Catalog #AV8-4-232-CPC-EB2
Test Report #13626.0, Dated 07/31/07

Lamp Type: F32T8/835/RS
Lamp Quantity: 2



CANDLEPOWER DISTRIBUTION

VERT. ANG	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	1116.	1116.	1116.	
5	1113.	1113.	1113.	106.2
15	1099.	1128.	1165.	319.8
25	962.	1035.	1121.	480.2
35	794.	907.	1052.	575.7
45	631.	775.	1000.	617.1
55	443.	592.	870.	565.1
65	266.	436.	721.	465.2
75	102.	264.	519.	310.4
85	13.	135.	328.	172.8
90	1.	84.	233.	

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = 20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	75	75	75	73	73	73	69	69	69
1	68	65	62	66	63	60	60	58	56
2	62	56	52	60	55	51	52	49	46
3	56	50	44	55	48	44	46	42	39
4	52	44	38	50	43	38	41	37	33
5	47	39	33	45	38	32	36	32	28
6	43	35	29	42	34	28	33	28	24
7	40	31	25	38	30	25	29	24	21
8	37	28	22	35	27	22	26	22	18
9	34	25	20	33	24	19	24	19	16
10	31	23	17	30	22	17	21	17	14

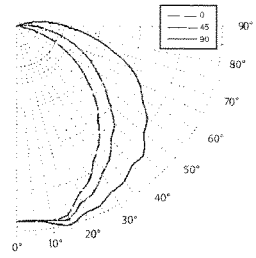
LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	906.	15.4	24.4
0 - 40	1482.	25.1	39.9
0 - 60	2664.	45.2	71.7
0 - 90	3613.	61.2	97.2
90 - 120	106.	1.8	2.8
90 - 130	106.	1.8	2.8
90 - 150	106.	1.8	2.8
90 - 180	106.	1.8	2.8
0 - 180	3718.	63.0	100.0

SPACING CRITERIA: END = 1.2 DIAG. = 1.3 ACROSS = 1.4

Williams Catalog #AV8-4-154T5H-CPC-EB1
Test Report #13627.0, Dated 08/01/07

Lamp Type: FP54T5HO/835
Lamp Quantity: 1



CANDLEPOWER DISTRIBUTION

VERT. ANG	HORIZONTAL ANGLE 0	45	90	ZONAL LUMENS
0	876.	876.	876.	
5	880.	874.	874.	83.5
15	875.	894.	921.	253.6
25	765.	819.	885.	380.0
35	641.	725.	846.	461.3
45	510.	619.	807.	495.4
55	358.	482.	716.	461.1
65	213.	360.	607.	385.9
75	80.	231.	452.	269.0
85	9.	119.	292.	150.4
90	2.	77.	217.	

ZONAL CAVITY COEFFICIENTS

EFFECTIVE FLOOR CAVITY REFL. = 20

CEILING	.80			.70			.50		
WALL RCR	.70	.50	.30	.70	.50	.30	.50	.30	.10
0	72	72	72	70	70	70	67	67	67
1	65	62	59	63	61	58	58	55	53
2	59	54	50	57	53	49	50	47	44
3	54	48	42	52	46	42	44	40	37
4	49	42	37	48	41	36	39	35	31
5	45	37	31	44	36	31	35	30	26
6	41	33	27	40	32	27	31	26	23
7	38	30	24	37	29	24	28	23	20
8	35	27	21	34	26	21	25	20	17
9	32	24	19	31	23	18	22	18	15
10	30	22	17	29	21	16	20	16	13

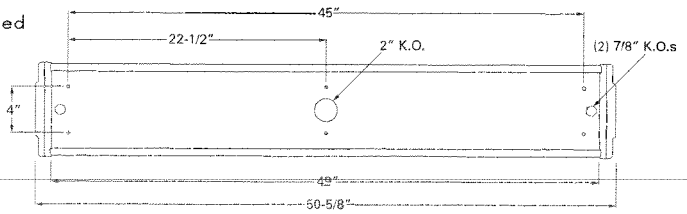
LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% FIXTURE
0 - 30	717.	14.3	23.6
0 - 40	1178.	23.6	38.7
0 - 60	2135.	42.7	70.1
0 - 90	2940.	58.8	96.6
90 - 120	105.	2.1	3.4
90 - 130	105.	2.1	3.4
90 - 150	105.	2.1	3.4
90 - 180	105.	2.1	3.4
0 - 180	3045.	60.9	100.0

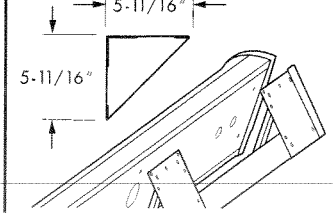
SPACING CRITERIA: END = 1.2 DIAG. = 1.3 ACROSS = 1.5

MOUNTING OPTIONS

Visit our website for detailed mounting instructions: www.hewilliams.com



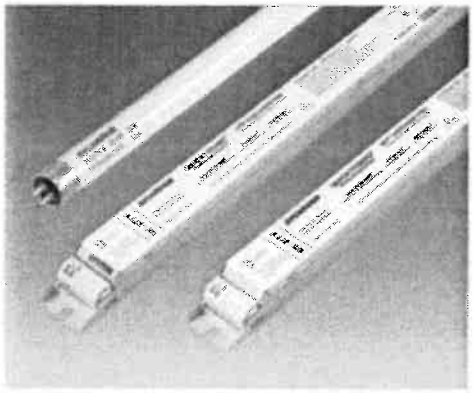
CMB Dry and damp location only



H.E. WILLIAMS, INC.
H.E. Williams, Inc. • Carthage, Missouri • www.hewilliams.com • 417-358-4065 • Fax: 417-358-6015

Information contained herein is subject to change without notice.

SK Associates	Description : T5 TWO LAMP BALLAST	TYPE:
	Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL	V4
Product Details	Notes:	Page 1 of 1



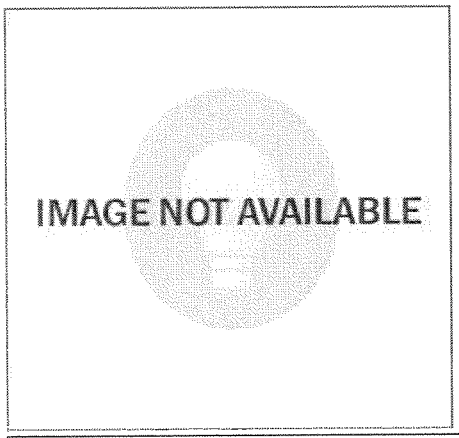
Product Number: 49180

Order Abbreviation: QTP 2X28T5/UNV PSN

General Description: 2-lamp Universal Voltage electronic ballast for 28W T5 lamp, packaged 10 pieces per case

Product Information	
Abbrev. With Packaging Info.	QTP2X28T5UNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8270
Ballast Length L (in)	14.1730
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP28T5
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	80

Return to: Pentron Standard | Print Page



Product Number: 20901

Order Abbreviation: FP28/835/ECO

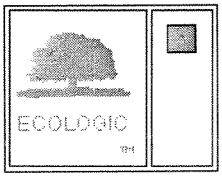
General Description: 28W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP28835ECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2600
Initial Lumens at 35C	2900
Mean Lumens at 25C	2418
Mean Lumens at 35C	2697
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



Footnotes

- Approximate initial lumens after 100 hours operation.
- The life ratings of fluorescent lamps are based on 3 hr. burning cycles under specified conditions and with ballast meeting ANSI specifications. If burning cycle is increased, there will be a corresponding increase in the average hours life.
- Lumen output and life rated on high frequency operation.
- Minimum starting temperature is a function of the ballast; consult the ballast manufacturer.
- There is a NEMA supported, industry issue where T2, T4, and T5 fluorescent and compact fluorescent lamps operated on high frequency ballasts may experience an abnormal end-of-life phenomenon. This end-of-life phenomenon can resultin one or both of the following: 1. Bulb wall cracking near the lamp base. 2. The lamp can overheat in the base area and possibly melt the base and socket. NEMA recommends that high frequency compact fluorescent ballasts have an end-of-life shutdown circuit which will safely and reliably shut down the system in the rare event of an abnormal end-of-life failure mode described above. The final requirements of this system are yet to be defined by ANSI. For additional information refer to NEMA papers on their WEBSITE at www.NEMA.org.
- SYLVANIA ECOLOGIC fluorescent lamps are designed to pass the Federal Toxic Characteristic Leaching Procedure (TCLP) criteria for classification as non-hazardous waste in most states. TCLP test results are available upon request. Lamp disposal regulations may vary, check your local & state regulations. For more information, please visit www.lamprecycle.org

Print Page

240 SERIES

VAPOR/DUST PROOF LIGHTING

DATE: _____ **TYPE V8** _____

JOB: _____

PN: **240 T5HO 4L 8 UNV1 TS P**

APPLICATIONS

Chemical Plants
Paper Mills
Tunnels
Water Treatment
Seacoast Areas
Prep, Inspection, Sanding
Machining Areas
Coal & Dust Storage

The 240 Series is a very versatile fixture that is UL listed for hazardous environments (Class I Division 2 Groups A, B, C and D, Class II Division 2 Groups F and G, and Class III). It is an ideal fixture for industrial applications, wet locations and task lighting. Optional adjustable mounting brackets allow for precise aiming in multiple angles suitable for most applications. The 240 Series is available in 2, 3, 4, 5 and 6 lamp options, all using a 3/16" tempered glass lens with acrylic and polycarbonate optional lenses. With multiple hub locations, the 240 Series can meet most of your wiring needs. Lamps not included.

SPECIFICATIONS

LISTINGS:
UL 844 listed U.S. and Canada
UL 1598 listed U.S. and Canada
Class I Division 2 Groups A,B,C,D
Class II Division 2 Groups F,G
Class III
Listed for wet locations
IP65
40°C ambient rating
55°C ambient rating for T8 (32 watt fixtures only)

c UL us
UL us
EM optioned fixture

FEATURES:
Front access fixture for hazardous locations
Hinged front door frame
Hinged ballast tray
Sturdy 18 Ga. steel white powder coated housing
Spring loaded lamp holders - standard
3/16" tempered glass lens
Zinc latches

ELECTRICAL:
Available in 28, 32, 44 and 54 watts with T5, T5HO, T8, and T8HO lamps.
Voltages of 120, 277, 347 & 480
Through feed wiring

OPTIONS:
ALL OPTIONS ORDERED SEPARATELY
Adjustable surface mount brackets
Cable mount
Chain mount kit
8' wire whip
Specular reflector
Wire guard
Fusing (not listed for Canada)
Acrylic lens
Polycarbonate lens
EM: Emergency battery backup ballast
HLO (high light output) ballast for T8 32 watt lamp only

• MOUNTING KITS - ordered separately - see page 89

VAPOR/DUST PROOF LIGHTING

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240 SERIES

VAPOR/DUST PROOF LIGHTING

www.ldpi-inc.com

240 SERIES	LAMP TYPE	LAMP QTY	VOLTAGE	HUB	OPTIONS
	T5: 28W T5HO: 54W T8: 32W T8HO: 44W*	2L 3L 4L 5L 6L	120: 120 Volts 277: 277 Volts 347: 347 Volts UNV1: 120-277 Volts†† UNV2: 347-480 Volts***	TS: Top & Side Hubs**	AM: Adjustable Angle Mounting Brackets (PN: 6856)† 6856SS: AM Stainless Steel† CB: Cable Mount (PN: 6875) Includes 5 ft. cables std. 6875SS: CB Stainless Steel. Includes 5 ft. cables std. (Consult Factory for availability) WH: 8' 3-Wire Whip SR: Specular High Bay Reflector W: Wire Guard F: Fuse A: Acrylic Lens P: Polycarbonate Lens 7979: Chain mount kit EM: Emergency battery backup ballast†† (Ambient reduced to 40°C) 8HLO: High light output ballast for T8 32W lamp only 10357: Vertical Mounting Bracket

LAMPS SOLD SEPARATELY

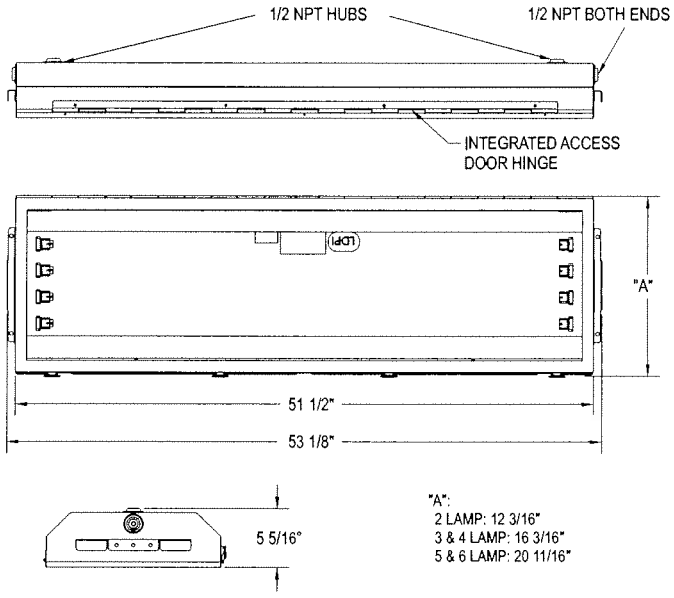
* 120 or 277 volt must be specified on T8HO
** 1/2" NPT standard
*** UNV2 T5HO Only
† For horizontal or ceiling mounted fixture only
†† EM available as UNV1 (120-277) only

T-Ratings

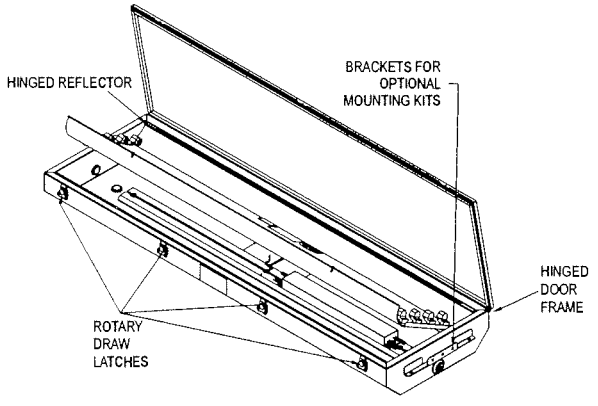
Model	Rated Ambient Deg. C	Supply Wiring Temp	Class I, Div. 2 Operating Temperature Code	Class II, Div. 2 Operating Temperature Code	Class III Operating Temperature Code
240-T5	40	75	T3C (160°C)	T4A (120°C)	T4A (120°C)
240-T5HO	40	75	T3C (160°C)	T4A (120°C)	T4A (120°C)
240-T8HO	40	75	T4A (120°C)	T4A (120°C)	T4A (120°C)
240-T8*	55	75	T5 (100°C)	T4A (120°C)	T4A (120°C)

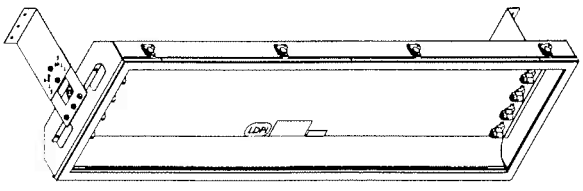
* 240 with EM option ambient is reduced to 40°C

DIMENSIONS (Nominal)



"A":
2 LAMP: 12 3/16"
3 & 4 LAMP: 16 3/16"
5 & 6 LAMP: 20 11/16"





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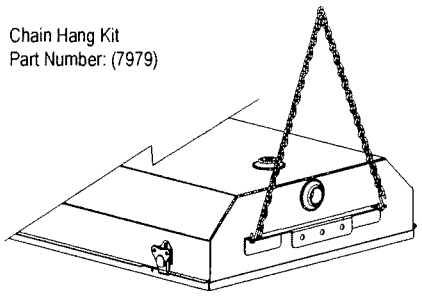
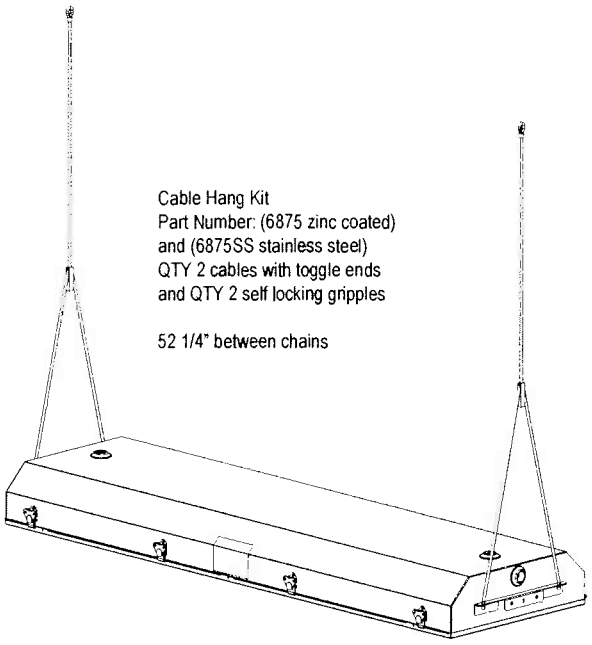
240 Series (4 Ft.)

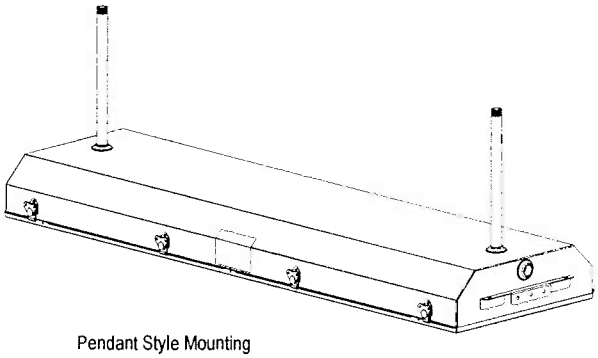
Chain Hang Kit
Part Number: (7979)





Cable Hang Kit
Part Number: (6875 zinc coated)
and (6875SS stainless steel)
QTY 2 cables with toggle ends
and QTY 2 self locking gripples

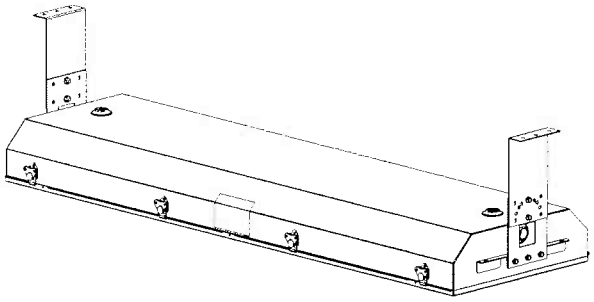
52 1/4" between chains



Pendant Style Mounting
NOTE: Conduit provided by others

Fixture suspended with 1/2" electrical conduit
using top hubs on fixture at both ends.

45" between conduit



Adjustable Surface Mounting Bracket Kit
Part Number: (6856 galvanized)
and (6856SS stainless steel)
Bracket attachment point for optional mounting methods

THERE ARE A NUMBER OF MOUNTING METHODS THAT ARE NOT SHOWN.

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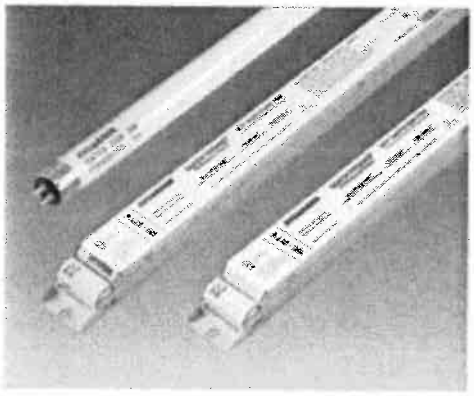


Product Number: 49180

Order Abbreviation: QTP 2X28T5/UNV PSN

General Description: 2-lamp Universal Voltage electronic ballast for 28W T5 lamp, packaged 10 pieces per case

Product Information	
Abbrev. With Packaging Info.	QTP2X28T5UNVPSN
Ballast Factor	1.00
Ballast Height H (in)	0.8270
Ballast Length L (in)	14.1730
Ballast Width W (in)	1.1810
Circuit Type	SERIES
Family Brand Name	QUICKTRONIC Professional
Input Current (Amps)	0.00
Nominal Voltage (V)	120.00
Nominal Voltage (V)	120-277V
Number of Lamps	2
Open Circuit Voltage (V)	<600
Power Factor	>0.98
Primary Lamp Type	FP28T5
Sound Rating	A
Starting Method	PROSTART
Starting Temperature - Fahrenheit	0
Starting Temperature - Celsius	-18
Total Harmonic Distortion (THD)	<10%
Wiring Method	WIRETRAP CONNECTORS
Total Maximum Wattage	80

SK & Associates	Description : FP28/835/ECO Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: V8

Return to: Pentron Standard | Print Page

IMAGE NOT AVAILABLE

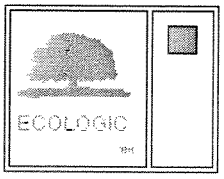
Product Number:	20901
Order Abbreviation:	FP28/835/ECO
General Description:	28W, T5 PENTRON fluorescent lamp, 3500K color temperature, rare earth phosphor, 85 CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP28835ECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2600
Initial Lumens at 35C	2900
Mean Lumens at 25C	2418
Mean Lumens at 35C	2697
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00

Additional Product Information

Product Documents, Graphs, and Images

Packaging Information



Footnotes

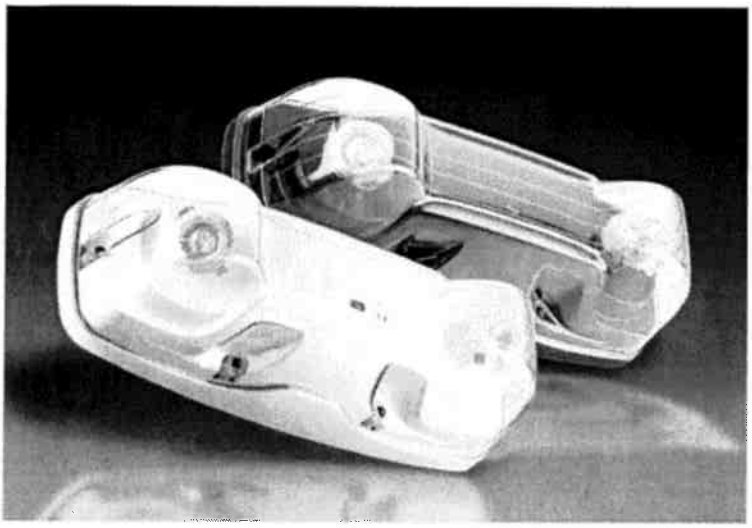
- Approximate initial lumens after 100 hours operation.
- The life ratings of fluorescent lamps are based on 3 hr. burning cycles under specified conditions and with ballast meeting ANSI specifications. If burning cycle is increased, there will be a corresponding increase in the average hours life.
- Lumen output and life rated on high frequency operation.
- Minimum starting temperature is a function of the ballast; consult the ballast manufacturer.
- There is a NEMA supported, industry issue where T2, T4, and T5 fluorescent and compact fluorescent lamps operated on high frequency ballasts may experience an abnormal end-of-life phenomenon. This end-of-life phenomenon can resultin one or both of the following: 1. Bulb wall cracking near the lamp base. 2. The lamp can overheat in the base area and possibly melt the base and socket. NEMA recommends that high frequency compact fluorescent ballasts have an end-of-life shutdown circuit which will safely and reliably shut down the system in the rare event of an abnormal end-of-life failure mode described above. The final requirements of this system are yet to be defined by ANSI. For additional information refer to NEMA papers on their WEBSITE at www.NEMA.org.
- SYLVANIA ECOLOGIC fluorescent lamps are designed to pass the Federal Toxic Characteristic Leaching Procedure (TCLP) criteria for classification as non-hazardous waste in most states. TCLP test results are available upon request. Lamp disposal regulations may vary, check your local & state regulations. For more information, please visit www.lamprecycle.org

Print Page

Survive-All SV Series

6 and 12 Volt Nema 4X Battery Unit

TYPE EB



*The **Survive-All SV Series** battery units combines state-of-the art illumination with a visually appealing package and are designed to perform in a wide range of commercial and industrial environments where humidity, dust, water infiltration and the risk of vandalism are specification criteria.*

UL Listed

Sealed Maintenance-Free Batteries

- Lead-Calcium
- Nickel-Cadmium (UL Listed for damp and wet locations)

Mounting

Wall, Strut or Beam (see diagram on page 53)

Certifications

- Certified to meet UL924 standards
- 90 minutes of emergency operation
- NEMA-4X Rated for high abuse areas, wet locations and cold weather (-40ÞC/-40ÞF) applications
- NSF Certified for use in food processing plants

PATENT PENDING

Standard Features

Reliability

The **SV Series** comes complete with a 3-year full warranty (excluding lamps and fuses)

Unit Data

This unit has a fully gasketed cast aluminum back plate with clear, UV resistant polycarbonate cover. Tamper-proof screws and bit are supplied with the unit. The **SV Series** is equipped with a tool-less MR16 swivel lamp assembly that will provide precise beam control. Choice of MR16 halogen lamps from 6V to 12V and 6 watt to 20 watt-IR. Choice of three different colors, black, white and gray.

Charger

Standard 120/277 Vac 0.3/0.15 Amp input. Non-audible advanced diagnostic charger board, 15 minute time delay and lamp disconnect are all standard features. Audible warning and time delay functions can be enabled or disabled during installation. Non-obtrusive, magnetic test switch. Micro-controller diagnostic system tests, detects and indicates battery, charger circuitry or MR16 lamp failures.

Optional Features

Description	Add Suffix
Cold weather location (-40°C to +40°C) (-40°F to +104°F)	-CW4*

*Only available 12SV24M and 12SV36M Lead-Calcium battery.

Accessories (order as a separate item)

Additional bit for tamperproof screws ..... TPB
Universal bracket (for mounting on poles, I-beams or strut metal framing) ..... PMK-E

Applications

- Hosedown areas / car washes
- Food processing / preparation facilities
- Marine locations
- Chemical plants
- Schools and other public facilities
- Parking garages
- Transit platforms
- Sports arenas / swimming pools
- Security areas / prisons
- Warehouse and cold storage facilities
- Heavy industrial facilities

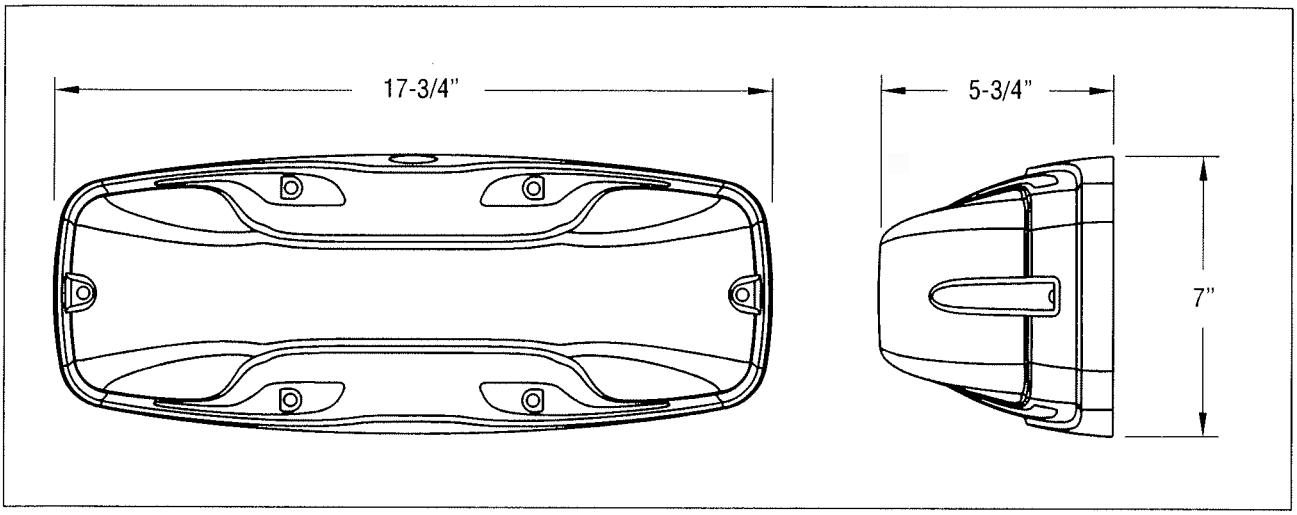
Unit Rating Chart

UNIT EQUIPMENT - WITH REMOTE CAPABILITY				
Sealed Maintenance-Free Battery Types	*Watts to 87 1/2% of rated battery voltage			
	1 1/2 hrs.	2hrs.	3hrs.	4 hrs.
Lead-Calcium	18	12	-	-
	24	16	12	-
	36	24	20	14
	54	36	27	20
Nickel-Cadmium	24	18	12	-
	40	30	20	15
Nickel Metal Hydride	60	45	30	20

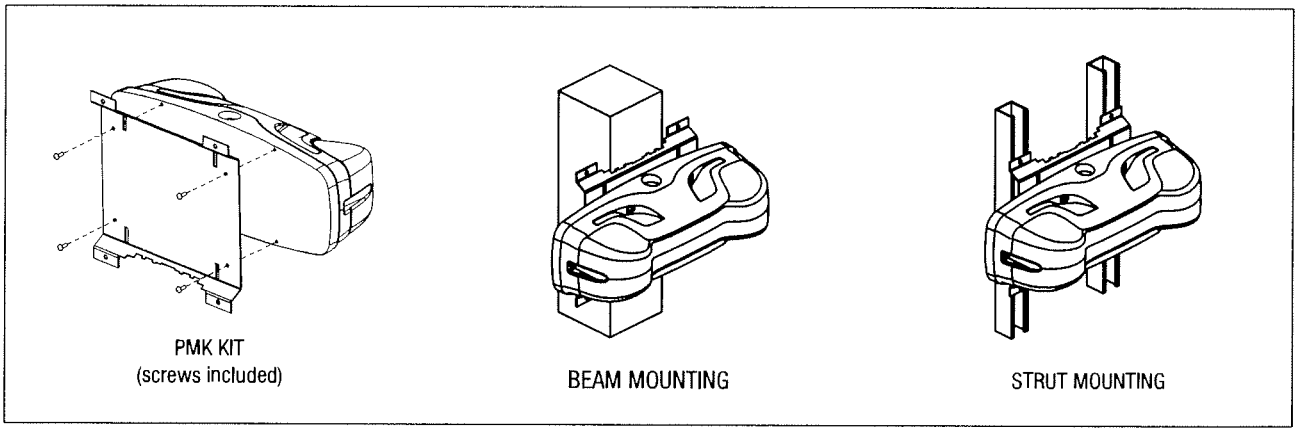
National Electrical Code Specification

Outline and Dimensions

Dimensions are approximate and subject to change.



Universal Bracket



PMK KIT
(screws included)

BEAM MOUNTING

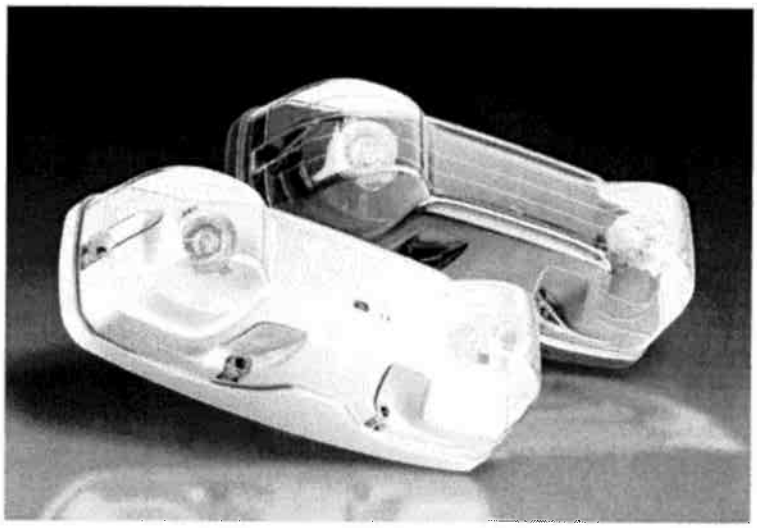
STRUT MOUNTING

How To Order *MODEL EXAMPLE:*

B	**12SV36M**	**-2**	**MK**	**-D**	
Color	*Series*	*# of Heads*	*Lamps*	*Charger*	*Options*
B=Black	**SV18M**=6V-18W, Lead-Calcium	**-2**=2 heads	L=LED 12V-5W	**-D**=Autodiagnostic Non-Audible (standard)	**Blank**=No Options
G=Gray	**12SV24M**=12V- 24W, Lead-Calcium		**MI**=6V-6W, MR16	**-DA**=Autodiagnostic Audible	**CW4**=Cold Weather* (-40°C to +40°C) (-40°F to +104°F)
W=Whist	**12SV36M**=12V- 36W, Lead-Calcium		**MK**=12V-12W, MR16		** Only available with 12SV24M & 12SV36M*
	12SV54M=12V- 54W, Lead-Calcium		MW=12V-20W, MR16-IR		
	12SV24N=12V- 24W, Nickel-Cadmium				
	12SV40N=12V- 40W, Nickel-Cadmium				
	12SV60H=12V- 60W, NIMH				

Survive-All SV Series

6 and 12 Volt Nema 4X Battery Unit



*The **Survive-All SV Series** battery units combines state-of-the art illumination with a visually appealing package and are designed to perform in a wide range of commercial and industrial environments where humidity, dust, water infiltration and the risk of vandalism are specification criteria.*

UL Listed

Sealed Maintenance-Free Batteries

- Lead-Calcium
- Nickel-Cadmium (UL Listed for damp and wet locations)

Mounting

Wall, Strut or Beam (see diagram on page 53)

Certifications

- Certified to meet UL924 standards
- 90 minutes of emergency operation
- NEMA-4X Rated for high abuse areas, wet locations and cold weather (-40ÞC/-40ÞF) applications
- NSF Certified for use in food processing plants

PATENT PENDING

Standard Features

Reliability

The **SV Series** comes complete with a 3-year full warranty (excluding lamps and fuses)

Unit Data

This unit has a fully gasketed cast aluminum back plate with clear, UV resistant polycarbonate cover. Tamper-proof screws and bit are supplied with the unit. The **SV Series** is equipped with a tool-less MR16 swivel lamp assembly that will provide precise beam control. Choice of MR16 halogen lamps from 6V to 12V and 6 watt to 20 watt-IR. Choice of three different colors, black, white and gray.

Charger

Standard 120/277 Vac 0.3/0.15 Amp input. Non-audible advanced diagnostic charger board, 15 minute time delay and lamp disconnect are all standard features. Audible warning and time delay functions can be enabled or disabled during installation. Non-obtrusive, magnetic test switch. Micro-controller diagnostic system tests, detects and indicates battery, charger circuitry or MR16 lamp failures.

Optional Features

Description	Add Suffix
Cold weather location (-40°C to +40°C) (-40°F to +104°F)	-CW4*

*Only available 12SV24M and 12SV36M Lead-Calcium battery.

Accessories (order as a separate item)

Additional bit for tamperproof screws ..... TPB
Universal bracket (for mounting on poles, I-beams or strut metal framing) ..... PMK-E

Applications

- Hosedown areas / car washes
- Food processing / preparation facilities
- Marine locations
- Chemical plants
- Schools and other public facilities
- Parking garages
- Transit platforms
- Sports arenas / swimming pools
- Security areas / prisons
- Warehouse and cold storage facilities
- Heavy industrial facilities

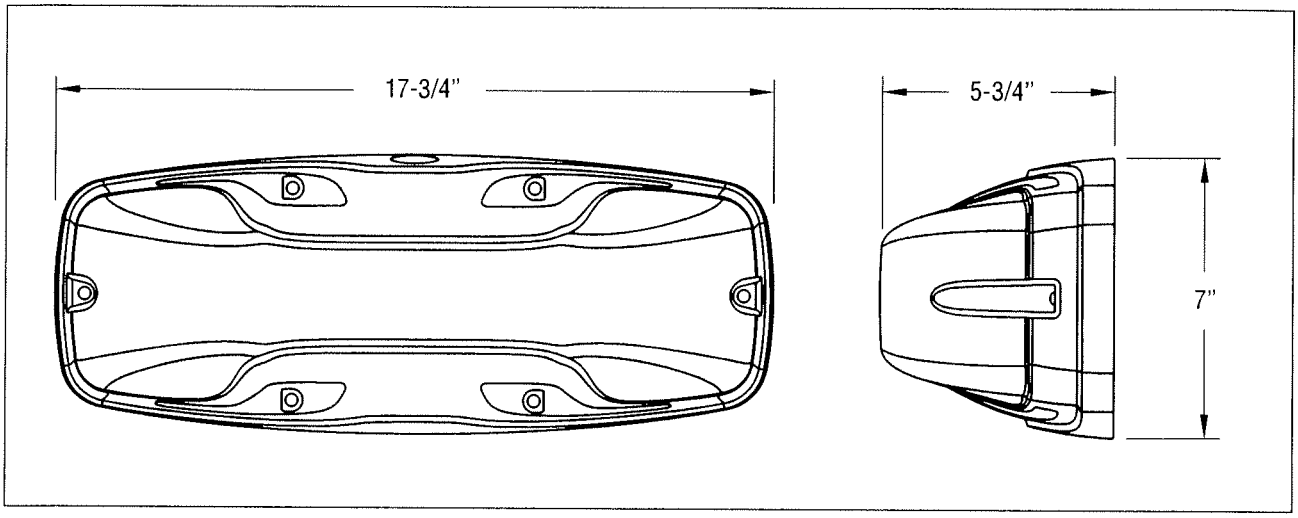
Unit Rating Chart

UNIT EQUIPMENT - WITH REMOTE CAPABILITY				
Sealed Maintenance-Free Battery Types	*Watts to 87½% of rated battery voltage			
	1½ hrs.	2hrs.	3hrs.	4 hrs.
Lead-Calcium	18	12	-	-
	24	16	12	-
	36	24	20	14
	54	36	27	20
Nickel-Cadmium	24	18	12	-
	40	30	20	15
Nickel Metal Hydride	60	45	30	20

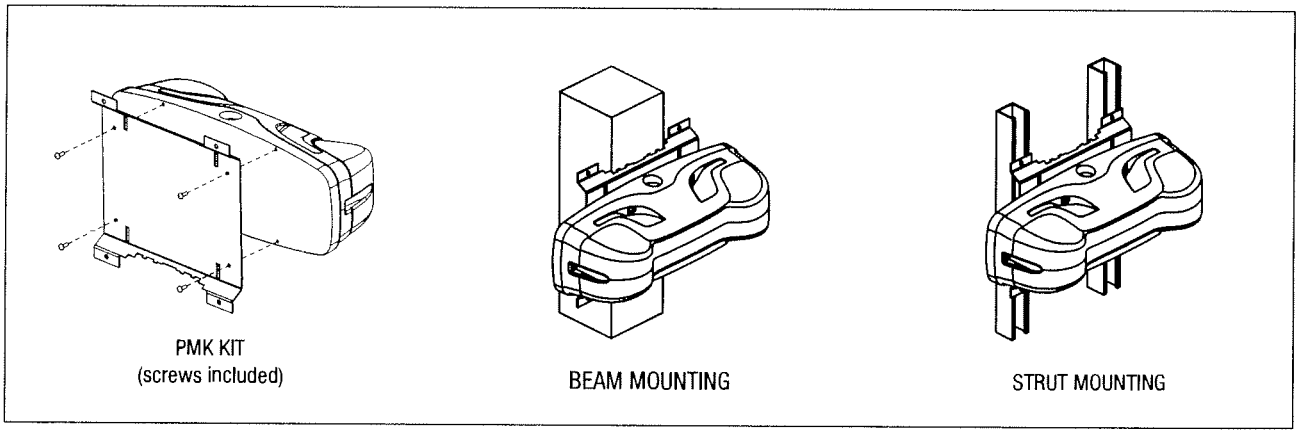
National Electrical Code Specification

Outline and Dimensions

Dimensions are approximate and subject to change.



Universal Bracket



PMK KIT
(screws included)

BEAM MOUNTING

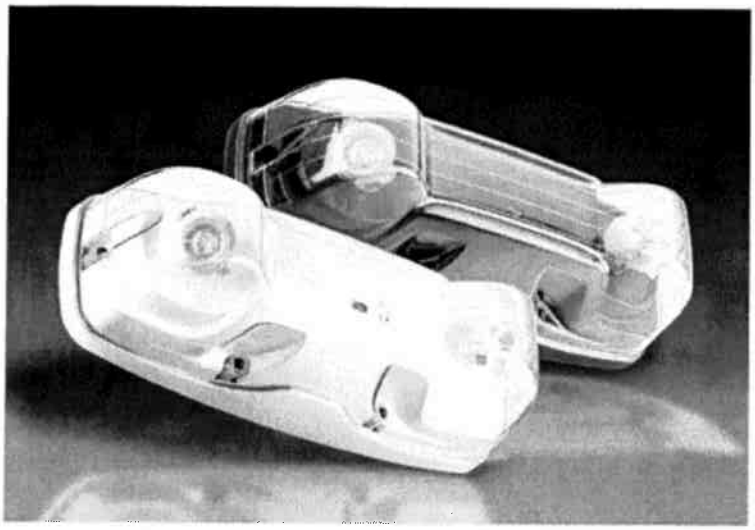
STRUT MOUNTING

How To Order *MODEL EXAMPLE:*

B	**12SV36M**	**-2**	**MK**	**-D**	
Color	*Series*	*# of Heads*	*Lamps*	*Charger*	*Options*
B=Black	**SV18M**=6V-18W, Lead-Calcium	**-2**=2 heads	L=LED 12V-5W	**-D**=Autodiagnostic Non-Audible (standard)	**Blank**=No Options
G=Gray	**12SV24M**=12V- 24W, Lead-Calcium		**MI**=6V-6W, MR16	**-DA**=Autodiagnostic Audible	**CW4**=Cold Weather* (-40°C to +40°C) (-40°F to +104°F)
W=Whist	**12SV36M**=12V- 36W, Lead-Calcium		**MK**=12V-12W, MR16		** Only available with 12SV24M & 12SV36M*
	12SV54M=12V- 54W, Lead-Calcium		MW=12V-20W, MR16-IR		
	12SV24N=12V- 24W, Nickel-Cadmium				
	12SV40N=12V- 40W, Nickel-Cadmium				
	12SV60H=12V- 60W, NIMH				

Survive-All SV Series

6 and 12 Volt Nema 4X Battery Unit



*The **Survive-All SV Series** battery units combines state-of-the art illumination with a visually appealing package and are designed to perform in a wide range of commercial and industrial environments where humidity, dust, water infiltration and the risk of vandalism are specification criteria.*

UL Listed

Sealed Maintenance-Free Batteries

- Lead-Calcium
- Nickel-Cadmium (UL Listed for damp and wet locations)

Mounting

Wall, Strut or Beam (see diagram on page 53)

Certifications

- Certified to meet UL924 standards
- 90 minutes of emergency operation
- NEMA-4X Rated for high abuse areas, wet locations and cold weather (-40ÞC/-40ÞF) applications
- NSF Certified for use in food processing plants

PATENT PENDING

Standard Features

Reliability

The **SV Series** comes complete with a 3-year full warranty (excluding lamps and fuses)

Unit Data

This unit has a fully gasketed cast aluminum back plate with clear, UV resistant polycarbonate cover. Tamper-proof screws and bit are supplied with the unit. The **SV Series** is equipped with a tool-less MR16 swivel lamp assembly that will provide precise beam control. Choice of MR16 halogen lamps from 6V to 12V and 6 watt to 20 watt-IR. Choice of three different colors, black, white and gray.

Charger

Standard 120/277 Vac 0.3/0.15 Amp input. Non-audible advanced diagnostic charger board, 15 minute time delay and lamp disconnect are all standard features. Audible warning and time delay functions can be enabled or disabled during installation. Non-obtrusive, magnetic test switch. Micro-controller diagnostic system tests, detects and indicates battery, charger circuitry or MR16 lamp failures.

Optional Features

Description	Add Suffix
Cold weather location (-40°C to +40°C) (-40°F to +104°F)	-CW4*

*Only available 12SV24M and 12SV36M Lead-Calcium battery.

Accessories (order as a separate item)

Additional bit for tamperproof screws ..... TPB
Universal bracket (for mounting on poles, I-beams or strut metal framing) ..... PMK-E

Applications

- Hosedown areas / car washes
- Food processing / preparation facilities
- Marine locations
- Chemical plants
- Schools and other public facilities
- Parking garages
- Transit platforms
- Sports arenas / swimming pools
- Security areas / prisons
- Warehouse and cold storage facilities
- Heavy industrial facilities

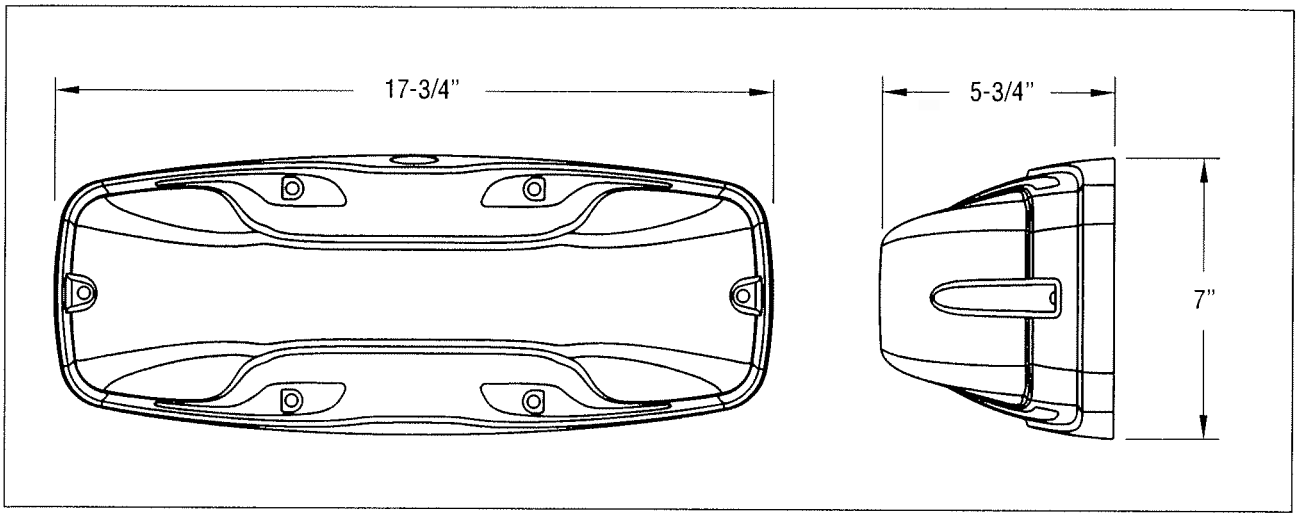
Unit Rating Chart

UNIT EQUIPMENT - WITH REMOTE CAPABILITY				
Sealed Maintenance-Free Battery Types	*Watts to 87½% of rated battery voltage			
	1½ hrs.	2hrs.	3hrs.	4 hrs.
Lead-Calcium	18	12	-	-
	24	16	12	-
	36	24	20	14
	54	36	27	20
Nickel-Cadmium	24	18	12	-
	40	30	20	15
Nickel Metal Hydride	60	45	30	20

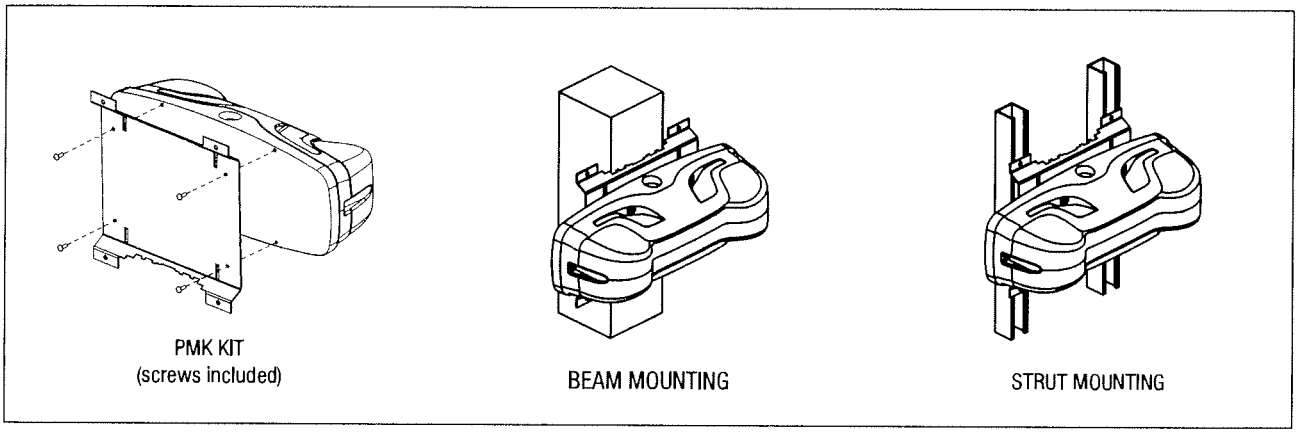
National Electrical Code Specification

Outline and Dimensions

Dimensions are approximate and subject to change.



Universal Bracket



PMK KIT
(screws included)

BEAM MOUNTING

STRUT MOUNTING

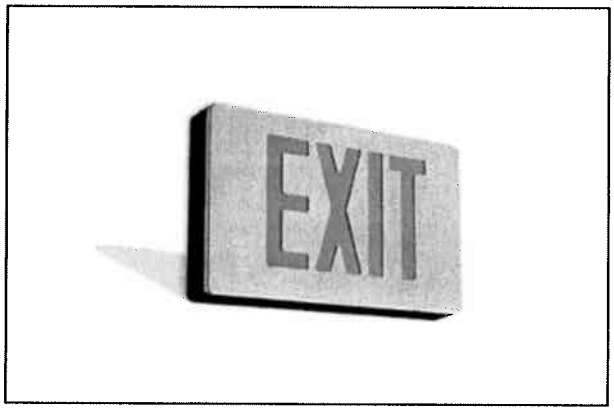
How To Order *MODEL EXAMPLE:*

B	**12SV36M**	**-2**	**MK**	**-D**	
Color	*Series*	*# of Heads*	*Lamps*	*Charger*	*Options*
B=Black	**SV18M**=6V-18W, Lead-Calcium	**-2**=2 heads	L=LED 12V-5W	**-D**=Autodiagnostic Non-Audible (standard)	**Blank**=No Options
G=Gray	**12SV24M**=12V- 24W, Lead-Calcium		**MI**=6V-6W, MR16	**-DA**=Autodiagnostic Audible	**CW4**=Cold Weather* (-40°C to +40°C) (-40°F to +104°F)
W=Whist	**12SV36M**=12V- 36W, Lead-Calcium		**MK**=12V-12W, MR16		** Only available with 12SV24M & 12SV36M*
	12SV54M=12V- 54W, Lead-Calcium		**MW**=12V-20W, MR16-IR		
	12SV24N=12V- 24W, Nickel-Cadmium				
	12SV40N=12V- 40W, Nickel-Cadmium				
	12SV60H=12V- 60W, NIMH				

SK & Associates	Description : WWP1R Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: AC

EMERGI-LITE®

TYPE:
CATALOG #:
NOTES:



New Preceptor

Series

Die-Cast LED exit sign

nexus

Stylish built in die-cast aluminum, the new **Die-Cast Series** offers workmanship, versatile mounting capability and economical long-lasting LED performance.

Standard Features

- Housing of die-cast aluminum in a variety of finishes
- Slim-line canopy for top and end mounting
- Universal mounting for: wall, end, or ceiling
- Universal, field-selectable knock-out chevrons
- Long-life LED light source. Red LED's of ALINGAP technology
- Dual voltage input: 120 / 277Vac 60Hz
- Low power consumption: less than 3 Watts in any configuration
- Self-powered models with sealed maintenance-free Nickel-Cadmium batteries
- UL924 Listed
- Five-year full warranty

Suggested Specification

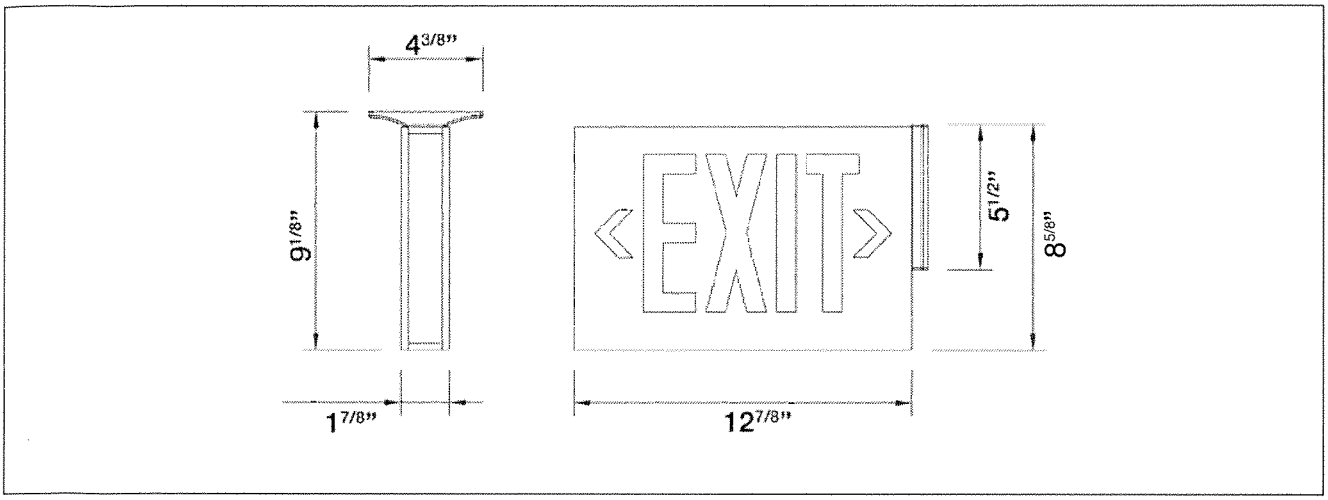
Supply and install the **Emergi-lite®** Die-Cast exit sign. The frame, face plate(s), back plate and canopy shall be constructed of die-cast aluminum of _____ finish and _____ color. No screws are necessary to hold the faceplate(s) or the back plate to the housing. The unit shall be suitable for installation on wall, end, or ceiling mount. The faceplates shall come standard with knockout chevrons. The light source shall be light emitting diodes (LEDs). Red LED technology shall be ALINGAP. The LEDs shall provide illumination in normal and emergency operation and shall be mounted inside the exit housing, not on the face. An LED-sensitive diffuser shall be mounted in front of the LEDs to provide the 6" high by ¾" stroke letters with even illumination. The exit sign in a self-powered configuration shall be equipped with a sealed, maintenance-free Nickel-Cadmium battery. The equipment shall operate with a dual-voltage input of 120/277Vac 60Hz with less than 3 Watts of consumption. The equipment shall stay illuminated at least 90 minutes upon AC failure. The exit sign shall be listed to UL924 standard.

When specified, the self-powered model equipped with Advanced Diagnostic shall self-test by simulating a power failure for one minute every 30 days, 30 minutes every 60 days and 90 minutes every 360 days. A diagnostic circuit shall continuously monitor the performance of the battery, charger module and LED lamps. Upon failure detection the system shall display the error on the AC pilot lamp, which will change color from green to red and will flash with a specific code. The red light shall be steady-on in case of "*Battery Disconnect*"; it shall flash with one blink for "*Battery failure*", two blinks for "*Charger failure*" and four blinks for "LED lamp failure. A label with the diagnostic legend shall be visible next to the pilot light.

The exit sign shall be **Emergi-lite®** Model - _____.

Outline and Dimensions

Dimensions are approximate and subject to change.



Power Consumption Chart

Model	AC Specs		DC Specs	
AC-Only	120 / 277Vac	Less than 2.5 W	-	
AC/DC-remote	120 / 277Vac	Less than 2 W	6 to 48 Vdc	Less than 1.5 W
Self-powered	120 / 277Vac	Less than 3 W	Ni-Cd battery	Min. 90 minutes
Self-powered with Diagnostic	120 / 277Vac	Less than 2.8 W	Ni-Cd battery	Min. 90 minutes

Unit Warranty*

Unit carries a 5-year full warranty. (excluding lamps and fuses)

How To Order

Example: BAPU2R

Housing color	Models	No. of Faces	Legend Color	Options
BA= Black body/Aluminum face **WW**= White body/White face **WA**= White body/Aluminum face **BB**= Black body/Black face **AA**= Brushed aluminum body and face	**Standard Models** **P**= AC only (120/277 volts) **PU**= 120/277vac & 6 to 48vdc **PXN**= Self-powered diagnostic Ni-Cd **PND**= Self-powered Ni-Cd, No AD **Optional Models** **P2C1**= Dual AC circuit (2 x 120V) **P2C2**= Dual AC circuit (2 x 277V) **PNEX**= NEXUS® wired **PNEXRF**= NEXUS® wireless	**1**= Single Face **2**= Double Face	**R**= Red **G**= Green **RW**= Red on white (Open face) **GW**= Green on white (Open face)	**Blank**= No options **FZ**= Flasher buzzer * **FL** = Flasher * **FA**= Fire alarm activated flasher (not available with PDN) **FBF**= Flasher buzzer + fire alarm activated flasher * **VR**= Tamper proof screws ** **VR1**= Polycarbonate shield with tamper proof screws ** **DL** = damp location *PXN, PNEX, PNEXRF models only **Please specify single or double face Red or Green

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All information and specifications contained in this specsheet are subject to change due to engineer design, errors and omissions. Illustrations and diagrams within this specsheet may vary from actual products.

SK & Associates	Description : WWPXN1R Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: X1

EMERGI-LITE®

TYPE: _____

CATALOG #: _____

NOTES: _____

New Preceptor

Series

Die-Cast LED exit sign

nexus UL

Stylish built in die-cast aluminum, the new **Die-Cast Series** offers workmanship, versatile mounting capability and economical long-lasting LED performance.

Standard Features

- Housing of die-cast aluminum in a variety of finishes
- Slim-line canopy for top and end mounting
- Universal mounting for: wall, end, or ceiling
- Universal, field-selectable knock-out chevrons
- Long-life LED light source. Red LED's of ALINGAP technology
- Dual voltage input: 120 / 277Vac 60Hz
- Low power consumption: less than 3 Watts in any configuration
- Self-powered models with sealed maintenance-free Nickel-Cadmium batteries
- UL924 Listed
- Five-year full warranty

Suggested Specification

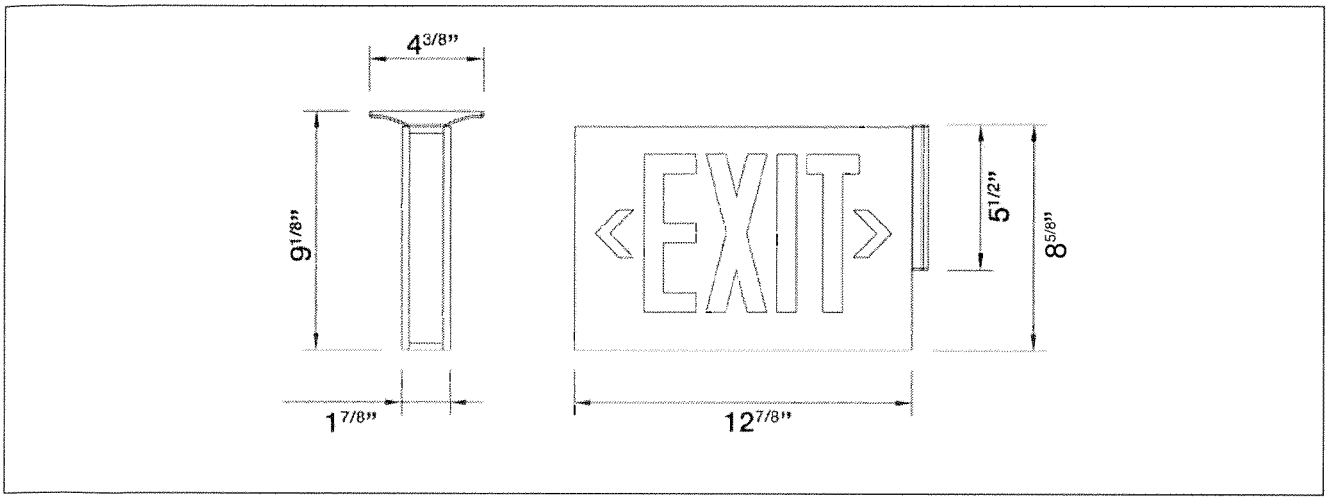
Supply and install the **Emergi-lite®** Die-Cast exit sign. The frame, face plate(s), back plate and canopy shall be constructed of die-cast aluminum of _____ finish and _____ color. No screws are necessary to hold the faceplate(s) or the back plate to the housing. The unit shall be suitable for installation on wall, end, or ceiling mount. The faceplates shall come standard with knockout chevrons. The light source shall be light emitting diodes (LEDs). Red LED technology shall be ALINGAP. The LEDs shall provide illumination in normal and emergency operation and shall be mounted inside the exit housing, not on the face. An LED-sensitive diffuser shall be mounted in front of the LEDs to provide the 6" high by ¾" stroke letters with even illumination. The exit sign in a self-powered configuration shall be equipped with a sealed, maintenance-free Nickel-Cadmium battery. The equipment shall operate with a dual-voltage input of 120/277Vac 60Hz with less than 3 Watts of consumption. The equipment shall stay illuminated at least 90 minutes upon AC failure. The exit sign shall be listed to UL924 standard.

When specified, the self-powered model equipped with Advanced Diagnostic shall self-test by simulating a power failure for one minute every 30 days, 30 minutes every 60 days and 90 minutes every 360 days. A diagnostic circuit shall continuously monitor the performance of the battery, charger module and LED lamps. Upon failure detection the system shall display the error on the AC pilot lamp, which will change color from green to red and will flash with a specific code. The red light shall be steady-on in case of "*Battery Disconnect*"; it shall flash with one blink for "*Battery failure*", two blinks for "*Charger failure*" and four blinks for "LED lamp failure. A label with the diagnostic legend shall be visible next to the pilot light.

The exit sign shall be **Emergi-lite®** Model - _____.

Outline and Dimensions

Dimensions are approximate and subject to change.



Power Consumption Chart

Model	AC Specs		DC Specs	
AC-Only	120 / 277Vac	Less than 2.5 W	-	
AC/DC-remote	120 / 277Vac	Less than 2 W	6 to 48 Vdc	Less than 1.5 W
Self-powered	120 / 277Vac	Less than 3 W	Ni-Cd battery	Min. 90 minutes
Self-powered with Diagnostic	120 / 277Vac	Less than 2.8 W	Ni-Cd battery	Min. 90 minutes

Unit Warranty*

Unit carries a 5-year full warranty. (excluding lamps and fuses)

How To Order

Example: BAPU2R

Housing color	Models	No. of Faces	Legend Color	Options
BA= Black body/Aluminum face **WW**= White body/White face **WA**= White body/Aluminum face **BB**= Black body/Black face **AA**= Brushed aluminum body and face	**Standard Models** **P**= AC only (120/277 volts) **PU**= 120/277vac & 6 to 48vdc **PXN**= Self-powered diagnostic Ni-Cd **PND**= Self-powered Ni-Cd, No AD **Optional Models** **P2C1**= Dual AC circuit (2 x 120V) **P2C2**= Dual AC circuit (2 x 277V) **PNEX**= NEXUS® wired **PNEXRF**= NEXUS® wireless	**1**= Single Face **2**= Double Face	**R**= Red **G**= Green **RW**= Red on white (Open face) **GW**= Green on white (Open face)	**Blank**= No options **FZ**= Flasher buzzer * **FL** = Flasher * **FA**= Fire alarm activated flasher (not available with PDN) **FBF**= Flasher buzzer + fire alarm activated flasher * **VR**= Tamper proof screws ** **VR1**= Polycarbonate shield with tamper proof screws ** **DL** = damp location *PXN, PNEX, PNEXRF models only **Please specify single or double face Red or Green

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SK & Associates	Description : WWPXN2R Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: X2

EMERGI-LITE®

TYPE: _____

CATALOG #: _____

NOTES: _____

New Preceptor

Series

Die-Cast LED exit sign

nexus UL

Stylish built in die-cast aluminum, the new **Die-Cast Series** offers workmanship, versatile mounting capability and economical long-lasting LED performance.

Standard Features

- Housing of die-cast aluminum in a variety of finishes
- Slim-line canopy for top and end mounting
- Universal mounting for: wall, end, or ceiling
- Universal, field-selectable knock-out chevrons
- Long-life LED light source. Red LED's of ALINGAP technology
- Dual voltage input: 120 / 277Vac 60Hz
- Low power consumption: less than 3 Watts in any configuration
- Self-powered models with sealed maintenance-free Nickel-Cadmium batteries
- UL924 Listed
- Five-year full warranty

Suggested Specification

Supply and install the **Emergi-lite®** Die-Cast exit sign. The frame, face plate(s), back plate and canopy shall be constructed of die-cast aluminum of _____ finish and _____ color. No screws are necessary to hold the faceplate(s) or the back plate to the housing. The unit shall be suitable for installation on wall, end, or ceiling mount. The faceplates shall come standard with knockout chevrons. The light source shall be light emitting diodes (LEDs). Red LED technology shall be ALINGAP. The LEDs shall provide illumination in normal and emergency operation and shall be mounted inside the exit housing, not on the face. An LED-sensitive diffuser shall be mounted in front of the LEDs to provide the 6" high by ¾" stroke letters with even illumination. The exit sign in a self-powered configuration shall be equipped with a sealed, maintenance-free Nickel-Cadmium battery. The equipment shall operate with a dual-voltage input of 120/277Vac 60Hz with less than 3 Watts of consumption. The equipment shall stay illuminated at least 90 minutes upon AC failure. The exit sign shall be listed to UL924 standard.

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Outline and Dimensions

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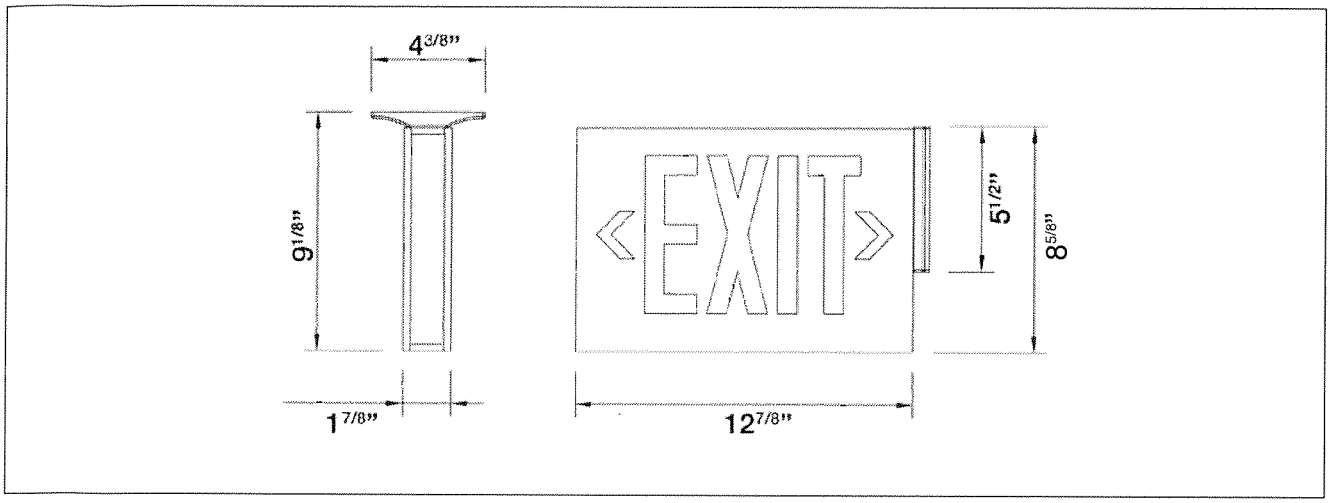

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Example: BAPU2R

Housing color	Models	No. of Faces	Legend Color	Options
BA= Black body/Aluminum face **WW**= White body/White face **WA**= White body/Aluminum face **BB**= Black body/Black face **AA**= Brushed aluminum body and face	**Standard Models** **P**= AC only (120/277 volts) **PU**= 120/277vac & 6 to 48vdc **PXN**= Self-powered diagnostic Ni-Cd **PND**= Self-powered Ni-Cd, No AD **Optional Models** **P2C1**= Dual AC circuit (2 x 120V) **P2C2**= Dual AC circuit (2 x 277V) **PNEX**= NEXUS® wired **PNEXRF**= NEXUS® wireless	1= Single Face 2= Double Face	**R**= Red **G**= Green **RW**= Red on white (Open face) **GW**= Green on white (Open face)	**Blank**= No options **FZ**= Flasher buzzer * **FL** = Flasher * **FA**= Fire alarm activated flasher (not available with PDN) **FBF**= Flasher buzzer + fire alarm activated flasher * **VR**= Tamper proof screws ** **VR1**= Polycarbonate shield with tamper proof screws ** **DL** = damp location *PXN, PNEX, PNEXRF models only **Please specify single or double face Red or Green

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All information and specifications contained in this specsheet are subject to change due to engineer design, errors and omissions. Illustrations and diagrams within this specsheet may vary from actual products.

SK & Associates	Description : WWSVXN1R-D4X-CW Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: WP

EMERGI-LITE

TYPE:
CATALOG #:
NOTES:

SVX SERIES SURVIVE-ALL EXIT
ALL PURPOSE LED EXIT SIGN

AC, AC/DC and Self-Powered
Self-Powered Exit Sign comes standard
with Self-Diagnostic/Self-Test circuitry

Listed to UL924 Standard

Sealed Maintenance-Free Battery
- Nickel Cadmium

Energy Star · UL Listed · NSF · ADVANCED EXIT DIAGNOSTICS

Applications:
• High Abuse Areas • Vandal Prone Areas • Damp and Wet Locations • NEMA-4X Rated • Hose Down Areas • Cold Temperatures • Food Processing/Preparation

General Information
The Survive-All SVX Series is offered in AC-Only, AC/DC or Self-Powered configurations. The industrial grade polyvinyl chloride enclosure is designed specifically for hostile environment applications. The Survive-All SVX Series is fully gasketed around lens and canopy. The sealed faceplate is constructed of heavy duty, vandal resistant polycarbonate and features an evenly illuminated legend. The stencil-face has knock-out directional chevron arrows. A magnetic test switch adds to the ruggedness of the SVX Series design by reducing the chance of tampering and damage.
The Survive-All SVX Series is designed specifically for high abuse areas, wet locations, and cold weather (-20C°) (-4°F) applications. It is ideally suited for schools, parking garages, public areas, transit platforms, and security areas/prisons.

Self-Diagnostic/Self-Test Feature (Standard)
Self-Diagnostic circuitry is standard on all self-powered models. This circuitry is programmed to ensure the exits readiness and reliability by continuously monitoring every critical function of the unit. If a problem occurs, a single service required indicator illuminates immediately. A detailed diagnostic display is located on the inside of the exit sign... out of sight from the general public will further indicate the nature of the fault. The self testing software will test the unit for 30 seconds every 30 days, 30 minutes every 60 days and 90 minutes annually.

Standard Features
Housing— Rugged poly vinyl chloride body, will not dent, peel, rust or corrode. The sealed faceplate is constructed of heavy duty, vandal resistant polycarbonate and features an evenly illuminated legend. The fully gasketed faceplate is fastened with stainless steel tamper-resistant screws. Models can be wall, end or ceiling mounting. Legend and chevron complies with UL and CSA requirements.

*AC only and AC/DC units are listed for use at -40°C to + 40°C

Reliability.— Survive-All SVX Series exits signs are unaffected by the vibrations, ambient temperature swings and typical power surges detrimental to standard exit light sources.

High Performance Circuitry
- Self Contained... Batteries and circuitry are located inside the exit housing.
- Continuous self-diagnostic monitoring.
- Fully automatic charger is solid state.
- AC, AC/DC and Self-Powered Models have universal, 2-wire input 120V to 277VAC 50/60 Hz.
- Batteries are sealed, maintenance-free Nickel-Cadmium for superior performance and long life.
- Provides 90 minutes of emergency operation.
- Batteries recharge per UL924 requirements.
- Self-testing in accordance with NFPA101
- Each unit comes standard with one tamper-proof driver bit. To order extra: part # 690.0454

Suggested Specification

Supply and install the Emergi-Lite SVX Series LED exit signs. The signs shall be listed to UL924. The exit housing shall be molded polyvinyl chloride in either white or black. A universal mounting pattern shall be available on single face signs for back mounting to a wall or surface. All models shall come equipped with a canopy for ceiling or end mount applications. The faceplate and canopy shall have gasketing available for a secure, water-tight seal. Vandal proof screws shall be provided for securing the faceplate(s).

Light Source: Shall be high intensity, long-life light emitting diodes (LED's). LED's shall provide even illumination, at the same intensity during AC operation and in the the emergency mode. LED's shall be mounted within the exit housing but not along the face or wording. An LED sensitive ink diffuser shall be mounted on the face to provide full 3/4" letter stroke with even illumination. Red LED technology shall be **ALINGAP**.

Self Powered Models: Shall have a Nickel-Cadmium battery for long, maintenance-free life. In the emergency mode the battery shall provide a minimum of 90 minutes run time. Self Testing/Self diagnostics shall be standard on all self powered signs. The circuit shall have a single "service required" LED visible to the user. A detailed diagnostic display will be found internally to the unit and isolate the fault to the battery charger board or LED lamps. The self testing software will simulate a power failure and transfer the light source to the battery for 30 seconds every 30 days, 30 minutes every 60 days and 90 minutes annually in accordance with NFPA 101. The unit shall be supplied with an AC pilot light and a magnetic proximity test switch for manual testing.

The charger shall be fully automatic, solid state, temperature compensated and short circuit protected. The Emergi-Lite model number shall be _____.

Optional Features

Description	Add Suffix
AC/DC (6-48Vdc)	-DC
Cold Weather (-20°C)(-4°F) (Self-Powered)	-CW
2 Circuit (120/120 or 277/277)	-2CKT*
Fire Alarm Activated Flasher (Self-Powered Only)	-FA
Flasher/Buzzer (Self-Powered Only)	-FB
Canopy Pendant Mount	-CM
Special Wording (Contact Factory)	

* AC Units only.

NOTE: Certain option combinations may effect the listing. Please contact the factory for specifics.

Accessories (order as a separate item)

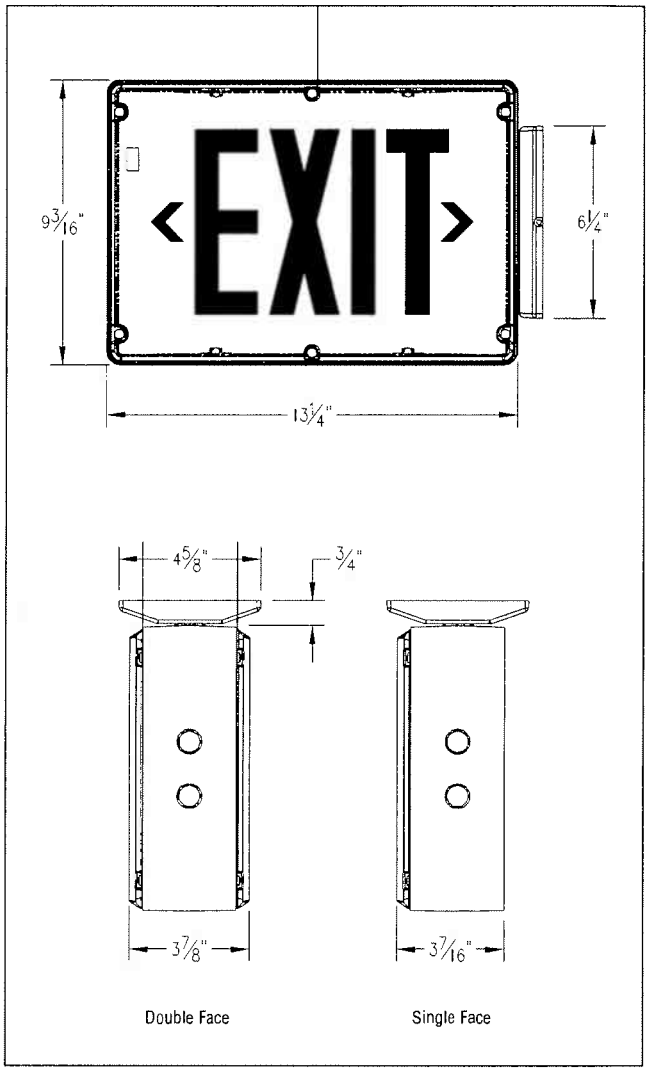
Tamper-Proof Bit ..... part # 690.0454
Convert single to double face, red ..... DFKR
Convert single face to double face, green ..... DFKG

Power Consumption

Model	AC Specs		DC Specs	
AC-only	120 to 277 Vac	1.2 W	-	-
AC/DC	120 to 277 Vac	1.2 W	6 to 24Vdc	Less than 1.5 W
Self-powered	120 to 277 Vac	3.7 W	NiCad battery	Min. 90 minutes

Outline and Dimensions

Dimensions are approximate and subject to change.



Unit Warranty*

Unit carries a 5-year Full Warranty.

Battery Warranty*

Sealed Nickel-Cadmium Battery has a 10 year life expectancy and carries a 5-year Full Warranty, plus a 5-year pro rata warranty.

**Subject to proper installation and maintenance*

How To Order *(example)*

BB	SVXN	1	R	- D	- 4X	- FA
Color Option, Housing/Face	*Series (120/277 Volt)*	*Faces*	*Legend colors*	*Diagnostics*	*Housing*	*Options*
BB = Black/Black	**SVX** = AC-only	**1** = Single face	**R** = Red	Standard on all self-powered Models	NEMA 4X housing standard	*See Optional Features*
BW = Black/White	**SVXN** = Self-powered Nickel Cadmium Battery	**2** = Double face	**G** = Green			
BA = Black/Aluminum						
GB = Gray/Black						
GW = Gray/White						
GA = Gray/Aluminum						
WB = White/Black						
WW = White/White						
WA = White/Aluminum						

EMERGI-LITE

Printed in Canada. 07/07 960.1859

Thomas&Betts

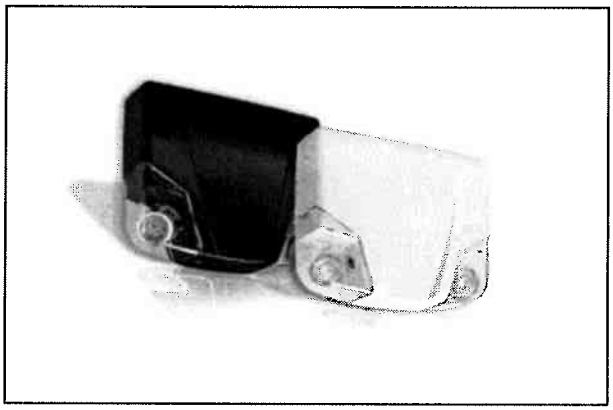
SK & Associates	Description : 12PR40M-2MK-DA Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: **EB**

EMERGI-LITE®

TYPE: _____

CATALOG #: _____

NOTES: _____



Premier Series

Injection-moudled Thermoplastic Battery Unit

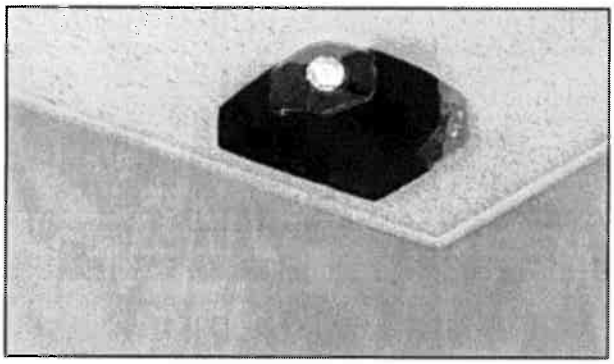
nexus

The **Premier battery unit Series** is designed with aesthetics, ease of installation and performance in mind

Standard Features

- Simple, compact and contemporary design
- Wall-mount or ceiling-mount installation (specify)
- Two-piece housing of injection-molded thermoplastic
- MR16 halogen lamps, shielded by clear polycarbonate covers
- Sealed, maintenance-free, Lead-Calcium or Nickel-Cadmium batteries
- Dual voltage input: 120/277 Vac.
- Total load capacity up to 72Watts
- UL924 listed
- Advanced diagnostic-audible (optional)
- Listed for damp locations (optional)
- NEXUS® interface (optional)

Flat Ceiling Mount



Suggested Specification

Supply and install **Premier Series** of battery unit equipment. The unit construction shall include a housing and a front cover of high-impact thermoplastic molded in white. No screws shall be necessary to hold the front cover to the housing. The unit shall be equipped at the bottom with two emergency heads with adjustable swivels and long-life MR-16 lamps of ___ V ___W protected by snap-on shock-absorbent, clear polycarbonate covers. The unit shall be suitable for wall mount or as otherwise specified.

The unit shall be suitable for wall or ceiling mount application (please specify). The unit equipment shall have a dual-voltage input of 120/277Vac and shall be equipped with a test switch and a pilot light, located on the left side. The housing shall host the battery and the battery charger. The battery charger and other unit functions shall be driven by a micro-controller. All electronic circuitry shall be installed on a single printed circuit board.

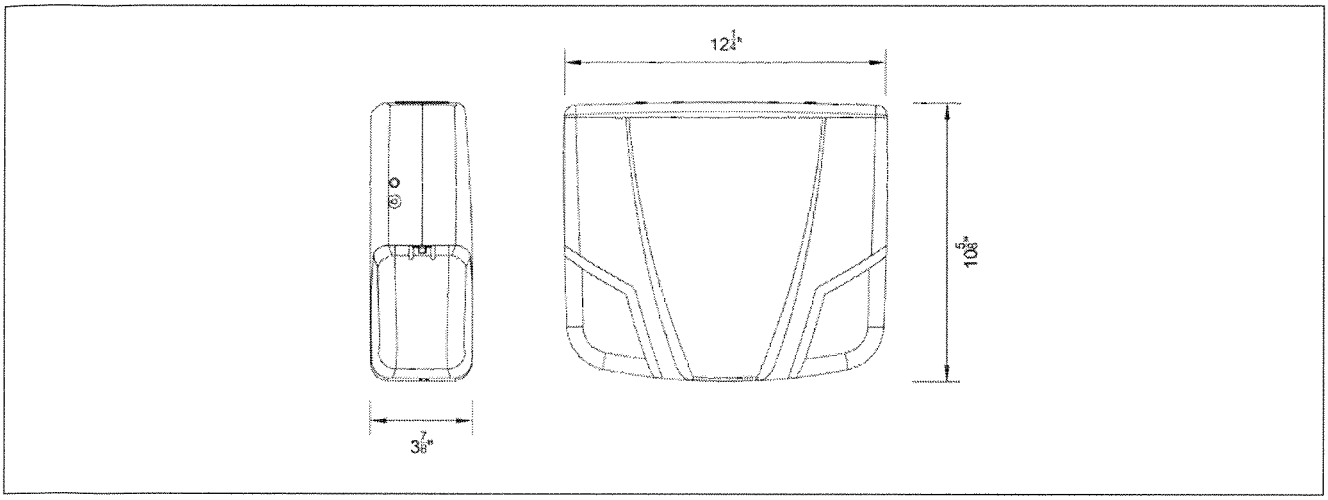
When specified, the unit equipped with Advanced Diagnostic shall automatically self-test for one minute every 30 days, 30 minutes in the 6th month and 90 minutes annually. When a fault is detected, the bi-color pilot light shall turn from green to red and start flashing. A legend on a label next to the pilot light shall display the source of failure: battery, charger circuitry or lamp load.

The unit equipment shall be UL924 listed.

The unit equipment shall be **Emergi-Lite** model: _____.

Outline and Dimensions

Dimensions are approximate and subject to change.



Power Consumption Chart

Model	AC Specs		Watts to 87.5% of rated battery voltage(*)			
			1 1/2 hours	2 hours	3 hours	4 hours
18M	6 Volts	0.25 / 0.12 A	18	14	9	-
30M	6 Volts		30	20	15	10
40M	6 Volts		40	30	20	15
60M	6/12 Volts		60	40	30	20
72M	12 Volts		72	54	36	27
20NC	6 Volts	0.2 / 0.1 A	20	15	10	8
40NC	12 Volts		40	30	20	15
50NC	12 Volts		50	36	24	18

***National Electrical Code specification**

Unit Warranty*

Unit carries a 5-year full warranty. (excluding lamps and fuses)

Replacement Batteries

Model	Battery Type
860.0018-E	Lead Calcium
860.0010-E	Lead Calcium
860.0064-E	Lead Calcium
002006-E	NiCad
022290-E	NiCad

Replacement Lamps

Model	Lamp Type	Voltage-Wattage
580.0074-E	MR16	6V6W
580.0079-E	MR16	6V10W
580.0099-E	MR16	12V10W
580.0080-E	MR16	12V12W
580.0075-E	MR16	12V20W
580.0096-E	LED MR16	12V4W

Wire Guards

WG1-E	Wall or flat ceiling mount

How To Order

Battery Unit

Example: PR18M2MI

Housing color	Series/Capacity	Number of heads	Lamp/Wattage	Unit type	Options
Blank= white **B**= black	**PR18M**=6V18W lead cal **PR30M**= 6V30W lead cal **PR60M**= 6V60W lead cal **12PR40M**= 12V40w lead cal **12PR60M**= 12V60W lead cal **12PR72M**=12V72W lead cal **PR20NC**= 6V20W NiCad **12PR40NC**= 12V40W NiCad **12PR50NC**= 12V50W NiCad	**Blank**= 0 heads **2**= two heads	***MI**= 6V6W MR16 ***MJ**= 6V10W MR16 ***MO**= 12V10W MR16 ***MK**= 12V12W MR16 **MG**=12V20W MR16 ***LH**= 12V4W LED MR16 * Available with Damp Location.	**Blank**= standard **-D**= advanced diagnostics non-audible **-DA**= advanced diagnostics audible **NEX***= NEXUS® interface **NEXRF***= NEXUS® wireless	**Blank**= no option **-D3**= time delay (15 mins)* **-CM**= ceiling mount **-DL**= Damp Location *Not available with NEXUS®

EMERGI-LITE®

www.emergi-lite.com

Thomas&Betts

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Printed in Canada. 05/10/1300. Order n°. ELUSA-PREMIERBATTERYUNIT-SPECSHEET

All information and specifications contained in this flyer are subject to change due to engineer design, errors and omissions. Illustrations and diagrams within this flyer may vary from actual products.

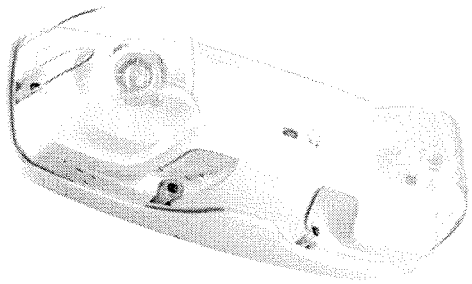
SK & Associates	Description : 12SV54M-2MW-DA Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: EBH

EMERGI-LITE®

TYPE:

CATALOG #:

NOTES:



Survive-All SV Series

6 or 12 Volt

Nema 4X Battery Unit

Listed to UL 924 standards

Sealed Maintenance-Free Battery

- Lead Calcium
- Nickel Cadmium

Patent Pending | UL Listed | NSF | ADVANCED EXIT DIAGNOSTICS | NEMA-4X

General Information

The **Survive-All SV Series** will help change the way typical emergency lighting battery units are perceived. It is designed for use in commercial as well as industrial heavy-duty environments, such as hose-down areas, food-processing facilities, parking garages, and other demanding applications. The visually pleasing design makes it also ideal for schools and other public facilities.

The **Survive-All SV Series** Emergency Battery Unit will provide 90 minutes of illumination for rated wattage upon loss of the AC power.

Standard Features

Reliability: The Survive-All SV Series Emergency Battery Unit carries a 3-year limited warranty.

Unit data

Housing: The equipment is constructed of a die-cast aluminum backplate and an aesthetically pleasing housing, made of industrial grade thermoplastic. The MR16 emergency lights are protected by a UV stabilized clear polycarbonate cover, which is installed with stainless steel tamper-proof screws. A special bit for these screws is provided with every unit and additional bits can be ordered separately (see accessories). Special gaskets are installed to guarantee a watertight, dust-tight NEMA 4X rated enclosure. The thermoplastic housing is available in 3 colors: off- white, black and gray. The unit is NSF Certified for use in food processing plants.

Light Source

The fully field adjustable emergency lighting heads can be equipped with standard MR16 halogen lamps (with a power range of 6 to 20W) or MR16 white LED lamps (the lamp consumes 4 Watts and includes a 3-Watt Luxeon white LED)

Unit Rating Chart

UNIT EQUIPMENT - WITH REMOTE CAPABILITY				
Sealed Maintenance-Free Battery Types	*Watts to 87 1/2% of rated battery voltage			
	1 1/2 hrs.	2hrs.	3hrs.	4 hrs.
Lead-Calcium	18	12	-	-
	24	16	12	-
	36	24	20	14
	54	36	27	20
Nickel-Cadmium	24	18	12	-
	40	30	20	15
Nickel Metal Hydride	60	45	30	20

*National Electrical Code Specification

Charger

The **Survive-All SV Series** Emergency Battery Unit is equipped with a fully automatic Improved Diagnostic Micro-controller based circuitry. The Micro-controller tests, detects and indicates any malfunction or failure of the battery, charger circuitry, or lamps. An external LED signals a general service alarm, while four internal diagnostic LED's indicate the nature of failure. The board is factory preset to non-audible diagnostic and a 15 minutes time delay. These functions can be enabled or disabled during installation. The equipment comes standard with a dual voltage input of 120/277Vac.

Battery

Sealed, Lead-Calcium, battery with capacity of 18W to 54W for 90 minutes of emergency operation at 6Vdc or 12Vdc.

Sealed, Maintenance free Nickel-Cadmium battery is UL listed for wet and damp location from 5°C to 40°C (41°F to 104°F).

Optional features

Description	Add Suffix
Cold weather location (-40°C to +40°C) (-40°F to +104°F)	..-CW4*

*Only available 12SV24M and 12SV36M Lead-Calcium battery.

Accessories (order as a separate item)

Additional bit for tamperproof screws .....TPB

Universal bracket (for mounting on poles, I-beams or strut metal framing) .....PMK

NOTE: Certain option combinations may affect the listings. Please contact the factory for specifics.

*Unit Warranty

Entire unit (excluding lamps) carries a 3-year full warranty.

*Battery Warranty

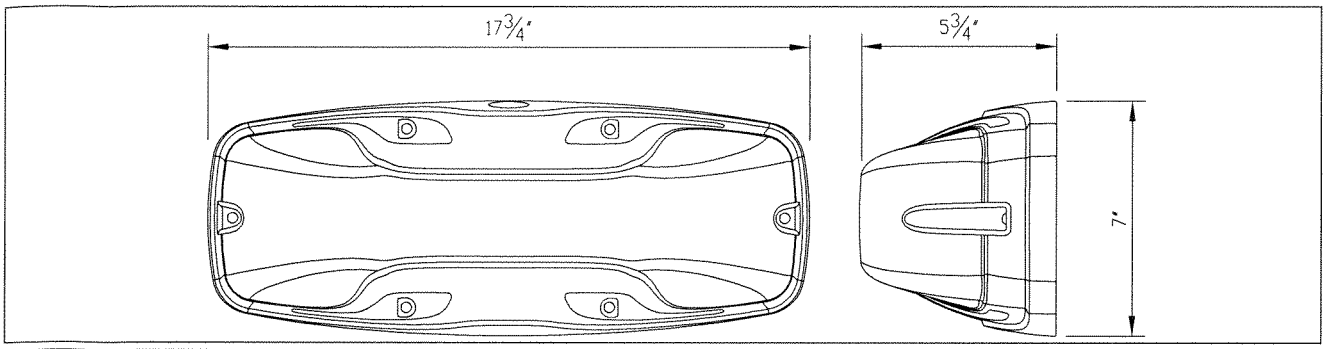
Lead-Calcium batteries carry a 3-year full warranty and 3-year pro-rata warranty.

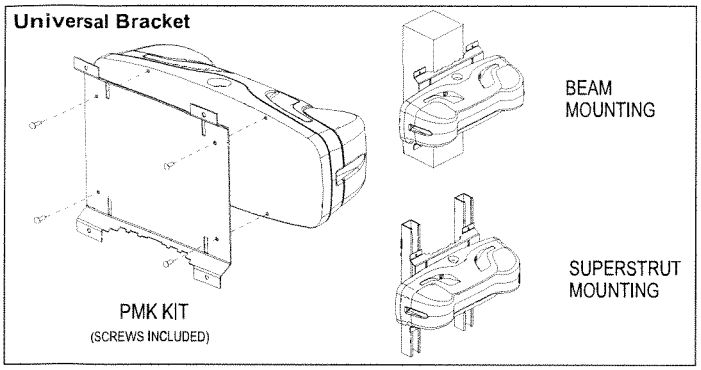
Nickel-Cadmium batteries carry a 5-year full warranty and 5-year pro-rata warranty.

*Subject to proper installation and maintenance.

Outline and Dimensions

Dimensions are approximate and subject to change.





Mounting

The unit has a universal knockout pattern for direct wall-mounting on the junction box. A 7/8" knockout, located on the side of the top of the unit, is also available for conduit entry. Special bracket can be ordered (see accessories) for mounting on poles, I-beams or Superstrut® structures.

Suggested Specification

Supply and install Emergi-Lite, Survive-All SV Emergency Battery Unit, with electrically compatible fixtures or exit signs as indicated on the plans.

The unit shall include a die-cast aluminum back plate and an equipment frame of industrial grade thermoplastic with a gasket around lenses and canopy, specifically designed for hostile environments. The front of the unit shall be protected with a clear cover constructed of heavy-duty vandal-resistant, UV stabilized polycarbonate, fixed with tamper-proof screws. Emergency lights shall be fully adjustable and equipped with high efficiency MR16 lamps. The unit shall be NEMA 4X rated, NSF certified and designed specifically for high abuse areas, wet and damp locations, as well as cold weather applications (CW4 option).

The equipment shall supply the rated load for a minimum of 90 minutes to 87.5% of the rated battery voltage. The unit shall be rated 120/277Vac, 60Hz, and be UL listed. The unit shall have an output of ___ V ____ W.

The charger shall at first continuously recharge the battery, then when the battery is at full capacity, the charger will periodically pulse-charge the battery in stand-by mode. This pulse-plus charger promotes long battery life and reduces the potential for grid corrosions. Its charge voltage is factory set to +/-1% tolerance and temperature compensated. The charger incorporates Lockout and Brownout Circuits, and Low Voltage Disconnection. It protects the unit from over-current, short-circuit, and reverse polarity.

The Emergi-Lite Advanced Diagnostic Micro-controller board shall self-test for 1 minute every 30 days, 30 minutes on the 6th month and 90 minutes every 12 months. The unit shall be capable of full recharge in compliance with UL specifications. The unit shall be furnished with a magnetic test switch. A "Service Required" lamp shall be located near the test switch and flash when a fault is detected. A LED-based diagnostic display shall be located inside the equipment and shall identify the source of failure (battery, charger, circuitry, or lamps).

The unit shall be Emergi-Lite Model - _____

How To Order

Example: B12SV36M-2MK-D

Color	Series	# of Heads	Lamps	Charger	Options
B = black **G** = gray **W** = white	**SV18M** = 6V - 18W, lead calcium **12SV24M** = 12V - 24W, lead calcium **12SV36M** = 12V - 36W, lead calcium **12SV54M** = 12V - 54W, lead calcium **12SV24N** = 12V - 24W, nickel cadmium **12SV40N** = 12V -40W, nickel cadmium **12SV60H** = 12V - 60W, NIMH	**-2** = 2 heads	**L** = LED 12V-5W **MI** = 6V-6W, MR16 **MK** = 12V-12W, MR16 **MW** = 12V-20W, MR16-IR	-**D** = Advanced diagnostic non-audible (standard) **-DA** = Advanced diagnostic audible	**Blank** = no options **CW4** = cold weather* (-40°C to +40°C) (-40°F to +104°F) *Only available with 12SV24M & 12SV36M.

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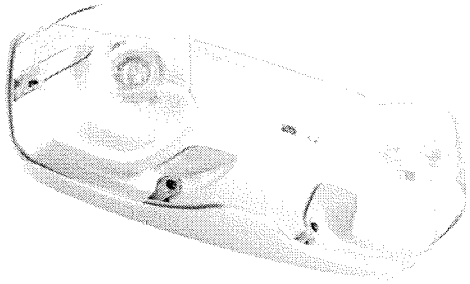
All information and specifications contained in this flyer are subject to change due to engineer design, errors and omissions. Illustrations and diagrams within this flyer may vary from actual products.

SK & Associates	Description : 12SV24M-2MK-DA-CW4 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: EBW

EMERGI-LITE®

TYPE:
CATALOG #:
NOTES:



Survive-All SV Series

6 or 12 Volt

Nema 4X Battery Unit

Listed to UL 924 standards

Sealed Maintenance-Free Battery

- Lead Calcium
- Nickel Cadmium

Patent Pending | UL Listed | NSF | ADVANCED EXIT DIAGNOSTICS | NEMA-4X

General Information

The **Survive-All SV Series** will help change the way typical emergency lighting battery units are perceived. It is designed for use in commercial as well as industrial heavy-duty environments, such as hose-down areas, food-processing facilities, parking garages, and other demanding applications. The visually pleasing design makes it also ideal for schools and other public facilities.

The **Survive-All SV Series** Emergency Battery Unit will provide 90 minutes of illumination for rated wattage upon loss of the AC power.

Standard Features

Reliability: The Survive-All SV Series Emergency Battery Unit carries a 3-year limited warranty.

Unit data

Housing: The equipment is constructed of a die-cast aluminum backplate and an aesthetically pleasing housing, made of industrial grade thermoplastic. The MR16 emergency lights are protected by a UV stabilized clear polycarbonate cover, which is installed with stainless steel tamper-proof screws. A special bit for these screws is provided with every unit and additional bits can be ordered separately (see accessories). Special gaskets are installed to guarantee a watertight, dust-tight NEMA 4X rated enclosure. The thermoplastic housing is available in 3 colors: off- white, black and gray. The unit is NSF Certified for use in food processing plants.

Light Source

The fully field adjustable emergency lighting heads can be equipped with standard MR16 halogen lamps (with a power range of 6 to 20W) or MR16 white LED lamps (the lamp consumes 4 Watts and includes a 3-Watt Luxeon white LED)

Unit Rating Chart

UNIT EQUIPMENT - WITH REMOTE CAPABILITY				
Sealed Maintenance-Free Battery Types	*Watts to 87 1/2% of rated battery voltage			
	1 1/2 hrs.	2hrs.	3hrs.	4 hrs.
Lead-Calcium	18	12	-	-
	24	16	12	-
	36	24	20	14
	54	36	27	20
Nickel-Cadmium	24	18	12	-
	40	30	20	15
Nickel Metal Hydride	60	45	30	20

*National Electrical Code Specification

Charger

The **Survive-All SV Series** Emergency Battery Unit is equipped with a fully automatic Improved Diagnostic Micro-controller based circuitry. The Micro-controller tests, detects and indicates any malfunction or failure of the battery, charger circuitry, or lamps. An external LED signals a general service alarm, while four internal diagnostic LED's indicate the nature of failure. The board is factory preset to non-audible diagnostic and a 15 minutes time delay. These functions can be enabled or disabled during installation. The equipment comes standard with a dual voltage input of 120/277Vac.

Battery

Sealed, Lead-Calcium, battery with capacity of 18W to 54W for 90 minutes of emergency operation at 6Vdc or 12Vdc.

Sealed, Maintenance free Nickel-Cadmium battery is UL listed for wet and damp location from 5°C to 40°C (41°F to 104°F).

Optional features

Description	Add Suffix
Cold weather location (-40°C to +40°C) (-40°F to +104°F)	..-CW4*

*Only available 12SV24M and 12SV36M Lead-Calcium battery.

Accessories (order as a separate item)

Additional bit for tamperproof screws .....TPB

Universal bracket (for mounting on poles, I-beams or strut metal framing) .....PMK

NOTE: Certain option combinations may affect the listings. Please contact the factory for specifics.

*Unit Warranty

Entire unit (excluding lamps) carries a 3-year full warranty.

*Battery Warranty

Lead-Calcium batteries carry a 3-year full warranty and 3-year pro-rata warranty.

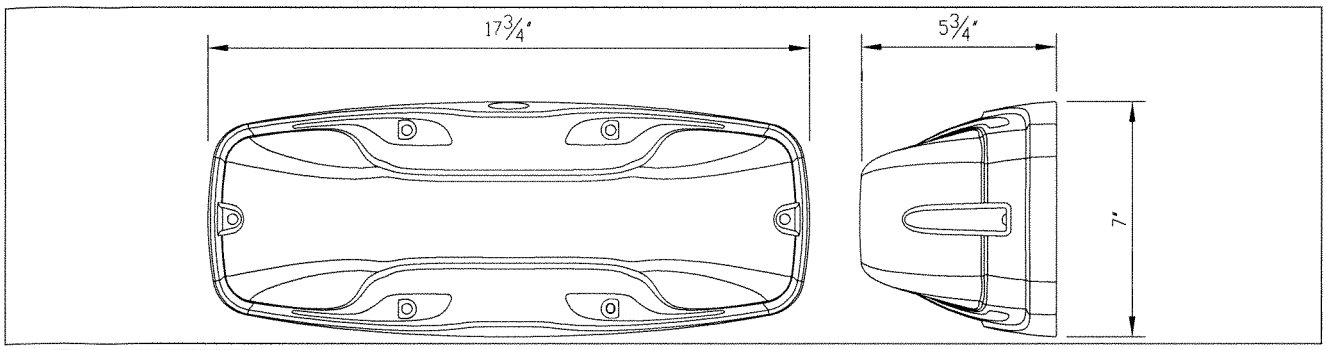
Nickel-Cadmium batteries carry a 5-year full warranty and 5-year pro-rata warranty.

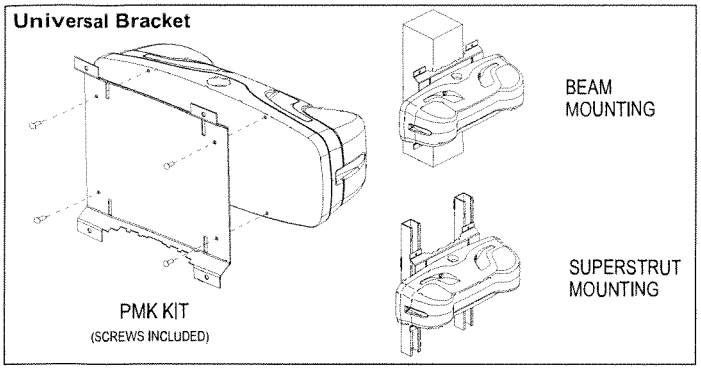
*Subject to proper installation and maintenance.

U.L. Listed to Standard 924. Complies with NEC, Life Safety Code and OSHA. Approved for use in the Commonwealth of Pennsylvania.

Outline and Dimensions

Dimensions are approximate and subject to change.





Mounting

The unit has a universal knockout pattern for direct wall-mounting on the junction box. A 7/8" knockout, located on the side of the top of the unit, is also available for conduit entry. Special bracket can be ordered (see accessories) for mounting on poles, I-beams or Superstrut® structures.

Suggested Specification

Supply and install Emergi-Lite, Survive-All SV Emergency Battery Unit, with electrically compatible fixtures or exit signs as indicated on the plans.

The unit shall include a die-cast aluminum back plate and an equipment frame of industrial grade thermoplastic with a gasket around lenses and canopy, specifically designed for hostile environments. The front of the unit shall be protected with a clear cover constructed of heavy-duty vandal-resistant, UV stabilized polycarbonate, fixed with tamper-proof screws. Emergency lights shall be fully adjustable and equipped with high efficiency MR16 lamps. The unit shall be NEMA 4X rated, NSF certified and designed specifically for high abuse areas, wet and damp locations, as well as cold weather applications (CW4 option).

The equipment shall supply the rated load for a minimum of 90 minutes to 87.5% of the rated battery voltage. The unit shall be rated 120/277Vac, 60Hz, and be UL listed. The unit shall have an output of ___ V ____ W.

The charger shall at first continuously recharge the battery, then when the battery is at full capacity, the charger will periodically pulse-charge the battery in stand-by mode. This pulse-plus charger promotes long battery life and reduces the potential for grid corrosions. Its charge voltage is factory set to +/-1% tolerance and temperature compensated. The charger incorporates Lockout and Brownout Circuits, and Low Voltage Disconnection. It protects the unit from over-current, short-circuit, and reverse polarity.

The Emergi-Lite Advanced Diagnostic Micro-controller board shall self-test for 1 minute every 30 days, 30 minutes on the 6th month and 90 minutes every 12 months. The unit shall be capable of full recharge in compliance with UL specifications. The unit shall be furnished with a magnetic test switch. A "Service Required" lamp shall be located near the test switch and flash when a fault is detected. A LED-based diagnostic display shall be located inside the equipment and shall identify the source of failure (battery, charger, circuitry, or lamps).

The unit shall be Emergi-Lite Model - _____

How To Order

Example: B12SV36M-2MK-D

Color	Series	# of Heads	Lamps	Charger	Options
B = black **G** = gray **W** = white	**SV18M** = 6V - 18W, lead calcium **12SV24M** = 12V - 24W, lead calcium **12SV36M** = 12V - 36W, lead calcium **12SV54M** = 12V - 54W, lead calcium **12SV24N** = 12V - 24W, nickel cadmium **12SV40N** = 12V -40W, nickel cadmium **12SV60H** = 12V - 60W, NIMH	**-2** = 2 heads	**L** = LED 12V-5W **MI** = 6V-6W, MR16 **MK** = 12V-12W, MR16 **MW** = 12V-20W, MR16-IR	**-D** = Advanced diagnostic non-audible (standard) **-DA** = Advanced diagnostic audible	**Blank** = no options **CW4** = cold weather* (-40'C to +40'C) (-40'F to +104'F) *Only available with 12SV24M & 12SV36M.

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All information and specifications contained in this flyer are subject to change due to engineer design, errors and omissions. Illustrations and diagrams within this flyer may vary from actual products.

EXITRONIX

CT700 Series

STEEL WHEELCHAIR ACCESSIBLE EXIT

Model Number: Accessories: Job: Type:	Approvals:

STANDARD FEATURES

- Meets State of Connecticut Emergency Building Code requirements (Para. 1011.1.2)
- Enclosure constructed of rugged 20 gauge steel
- Face includes "EXIT" wording with the ADA compliant, universal wheelchair accessible symbol
- Charge rate/power "ON" LED indicator light with test button
- Maintenance-free NiCad battery
- ETL listed 90 minute emergency run time, 24 hour recharge time
- Exit face is illuminated by long-life, high intensity, red or green LEDs
- Chevron-style, universal arrow knockouts
- Universal Mounting - Ceiling, back or end mount
- 120/277V dual primary, 60Hz input
- Standard finishes: Black or white

The CT700 Series offers a contemporary slim profile steel housing design ideal for commercial and institutional installations utilizing the ADA Compliant, State of Connecticut required, universal handicap symbol. This series features high intensity red or green LED's providing bright and uniform illumination, while offering durability and strength in a 20 gauge steel enclosure.

WARRANTY

Electronic and battery warranted for 3 years. This warranty does not cover physical damage, abuse, or acts of God. Manufacturer reserves the right to charge for repairs if deemed necessary.

3/3 WARRANTY

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

ORDERING INFORMATION **Example:** CT703-WB-WH

Series	Power Source	Finish
CT702 = Red Single Face	LB = AC Only	WH = White
CT703 = Red Double Face	WB = With Battery	BL = Black
GCT702 = Green Single Face		
GCT703 = Green Double Face		

CONSTRUCTION

The CT700 series exit is constructed of 20 gauge steel. Universal chevron knockouts are concealed and easily removed. All units are supplied with mounting canopy for back, top or end mounting. Finish options include white or black powder coat.

Stencil letters and ADA compliant wheelchair symbol are 6" high with 3/4" stroke, with minimum of 100 ft viewing distance rating as required by UL924 standard.

ILLUMINATION

Illumination of the CT700 series is accomplished utilizing high-intensity, long-life red or green LEDs. LEDs provide excellent illumination while maximizing energy efficiency. As a maintenance-free solution, LEDs provide up to 100,000 hours of use without failure.

ELECTRICAL

Input

Dual-voltage input 120 or 277VAC @ 60Hz.

Sealed Nickel Cadmium Battery – NiCad

Exitronix sealed nickel cadmium batteries are maintenance-free with a life expectancy of 15 years. Nickel cadmium batteries offer high discharge rates and continue to perform in a vast temperature range from 0-40 degrees C. NiCad technology provides long lasting, safe and reliable performance by utilizing the jelly-roll design and allows a Ni-Cad cell to deliver a much higher maximum current than an equivalent size alternative battery. As a relatively larger area of the electrode is in contact with the active material in each cell, the internal resistance for an equivalent sized NiCad cell is lower which increases the maximum current that can be delivered.

Emergency

The CT700 series exit will operate for a minimum of 90 minutes during a loss of power with a 24 hour maximum recharge time for the battery.

Brownout Circuit

The brownout circuit monitors the flow of AC current to the unit and triggers the emergency lighting system once a set reduction of AC power occurs. This dip in the voltage will cause many fixtures to extinguish causing loss of normal lighting even though a total power failure has not occurred.

Low Voltage Disconnect

When the battery's terminal voltage falls below predetermined levels, the low-voltage circuit disconnects the emergency lighting load. The disconnect remains in effect until normal power is restored, preventing deep battery discharge and improving the life of the battery. The disconnect will also automatically reconnect the load circuit once the battery voltage returns to a normal value after charging.

Solid-State Transfer

The unit features a solid-state switching transistor which eliminates damaged contacts or mechanical failures associated with relays. The switching circuit is designed to detect a loss of AC power and automatically energizes the lamps. Upon restoration of the AC voltage, the emergency lamps will switch off and the charger will automatically recharge the battery.

Overload and Short-Circuit Protection

The solid-state overload monitoring system in the DC circuit disconnects the lamp load from the battery should excessive wattage demands be made and automatically resets when the overload or short-circuit is removed. This overload current protective characteristic eliminates the need for fuses or circuit breakers for the DC load.

Test Button

Our easily located test button allows for manual verification of proper operation of the transfer circuit and emergency lamps.

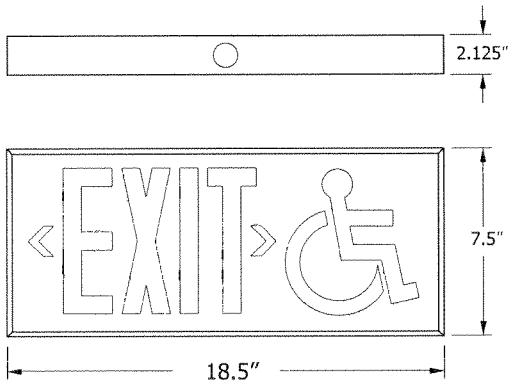
INSTALLATION

Installs in minutes with easy-to read instructions and detailed diagrams. No special hardware or tools necessary. Internally housed components and battery.

CONFORMANCE TO CODES & STANDARDS

The CT400 Series is ETL listed and meets or exceeds the following: UL 924, NEC requirements and NFPA 101. Specifically designed to meet the requirements of the State of Connecticut, Building Code Paragraph 1011.1.2

DIMENSIONS



BARRON lighting group

1911 W. Parkside Lane • Phoenix, AZ 85027
(800) 533-3948 • Fax: (623) 580-8948
www.barronltg.com

SK & Associates	Description : SLSCDS800 Project Name: NORFOLK AGRICULTURAL HIGH SCHOOL Notes:	TYPE: OCC

Segment Markets:

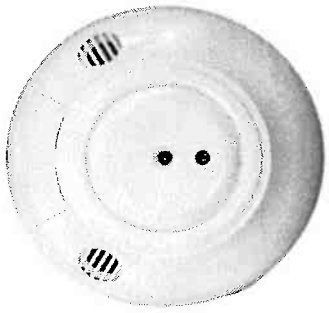
Residential Industrial Retail Hospital

180 Degree Ceiling-Mounted Occupancy Sensor

The 180 Degree Ceiling-Mounted Occupancy Sensors are ideal for use in business and office settings to accurately detect occupancy and automatically control lighting. The ceiling-mount design of these low-profile sensors allows the greatest possible motion sensitivity. An adjustment panel is conveniently located on the front of the sensor, providing ready access to setting controls after the sensor is installed. These occupancy sensors are available in the ultrasonic and dual technology models. The dual technology model employs passive infrared (PIR) and ultrasonic technology.

Features

- 1000 sq. ft. coverage area
- 180° field of view
- New patent pending adaptive technology employs advanced algorithms to achieve convenient energy savings and reduce lamp and ballast maintenance.
- Ambient light level sensing from 0.5 to 250 foot-candles
- Adjustable time delay from 15 sec. to 30 min.
- Adjustable sensitivity from 600 to 1000 sq. ft. (10-100% of maximum coverage)
- Isolated relay (Form C contacts for Class 2 signalling)
- LED motion indicators (ultrasonic = 1 red, dual technology = 1 red, 1 green)



180 Degree Ultrasonic Occupancy Sensor

180 Degree Dual Technology Occupancy Sensor

*** Comes with masking kit for changing coverage pattern as low as 45 degrees and adjustable in 15 degree increments.**

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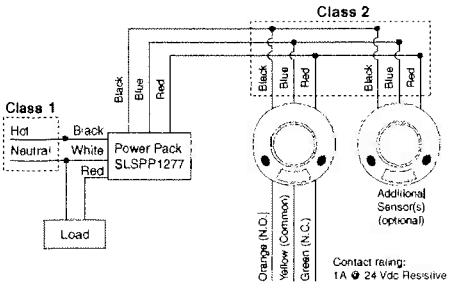
Wiring

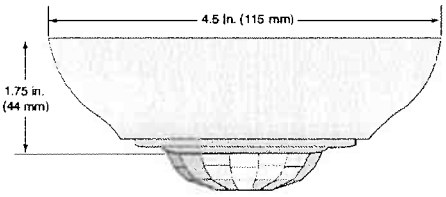


Standards and Specifications

Standards	Ultrasonic	Dual
	UL and cUL Listed FCC Part 15, Home and Office Use (Class B) California Title 24 Certified	
Specifications	**Ultrasonic**	**Dual**
Current Consumption @ 24VDC*	Active: 30mA	Active: 33mA
Isolated relay	Contact rating: 1A @24Vdc Resistive	
Operating Temperature	32 to 122°F (0 to 50°C)	
Humidity	0 to 90% RH non-condensing	

*Control power must be provided by the Power Pack SLSPP1277 or an approved equivalent.

Dimensions



Order Information

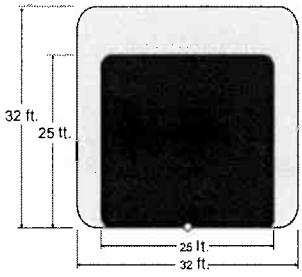
Description	Catalog Number
180 Degree Ultrasonic sensor	SLSCUS800
180 Degree Dual Technology Sensor (PIR and Ultrasonic Sensors combined)	SLSCDS800
Auxiliary Relay (optional)	SLSSP24

Ultrasonic

SLSCUS800

COVERAGE PATTERNS FOR 9 FT. CEILING HEIGHT

Top View



Area of Detection

□ : Ultrasonic Major Motion

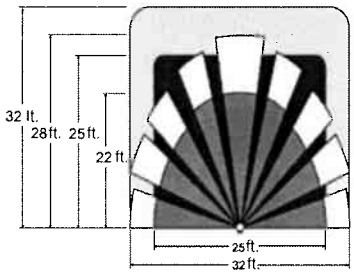
■ : Ultrasonic Minor Motion

Dual Technology

SLSCDS800

COVERAGE PATTERNS FOR 9 FT. CEILING HEIGHT

Top View



Area of Detection

□ : Ultrasonic Major Motion

■ : Ultrasonic Minor Motion

□ : PIR Major Motion

▩ : PIR Minor Motion

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SK & Associates	Description : **SLSCDS2000** Project Name: **NORFOLK AGRICULTURAL HIGH SCHOOL** Notes:	TYPE: **OCS**

Segment Markets:

Industrial Retail Hospital Other

Ceiling-mounted Dual Technology Occupancy Sensor

Ceiling-mounted Dual Technology Occupancy Sensor employs both passive infrared (PIR) and ultrasonic technology to accurately detect occupancy and automatically turn on lighting. To reduce the occurrence of false-on events, this sensor employs PIR technology to detect major motion. Once lighting has been turned on, it employs highly sensitive PIR and ultrasonic technology to detect minor motion and keep lighting on while areas remain occupied. When the room or area is no longer occupied, the sensor turns off lighting after a pre-set time delay.

The low profile sensor is ceiling mounted for greatest sensitivity to motion in large areas with obstructions. With a 360 degree field of view and up to 2000 square feet of coverage area, the Ceiling-mounted Dual Technology Occupancy Sensor is ideal for conference rooms, classrooms, bathrooms, and large office areas.

These ceiling mount sensors also incorporate an integral light level sensor to prevent lighting from switching On when sufficient ambient light is present, such as is commonly found in windowed areas.

Installation and configuration is simple. The sensor readily mounts to drop ceilings and features front located adjustments for setting sensitivity and time delay. The sensor also features an isolated relay for use with building automation and HVAC systems.

Features

- 2000 sq. ft. coverage area
- 360 degree field of view
- Light level sensing (from 0.5 to 250 foot-candles)
- Adjustable time delay (pre-set time delays from 15 seconds to 30 minutes)
- Automatic adaptive technology adjusts the time delay for maximum energy savings.
- Adjustable sensitivity (from 60 to 100%)
- Isolated relay (1A at 24Vdc NO and NC From C Relay)
- LED motion indicators (Red-PIR/Green-Ultrasonic)
- Adjustment compartment cover equipped with retention feature
- Manual bypass
- UL®/cUL Listed
- Five-year warranty

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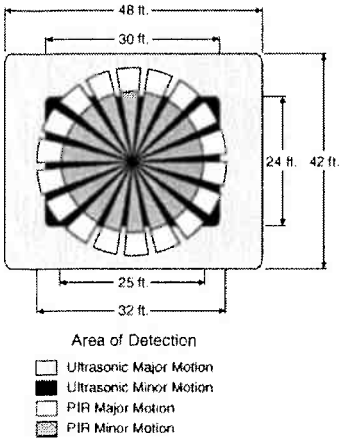
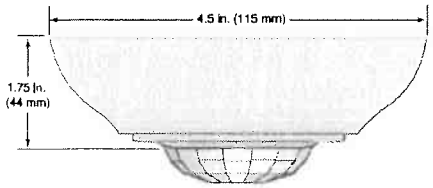
Dual Technology Sensor Field of View (Top)



Dual Technology Sensor Measurements



Specifications

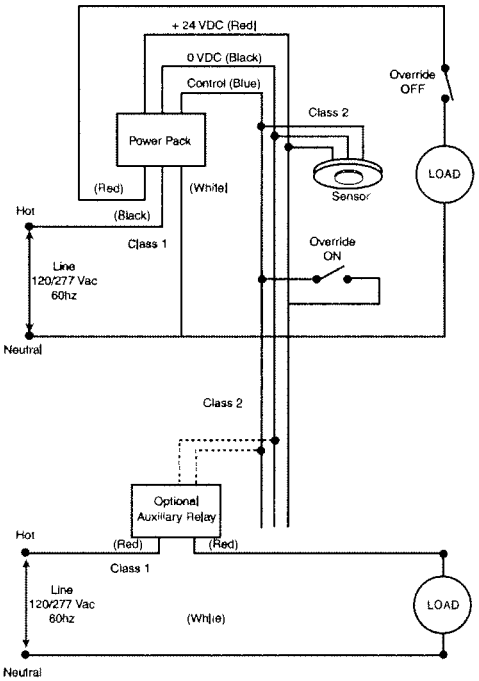
Ceiling Mounted Dual Technology Occupancy Sensor	
Current Consumption @ 24Vdc*	37mA Nominal
Isolated Relay	1A @ 24 Vdc Resistive
Operating Temperature	32 - 122°F (0 - 50°)
Maximum Humidity	90% RH Non-condensing
Standards	UL and cUL Listed FCC: Part 15, Home and Office Use Class B Title 24 Certified

* Control power must be provided by Schneider Electric Power Pack SLSPP1277 or an approved equivalent.

Order Information

Description	Catalog Number
Ceiling-mounted Dual Technology Sensor	SLSCDS2000
Power Pack (required)	SLSPP1277
Auxiliary Relay	SLSSP24

Wiring Diagram



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SK & Associates	Description : **SLSPP1277** Project Name: **NORFOLK AGRICULTURAL HIGH SCHOOL** Notes:	TYPE: **PP**

Segment Markets

Industry Retail Hospital Other

Power Pack and Auxiliary Relay – 120V/ 277V

The power pack supplies low voltage power to Schneider Electric ceiling and wall mounted occupancy sensors, and employs a heavy duty 20A relay to switch lighting and HVAC loads based on a control signal received from the occupancy sensor. The power pack accepts 120V and 277V input and supplies up to 100mA at 24VDC.

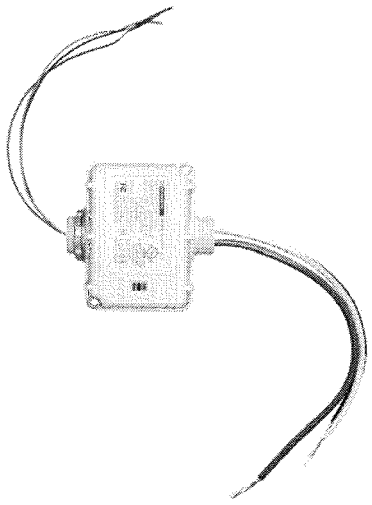
The power pack employs a micro-controller that switches loads at minimum voltage, protecting relay contacts from high in-rush current common when switching electronic ballasts. This switching method reduces the stress across the relay contacts, preventing arc-over and assuring long reliable contact life.

Similar to the power pack, the auxiliary relay does not supply power, but switches lighting and HVAC loads based on a control signal from the occupancy sensor.

Both the power pack and auxiliary relay are housed in a rugged plenum rated enclosure, and rated for lighting and HVAC loads, including electronic ballasts. Flexible mounting scheme allows for installation inside or outside a standard 4 x 4 inch junction box.

Features

- 120V and 277V Input
- Plenum rated
- FCC Part 15, Class B
- Heavy duty relay rated to switch electronic ballast loads
- External color coded leads for quick installation
- Flexible mounting options – mounts to a standard 4-in. x 4-in. junction box using a 1/2-in. threaded EMT nipple
- UL®/cUL Listed



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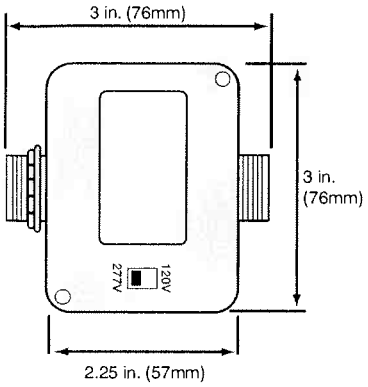
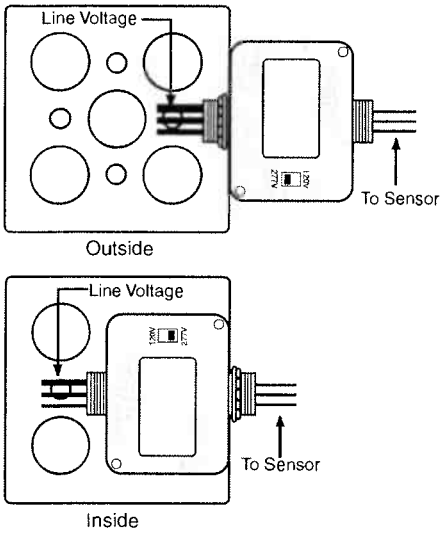
Dimensions



Flexible Mounting



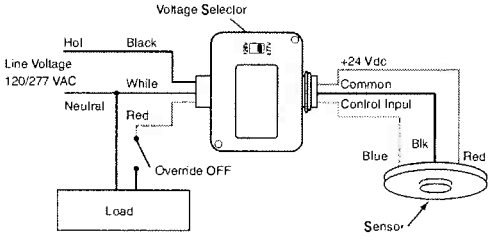
Specifications

Power Pack and Auxiliary Relay				
Item	Power Pack		Auxiliary Relay	
Storage Temperature	-20 - 150°F (-29 - 65°C)			
Operating Temperature	32 - 104°F (0 - 40°C)			
Maximum Humidity	90% RH Non-condensing			
Input	120 or 277Vac / 60 Hz		24Vdc / 36mA	
Output	24Vdc / 100mA Max		No power supply	
Maximum Load Ratings	120Vac / 60Hz	277Vac / 60Hz	120Vac / 60Hz	277Vac / 60Hz
Tungsten	15A / 1800W			
Ballast	20A			
AC Motor	1 HP at 120Vac / No HP rating at 277Vac			
Dimensions	3 in. tall X 2.25 in. wide X 1.75 in. deep [76mm tall X 57mm wide X 44mm deep]			
Standards	UL and cUL Listed FCC Part 15, Home and Office Use Class B			

Order Information

Description	Catalog Number
Occupancy Sensor Power Pack	SLSPP1277
Occupancy Sensor Auxiliary Relay	SLSSP24

Wiring Diagram



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One Bridal Avenue
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Phone: (401) 262-0225
Fax: (401) 615-9109
www.zoomlighting.com

CONDITIONS OF SALE (effective February 1, 2008)

CONDITIONS

A) All orders are subject to terms and conditions contained herein.
B) All orders are subject to acceptance by Zoom Lighting and are not binding upon Zoom Lighting until so accepted.
C) All prices, models and material specifications subject to change or withdrawal without notice.
D) All orders and/or releases must be received on customers' order form and must include all details order is subject to by customer's request.
E) Zoom Lighting will not be responsible for any penalty clauses or back charges on project contracts.
F) Orders must include a specific shipping date unless the requirement is to ship as soon as possible.

PRICES

A) Prices do not include shipping costs and are based on standard packaging.
B) Lamps are not included in the price of standard products.

PRICE CHANGES

A) Prices are subject to change without prior notice
B) Quotations Prices on product not released within 180 days of date of order may at Zoom Lighting's discretion be increased. Said increase to be based upon increased costs of labor and/or materials on the released date.

TERMS

A) Net 30 days. Orders $2,000 or less, net 15 days.
B) Interest on overdue accounts will be 1 ½% per month or the highest rate permitted by law.
C) Shipments are FOB-Rhode Island
D) Orders $10,000 and over will be freight allowed within the United States East Coast. Freight to other areas TBD.
E) Shipping dates are approximate and based on present production schedules, which are subject to change
F) Drop shipments to locations to locations without suitable unloading facilities and/or personnel are subject to a minimum $50.00 surcharge.

MINIMUM ORDERS

A) To cover handling costs, orders or releases of less than $500.00 invoice value will be subject to a $50.00 handling charge. Orders less than the minimum will be accepted provided that they are paid for in advance.

QUOTATIONS

A) Confirmed quotations are valid for a period of 30 days from the quotation date.

APPROVALS

A) All luminaires are manufactured with UL listed components. All luminaires are UL listed unless otherwise indicated.

LIMITED WARRANTY

A) Zoom Lighting equipment and components, when properly installed on correct line voltage, and under normal conditions of use, are guaranteed against mechanical and electrical defects for a period of one year from date of shipment. Damage incurred in transit or from handling is excluded from the terms of this guarantee. When customary or minor assembly or corrective expenses are involved, it is the Contractor's obligation to make corrections or adjustments at its cost and expense.
B) The warranty extended to us by manufacturers of the electrical components is passed on to our customers.
C) Zoom Lighting will hold no responsibility for damages, or injury, whether accidental or consequential, resulting directly or indirectly from improper electrical connections, or improper installation of its equipment, nor for labor charges suffered by the purchaser, caused by delay in delivery, or by negligence or any other causes beyond Zoom Lighting's control.

NORA TERMS AND CONDITIONS OF SALE

NORA LIGHTING.

1. PRICES
All orders are subject to effective prices and terms of sale in effect on date of shipment and are subject to change without notice unless otherwise authorized and specified in writing by Nora Lighting. Written quotations expire 30 days from date of quotation unless otherwise specified. Nora Lighting requires a minimum of $50.00 per order not including freight. A $5.00 charge per open box orders will be added to invoice per item number. Nora Lighting reserves the right to adjust upwardly certain or all of its prices to reflect anticipated volatility in the costs of critical raw materials and components such as steel, copper, silver, aluminum, rubber and plastic compounds.

2. TAXES
Prices do not include any federal, state or local taxes.

3. TERMS OF PAYMENT
Payment on each invoice is due within 30 days from the invoice date. Any balance unpaid at such time will bear interest at the rate of 1 1/2% per month (ANNUAL PERCENTAGE RATE OF 18%). Purchaser also agrees to pay any costs incurred by Nora Lighting in enforcing the terms of this agreement.

4. FREIGHT
(a) Nora Lighting reserves the right to select origin of shipment, routing and other method of transportation. If customer specifies alternate routing, customer must assume all additional charges.
(b) Material not in stock when order is released by customer will be shipped as soon as possible thereafter. Freight will be allowed on these shipments if original order as released meets allowance terms specified below.
(c) Premium freight charges (such as air freight) will be at purchasers expense. Written authorization by facsimile, letter, telegram or telex must be received from purchaser prior to the shipment leaving Nora Lighting.
(d) Free deliveries on all shipments over $1500.00 in the 48 contiguous states.
(e) Transportation charges will be pre-paid and added to invoice unless otherwise stated.

5. CLAIMS FOR LOSS OR DAMAGE IN SHIPMENT
If merchandise is delivered in damaged condition or cartons are missing, a notation must be placed on all documentation signed by the receiver. If unreported or concealed damages are notified after delivery, the carrier should be contacted by telephone and in writing to request an inspection. All requests for credit due to transportation loss or damage should be accompanied by properly signed documentation. A claim for loss or damage must be filed by customer within 5 working days from receipt of shipment date. Credit cannot be allowed for damage claims that are not properly substantiated with supporting documentation or received by Nora Lighting too late for timely filing with the carrier.

6. LIMITED WARRANTY
Nora Lighting warrants that products sold will, upon shipment, be free of defects of workmanship or material under normal and proper usage. Should any failure to conform to this warranty become apparent during the warranty period (in most cases one year after the date of shipment) Nora Lighting must be notified in writing. Nora Lighting is not responsible for labor costs in connection with the installation, removal or replacement of warranted products or for any consequential damages. Nora Lighting further reserves the right to refuse to honor the above warranty for any product(s) altered, improperly installed or installed in application for which not intended. In no event and under no circumstances shall Nora Lighting be liable to the purchaser or to any other person for any indirect, special, consequential or incidental losses or damages including, without limitation, lost profits except to the extent that liability for personal injury or property damage may be imposed upon Nora Lighting by law. As used herein, the term "person" shall include, without limitation, any individual, sole proprietorship, partnership, corporation or other entity.

EXCLUSION FROM WARRANTY

6.1 ABUSE
Nora Lighting cannot assume responsibility for claims arising from abuse of the product:
(a) due to improper installation practices or procedures.
(b) due to abuse by the ultimate user.

6.2 DESIGN
Nora Lighting cannot assume responsibility for claims resulting from failure from improper design of the end product, such as (but not limited to) subjecting the Nora Lighting product to conditions which exceed the rated capacity of the Nora Lighting product to operating conditions which constitute improper usage.

6.3 INSPECTION
Nora Lighting's warranty is conditioned on substantiation that the manufacturer's incoming inspection and production line procedures are deemed effective and within the context of industry accepted standards. The foregoing warranty is exclusive and in lieu of all other warranties of quality whether written, oral or implied (including any warranty of merchantability or fitness for purpose).

7. TERMINATION OF ORDER
Any order or contract may be terminated by the purchaser only upon payment of all reasonable charges based upon expenses already incurred and commitments made by Nora Lighting.

8. RETURN GOODS AUTHORIZATION
No products are to be returned without prior Nora Lighting authorization (RGA number) and then only in accordance with Nora Lighting's instructions and terms. Under no circumstances shall purchasers assume settlement nor will Nora Lighting be bound via deductions from remittance due.
When return is occasioned due to Nora Lighting's error other than covered by warranty, full credit including transportation charges will be allowed. All credits if approved by Nora Lighting will be applied towards future purchases.
Where the purchaser requests authorization to return products for reasons of his own, and issues approval for return, purchaser will be billed a 20% restocking charge plus outbound freight. The return shipment is to be freight pre-paid by the purchaser. All material must be in salable condition and of current design, NO obsolete items, SPECIAL SALES ITEMS, or those special products built to the purchaser's specification will not be accepted for return. In no event will Nora Lighting be responsible for products returned without proper authorization or identification.

9. ORDER ACCEPTANCE
No modification of these terms or conditions will be recognized by Nora Lighting unless specifically agreed to in writing by an officer of Nora Lighting. Failure of Nora Lighting to object to provisions contained in any purchase order or other communication from a purchaser (including, without limitation, penalty clauses or labor charges) shall not be construed as a waiver to these Standard Conditions of Sale nor an acceptance of any provisions.

10. SHIPPING SCHEDULE PERFORMANCE
(a) When requested, Nora Lighting will establish estimated shipping schedules as closely as practicable in accordance with the purchasers express needs and will express diligence in meeting such estimated schedules and in giving the best practicable service. However, Nora Lighting will not be responsible for deviations in meeting shipping schedules nor for any losses or damages to purchaser (or any third persons), whether occasionally by the deviations in performance or the non-performance of any of Nora Lighting's obligations under the contract or loss of or damage to goods when caused directly or indirectly by or in any manner arising from any casualty, riots, acts of the purchaser, strikes or other labor difficulties, shortage of labor, supplies and transportation facilities or any other cause beyond its control or the control of its suppliers.
(b) In no event shall Nora Lighting agree to pay any fixed amount whether identified as a penalty or as liquidated damages for failure to meet a shipping schedule unless specific agreement to that effect is made in writing and signed by an officer of Nora Lighting.
(c) Delay in delivery. Nora Lighting shall not be made liable for any detention or delay in delivery installations or for any loss, damage or expense due to any cause beyond Nora Lighting's reasonable control including without limitation, an act of God, act or omission of the buyer, embargo or other governmental act or authority regulation or request, fire, theft, accident, strike, slowdown, a war, riot, delay in transportation, inability to obtain necessary labor, material or manufacturing facilities.

11. ERRORS
Typographical or clerical errors in quotation orders or acknowledgements are subject to correction.

12. DIMENSIONS
The dimensions in catalogs and price lists are normally accurate, but are not to be used for construction purposes.

METALUMEN®
DISTINGUISHED DESIGN • ENGINEERED EXCELLENCE
MANUFACTURING INC.
P.O.BOX 1779, 570 SOUTHGATE DRIVE, HANLON BUSINESS PARK, GUELPH, ONTARIO, N1H6Z9, TEL.: 519/822-4381, FAX: 519/822-4589

March 20, 2006

General Terms and Conditions

1. Payment terms net 30 days upon satisfactory credit approval.

2. All shipment are F.O.B. Guelph. Freight prepaid on orders above $5,000.00.

3. Quotations are firm for 90 days for delivery within 6 months. Quantity change, if greater than 10%, may affect quoted prices. Lamps are provided by others, unless otherwise noted.

4. Cancellation charges for orders prior to Approval Drawing release, 25%. Cancellation charges for orders with Approval Drawing release, 100%.

5. Minimum order quantity on manufactured parts $500.00. Purchased parts $150.00.

6. Return materials must be accompanied by a Return Material Authorization Number. Material received without this number clearly attached, will be refused at our dock.

   Request for Return Authorization should include:
   Customer Purchase Order Number
   Metalumen Invoice Number
   Job Name
   Reason for return

   All returns must be sent to Metalumen Manufacturing freight prepaid.

7. Ballast Warranty.
   Fluorescent - Warranted by Distributor and Ballast Manufacturer. Contact Metalumen for ballast representatives' name and address.
   H.I.D. - Potted ballasts are to be returned to Metalumen with proper authorization for Metalumen warranty. Ballasts supplied to site, prior to return, will be billed to the customer at $150.00 per ballast and credited upon confirmation of defective ballast.
   Non Potted ballasts are to be returned to Distributor and Ballast Manufacturer for Warranty.

8. Workmanship.
   One year parts and labour factory warranty on Metalumen manufactured parts and luminaires. Field Quality issues relating to Metalumen workmanship require a Repair Material Authorization prior to incurring costs outside of normal installation contract.

Limited Warranty

Visionaire Lighting, LLC (hereinafter referenced as "Visionaire") warrants products against defects in materials and workmanship for a period of two (2) years from date of shipment. Any component manufactured by Visionaire Lighting proven to be defective within two (2) years from date of shipment, and provided that the conditions of installation and operation have been proper, will be re-paid or replaced (at Visionaire's option). In addition, Visionaire will, with prior written approval, pay reasonable labor costs involved in replacing defective components that are manufactured by Visionaire and that fail within two (2) years of the original ship date.

This warranty does not include lamps, ballasts, capacitors, igniters, photocells or other related equipment not manufactured by Visionaire.

Ballasts: Ballasts, capacitors and igniters are warranted from the manufacturer for a period of two (2) years from date of shipment. Replacements will be handled by a local ballast-authorized distributor, or by Visionaire acting as their agents. No charges of rental equipment or time will be covered, unless agreed upon in writing before said work is completed.

Lamps: Lamps (components that are not manufactured by Visionaire) are specifically excluded from the Visionaire warranty. No claims for replacement of defective lamps or labor associated with such replacement will be covered. Visionaire will assist in any way possible, through the appropriate Original Manufacturer (hereinafter referenced as "OEM"), to facilitate replacements.

LED: All LED light sources, including VisionBars™ are warranted for a period of five (5) years. If 25% of the individual LED diodes (light sources) in the LED VisionBar™ should fail within a five (5) year period, Visionaire will provide the purchaser with a replacement LED VisionBar™. Labor and other installation costs for replacement of LED VisionBars™ are not included in this limited warranty and are the responsibility of the purchaser.

LED Drivers: LED drivers are warranted by the OEM for a period of five (5) years. Visionaire provides no warranty on LED Drivers. Visionaire makes no representation of any warranty by the OEM.

Induction Systems: All Induction Systems are warranted by the OEM of the Induction System, and subject to their terms. Induction Systems are not warranted by Visionaire. Visionaire makes no representation of any warranty by the OEM.

Solar Components:

1. Solar Flex Wrap - Solar wrap carries a limited warranty for a period of twenty (20) years by the solar wrap OEM. Please reference the OEM's terms for limitations. Visionaire provides no warranty on solar wraps. Visionaire makes no representation of any warranty by the OEM.
2. Solar Panels - Solar panels are not warranted by Visionaire Lighting. Visionaire makes no representation of any warranty by the OEM.
3. Solar Batteries - Solar batteries are warranted for a period of two (2) years from shipment by the solar battery OEM. Visionaire provides no warranty on batteries. Visionaire makes no representation of any warranty by the OEM.
4. Photocells, Solar Controls, Time Clocks and Internal Electrical Components - Photocells, solar controls, time clocks and internal electrical components within any Solar Assembly are warranted only by that part's respective OEM. Visionaire provides no warranty on these components. Visionaire makes no representation of any warranty by the OEM.

Finishes: All Visionaire products are powder coated and guaranteed for a two (2) year period. Poles must be inspected regularly and wiped clean to insure a non-abrasive surface. Visionaire's poles, brackets and fixtures are warranted against peeling, cracking, fading or chalking. The warranty is at sellers' discretion as to how and where to fix the any problems that may occur. Seller will not cover costs of transportation, installation and removal of defective or damaged poles.

Visionaire will not honor any claim without prior written approval.

No other Guarantees or Warranties, expressed or implied, exist beyond those included above.

19645 Rancho Way • Rancho Dominguez, CA • 90220
Tel: (310) 512-6480 • Fax: (310) 512-6486
www.visionairelighting.com

Terms & Conditions

• Terms: Payment terms are Net 30 days from Invoice. Interest of 2%/ month + Attorney's Fees and Costs will be levied on all past due accounts. Invoices are dated when they are mailed from Visionaire Lighting. Minimum Order is $200.00, except for replacement parts. ALL ORDERS MUST INCLUDE A WRITTEN PURCHASE ORDER. Attorneys fees, and costs will be levied if consult is retained to collect past due amounts.

Purchaser agrees that the venue for any legal action arising from this transaction including but not limited to the collection of past due amounts, freight and/or damage claims or product liability issues is Los Angeles, California.

• Prices: Written quotations are valid for a period of 30 days, unless specified otherwise in writing. Prices are subject to change without notice.

• Shipping, Handling, Transportation, and Delivery: All prices are FOB shipping point; freight allowance begins with orders over and above $3000.00 per shipment, per destination in the continental United States. Any order that will not qualify for pre-paid factory freight will be charged in the following manor:
1. Fixtures and Poles will be shipped and charged the Freight Company's cost to Visionaire, plus an additional 15% fee for handling.
2. If anchor bolts are requested to be pre-shipped, freight will be charged and anchor bolts will be invoiced after shipment. Anchor bolt freight will be charged at cost of freight plus a 15% fee for handling.
3. Flatbed or special trucks requested from buyer will result additional shipping and handling charges.
4. Air Freight shipments requested by buyer will be invoiced at Visionaire's cost of freight. Seller will use its own discretion in routing all shipments, upon which it assumes transportation charges. Seller may make partial shipments at its discretion; however, each such shipment will be subsequently invoiced on terms applicable to the complete order. Seller will not assume, allow or pay any fees for cartage. While every effort is made to ship as scheduled, any delay or failure due to strikes, lockouts, fires, breakdowns, supplier delays, lack of shipping space, lack of customer approval, correction or clarification of order, govemmental acts or regulations, acts of God and any other circumstances beyond the control of Visionaire Lighting shall not be breach of contract.

Any goods damaged or lost in transit must be noted so on the delivering carrier's freight bill. Rates are determined in proportion to the damage liability; therefore, the carrier, and not the shipper, should be charged with all loss or damage. Visionaire will do everything to assist the buyer, except file the claim. Replacement goods must be ordered and paid for by the consignee. Shipments must be unloaded promptly as we will pay no storage, or re-delivery fee.

Buyer must examine the merchandise upon delivery, and must report all apparent errors or defects to Seller within ten (10) days of delivery; otherwise, it shall be conclusively presumed between buyer and seller that the merchandise has been delivered as specified in this contract.

All pre-shipments of Anchor Bolts will be invoiced at the time of shipment. All pre-shipments of Anchor Bolts will be charged freight cost, plus 15% handling fee, per Visionaire's standard terms.

• Cancellations, Returns or Suspension of Orders: Returns as a result of Buyer error will be charged for freight, both ways and a minimum service charge of 35% of the product value. This will be deducted from all returned goods to cover the costs of handling, unpacking, inspecting, and break down of all component parts and re-stocking. Postponement of deliveries at the Buyer's request, if for a period of more than 30 days will not be made without the seller's approval in writing.

All suspensions are liable to handling and storage fees. Seller will not accept the return of any goods without seller's prior written consent, and buyer must request an RA within 30 days of seller's invoice. Returns will not be accepted after this time. In the event of a replacement order, we will first charge for replacement items, and then credit upon return of the defective or incorrect items. 60 day terms will be set on these items, and if the returnable items are not received by the 60 day mark, the invoice will become due and payable.

Terms are Net 30 days from Invoice. Interest of 2% per month + Attorney's Fees and Costs will be levied on all past due accounts. Purchaser agrees that the venue for any legal action arising from this transaction including but not limited to the collection of past due amounts, freight and/or damage claims or product liability issues is Los Angeles, California. Poles and Custom products are non-returnable.

• Product Changes: Visionaire Lighting reserves the right to make modifications or changes to any of its products without prior notice and without incuming obligation.

• Taxes: All prices, quotations, orders and agreements are subject to local and federal taxes. These taxes will be added to the invoice unless legal proof of exemption is provided.

• Cost of Collection: If buyer defaults with respect to any payment described here and above, it shall pay Seller for all costs and expenses, including legal expenses and attorneys fees, incurred by seller in exercising any of its rights or remedies.

• CAUTION: If any additional stress such as flags, banners, streamers, ropes, or any other such items are added to poles, Visionaire Lighting's normal product guarantee is null and void. Additionally, adding such items to any pole may create severely hazardous conditions. Poles are calculated to withstand steady wind velocities of between 70 and 100 mph wind zones with a 1.3 gust factor depending on height, wall thickness, and width/ diameter. For an exact rating on a specific order, contact Visionaire directly.

This warranty excludes fatigue failure caused by induced vibration. Poles must be maintained and inspected on a regular basis. Repair of scratches, scrapes, bumps, etc. must be conducted to ensure a safe and attractive product.

Limited Warranty

1.0 **EMERGI-LITE** 6, 12 and 24 volt Emergency Lighting Unit Equipment (excluding lamps and fuses) are fully warranted to be free of defects in material and workmanship under normal use for a period of three years from date of installation (see Paragraph 2.0).

1.1 **EMERGI-LITE** 6, 12 and 24 volt Unit Equipment Batteries are warranted as follows (Warrant below includes the 3-year full warranty on entire unit as called out in Paragraph 1.0).

1.2 **EMERGI-LITE** volt Emergency Lighting Unit Equipment (excluding lamps, and fuses) is fully warranted to be free of defects in material and workmanship under normal use for a period of one year from date of installation (see Paragraph 2.0).

BATTERY TYPE	LIFE EXPECTANCY	SHELF LIFE*	FULL WARRANTY	PRO RATA WARRANTY
Sealed Lead-Calcium	8 years	6 months	3 years	3 years
Sealed Lead-Calcium Immobilized Electrolyte)	12 years	6 months	5 years	5 years
Sealed Long Life Lead	12 years	6 months	5 years	5 years
Sealed Nickel-Cadmium	15 years	1 year	5 years	7 years
Refillable Lead-Calcium	15 years	6 months	3 years	8 years
Refillable Nickel-Cadmium	15 years	2 years	5 years	7 years

***MAXIMUM STORAGE LIFE. MUST BE RECHARGED IF NOT PLACED IN SERVICE OR BATTERY WARRANTY VOID**

2.0 The full warranty period begins on the date of installation or 90 days from date of shipment, whichever date is earlier.

2.1 Should a defect appear in the equipment or batteries listed in Paragraphs 1.0, 1.1 or 1.2 above within the specified full warranty period, Emergi-Lite will repair or replace equipment without charge (see Paragraph 3.3). Such repair or replacement shall be the purchaser's exclusive remedy.

2.2 The Pro Rata Warranty Period for batteries begins on the date the full warranty period ends.

2.3 A battery determined to be defective during the Pro Rata Warranty Period shall be repaired or replaced at a cost equal to the net price in effect at the time, reduced by the percentage obtained in multiplying 10% by the number of full years remaining in the total warranty period. Such repair or replacement at this adjusted price shall be the purchaser's exclusive remedy.

3.0 All warranties are subject to proper installation and maintenance in accordance with the instructions supplied.

3.1 Any material deemed defective must be returned, freight prepaid, to the factory for evaluation (see Paragraph 5.0-5.3). Any changes in circuitry or components by other than authorized Emergi-lite personnel or its service companies will void the warranty.

3.2 All warranties are limited to the repair and/or replacement or parts or equipment, which, upon examination at our plant, are determined to be defective and in our judgement are subject to repair or replacement under warranty. Replacement of lamps and fuses is not included in the warranty.

3.3 If new replacement parts are shipped before defective goods are received for evaluation, the replacement parts will be invoiced at the net price in effect at that time. These charges will be credited if, upon receipt and evaluation of goods, a defect is determined. Only replacement parts will be shipped under these circumstances, if field replacement is possible. **EMERGI-LITE FACTORY ONLY RESERVES THE RIGHT TO SHIP NEW UNIT EQUIPMENT FOR REPLACEMENT PURPOSES.** Units returned after installation cannot be restored to 100% saleable condition.

4.0 In no event shall Emergi-lite be liable for backcharges of any kind, including, without limitation, labor charges for field repair or late penalties.

4.1 This warranty does not cover damages caused by improper maintenance of installation or damage due to installation in areas with other than normal temperatures and environmental conditions per application specifications. Emergi-lite assumes no responsibility for any damage to people, property, apparatus or otherwise resulting from improper installation or maintenance of its Emergency Lighting Unit Equipment.

4.2 This warranty does not cover damages caused by abuse, fire or Act of God.

4.3 In no event shall Emergi-lite be liable for incidental or consequential damages.

4.4 The foregoing warranty is in lieu of all other warranties, expressed or implied, or merchantability, fitness for a particular purpose or any other thing. Except as stated in this warranty, Emergi-lite shall not be liable for any defects in, or breach of any contract relating to, the quality of performance of Emergi-lite Equipment under any theory of law including, without limitation, contract, negligence, strict liability or misrepresentation.

4.5 Emergi-lite warranty coverage shall not apply to any equipment of another manufacturer used in conjunction with Emergi-lite Equipment.

4.6 Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This written warranty gives you specific legal rights and you may also have other rights which vary from state to state.

5.0 No returned defective materials will be accepted without a Returned Goods Authorization issued in writing by an authonzed Emergi-lite employee.

5.1 Purchaser is responsible for secure packing of returned materials to provide best possible assurance against damage in shipment.

5.2 Defective batteries of any kind must not be returned to Emergi-lite's factory without strict adherence to special instructions for handling and shipping. WARNING Never ship a refillable wet battery in any type of emergency lighting equipment. Failure to adhere to this policy will void warranty.

5.3 Defective goods returned to the factory must be shipped prepaid. COLLECT RETURNED SHIPMENT WILL BE REFUSED. Freight charges to return repaired equipment or ship replacement equipment to the purchaser to be paid by Emergi-lite. Factory will return repaired goods via same shipping method as received.

FAILURE TO COMPLY WITH ANY OF THE STIPULATIONS SET FORTH WILL VOID THE WARRANTY.

ANY EXCEPTIONS TO THE FOREGOING WARRANTY MUST BE REQUESTED AND ACCEPTED IN WRITING PRIOR TO SHIPMENT.

EMERGI-LITE EQUIPMENT NOT LISTED IN PARAGRAPHS 1.0, 1.1 OR 1.2 IS WARRANTED AS DESCRIBED ON ITS INDIVIDUAL DATA SHEET WITH THE STIPULATIONS AS STATED IN PARAGRAPHS 2.0-5.3.

LDPI, INC. GENERAL TERMS AND CONDITIONS OF SALE

1. EXCLUSIVITY OF TERMS: These terms and conditions, together with any terms and conditions contained either on the front side of this document or any other purchase documents issued by us, constitute the entire agreement of LDPI, Inc. ("Seller") and the Buyer named on the front side ("Buyer"), and supersede all previous correspondence between Buyer and Seller, both written and oral, including any purchase orders that may have been submitted by the Buyer. Any term specified on the front side of this document supersedes any term on this side of the Agreement. Requests for change orders telephoned, mailed, emailed or faxed to Seller shall be considered written and approved by Buyer if Seller agrees to such change and commences engineering or production changes. These changes shall be binding even if Seller has not yet quoted an amount for the change. If quoted, the quoted amount shall be deemed accepted by Buyer. If not yet quoted, Seller shall be entitled to an equitable adjustment to price and delivery terms, not less than its standard shop rates and burden rates applicable to the Buyer in the base agreement.

2. PURCHASE PRICE: The purchase price is exclusive of any sales, use, or other taxes. Any taxes will be added to the purchase price unless a valid exemption certificate is provided by the Buyer. The purchase price shall be adjusted for change orders as set forth above.

3. TERMS OF PAYMENT: Unless otherwise specified by the Seller, all prices are 30 days, net cash, subject to Seller's approval of Buyer's credit. If any payment is not made when due, Seller may impose interest on the unpaid balance of the purchase price (including change orders, taxes, freight and handling) at the rate of 18% PER ANNUM, unless such rate is prohibited by law, in which case, the highest rate permitted by law shall apply. Additionally, Buyer shall pay all costs of collection incurred by Seller, including reasonable attorneys' fees. If Buyer fails to pay any sum when due under this Agreement, Seller may declare all payments owing under this Agreement and any other agreement with Buyer, to be immediately due and payable and may refuse to perform any obligations then remaining unperformed under this Agreement or any agreement with Buyer.

4. DELIVERY: Any term of delivery specified is tied to the date Seller receives Buyer's signed copy of this Agreement, and is only an estimate. Seller does not guarantee the delivery date, but will make a good faith effort to do so. Seller may make partial shipments and submit a separate invoice for each shipment. Unless other wise specified, all shipments will be F.O.B. Seller's plant, Eau Claire, Wisconsin. Unless otherwise specified, delivery for shipment to Buyer of designs, shop drawings, equipment or materials to a carrier at Seller's plant in Eau Claire, Wisconsin, shall constitute delivery by Seller to Buyer. All orders are shipped at Buyer's risk and Seller shall incur no liability for any order damaged, broken or lost in transit. Seller shall not be liable for any failure to design, manufacture or deliver, or for any delay in the design, manufacture or delivery of, any order sold or to be sold by it if such a failure or delay or inability to obtain transportation, inability to obtain materials, shortage of fuel, failure of sources of suppliers, labor disputes, accident, riot, war, terrorist act, embargo, restraint or demand of the United States or of any other government, non-fulfillment by Buyer of conditions of payment, natural disaster, or any other cause beyond the control of Seller. If at any time Seller shall be prevented by any of the above causes from the supplying all or any part of Buyer's order and to its other customers under contract, Seller shall have the right to prorate the quantity then deliverable to Buyer and to its other customers.

5. ACCEPTANCE: Buyer shall be deemed to have accepted an order no later than 30 days following receipt unless it has previously notified Seller of any claim. All claims for damage in transit shall be submitted directly to the carrier.

6. SECURITY INTEREST: Seller retains a purchase money security interest in all unpaid goods and these goods shall remain personal property until the unpaid purchase price, and any costs, are paid in full. By signing any quote, purchase order, request for purchase or quotation, order confirmation or contract, Buyer shall be deemed to have provided an authenticated signature under the Uniform Commercial Code (UCC) and these terms shall by deemed incorporated by reference into all such writings. Buyer shall allow Seller to file any financing statement evidencing this security interest and these terms shall be deemed by the parties to constitute a security agreement under the UCC. Until paid in full, Buyer shall not encumber, allow any lien to attach or convey the goods. Buyer shall be responsible for maintaining insurance on all unpaid goods for the invoice amount.

7. INSTALLATION: This Agreement is limited solely to the transaction described on the front side, and Seller has no obligation to install the order. Buyer assumes all liability for installation of the order and shall be responsible for ensuring that the installation complies with federal, state and local health and safety laws and regulations. Buyer indemnifies, holds harmless, and agrees to defend Seller from any and all claims, damages, liabilities and expenses resulting from negligent installation of the order, installation that does not comply with such laws and regulations, or violation of any such law or regulation.

8. LIMITED WARRANTY: The Seller warrants to the Buyer that any order designed, manufactured and sold by the Seller, if properly installed, in an unmodified condition, in accordance with the Seller's Service Manual, operated, and maintained, and used under normal conditions, shall be free from defects in workmanship and materials for a period of one (1) year from the date the order is shipped from the facilities of the Seller. This warranty does not apply to orders manufactured by third parties or for any work or modifications performed by third parties. The obligations of the Seller, and the Buyer's SOLE AND EXCLUSIVE REMEDY, shall be limited to one of the following, at the Seller's option: (a) the repair or replacement of defective parts, provided, however, the Buyer shall be responsible for the payment of all labor costs associated with any such repair or replacement; or (b) in the event the Seller is unable to repair or replace the defective parts, the Buyer shall be entitled to a refund of the costs of the parts. The Seller shall have no obligation under this Limited Warranty for ordinary wear and tear, damage, improper installation or modification, improper or inadequate maintenance or inspection or if the order as used or installed does not comply with local, state, and federal laws or regulations. The Seller makes no warranty of any kind whatsoever with respect to parts which are manufactured or supplied by other persons or organizations (an OEM); provided, however, the Seller shall reasonably assist the Buyer in connection with warranties, if any, provided by an OEM.

CONTINUED ON NEXT PAGE

9. RETURN MERCHANDISE: Return goods will not be accepted unless a prior agreement has been reached between the Seller (LDPI Inc) and Buyer. Merchandise must be returned, freight prepaid, and in original factory cartons. All parts returned for repair, replacement, or refund (which refund may be in the form of credit to the buyer's account) are subject to a minimum 20% restocking fee plus transportation costs. A 50% restocking fee will apply if material is not accompanied with proper Return Material Authorization (RMA) numbers. Request for authorization to return material must be made within 60 days from the date of shipment.

10. DISCLAIMERS OF WARRANTIES: THE WARRANTIES CONTAINED HEREIN ARE EXPRESSLY IN LIEU OF ANY OTHER EXPRESSED OR IMPLIED WARRANTIES, OR ANY OTHER OBLIGATION ON THE PART OF THE SELLER, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Any models, drawings, plans, specifications, affirmations of fact, promises or other communication by the Seller with reference to the order or the performance of the order are solely for the convenience of the Buyer and shall not in any way modify the expressed warranties and disclaimers set forth. No agents or other parties are authorized to make any warranties on behalf of the Company or to assume for the Company any other liability or obligation in connection with the order.

11. CONSEQUENTIAL DAMAGES: The Seller shall not be liable for any incidental or consequential damages arising from the order, the breach of any warranties, the failure to deliver, delay in delivery, delay on nonconforming condition, or for any other breach of contract or duty between Seller and Buyer. In no event shall the Seller's total liability for any or all breaches of any warranty, exceed the actual purchase price paid by the Buyer for the equipment.

12. LIMITATIONS OF ACTIONS: Any action against the Seller must be commenced within one (1) year after the cause of action accrues.

13. CANCELLATIONS: Order cancellations will be subject to all expenses incurred by Seller including engineering costs, special parts purchased and production time. These expenses are the responsibility of the Buyer. If an order is cancelled after shipment is made or delivery is refused at destination, all costs for any and all further actions such storage, rerouting or return shipment to will be the responsibility of the Buyer. Any purchase order already in the manufacturing process will have a minimum of 25% value of order assessed to the Buyer or in any circumstance an amount established by Seller. No cancellation of a "Plans and specifications: Special Order / Non Catalog Items" will be allowed once acknowledged.

14. PLANS AND SPECIFICATIONS: Seller does not assume responsibility for orders shipped in accordance with the information supplied on or with Buyer orders in regards to Buyer approved drawings, non-standard fixture modification, lighting layout or custom designed application of product. Acceptance of any custom production item requires customer written authorization of signature.

15. BACKCHARGES: Seller will not approve or accept returns or backcharges for labor, materials, or other costs incurred in modification, adjustment, service or repair of an order unless previously approved by Seller in writing.

16. CHANGES IN DESIGN: Seller reserves the right to modify the design and construction of the order to incorporate improvements or to substitute material equal or superior to that originally specified.

17. MISCELLANEOUS: All terms used herein, which are defined or given meaning in the Uniform Commercial Code, as adopted in the State of Wisconsin, and this Agreement, shall be governed by the laws of Wisconsin.

TASK 1
PAINTBOOTH 2
VAPOR DUST 3
VAPOR 4
WET DAMP 5
MARINE 6
EXPLOSION PROOF 7
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PORTABLE LIGHTING 10
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TERMS AND CONDITIONS OF SALE

TERMS OF PAYMENT

Net is due (30) thirty days upon received material.

PRICES

Prices are subject to change without notice and Supersede all previous prices shown. In the event of a price increase, all orders on hand will be filled at lower prices provided such orders are released for shipment within the (15) fifteen day grace period, the order will be billed at prices in effect at the time of shipment. Special quoted orders which cannot be released for shipment within the (15) fifteen day grace period will be subject to an increase as other items in our line are increased. Minimum billing is $100.00 net. Prices include units wired complete, but less lamps.

HOLD ORDERS

Orders entered on a hold for release basis will not be accepted unless they contain an approximate release date. Production and procurement of components not normally stocked will be withheld until a firm release date is given.

QUOTATIONS

Written quotations are authorized for a period of (30) thirty days. Unless otherwise indicated, RLE Industries reserves the right to withdraw any quote prior to its formal acceptance. All quotes on equals are subject to approval after submittal of cuts. We cannot guarantee approval. Quotations are based on complete shipments at one time or in truckload quantities unless otherwise stated in writing on our quotation. Acceptance of orders can only be made at the home office in Fairfield.

CANCELLATIONS

No order can be cancelled without written consent or without payment for work performed. If an order is cancelled after shipment or if delivery is refused at destination, all warehousing, delivery and return costs will be charged to the customer.

FREIGHT

All units are priced F.O.B. factory, full freight allowed on orders of $2,000.00 or more for release on one shipment to one destination. Freight allowance for states West of Ohio & South of North Carolina is $2,500.00. *Freight allowance west of the Mississippi River must be approved in advance by our factory.* Routing is at the discretion of the factory. We will ship in the manner selected by the customer if the customer will assume any additional transportation charges.

TRANSPORTATION CLAIMS

All our material is regularly inspected by the transportation authorities who assume responsibility for both apparent and concealed damage by improper handling. Title passes to the purchaser upon delivery by us to the carrier and all claims for damage and shortages in transit shall be made by purchaser with delivering carrier. We shall be glad to assist when called upon.

RETURNED GOODS

All return goods must be accompanied by a Return Goods Authorization from the factory. Return goods authorization must be made within (3) three months of original date of shipment. Only claims for stocking items are accepted for return and material must be shipped to the location designated by the factory and shipped prepaid. Expenses for freight both ways and a minimum service charge of 30% will be charged on all goods to partly defray the costs of handling, packaging and placing the product in a saleable condition. Authorization will not be granted when value of all items to be returned is less than $50.00.

FIXTURE GUARANTEE

All fixtures are guaranteed for a period of (1) one year from defect develops under normal and proper use. This guarantee is applicable only to the replacement of a defective fixture or components with positively no labor allowance unless specifically authorized in writing by the factory before such work is begun.

BALLAST GUARANTEE

Our ballast guarantee is the same as that of the ballast manufacturer. Claims for defective ballasts found to be made under warranty are to be made directly to the ballast manufacturer through their local ballast service center or the field representative. Labor charges for replacement of defective ballasts will not be acceptable to RLE Industries but must be authorized by the ballast manufacturer.

FIXTURE DIMENSIONS

Fixture dimensions are subject to change without notice. Consult factory for verification.

RLE Industries
ROBERTS LIGHTING & ENERGY

H.E. Williams, Inc.

Standard Terms and Conditions for Acceptance of Purchase Orders

1. **Making of Contract:**
This Contract and any related purchase order or supply agreement (including electronic transmissions) shall become effective upon the receipt of same by a customer ("Buyer") of H. E. Williams, Inc ("Seller") and shipment of goods by Seller. These Standard Terms & Conditions for Acceptance of Purchase Orders (hereafter, "Standard Terms") shall apply to all purchase orders or other supply arrangement (such as in a transmittal letter) submitted by Buyer, and regardless of Seller's execution of any agreement or other instrument/document required by Buyer. Buyer's acceptance of any goods shipped by Seller shall constitute acceptance of these Standard Terms, regardless of any conflicting terms or waiver language contained in any Buyer purchase order, general terms & conditions, or other instrument.

2. **Terms of Payments:**
Cash Discount of 1% 10th prox. net 25th. All payments must be in U.S. dollars. Any account having a balance due that is 30 days past due or has unauthorized payment deductions may be placed on a 'Credit Hold' condition. Late payments on invoices shall bear interest at 1.5% per month or the highest rate allowed by applicable law, whichever is less. Seller shall be entitled to recover its costs of collection of any past due invoice, including court costs and reasonable attorneys' fees.

3. **Freight Allowances:**
All goods are priced FOB factory, full freight allowed on orders having a distributor price total of $2,000.00 or more for release of one shipment to one destination within continental limits of the United States. Routing is at the Seller's discretion.

4. **Drop Shipments:**
Seller reserves the right to refuse to make direct shipments to points of destination outside of the regular or assigned selling and service area of the Buyer.

5. **Pricing:**
Prices are subject to change without notice. In the event of price increases, all orders on hand will be filled at their original levels provided such orders are released for immediate shipment within 30 days after the increase. All orders are subject to acceptance at the Carthage office and contingent upon fires, strikes, machinery breakdown, or any cause beyond our control. Any taxation levied upon sale, production, or transportation of these goods is borne by buyer. Fixture prices do not include lamps unless otherwise noted.

6. **Delivery Date:**
The shipment date on the face hereof, or any delivery date stated in any related purchase order or supply agreement, is only Seller's estimate of the shipment/delivery date. While Seller shall use commercially reasonable efforts to meet such date, Seller shall not be liable for damages of any kind (including any direct, incidental, consequential or punitive damages) for the failure to meet such date or for any delay in shipment or delivery.

7. **Hold Orders:**
Order production and component purchasing will not commence until order has been released for immediate shipment.

8. **Order Changes and Cancellations:**
Changes or modifications to existing orders which fall into the current week of production are subject to a $150.00 order modification fee. For those orders being produced at the time of the requested change, a modification fee will be charged and if applicable, a warehousing fee will apply. Upon cancellation, orders may be subject to additional charges for payment of work performed, including engineering charges on custom material and/or engineering fees for layouts. All costs for warehousing and freight on orders canceled after shipment and/or refused at destination will be charged to the buyer. Buyer acknowledges that the above cancellation fees shall be paid to the Seller as reasonable liquidated damages to compensate Seller in part for direct and indirect expenses incurred in connection with cancellation of order.

9. **Transportation Claims:**
All goods are inspected prior to shipping. Seller's responsibility for safe delivery ceases when merchandise has been turned over to the carrier in good condition. Shipment should be thoroughly checked upon receipt for damage or shortage in transit and, if damage or shortage occurs, a claim should be filed at once by the Buyer with the delivering carrier.

10. **Return Merchandise:**
No merchandise may be returned without prior written permission from the factory. Request must be made within 60 days from date of shipment. Returns for one job will be limited to 10% of the total job value. Only Quick Ship items are acceptable for return and must be shipped pre-paid to location designated by the Seller. Credit will be issued less a 35% service charge less the freight expense of the original shipment. All non stocking, special, custom or modified fixtures are not returnable. Authorization will not be granted when value of all items to be returned is less than $100.00.

11. **Limited Fixture Warranty:**
If the goods provided by the Seller, under normal operating conditions, prove defective in material or workmanship, as determined by Seller's inspection, within twelve (12) months from the date of shipment or performance, Seller will replace or repair the same free of charge, or, in Seller's sole discretion, refund the price allocable to the defective goods. This limited warranty is contingent upon the following conditions: that Seller promptly receive notice of the defect; that Buyer establish that any goods have been properly installed, maintained and operated by qualified personnel within the limits of related and normal usage as specified by Seller; and that, upon Seller's request, Buyer will return to the Seller at Buyer's expense, the defective goods or part thereof. Any services or goods provided by Seller which are outside the scope of the above warranty shall be charged to Buyer at Seller's applicable time and material rate and on terms and conditions in effect at the time such services or goods are provided. Seller will not accept or recognize any labor charges submitted by Buyer without prior written permission and approval.

12. **Ballast Guarantee:**
Claims for defective ballasts in warranty should be made directly to Buyer's nearest ballast service center to expedite replacement. Any charges for replacement of such ballasts must be authorized by the ballast manufacturer and will not be accepted by the Seller.

13. **Exclusion of Other Warranties:**
The warranty to repair or replace defective goods or refund a portion of the purchase price as set forth in Paragraph 11 hereof IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

14. **Limitation of Remedies and Liabilities:**
BUYER AGREES THAT SELLER'S LIABILITY AND BUYER'S SOLE AND EXCLUSIVE REMEDY PURSUANT TO ANY CLAIM OF ANY KIND HEREUNDER OR RELATION TO THE GOODS DELIVERED BY SELLER TO BUYER, INCLUDING WITHOUT LIMITATION ANY CLAIM IN CONTRACT, TORT (INCLUDING NEGLIGENCE) OR STRICT LIABILITY, AGAINST SELLER OR ANY OF ITS AFFILIATES, SHALL BE (A) THE REPAIR OR REPLACEMENT AT SELLER'S OPTION OF DEFECTIVE GOODS, OR (B) IN SELLER'S SOLE DISCRETION, A REFUND OF THE PRICE ALLOCABLE TO THE DEFECTIVE GOODS. UNDER NO CIRCUMSTANCES SHALL SELLER OR ANY OF ITS AFFILIATES HAVE ANY LIABILITY WHATSOEVER FOR INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.

15. **Indemnity:**
Subject to paragraphs 11 – 14 above, Seller shall defend, indemnify and hold harmless Buyer against all actual damages arising out of or resulting from any defect in the goods purchased hereunder, or from any act or omission of Seller, its agents, employees or subcontractors. Buyer herby covenants and agrees that it will assemble, maintain, and operate Seller's goods, only in accordance with Seller's recommendations and safe industry practice. In addition, Buyer shall defend, indemnify and hold harmless Seller, against all damages, claims, or liabilities and expenses (including attorney's fees) arising out of or resulting in any way from the assembly, maintenance, operation or use of Seller's goods by Buyer or its employees, agents or subcontractors, however such injuries, death, damage to property or violations may have occurred.

16. **Risk of Loss:**
Possession and risk of loss of any goods shall pass to Buyer upon Seller's delivery of such goods to any common carrier.

17. **Merger:**
This contract (along with any related purchase order or supply agreement that has been executed by both Buyer and Seller) supersedes any prior purchase order, oral representations, correspondence, proposals, quotations or agreements between the parties or their representatives, and the same constitutes the complete and exclusive expression of the terms of the party's agreement. Any conflict between this Contract and any related purchase order or supply agreement shall be resolved in favor of this Contract.

18. **Assignment:**
Buyer shall not assign this Contract or any related purchase order or supply agreement without Seller's prior written consent.

19. **Governing Law:**
This Contract shall be governed by and construed under the substantive laws of the State of Missouri.

Williams
H.E. WILLIAMS, INC.

Limited Warranty

1.0 **EMERGI-LITE** 6, 12 and 24 volt Emergency Lighting Unit Equipment (excluding lamps and fuses) are fully warranted to be free of defects in material and workmanship under normal use for a period of three years from date of installation (see Paragraph 2.0).

1.1 **EMERGI-LITE** 6, 12 and 24 volt Unit Equipment Batteries are warranted as follows (Warrant below includes the 3-year full warranty on entire unit as called out in Paragraph 1.0).

1.2 **EMERGI-LITE** volt Emergency Lighting Unit Equipment (excluding lamps, and fuses) is fully warranted to be free of defects in material and workmanship under normal use for a period of one year from date of installation (see Paragraph 2.0).

BATTERY TYPE	LIFE EXPECTANCY	SHELF LIFE*	FULL WARRANTY	PRO RATA WARRANTY
Sealed Lead-Calcium	8 years	6 months	3 years	3 years
Sealed Lead-Calcium Immobilized Electrolyte)	12 years	6 months	5 years	5 years
Sealed Long Life Lead	12 years	6 months	5 years	5 years
Sealed Nickel-Cadmium	15 years	1 year	5 years	7 years
Refillable Lead-Calcium	15 years	6 months	3 years	8 years
Refillable Nickel-Cadmium	15 years	2 years	5 years	7 years

***MAXIMUM STORAGE LIFE. MUST BE RECHARGED IF NOT PLACED IN SERVICE OR BATTERY WARRANTY VOID**

2.0 The full warranty period begins on the date of installation or 90 days from date of shipment, whichever date is earlier.

2.1 Should a defect appear in the equipment or batteries listed in Paragraphs 1.0, 1.1 or 1.2 above within the specified full warranty period, Emergi-Lite will repair or replace equipment without charge (see Paragraph 3.3). Such repair or replacement shall be the purchaser's exclusive remedy.

2.2 The Pro Rata Warranty Period for batteries begins on the date the full warranty period ends.

2.3 A battery determined to be defective during the Pro Rata Warranty Period shall be repaired or replaced at a cost equal to the net price in effect at the time, reduced by the percentage obtained in multiplying 10% by the number of full years remaining in the total warranty period. Such repair or replacement at this adjusted price shall be the purchaser's exclusive remedy.

3.0 All warranties are subject to proper installation and maintenance in accordance with the instructions supplied.

3.1 Any material deemed defective must be returned, freight prepaid, to the factory for evaluation (see Paragraph 5.0-5.3). Any changes in circuitry or components by other than authorized Emergi-lite personnel or its service companies will void the warranty.

3.2 All warranties are limited to the repair and/or replacement or parts or equipment, which, upon examination at our plant, are determined to be defective and in our judgement are subject to repair or replacement under warranty. Replacement of lamps and fuses is not included in the warranty.

3.3 If new replacement parts are shipped before defective goods are received for evaluation, the replacement parts will be invoiced at the net price in effect at that time. These charges will be credited if, upon receipt and evaluation of goods, a defect is determined. Only replacement parts will be shipped under these circumstances, if field replacement is possible. **EMERGI-LITE FACTORY ONLY RESERVES THE RIGHT TO SHIP NEW UNIT EQUIPMENT FOR REPLACEMENT PURPOSES.** Units returned after installation cannot be restored to 100% saleable condition.

4.0 In no event shall Emergi-lite be liable for backcharges of any kind, including, without limitation, labor charges for field repair or late penalties.

4.1 This warranty does not cover damages caused by improper maintenance of installation or damage due to installation in areas with other than normal temperatures and environmental conditions per application specifications. Emergi-lite assumes no responsibility for any damage to people, property, apparatus or otherwise resulting from improper installation or maintenance of its Emergency Lighting Unit Equipment.

4.2 This warranty does not cover damages caused by abuse, fire or Act of God.

4.3 In no event shall Emergi-lite be liable for incidental or consequential damages.

4.4 The foregoing warranty is in lieu of all other warranties, expressed or implied, or merchantability, fitness for a particular purpose or any other thing. Except as stated in this warranty, Emergi-lite shall not be liable for any defects in, or breach of any contract relating to, the quality of performance of Emergi-lite Equipment under any theory of law including, without limitation, contract, negligence, strict liability or misrepresentation.

4.5 Emergi-lite warranty coverage shall not apply to any equipment of another manufacturer used in conjunction with Emergi-lite Equipment.

4.6 Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This written warranty gives you specific legal rights and you may also have other rights which vary from state to state.

5.0 No returned defective materials will be accepted without a Returned Goods Authorization issued in writing by an authorized Emergi-lite employee.

5.1 Purchaser is responsible for secure packing of returned materials to provide best possible assurance against damage in shipment.

5.2 Defective batteries of any kind must not be returned to Emergi-lite's factory without strict adherence to special instructions for handling and shipping. WARNING Never ship a refillable wet battery in any type of emergency lighting equipment. Failure to adhere to this policy will void warranty.

5.3 Defective goods returned to the factory must be shipped prepaid. COLLECT RETURNED SHIPMENT WILL BE REFUSED. Freight charges to return repaired equipment or ship replacement equipment to the purchaser to be paid by Emergi-lite. Factory will return repaired goods via same shipping method as received.

FAILURE TO COMPLY WITH ANY OF THE STIPULATIONS SET FORTH WILL VOID THE WARRANTY.

ANY EXCEPTIONS TO THE FOREGOING WARRANTY MUST BE REQUESTED AND ACCEPTED IN WRITING PRIOR TO SHIPMENT.

EMERGI-LITE EQUIPMENT NOT LISTED IN PARAGRAPHS 1.0, 1.1 OR 1.2 IS WARRANTED AS DESCRIBED ON ITS INDIVIDUAL DATA SHEET WITH THE STIPULATIONS AS STATED IN PARAGRAPHS 2.0-5.3.

Data Bulletin

Product Warranty — Occupancy Sensors

STANDARD WARRANTY

Square D® warrants occupancy sensor equipment having a catalog prefix of "SLS" manufactured by it and sold through authorized sales channels to be free from defects in materials and workmanship for sixty (60) months from date of invoice by Square D or its authorized sales channel. If within such period any such equipment shall be proved to Square D's satisfaction to be non-conforming, such equipment shall be repaired or replaced at Square D's option. This warranty shall not apply (a) to equipment not manufactured by Square D, (b) to equipment that has been repaired or altered by other than Square D so as, in its judgment, to affect the same adversely, or (c) to equipment that has been subjected to negligence, accident, or damage by circumstances beyond Square D's control, or improper operation, maintenance or storage, or to other than normal use or service. With respect to equipment not manufactured by Square D, the warranty obligations of Square D shall in all respects conform and be limited to the warranty actually extended to Square D by its supplier. Non-conforming products must be returned at Square D's expense for evaluation unless this is waived in writing. Replacement products may be new or reconditioned. The foregoing warranties do not cover reimbursement for labor, transportation, removal, installation, temporary power, or any other expenses that may be incurred in connection with repair or replacement.

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Contact the Square D Customer Information Center for technical support by phone at 1-888-778-2733 or e-mail at lightingcontrol.support@us.schneider-electric.com.

You may also find helpful information on our web site at www.squaredlightingcontrol.com.

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ADDITIONAL TERMS & CONDITIONS OF SALE

ADDITIONAL TERMS AND CONDITIONS OF SALE

1. Our Conditional Acceptance. Regardless of any attempt by you to limit us to your terms and conditions, we will accept your order only to the extent that the terms and conditions of your purchase order are exactly mirrored herein. Furthermore, all sales are conditional on your assent to any additional and different terms as we have set forth herein. Your assent to all terms herein shall have been accomplished by your submitting an order after obtaining our quote, accepting our acknowledgment without written objection to our terms or taking possession from us at F.O.B. point of all or any portion of the goods set forth hereon. (Quotes issued by sales representatives are price offerings only, subject to these Additional Terms and Conditions of Sale.) You are hereby notified that we object to and reject all terms and conditions contained on your purchase order that conflict with ours, any statement in your purchase order to the contrary not withstanding. You must notify us in writing immediately (upon your first receipt of this form) of your specific objection to any of our terms and conditions as set forth herein or you will be bound by these terms. If you object to our terms you must also refuse shipment, or return shipment at your cost upon receipt, otherwise your assent shall be presumed. In no case may an order for custom items be canceled after manufacturing of the custom items has begun.

2. "Remit to" Address. Note: "Remit to" address is a direct depository bank whose authority is limited to processing deposits only. Bank is not authorized to waive or compromise claims or accept "payment in full" on disputed accounts.

3. Price and Sales Terms. The Standard Terms and Conditions of Sale in our price list or as otherwise published by us, covering the goods referenced on the face hereof, are incorporated by reference herein as if fully reprinted at this point. No other prices or terms and conditions shall be applicable, except as modified herein or unless we have issued you specific authorized quotations containing such modifications which modifications are also confirmed on this document. In either case, the terms and conditions contained herein shall be considered supplemental to same. (However, see paragraph 9 below.) Prompt payment by you pursuant to such terms and conditions and as stated herein is required. Failure by you to pay promptly shall result in your liability for all costs and expenses, including reasonable attorneys' fees, incurred by us in collecting or attempting to collect any and all sums due here under and under subsequent invoices, to the extent allowed by law. We reserve the right to add to prices the amount of any taxes which we may be required to pay or collect under any law regarding the goods sold and shipped, whether incurred because of their sale, purchase, delivery, storage, processing, use, consumption, transportation or value added. We reserve the right to terminate this contract, or suspend performance and further deliveries, in the event you fail to pay for any shipment when payment is due. Should your financial condition become unsatisfactory to us, we reserve the right to require cash payments or satisfactory security. PAYMENT DUE DATES SHALL BE CALCULATED FROM DATE OF INVOICE.

4. Deliveries and Excuse of Performance. Shipment and delivery dates are estimates only and we shall not be held responsible for delays in delivery or failure to manufacture or deliver due to causes beyond our reasonable control, or due to acts of God, acts of the purchaser, acts of civil or military authority, priorities, fires, strikes, floods, epidemics, war, riot, delays in transportation, car shortages, or inability due to cause beyond our reasonable control to obtain necessary labor, materials, components or manufacturing facilities. Goods shipped and delivered in advance of schedule may not be returned without our prior written consent. No goods may be returned to us under any circumstances unless freight is prepaid and we have issued a prior return authorization. Unless deliveries are taken F.O.B. our plant, we reserve the right to determine the method of transportation. If you specify transportation method, you will bear the additional expense associated with it. We reserve the right to refuse to drop ship products out of a distributor's geographic area.

CONTINUED ON BACK

TERMS & CONDITIONS

electro/connect®

5. Warranty, Disclaimer and Limitation of Remedies. You are responsible for determining the suitability of our products for your use or resale. We warrant to you, our direct purchaser only, title to our products, as well as material and workmanship at time of shipment, for the period set forth in our published warranty, which period shall run from date of shipment. (If component vendors provide a user warranty, e.g. on ballasts, WE OFFER NO WARRANTY, BUT PASS THEIRS TO YOU ONLY.) Warranty claims against us must be asserted by you within said time period. Thereafter, they will not be honored. Furthermore, you are not authorized to extend to any person or entity a warranty on our behalf, or to extend any remedies against us to anyone. (Such extensions by you shall remain your responsibility.) Therefore, except to the extent of our published warranty and the warranty of title, WE DISCLAIM ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE LIABLE TO YOU IN WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, FOR ANY DAMAGES, WHETHER INCIDENTAL OR CONSEQUENTIAL, WHICH ARE ALLEGED TO BE CAUSED BY ONE OR MORE OF OUR PRODUCTS, BEYOND THE COST TO YOU OF THE SUBJECT PRODUCT OR PRODUCTS. YOUR SOLE AND EXCLUSIVE REMEDY AGAINST US FOR BREACH OF WARRANTY, BREACH OF CONTRACT OR IN NEGLIGENCE OR STRICT LIABILITY, OR OTHERWISE, SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE SUBJECT PRODUCT (AT OUR OPTION) F.O.B. OUR FACTORY (EXCLUDING INSTALLATION AND REMOVAL CHARGES, WHICH SHALL BE YOUR RESPONSIBILITY) OR, IF WE CHOOSE, REFUND OF THE PURCHASE PRICE, AND SUCH LIMITED EXCLUSIVE REMEDY SHALL EXPIRE AT THE END OF THE PUBLISHED WARRANTY PERIOD FROM DATE OF SHIPMENT.

6. Changes; Procurement. We reserve the right to change or substitute goods of like grade, quality and function for those which are contained hereon. We reserve the right to procure any items shown hereon from other sources to the extent we deem necessary.

7. Indemnification and Hold Harmless. You are responsible for all consequences of incorporating our products into items or objects or for applications which you design, assemble, construct or manufacture. Therefore, in such instances, you are responsible for drafting, specifying and designing any and all instructions, warnings, safeguards or devices which must accompany the products which you are purchasing hereunder and which you are incorporating as aforesaid, and you shall indemnify us and hold us harmless from any and all claims for injuries, death or damages associated with such incorporation, if such claims actually or allegedly arise from such design, assemblage, construction or manufacture, or from a failure to draft or specify instructions, warnings, safeguards or devices as aforesaid.

8. No Waiver by our Forbearance. That we may forbear in seeking any remedies against you for your failure to abide by this agreement shall not be deemed a waiver by us of any right we may have hereunder whether for such failure already committed by you or for any failure committed by you in the future.

9. Other Agreements; Merger Clause. Unless we execute a separate, written purchase and sale agreement with you either before or after the date hereof which is intended by us to supercede these Terms and Conditions of Sale (excluding your purchase order which has been rejected as aforesaid), the terms and conditions stated herein shall constitute an exclusive and final expression of the terms of our agreement with respect to the purchase and sale of the goods on the face of this document.

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PHILIPS

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2.3 LIGHTING CONTROLS

DOUGLAS
lighting controls

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
WALPOLE, MA

Project Number:	J12-38603
Douglas Representative:	S K Associates Canton, MA (781)821-1700
Supplier:	Yale Electric Supply Canton, MA (781)737-2500
Electrical Contractor:	- -, - -

Issue	Designer	Date Issued
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

4455 Juneau Street, Burnaby, BC, Canada, V5C-4C4
Tel: (604) 873-2797, Fax: (604) 873-6939, www.DouglasLightingControls.com

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Manufacturer's Warranty

DOUGLAS products are warranted for one year from the commissioning date against factory defects due to materials and the company's workmanship only. The sole obligation hereunder shall be to repair, or at the company's option to replace, products as aforesaid, provided same are returned upon authorization, "transportation prepaid" to the company's office(s) within the said period. Defects or failures due to improper or careless installation, storage or handling, or usage under other than rated conditions, are specifically excluded from this warranty. No liability is accepted for return transportation charges following repair or replacement as aforesaid or for reinstallation costs. No other liability of any nature or kind, whether arising out of or from the use of the product, whether or not defective, is assumed.

Technical Support:

Douglas will provide lifetime technical support. Toll free telephone number: 1-877-873-2797

Warranty Replacement Parts:

Customer must speak to tech support first to diagnose potential problem and to ensure unit is defective. RMA form will be completed. A replacement PO must be sent to Douglas for new parts, when the new PO in received new parts is sent out and RMA is issued. *Po is invoiced. *Parts are expected to be returned within 30 days to receive credit. *When parts are returned replacement PO will be credited.

Special Points to Note

1) The entry sensors are to turn the lights ON only when the motion is detected.
2) EPC-A-120 UL-924 Emergency Shunt relays will be removed from the relay panel on site and then the EPC's will be mounted remotely by the Electrical contractor.
3) All Low Voltage wiring runs must be installed at a minimum distance of 12" from any Line Voltage wiring runs.
4) Douglas switches correctly fit standard electrical gang boxes; however, Douglas switches do not fit in some plaster rings. Check before installing plaster ring to ensure correct fit.

Technical References:

- Refer to the following manuals for programming information for your system:
    - WLC-3150 – Dialog Instruction Manual
- Refer to the Product Monograms (located at the back of this drawing package) for technical data on ALL devices listed on the following page.

AN BUILDING

LPB-AN

	PWE4-WxxM-S3	(Consisting of the following items)
1	WE4-S3-COV	Surface, Hinged Cover for WE4-33x20-BOX
1	WE4-WxxM-BPI	xx Relay Interior for WE4-33x20-BOX,
1	WE4-33x20-BOX	33x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
22	WR-6161-C	2-Wire HID Relay, 1P, 120/277/347V 20A
3	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WCI-3928	Dialog contact input, 8 inputs, iR set, c/w 24 VDC, 500 mA s
1	WLC-3150	Dialog lighting control unit
1	WNG-3131	Bacnet IP Gateway

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

Exterior Photocell

1	WPS-3741	Dialog data line photo sensor, exterior

AG BUILDING

LP1-AG

	PWE8-WxxM-S3	(Consisting of the following items)
1	WE8-S3-COV	Surface, Hinged Cover for WE8-54x20-BOX
1	WE8-WxxM-BPI	xx Relay Interior for WE8-54x20-BOX
1	WE8-54x20-BOX	54x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
40	WR-6161-C	2-Wire HID Relay, 1P, 120/277/347V 20A
5	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WCI-3928	Dialog contact input, 8 inputs, iR set, c/w 24 VDC, 500 mA s
1	WLC-3150	Dialog lighting control unit
1	WNG-3131	Bacnet IP Gateway

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

Exterior Photocell

1	WPS-3741	Dialog data line photo sensor, exterior

EQ BUILDING

LP-EQ

	PWE4-WxxM-S3	(Consisting of the following items)
1	WE4-S3-COV	Surface, Hinged Cover for WE4-33x20-BOX
1	WE4-WxxM-BPI	xx Relay Interior for WE4-33x20-BOX,
1	WE4-33x20-BOX	33x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
16	WR-6161-C	2-Wire HID Relay, 1P, 120/277/347V 20A
2	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WLC-3150	Dialog lighting control unit
1	WNG-3131	Bacnet IP Gateway

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

Exterior Photocell

1	WPS-3741	Dialog data line photo sensor, exterior

CB BUILDING

LP1-CB

	PWE4-WxxM-S3	(Consisting of the following items)
1	WE4-S3-COV	Surface, Hinged Cover for WE4-33x20-BOX
1	WE4-WxxM-BPI	xx Relay Interior for WE4-33x20-BOX,
1	WE4-33x20-BOX	33x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
22	WR-6161-C	2-Wire HID Relay, 1P, 120/277/347V 20A
3	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WCI-3928	Dialog contact input, 8 inputs, iR set, c/w 24 VDC, 500 mA s
1	WLC-3150	Dialog lighting control unit
1	WNG-3131	Bacnet IP Gateway

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

Exterior Photocell

1	WPS-3741	Dialog data line photo sensor, exterior

AS BUILDING

LP1-AS

	PWE8-WxxM-S3	(Consisting of the following items)
1	WE8-S3-COV	Surface, Hinged Cover for WE8-54x20-BOX
1	WE8-WxxM-BPI	xx Relay Interior for WE8-54x20-BOX
1	WE8-54x20-BOX	54x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
40	WR-6161-C	2-Wire HID Relay, 1P, 120/277/347V 20A
5	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WCI-3928	Dialog contact input, 8 inputs, iR set, c/w 24 VDC, 500 mA s
1	WLC-3150	Dialog lighting control unit
1	WNG-3131	Bacnet IP Gateway

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

ELP

	EPWE4-W36M-S3	(Consisting of the following items)
1	WE4-S3-COV	Surface, Hinged Cover for WE4-33x20-BOX
1	WE4-W36M-BPI	36 Relay Interior for WE4-33x20-BOX, Use WR-6161
1	WE4-33x20-BOX	33x20 Empty Relay Box
1	WR-4075-120/277	120/277:24 Transformer (40VA Steady/75VA Pulse)
1	ST1201PG	TVSS Surge Protector UL 1449 - 120V
2	PWEx-CL1-VDV-20	Line voltage compartment divider for PWE 3,4,6 & 8 Panels
16	WR-6161	2-Wire HID Relay, 1P, 120/277/347V 20A
2	WRD-3408	Dialog relay driver, 8 outputs, DIP set
1	WLC-3150	Dialog lighting control unit
8	WRE-9242	Emergency Force On Device for 2 - WR-6161 relays

*** 1 Relay to control 3-Pole 60A Contactor by Others**

*** Contactor in seperate enclosure by Others**

Exterior Photocell

1	WPS-3741	Dialog data line photo sensor, exterior

Low Voltage Switching

EQ Building Switches

2 Button Switch Station

1	WSW-3512	Dialog data line switch - 1 gang, 2 buttons, (2x1), iR set
1	WN-97401	Elan Decora Stainless Steel Switch Plate (1gang)

4 Button Switch Station

3	WSW-3514	Dialog data line switch - 1 gang, 4 buttons, (4x1), iR set
3	WN-97401	Elan Decora Stainless Steel Switch Plate (1gang)

8 Buttons Switch Station

2	WSW-3528	Dialog data line switch - 1 gang, 8 buttons (4x2), iR set
2	WN-97401	Elan Decora Stainless Steel Switch Plate (1gang)

Master Stations

7	WSW-3514	Dialog data line switch - 1 gang, 4 buttons, (4x1), iR set
7	WN-97401	Elan Decora Stainless Steel Switch Plate (1gang)

Low Voltage Local Stations

2	WSW-3512	Dialog data line switch - 1 gang, 2 buttons, (2x1), iR set
12	WSW-3514	Dialog data line switch - 1 gang, 4 buttons, (4x1), iR set
14	WN-97401	Elan Decora Stainless Steel Switch Plate (1gang)
4	WSW-3528	Dialog data line switch - 1 gang, 8 buttons (4x2), iR set
2	WSW-3514	Dialog data line switch - 1 gang, 4 buttons, (4x1), iR set
2	WN-97403	Elan Decora Stainless Steel Switch Plate (3gang)

Loose EPC Relays

23	EPC-A-120	UL-924 EmeShuntRly c/w Switch, Pre-wired in Panel, 120V Coil

Low Voltage Relay Override Sensor [ES]

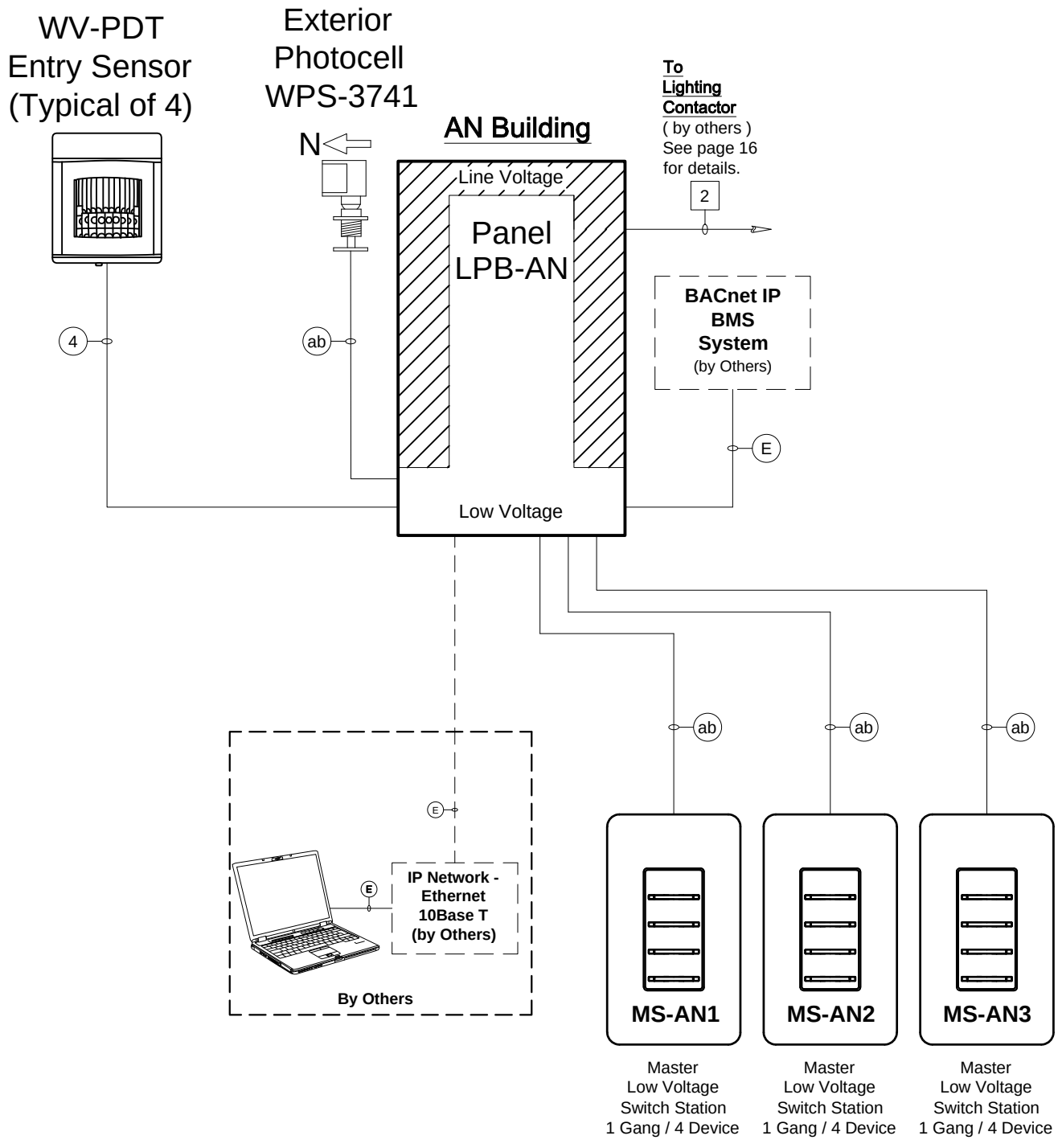
13	WORSDD1-R-N	Ceiling Recessed, Standard Lens, Dual Tech, 24V, 1P, Rly

Line Voltage Stand-alone Ceiling Sensors

42	CM-PC-ADC-DZ	24VDC Daylight Sensor ON/OFF & 0-10v dual zone dimm (req pp)
32	PP-20	Power Pack: 20A 120/277

Manufacturers Services

1	W-ENG-DWGS	Engineered Drawings
1	WIR-3110	Dialog iR setting unit



LEGEND

(#) Number of Conductors required (Use #18AWG)
Conductor counts DO NOT include any spares.
It is recommended to add a minimum of 10%.

[#] Line Voltage Wiring. Conductor Size and Count to be determined by Electrical Contractor

(ab) Use 2x #18 AWG Solid , Recommended cable is LVT or Bell wire

(tw) Use (2) Twisted Pair - Belden #9842 (in Shielded metal conduit)

(E) Standard Cat 5 Cable with RJ-45 Connector

(C) Crossover Cable Cat 5e with RJ-45 Connector

NOTES:

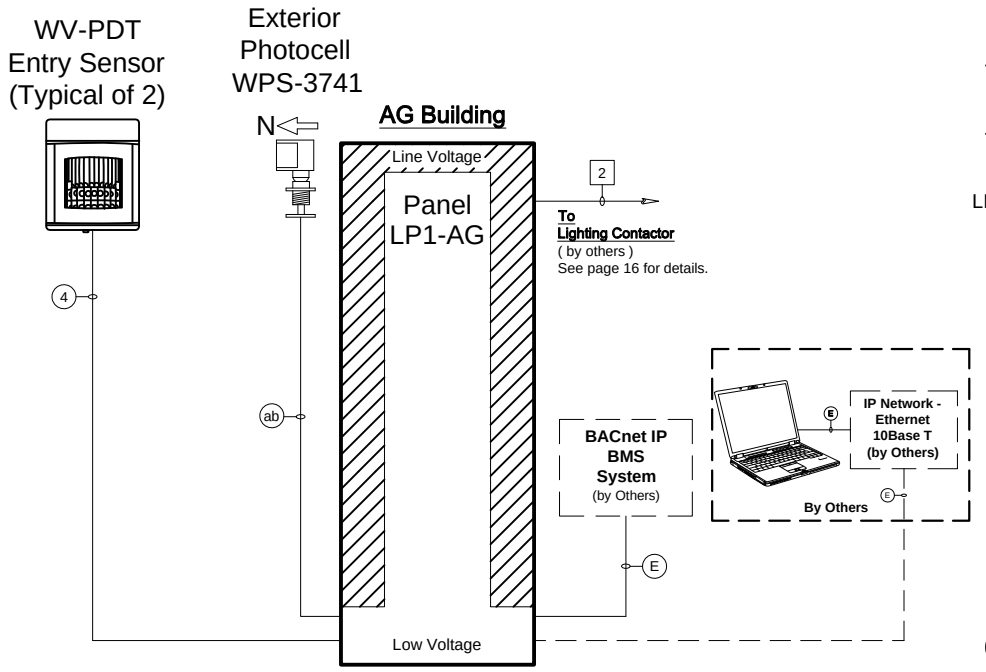
1. For Panel contents and dimensions see the Panel Schedules
2. FIELD WIRING IS TO BE COPPER (min.75°C) TORK T-BLOCK TO 4.5 lb in.

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

One-Line Diagram (Panel LPB-AN)

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



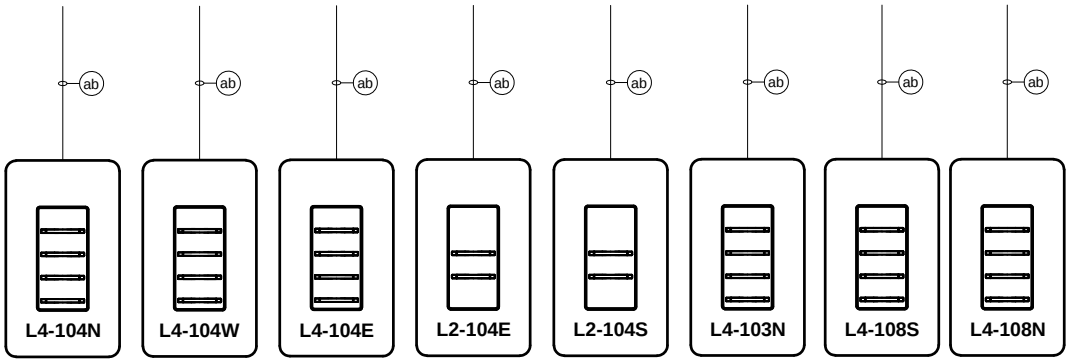
NOTES:

1. For Panel contents and dimensions see the Panel Schedules
2. FIELD WIRING IS TO BE COPPER (min.75°C) TORK T-BLOCK TO 4.5 lb in.

LEGEND

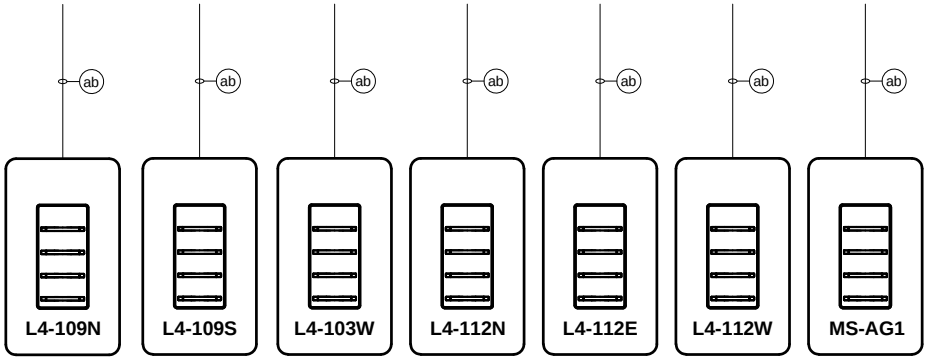
- (#) Number of Conductors required (Use #18AWG) Conductor counts DO NOT include any spares. It is recommended to add a minimum of 10%.
- [#] Line Voltage Wiring. Conductor Size and Count to be determined by Electrical Contractor
- (tw) Use (2) Twisted Pair - Belden #9842 (in Shielded metal conduit)
- (E) Standard Cat 5 Cable with RJ-45 Connector
- (C) Crossover Cable Cat 5e with RJ-45 Connector
- (ab) Use 2x #18 AWG Solid , Recommended cable is LVT or Bell wire

To Dataline Connection in Relay Panel AG



Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 2 Device
Low Voltage Switch Station 1 Gang / 2 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device

To Dataline Connection in Relay Panel AG



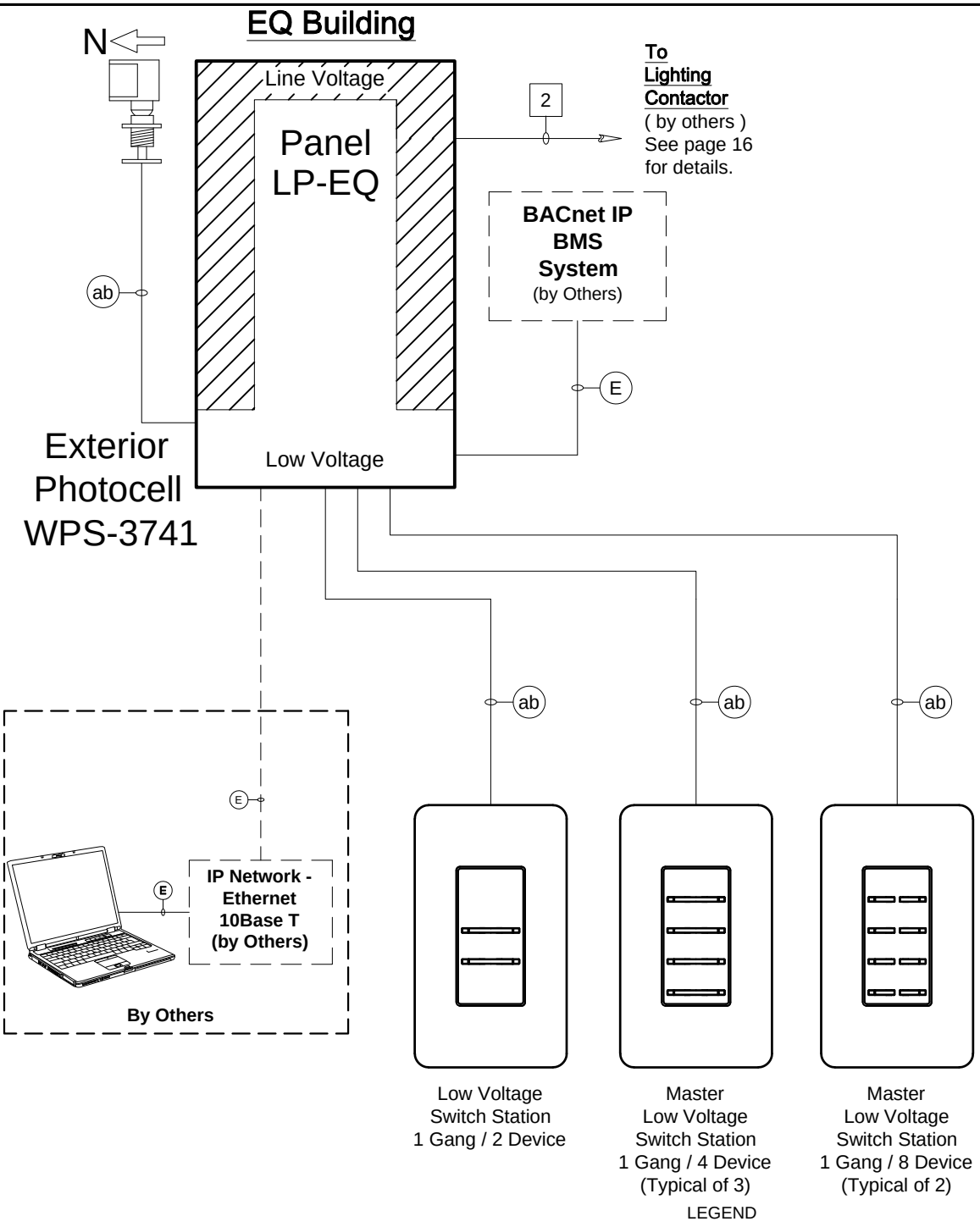
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Low Voltage Switch Station 1 Gang / 4 Device
Master Low Voltage Switch Station 1 Gang / 4 Device

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

One-Line Diagram (Panel LP1-AG)

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



LEGEND

NOTES:

1. For Panel contents and dimensions see the Panel Schedules
2. FIELD WIRING IS TO BE COPPER (min.75°C) TORK T-BLOCK TO 4.5 lb in.

(ab) Use 2x #18 AWG Solid , Recommended cable is LVT or Bell wire

(#) Number of Conductors required (Use #18AWG) Conductor counts DO NOT include any spares. It is recommended to add a minimum of 10%.

[#] Line Voltage Wiring. Conductor Size and Count to be determined by Electrical Contractor

(tw) Use (2) Twisted Pair - Belden #9842 (in Shielded metal conduit)

(E) Standard Cat 5 Cable with RJ-45 Connector

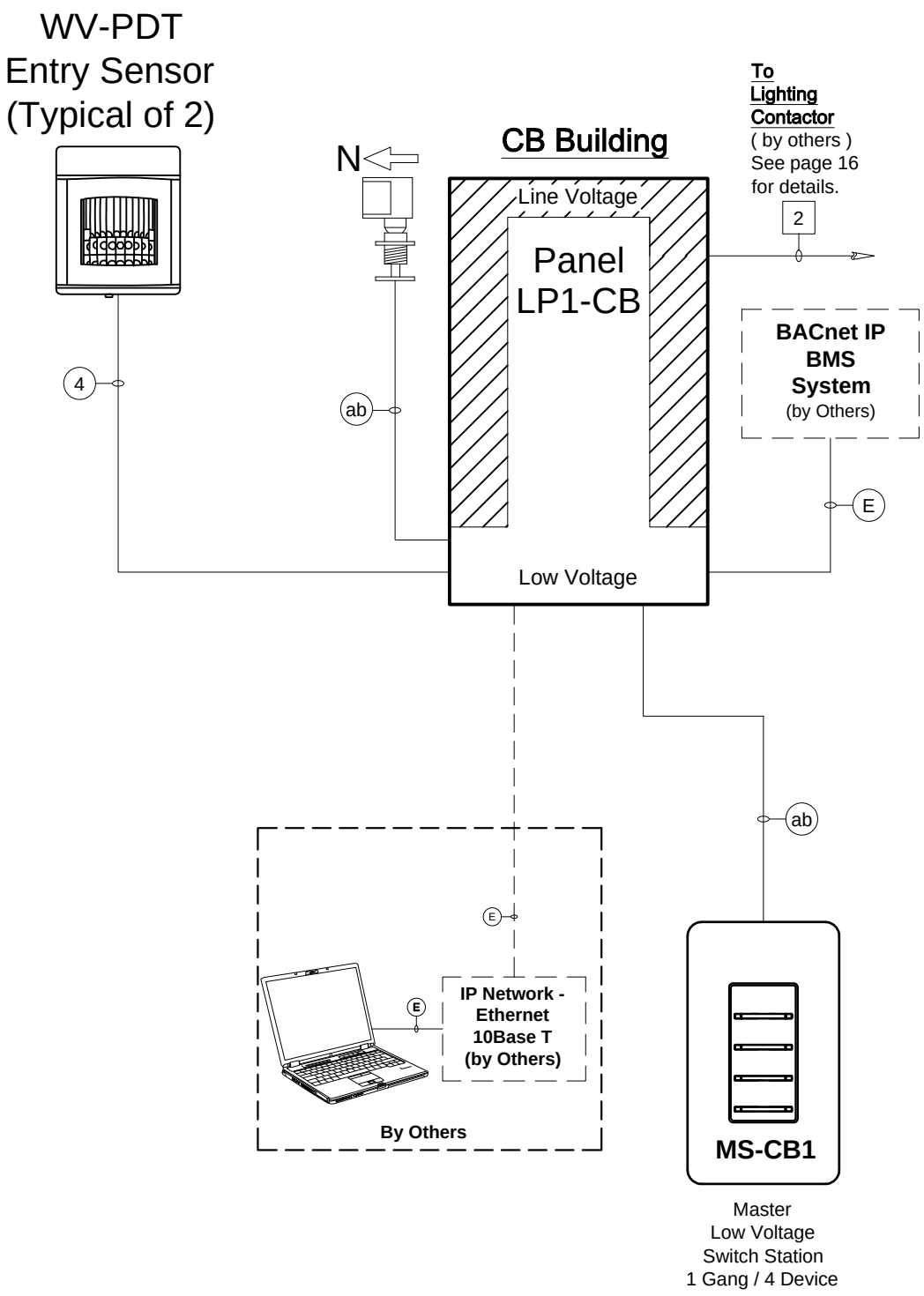
(C) Crossover Cable Cat 5e with RJ-45 Connector

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

One-Line Diagram (Panel LP-EQ)

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



LEGEND

(#) Number of Conductors required (Use #18AWG)
Conductor counts DO NOT include any spares.
It is recommended to add a minimum of 10%.

[#] Line Voltage Wiring. Conductor Size and Count to be determined by Electrical Contractor

(ab) Use 2x #18 AWG Solid , Recommended cable is LVT or Bell wire

(tw) Use (2) Twisted Pair - Belden #9842 (in Shielded metal conduit)

(E) Standard Cat 5 Cable with RJ-45 Connector

(C) Crossover Cable Cat 5e with RJ-45 Connector

NOTES:

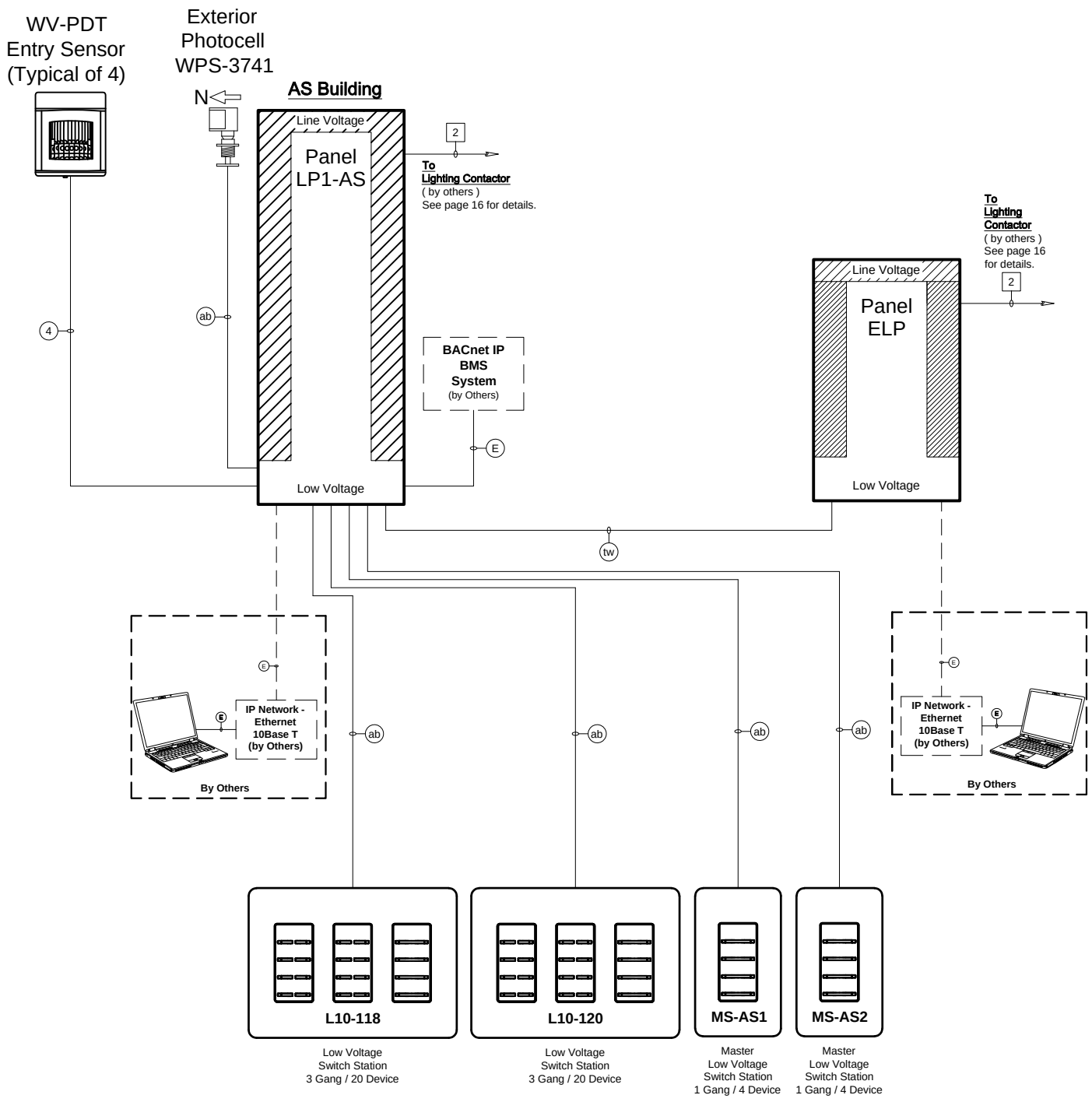
1. For Panel contents and dimensions see the Panel Schedules
2. FIELD WIRING IS TO BE COPPER (min.75°C) TORK T-BLOCK TO 4.5 lb in.

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

One-Line Diagram (Panel LP1-CB)

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



LEGEND

(#) Number of Conductors required (Use #18AWG)
Conductor counts DO NOT include any spares.
It is recommended to add a minimum of 10%.

[#] Line Voltage Wiring. Conductor Size and Count to be determined by Electrical Contractor

(ab) Use 2x #18 AWG Solid , Recommended cable is LVT or Bell wire

(tw) Use (2) Twisted Pair - Belden #9842 (in Shielded metal conduit)

(E) Standard Cat 5 Cable with RJ-45 Connector

(C) Crossover Cable Cat 5e with RJ-45 Connector

NOTES:

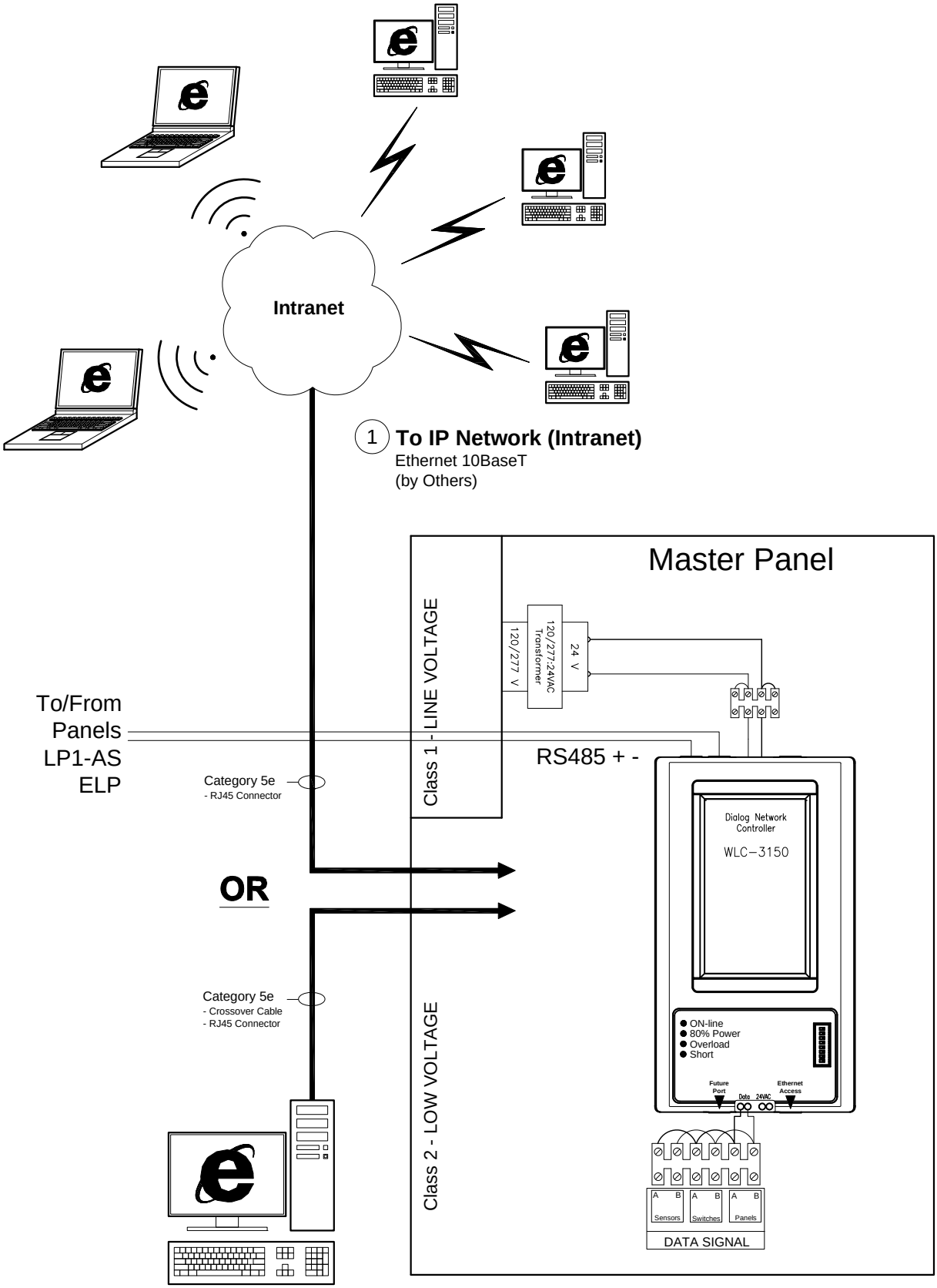
1. For Panel contents and dimensions see the Panel Schedules
2. FIELD WIRING IS TO BE COPPER (min.75°C) TORK T-BLOCK TO 4.5 lb in.

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

One-Line Diagram (Panel LP1-AS/ELP)

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



1 **To IP Network (Intranet)**
Ethernet 10BaseT
(by Others)

2 **Direct to PC connection**
Ethernet 10BaseT
(by Others)

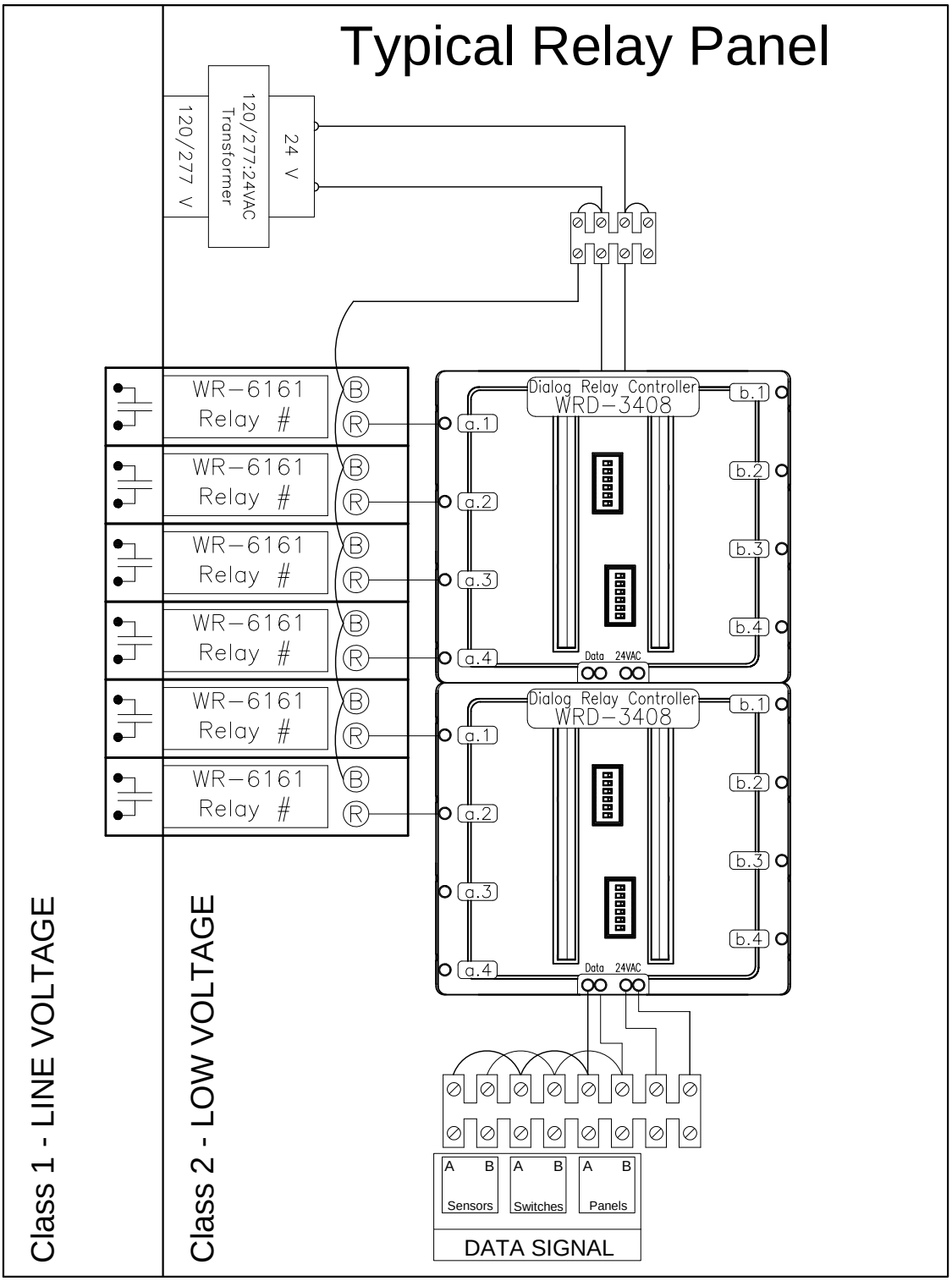
ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

WLC-3150 - Typical Connection Schematic

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603

Typical Relay Panel

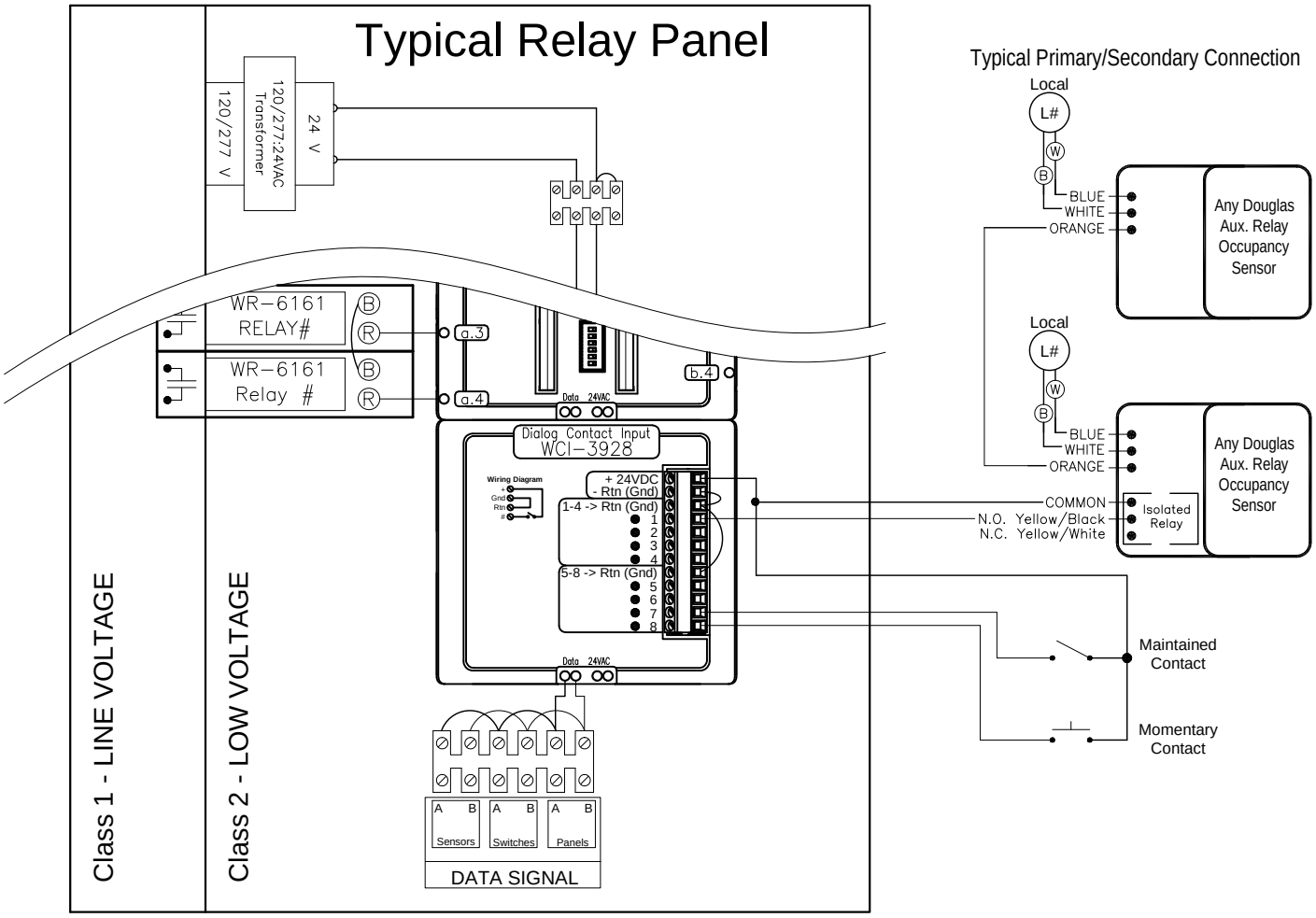


ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

WR-3408 Relay Driver - Typical Connection Schematic

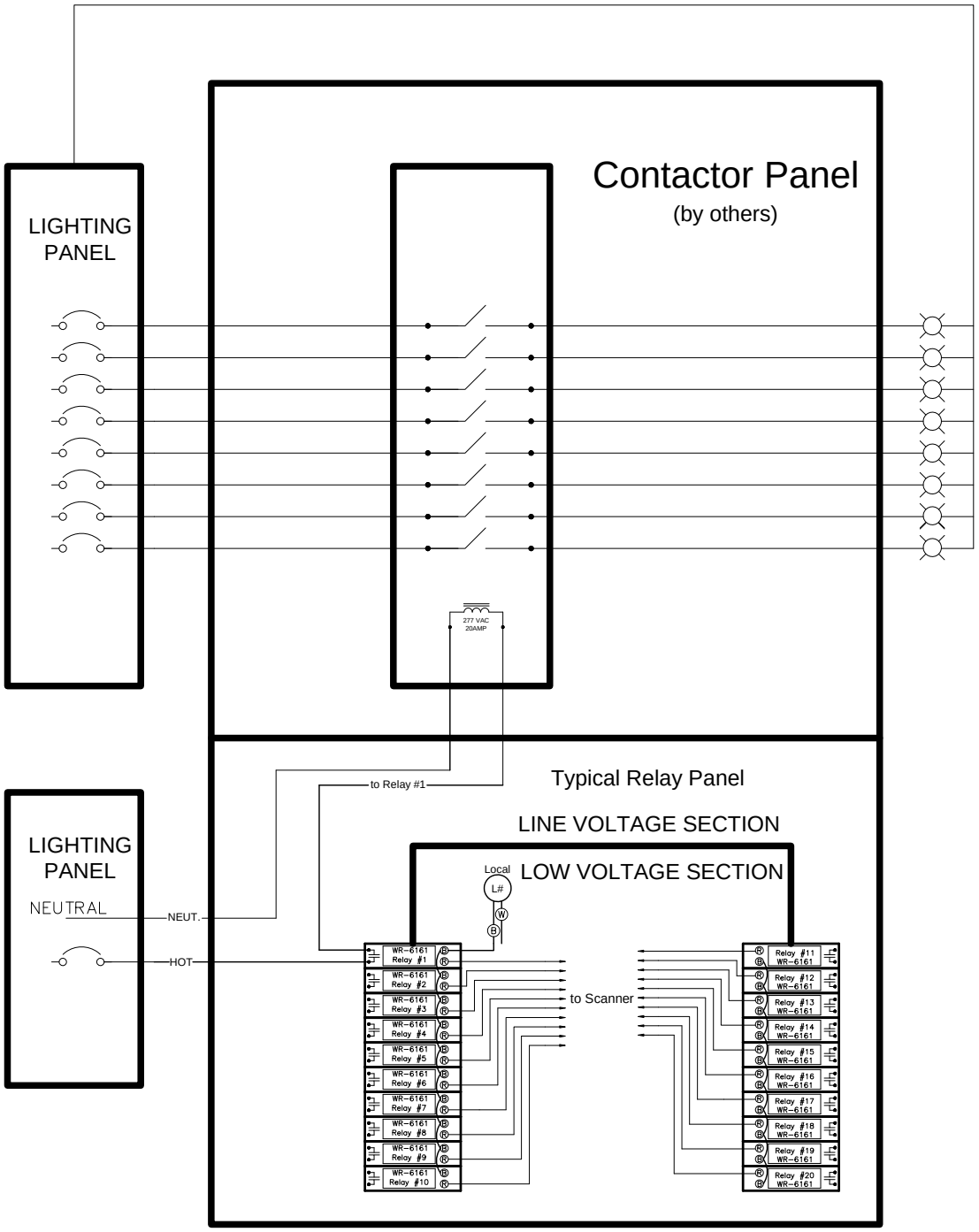
DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603



ISSUE	DRAWN	DATE	WCI-3928 Input Module - Typical Connection Schematic			
Rev. #2	BK	7-Nov-12	DOUGLAS lighting controls	PROJECT NAME	Norfolk County Agricultural High School	17
Rev. #3	BK	23-Nov-12		PROJECT LOCATION	Walpole, MA	
Rev. #4	BK	12-Apr-13		PROJECT NUMBER	J12-38603	
F.A.B.	BK	3-May-13				

NOTE:
Contractor to coordinate to determine Lighting Contactor Poles/Amps/ Coil voltage requirement.



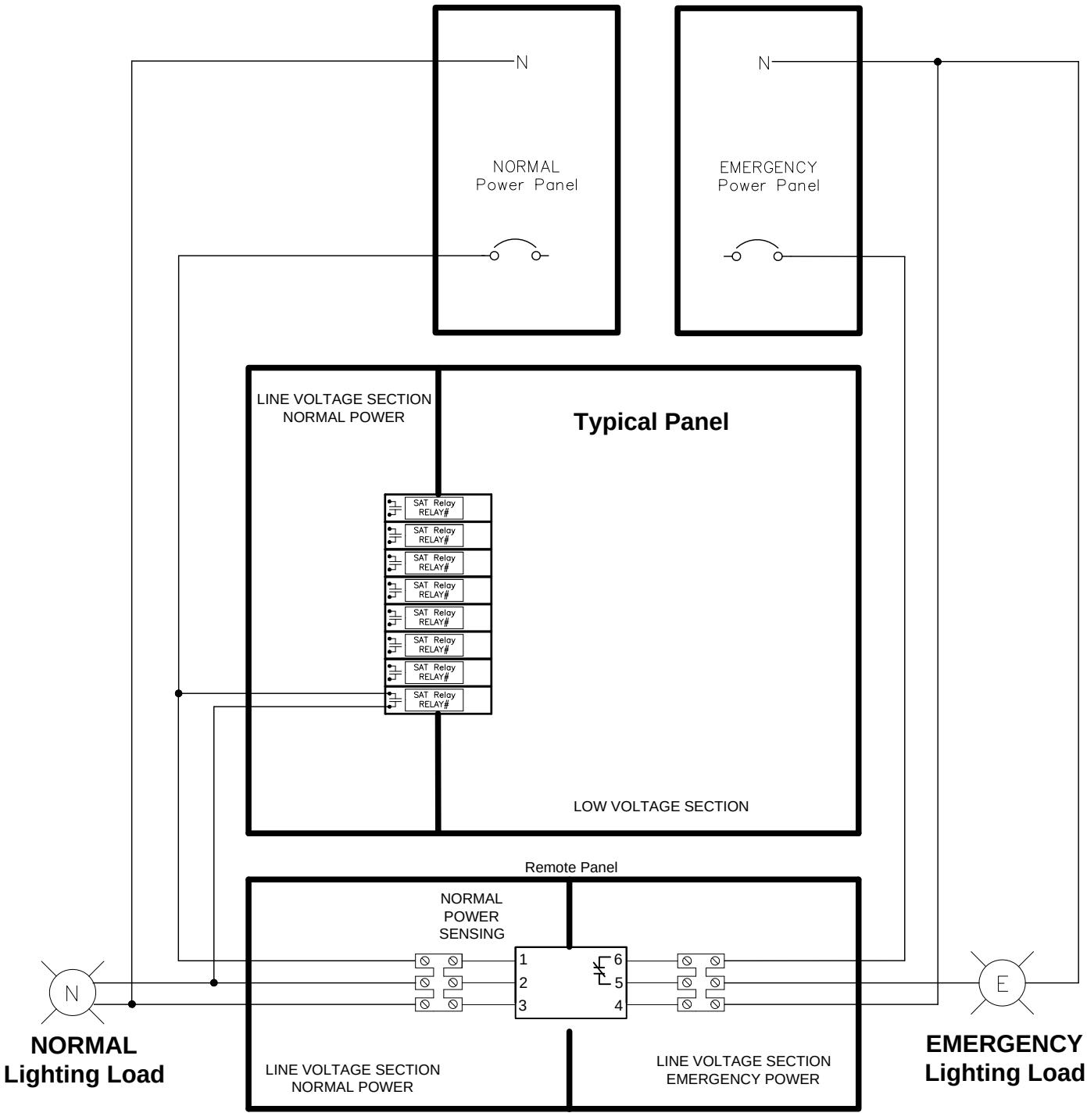
ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

Contactor Panel - Typical Connection Schematic

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603

During Normal Operation, the Douglas Relays control the Normal Lights ON & OFF.
A UL-924 Emergency By-Pass Relay is wired with each Douglas Relay controlling Emergency Lights too.
The Emegency By-Pass Relay is constantly sensing the NORMAL Power, and if the NORMAL power fails, the Emegency By-Pass Relay closes.
This action will turn ON the Emergency Lights regardless of the Douglas Relay position, and remain ON until Normal Power returns.
Upon return of Normal Power, the Emergency By-Pass Relay contact opens, and the Douglas Relay resumes control of the Normal Lights.



Typical only, refer to cutsheets

ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

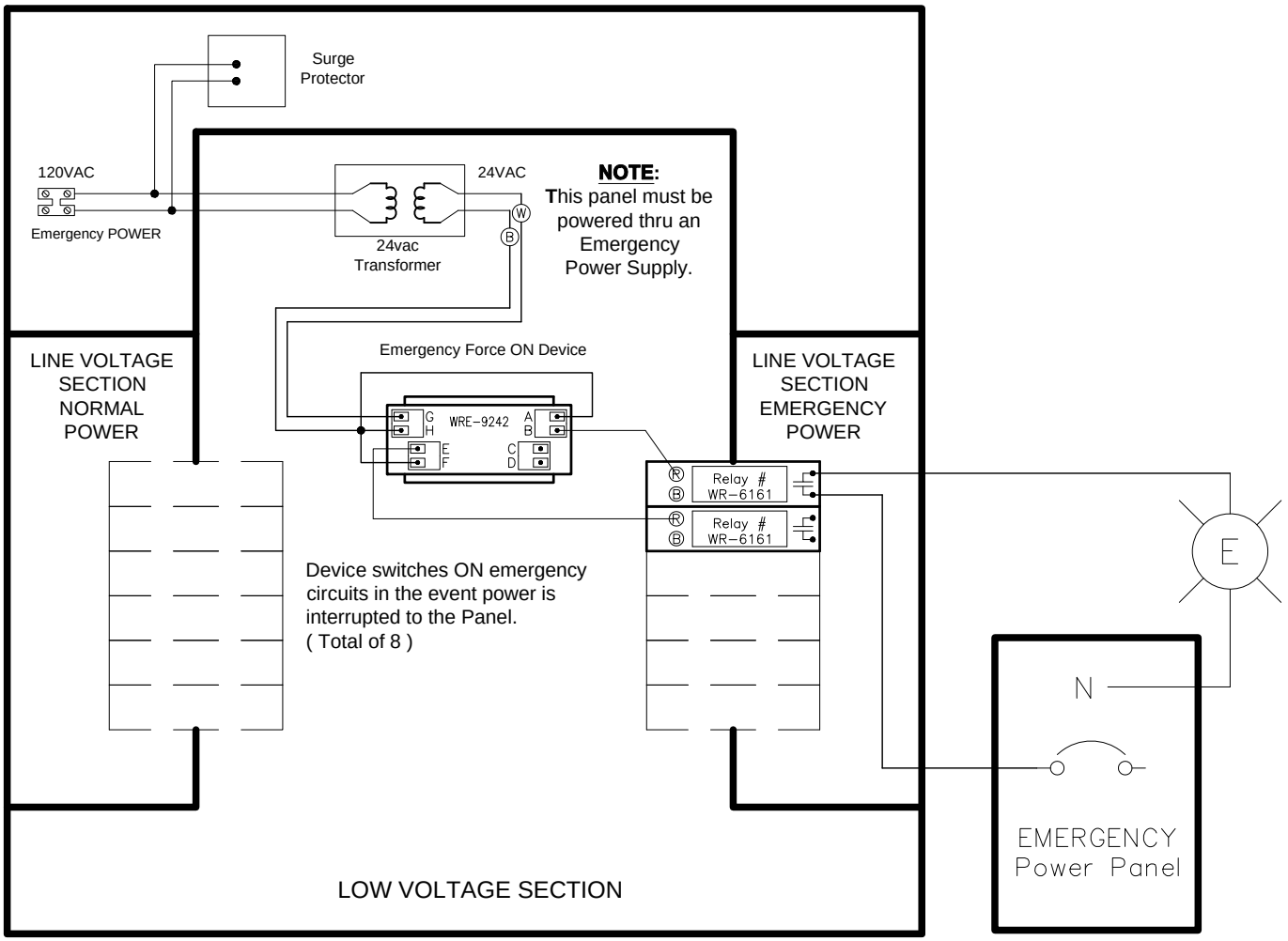
EM Shunt Relays - Typical Connection Schematic

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603

Part of Panel ELP

FOR EXACT PANEL CONTENTS.
PLEASE REFER TO INTARFACE LIST ON
PAGE 19.



ISSUE	DRAWN	DATE
Rev. #2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

EM Shunt Relays - Typical Connection Schematic

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603

Dialog Group List: Panel LP1-AG

Group Number	Pattern Function	Control Device Part Number	Code	Area of Control
G001	ON/OFF	WPS-3741 (LC64)	PC/TC-AG1	Exterior Lights
G002	ON/OFF	WLC-3150	TC-AG1	Interior Lighting
G003	ON/OFF	WCI-3928.1	ES-101/114	Corridor Lighting

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

Dialog Group List: Panel LP1-AG

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

Dialog Group List: Panel LP-EQ

Group Number	Pattern Function	Control Device Part Number	Code	Area of Control
G001	ON/OFF	WPS-3741 (LC64)	PC/TC-EQ1	Exterior Lighting
G002	ON/OFF	WLC-3150	TC-EQ1	Interior Lighting

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Dialog Group List: Panel LP-EQ

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

Dialog Group List: Panel LP1-CB

Group Number	Pattern Function	Control Device Part Number	Code	Area of Control
G001	ON/OFF	WPS-3741 (LC64)	PC/TC-CB1	Exterior Lights
G002	ON/OFF	WLC-3150	TC-CB1	Interior Lighting
G003	ON/OFF	WCI-3928.1	ES-102E/102W	Corridor Lighting

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Dialog Group List: Panel LP1-CB

PROJECT NAME	Norfolk County Agricultural High Schoo
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

Dialog Group List: Panel LP1-AS

Group Number	Pattern Function	Control Device Part Number	Code	Area of Control
G001	ON/OFF	WPS-3741 (Global 64)	PC/TC-AS1	Exterior Lighting
G002	ON/OFF	WLC-3150	TC-AS1	Interior Lighting
GP001	ON/OFF	WCI-3928	ES-117	Corridor Lighting
GP002	ON/OFF	WCI-3928	ES-201	Corridor Lighting
GP003	ON/OFF	WCI-3928	ES-B00/B06	AKC Ring #1 Lighting
GP004	ON	WSW-3528	L10-118.1/120.1 ON	AKC Ring #1 Lighting
GP005	OFF	WSW-3528	L10-118.1/120.1 OFF	AKC Ring #1 Lighting
GP006	ON	WSW-3528	L10-118.2/120.2 ON	AKC Ring #2 Lighting
GP007	OFF	WSW-3528	L10-118.2/120.2 OFF	AKC Ring #2 Lighting
GP008	ON	WSW-3528	L10-118.3/120.3 ON	AKC Ring #2 Lighting
GP009	OFF	WSW-3528	L10-118.3/120.3 OFF	
GP010	ON	WSW-3528	L10-118.4/120.4 ON	
GP011	OFF	WSW-3528	L10-118.4/120.4 OFF	
GP012	ON	WSW-3528	L10-118.5/120.5 ON	
GP013	OFF	WSW-3528	L10-118.5/120.5 OFF	
GP014	ON	WSW-3528	L10-118.6/120.6 ON	
GP015	OFF	WSW-3528	L10-118.6/120.6 OFF	
GP016	ON	WSW-3528	L10-118.7/120.7 ON	
GP017	OFF	WSW-3528	L10-118.7/120.7 OFF	
GP018	ON	WSW-3528	L10-118.8/120.8 ON	
GP019	OFF	WSW-3528	L10-118.8/120.8 OFF	
GP020	ON	WSW-3514	L10-118.9/120.9 ON	
GP021	OFF	WSW-3514	L10-118.9/120.9 OFF	
GP022	ON	WSW-3514	L10-118.10/120.10 ON	
GP023	OFF	WSW-3514	L10-118.10/120.10 OFF	

Dialog Group List: Panel ELP

Group Number	Pattern Function	Control Device Part Number	Code	Area of Control
G001	ON/OFF	WPS-3741 (Global 64)	PC/TC-AS1	Exterior Lighting
G002	ON/OFF	WLC-3150	TC-AS1	Interior Lighting
GP001	ON/OFF	WCI-3928	ES-117	Corridor Lighting
GP002	ON/OFF	WCI-3928	ES-201	Corridor Lighting
GP003	ON/OFF	WCI-3928	ES-B00/B06	AKC Ring #1 Lighting
GP004	ON	WSW-3528	L10-118.1/120.1 ON	AKC Ring #2 Lighting
GP005	OFF	WSW-3528	L10-118.1/120.1 OFF	
GP006	ON	WSW-3528	L10-118.2/120.2 ON	
GP007	OFF	WSW-3528	L10-118.2/120.2 OFF	
GP008	ON	WSW-3528	L10-118.3/120.3 ON	
GP009	OFF	WSW-3528	L10-118.3/120.3 OFF	
GP010	ON	WSW-3528	L10-118.4/120.4 ON	
GP011	OFF	WSW-3528	L10-118.4/120.4 OFF	
GP012	ON	WSW-3528	L10-118.5/120.5 ON	
GP013	OFF	WSW-3528	L10-118.5/120.5 OFF	
GP014	ON	WSW-3528	L10-118.6/120.6 ON	
GP015	OFF	WSW-3528	L10-118.6/120.6 OFF	
GP016	ON	WSW-3528	L10-118.7/120.7 ON	
GP017	OFF	WSW-3528	L10-118.7/120.7 OFF	
GP018	ON	WSW-3528	L10-118.8/120.8 ON	
GP019	OFF	WSW-3528	L10-118.8/120.8 OFF	
GP020	ON	WSW-3514	L10-118.9/120.9 ON	
GP021	OFF	WSW-3514	L10-118.9/120.9 OFF	
GP022	ON	WSW-3514	L10-118.10/120.10 ON	
GP023	OFF	WSW-3514	L10-118.10/120.10 OFF	

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
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Dialog Group List: Panel ELP

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

INTERFACE LIST BY PANEL 1/2

Interface Name	Part Number	Interface Type	Unit ID	Notes
				LPB-AN
RD-1/2	WRD-3408	Dialog Relay Driver		
RD-3/4	WRD-3408	Dialog Relay Driver		
RD-5/6	WRD-3408	Dialog Relay Driver		
INP-1	WCI-3928	Contact Input Unit		
LCU-1	WLC-3150	Dialog Lighting Control Unit		
BACNET-1	WNG-3131	Bacnet IP Gateway		System Gateway
				LP1-AG
RD-7/8	WRD-3408	Dialog Relay Driver		
RD-9/10	WRD-3408	Dialog Relay Driver		
RD-11/12	WRD-3408	Dialog Relay Driver		
RD-13/14	WRD-3408	Dialog Relay Driver		
RD-15/16	WRD-3408	Dialog Relay Driver		
INP-2	WCI-3928	Contact Input Unit		
LCU-2	WLC-3150	Dialong Lighitng Control Unit		
BACNET-2	WNG-3131	Bacnet IP Gateway		System Gateway
				LP-EQ
RD-17/18	WRD-3408	Dialog Relay Driver		
RD-19/20	WRD-3408	Dialog Relay Driver		
LCU-4	WLC-3150	Dialong Lighitng Control Unit		
BACNET-3	WNG-3131	Bacnet IP Gateway		System Gateway
				LP1-CB
RD-21/22	WRD-3408	Dialog Relay Driver		
RD-23/24	WRD-3408	Dialog Relay Driver		
RD-25/26	WRD-3408	Dialog Relay Driver		
INP-3	WCI-3928	Contact Input Unit		
LCU-3	WLC-3150	Dialog Lighting Control Unit		
BACNET-4	WNG-3131	Bacnet IP Gateway		System Gateway
				LP1-AS
RD-27/28	WRD-3408	Dialog Relay Driver		
RD-29/30	WRD-3408	Dialog Relay Driver		
RD-31/32	WRD-3408	Dialog Relay Driver		
RD-33/34	WRD-3408	Dialog Relay Driver		
RD-35/36	WRD-3408	Dialog Relay Driver		
INP-4	WCI-3928	Contact Input Unit		
LCU-5	WLC-3150	Dialog Lighting Control Unit		
BACNET-5	WNG-3131	Bacnet IP Gateway		System Gateway
				ELP
RD-37/38	WRD-3408	Dialog Relay Driver		
RD-39/40	WRD-3408	Dialog Relay Driver		
LCU-6	WLC-3150	Dialog Lighting Control Unit		
EOD-1	WRE-9242	Emergency ON Device		
EOD-2	WRE-9242	Emergency ON Device		
EOD-3	WRE-9242	Emergency ON Device		
EOD-4	WRE-9242	Emergency ON Device		
EOD-5	WRE-9242	Emergency ON Device		

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ISSUE	DRAWN	DATE
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Interface List by Panel 1/2

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

INTERFACE LIST BY PANEL 2/2

Interface Name	Part Number	Interface Type	Unit ID	Notes
EOD-6	WRE-9242	Emergency ON Device		
EOD-7	WRE-9242	Emergency ON Device		
EOD-8	WRE-9242	Emergency ON Device		

INPUTS BY PANEL 1/1

Input#	Address	Function	Input Type	Ctrl 1	Ctrl 2	Ctrl 3	Ctrl 4	Notes
								LPB-AN
								INP-1 (WCI-3928)
1	G003	ON Only	Maint. DC	ES-101	ES-108	ES-120	ES-130	Corridor Lighting
2		· ON o NA	Maint. DC					
3		· ON o NA	Maint. DC					
4		· ON o NA	Maint. DC					
5		· ON o NA	Maint. DC					
6		· ON o NA	Maint. DC					
7		· ON o NA	Maint. DC					
8		· ON o NA	Maint. DC					
								LP1-AG
								INP-2 (WCI-3928)
1	G003	ON Only	Maint. DC	ES-101	ES-114			Corridor Lighting
2		· ON o NA	Maint. DC					
3		· ON o NA	Maint. DC					
4		· ON o NA	Maint. DC					
5		· ON o NA	Maint. DC					
6		· ON o NA	Maint. DC					
7		· ON o NA	Maint. DC					
8		· ON o NA	Maint. DC					
								LP1-CB
								INP-3 (WCI-3928)
1	G003	ON Only	Maint. DC	ES-102E	ES-102W			Corridor Lighting
2		· ON o NA	Maint. DC					
3		· ON o NA	Maint. DC					
4		· ON o NA	Maint. DC					
5		· ON o NA	Maint. DC					
6		· ON o NA	Maint. DC					
7		· ON o NA	Maint. DC					
8		· ON o NA	Maint. DC					
								LP1-AS
								INP-4 (WCI-3928)
1	G003	ON Only	Maint. DC	ES-117				Corridor Lighting
2	G004	ON Only	Maint. DC	ES-201				Corridor Lighting
3	G005	ON Only	Maint. DC	ES-B00	ES-B06			Corridor Lighting
4		· ON o NA	Maint. DC					
5		· ON o NA	Maint. DC					
6		· ON o NA	Maint. DC					
7		· ON o NA	Maint. DC					
8		· ON o NA	Maint. DC					

LIST OF RELAY PANELS 1/1

Panel Name	Address	Tub Type	Dimensions (H" x W" x D")	Color	Drip Hood	Manufacturer	Interior	Relays			Cover	Locks
								Capacity	1 Pole	2 Pole		
LPB-AN		PWE4	33x20x4.25	Grey	No	Douglas	W36M	36	22	0	S3	Standard
LP1-AG		PWE8	54x20x4.25	Grey	No	Douglas	W72M	72	40	0	S3	Standard
LP-EQ		PWE4	33x20x4.25	Grey	No	Douglas	W36M	36	16	0	S3	Standard
LP1-CB		PWE4	33x20x4.25	Grey	No	Douglas	W36M	36	22	0	S3	Standard
LP1-AS		PWE8	54x20x4.25	Grey	No	Douglas	W72M	72	40	0	S3	Standard
ELP		EPWE4	33x20x4.25	Grey	No	Douglas	W36M	36	16	0	S3	Standard
								Total=>	156	0		

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List of Relay Panels

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

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XFMR1:	120. L1	TUB PART#:	PWE4	COVER:	S3	INTERIOR:	W36M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	36
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	22
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	33Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
118102	Corridor Lighting/Waiting Room	LPB-3a	1	RD-1.1	ES-101	ES-108	ES-120	ES-130	TC-AN1		1
118102	Corridor Lighting/Waiting Room	LPB-3b	2	RD-1.2	ES-101	ES-108	ES-120	ES-130	TC-AN1		2
210	Reception/Career Center	LPB-6a	3	RD-1.3					TC-AN1		3
210	Reception/Career Center	LPB-6b	4	RD-1.4					TC-AN1		4
121	Corridor Lighting	LPB-9a	5	RD-3.1	ES-101	ES-108	ES-120	ES-130	TC-AN1		5
121	Corridor Lighting	LPB-9b	6	RD-3.2	ES-101	ES-108	ES-120	ES-130	TC-AN1		6
	Misc. Lighting	LPB-9	7	RD-3.3					TC-AN1		7
	Exterior Egress Ltg.	LPB-10	8	RD-3.4					PC/TC-AN1		8
	Existing Circuit	LPB-EX	9	RD-5.1					TC-AN1		9
	Existing Circuit	LPB-EX	10	RD-5.2					TC-AN1		10
	Spare		11	RD-5.3							11
	Spare		12	RD-5.4							12
											13
											14
											15
											16
											17
											18

Class 1 (Line Voltage)

Class 2 (Low Voltage)

BARRIER

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

NOTES

1
2
3
4
5
6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
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Relay Panel LPB-AN

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

30

BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface	Rly	Circuit Number	Area	Rm
19		TC-AN1					RD-2.1	19	LPB-2	Interior Lighting	
20		TC-AN1					RD-2.2	20	LPB-4	Interior Lighting	
21		TC-AN1					RD-2.3	21	LPB-5	Interior Lighting	
22		TC-AN1					RD-2.4	22	LPB-7	Interior Lighting	
23		TC-AN1					RD-4.1	23	LPB-8	Interior Ltg. (Alt. #5)	
24		TC-AN1					RD-4.2	24	LPB-11	Interior Lighting	
25		TC-AN1					RD-4.3	25	LPB-EX	Existing Circuit	
26		TC-AN1					RD-4.4	26	LPB-EX	Existing Circuit	
27		TC-AN1					RD-6.1	27	LPB-EX	Existing Circuit	
28											
29											
30											
31											
32											
33											
34											
35											
36	(CC)						RD-6.2	36		SPD Unit	

Class 2 (Low Voltage)

Class 1 (Line Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

NOTES

1
2
3
4
5
6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
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Relay Panel LPB-AN

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

30b

XFMR1:	120. L2	TUB PART#:	PWE8	COVER:	S3	INTERIOR:	W72M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	72
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	40
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	54Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
103	Diesel Engine Shop	LP1-3g	1	RD-7.1	L4-103N.1	L4-103W.1			TC-AG1		1
103	Diesel Engine Shop	LP1-3h	2	RD-7.2	L4-103N.2	L4-103W.2			TC-AG1		2
103	Diesel Engine Shop	LP1-3j	3	RD-7.3	L4-103N.3	L4-103W.3			TC-AG1		3
103	Diesel Engine Shop	LP1-3k	4	RD-7.4	L4-103N.4	L4-103W.4			TC-AG1		4
104	Equipment / Machine Shop	LP1-5a	5	RD-9.1	L4-104N.1	L4-104E.1	L4-104S.1		TC-AG1		5
104	Equipment / Machine Shop	LP1-5b	6	RD-9.2	L4-104N.2	L4-104E.2	L4-104S.2		TC-AG1		6
104	Equipment / Machine Shop	LP1-7c	7	RD-9.3	L4-104N.3	L4-104E.3	L4-104W.1		TC-AG1		7
104	Equipment / Machine Shop	LP1-7d	8	RD-9.4	L4-104N.4	L4-104E.4	L4-104W.2		TC-AG1		8
104	Equipment / Machine Shop	LP1-9e	9	RD-11.1	L2-104E.1		L4-104W.3		TC-AG1		9
104	Equipment / Machine Shop	LP1-9f	10	RD-11.2	L2-104E.2		L4-104W.4		TC-AG1		10
108	Small Engine Shop	LP1-11n	11	RD-11.3	L4-108N.1	L4-108S.1			TC-AG1		11
108	Small Engine Shop	LP1-11o	12	RD-11.4	L4-108N.2	L4-108S.2			TC-AG1		12
108	Small Engine Shop	LP1-11p	13	RD-13.1	L4-108N.3	L4-108S.3			TC-AG1		13
108	Small Engine Shop	LP1-11q	14	RD-13.2	L4-108N.4	L4-108S.4			TC-AG1		14
109	Welding Shop	LP1-13r	15	RD-13.3	L4-109N.1	L4-109S.1			TC-AG1		15
109	Welding Shop	LP1-13s	16	RD-13.4	L4-109N.2	L4-109S.2			TC-AG1		16
109	Welding Shop	LP1-13t	17	RD-15.1	L4-109N.3	L4-109S.3			TC-AG1		17
109	Welding Shop	LP1-13u	18	RD-15.2	L4-109N.4	L4-109S.4			TC-AG1		18
	Spare		19	RD-15.3							19
	Spare		20	RD-15.4							20
											21
											22
											23
											24
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											32
											33
											34
											35
											36

Class 1 (Line Voltage)

Class 2 (Low Voltage)

BARRIER

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

NOTES

1
2
3
4
5
6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
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Rev. #4	BK	12-Apr-13
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Relay Panel LP1-AG

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface
37		TC-AG1	ES-114	ES-101			RD-8.1
38		TC-AG1	ES-114	ES-101			RD-8.2
39		TC-AG1					RD-8.3
40		TC-AG1					RD-8.4
41		TC-AG1					RD-10.1
42		TC-AG1					RD-10.2
43		TC-AG1					RD-10.3
44		PC/TC-AG1					RD-10.4
45		TC-AG1					RD-12.1
46		TC-AG1					RD-12.2
47		TC-AG1					RD-12.3
48		TC-AG1					RD-12.4
49		TC-AG1					RD-14.1
50		TC-AG1					RD-14.2
51		TC-AG1					RD-14.3
52		TC-AG1		L4-112W.1	L4-112E.1	L4-112N.1	RD-14.4
53		TC-AG1		L4-112W.2	L4-112E.2	L4-112N.2	RD-16.1
54		TC-AG1		L4-112W.3	L4-112E.3	L4-112N.3	RD-16.2
55		TC-AG1		L4-112W.4	L4-112E.4	L4-112N.4	RD-16.3
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							
67							
68							
69							
70							
71							
72	(CC)						RD-16.4

Rly	Circuit Number	Area	Rm
37	LP1-2l	Corridor Lighting	102117
38	LP1-2m	Corridor Lighting	102117
39	LP1-4	Misc. Lighting	
40	LP1-6	Computer Lab	123
41	LP1-8	Classroom Lighting	124
42	LP1-10	Classroom Lighting	125
43	LP1-12	Misc. Lighting	
44	LP1-14	Exterior Lighting	
45	LP1-16	Misc. Lighting	
46	LP1-18	Misc. Lighting	
47	LP1-EX	Existing Circuit	
48	LP1-EX	Existing Circuit	
49	LP1-EX	Existing Circuit	
50	LP1-EX	Existing Circuit	
51	LP1-EX	Existing Circuit	
52	LP1-15w	Wood Shop	112
53	LP1-15x	Wood Shop	112
54	LP1-15y	Wood Shop	112
55	LP1-15z	Wood Shop	112
72		SPD Unit	

Class 2 (Low Voltage)

Class 1 (Line Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

NOTES

1
2
3
4
5
6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
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Relay Panel LP1-AG

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

31b

XFMR1:	120. L3	TUB PART#:	PWE4	COVER:	S3	INTERIOR:	W36M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	36
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	16
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	33Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
101	Riding Ring	LP-1a	1	RD-17.1	L8-101W.1	L8-101E.1			TC-EQ1		1
101	Riding Ring	LP-2b	2	RD-17.2	L8-101W.2	L8-101E.2			TC-EQ1		2
101	Riding Ring	LP-3c	3	RD-17.3	L8-101W.3	L8-101E.3			TC-EQ1		3
101	Riding Ring	LP-4d	4	RD-17.4	L8-101W.4	L8-101E.4			TC-EQ1		4
108/110	Aisle Lighting	LP-5a	5	RD-19.1	L4-108E.1	L4-110E.1	L2-108.1		TC-EQ1		5
	Interior Lighting	LP-6	6	RD-19.2					TC-EQ1		6
108110	Aisle Lighting	LP-5b	7	RD-19.3	L4-108E.2	L4-110E.2	L2-108.2		TC-EQ1		7
	Spare		8	RD-19.4							8
	Spare		9	RD-18.1							9
											10
											11
											12
											13
											14
											15
											16
											17
											18

Class 1 (Line Voltage)

Class 2 (Low Voltage)

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

BARRIER

NOTES

1
2
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6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Relay Panel LP-EQ

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

32

BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface	Rly	Circuit Number	Area	Rm
19		PC/TC-EQ1					RD-18.2	19	LP-7	Exterior Lighting	
20		TC-EQ1			L8-101W.4	L8-101E.4	RD-18.3	20	LP-8e	Riding Ring	101
21		TC-EQ1			L8-101W.5	L8-101E.5	RD-18.4	21	LP-9f	Riding Ring	101
22		TC-EQ1			L8-101W.6	L8-101E.6	RD-20.1	22	LP-10g	Riding Ring	101
23		TC-EQ1			L8-101W.7	L8-101E.7	RD-20.2	23	LP-11h	Riding Ring	101
24		TC-EQ1					RD-20.3	24		Spare	
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36	(CC)						RD-20.4	36		SPD Unit	

Class 2 (Low Voltage)

Class 1 (Line Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

NOTES

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6

LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Relay Panel LP-EQ

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

32b

XFMR1:	120. L4	TUB PART#:	PWE4	COVER:	S3	INTERIOR:	W36M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	36
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	22
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	33Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
104	Classroom Lighting	LP1-3	1	RD-21.1					TC-CB1		1
105	Classroom Lighting	LP1-5	2	RD-21.2					TC-CB1		2
106	Classroom Lighting	LP1-6	3	RD-21.3					TC-CB1		3
103	Classroom Lighting	LP1-7	4	RD-21.4					TC-CB1		4
112-114	Classroom Lighting	LP1-8	5	RD-23.1					TC-CB1		5
115120	Classroom Lighting	LP1-9	6	RD-23.2					TC-CB1		6
	Spare		7	RD-23.3							7
	Spare		8	RD-23.4							8
	Spare		9	RD-25.1							9
	Spare		10	RD-25.2							10
	Spare		11	RD-25.3							11
	Spare		12	RD-25.4							12
											13
											14
											15
											16
											17
											18

Class 1 (Line Voltage)

Class 2 (Low Voltage)

BARRIER

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

NOTES

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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Relay Panel LP1-CB

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

33

BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface	Rly	Circuit Number	Area	Rm
19		TC-CB1					RD-22.1	19	LP1-2	Basement Lighting	B01,B02
20		TC-CB1			ES-102W	ES-102E	RD-22.2	20	LP1-4a	Corridor Lighting	102119
21		TC-CB1			ES-102W	ES-102E	RD-22.3	21	LP1-4b	Corridor Lighting	102119
22		TC-CB1					RD-22.4	22	LP1-10	Interior Lighting	Various
23		PC/TC-CB1					RD-24.1	23	LP1-11	Exterior Egress Ltg.	
24		TC-CB1					RD-24.2	24	LP1-12	Interior Lighting	121122
25							RD-24.3	25		Spare	
26							RD-24.4	26		Spare	
27							RD-26.1	27		Spare	
28											
29											
30											
31											
32											
33											
34											
35											
36	(CC)						RD-26.2	36		SPD Unit	

Class 2 (Low Voltage)

Class 1 (Line Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

NOTES

1
2
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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

Relay Panel LP1-CB

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

33b

XFMR1:	120. L5	TUB PART#:	PWE8	COVER:	S3	INTERIOR:	W72M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	72
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	40
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	54Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
118, 120	AKC Ring Lighting	LP1-11a	1	RD-27.1	L10-118.1	L10-120.1			TC-AS1		1
204, 205	Corridor Lighting	LP1-16m	2	RD-27.2				ES-201	TC-AS1		2
118, 120	AKC Ring Lighting	LP1-11d	3	RD-27.3	L10-118.4	L10-120.4			TC-AS1		3
118, 120	AKC Ring Lighting	LP1-11e	4	RD-27.4	L10-118.5	L10-120.5			TC-AS1		4
118, 120	AKC Ring Lighting	LP1-11f	5	RD-29.1	L10-118.6	L10-120.6			TC-AS1		5
118, 120	AKC Ring Lighting	LP1-11g	6	RD-29.2	L10-118.7	L10-120.7			TC-AS1		6
118	AKC Ring #1 Lighting	LP1-7b	7	RD-29.3	L10-118.2	L10-120.2			TC-AS1		7
118	AKC Ring #1 Lighting	LP1-7c	8	RD-29.4	L10-118.3	L10-120.3			TC-AS1		8
118	AKC Ring #1 Lighting	LP1-13b	9	RD-31.1	L10-118.2	L10-120.2			TC-AS1		9
118	AKC Ring #1 Lighting	LP1-13c	10	RD-31.2	L10-118.3	L10-120.3			TC-AS1		10
120	AKC Ring #2 Lighting	LP1-20i	11	RD-31.3	L10-118.9	L10-120.9			TC-AS1		11
120	AKC Ring #2 Lighting	LP1-20j	12	RD-31.4	L10-118.10	L10-120.10			TC-AS1		12
120	AKC Ring #2 Lighting	LP1-22i	13	RD-33.1	L10-118.9	L10-120.9			TC-AS1		13
120	AKC Ring #2 Lighting	LP1-22j	14	RD-33.2	L10-118.10	L10-120.10			TC-AS1		14
	Spare		15	RD-33.3							15
	Spare		16	RD-33.4							16
	Spare		17	RD-35.1							17
	Spare		18	RD-35.2							18
	Spare		19	RD-35.3							19
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											35
											36

Class 1 (Line Voltage)

Class 2 (Low Voltage)

BARRIER

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

NOTES

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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

Relay Panel LP1-AS

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

34

BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface	Rly	Circuit Number	Area	Rm
37							RD-35.4	37		Spare	
38		TC-AS1	ES-117				RD-28.1	38	LP1-2l	Corridor Lighting	104
39		TC-AS1	ES-117				RD-28.2	39	LP1-2m	Corridor Lighting	104
40		TC-AS1	ES-201				RD-28.3	40	LP1-16l	Corridor Lighting	
41		TC-AS1					RD-28.4	41	LP1-4	Computer Lab	115
42		TC-AS1					RD-30.1	42	LP1-5	Classroom Lighting	Various
43		TC-AS1					RD-30.2	43	LP1-6	Misc. Lighting	
44		TC-AS1					RD-30.3	44	LP1-8	LAB Lighting	227231
45		TC-AS1					RD-30.4	45	LP1-10	LAB Lighting	225228229
46		TC-AS1					RD-32.1	46	LP1-12	LAB Lighting	216221
47		TC-AS1	ES-201				RD-32.2	47	LP1-14m	Corridor Lighting	204, 205
48		TC-AS1					RD-32.3	48	LP1-16	Misc. Lighting	
49		TC-AS1					RD-32.4	49		Spare	
50		TC-AS1					RD-34.1	50	LP1-15	Classroom Lighting	206
51		TC-AS1					RD-34.2	51	LP1-17	Classroom Lighting	207, 208
52		TC-AS1					RD-34.3	52	LP1-19	Classroom Lighting	209, 210
53							RD-34.4	53	LP1-21	Classroom Lighting	211, 212
54		PC/TC-AS1					RD-36.1	54	LP1-2	Exterior Lighting	
55							RD-36.2	55	LP1-30	Animal Display	229
56							RD-36.3	56		Spare	
57											
58											
59											
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72	(CC)						RD-36.4	72		SPD Unit	

Class 2 (Low Voltage)

Class 1 (Line Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

NOTES

1
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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Relay Panel LP1-AS

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

34b

XFMR1:	120. L6	TUB PART#:	EPWE4	COVER:	S3	INTERIOR:	W36M
XFMR2:		MANUFACTURER:	Douglas	HINGED:	Yes	CAPACITY:	36
XFMR3:		DRIPHOOD:	No	LOCKS:	Standard	1 POLE:	16
XFMR4:		COLOR:	Grey	LOCATION:		2 POLE:	0
24V From:		DIMENSION:	33Hx20Wx4.25D	MISC:			

BARRIER

Rm	Area	Circuit Number	Rly	Interface	Control1	Control2	Control3	Control4	Control5	Control6	
	Interior Egress Ltg.	ELP-3k	1	RD-37.1			ES-B00	ES-B06	TC-AS2	EOD-1.B	1
	Interior Egress Ltg.	ELP-3h	2	RD-37.2				ES-117	TC-AS2	EOD-1.E	2
	Spare		3	RD-37.3					TC-AS2	EOD-2.B	3
	Interior Egress Ltg.	ELP-9d	4	RD-37.4	L10-118.4	L10-120.4			TC-AS2	EOD-2.E	4
	Interior Egress Ltg.	ELP-16	5	RD-39.1					TC-AS2	EOD-3.B	5
	Interior Egress Ltg.	ELP-9e	6	RD-39.2	L10.118.5	L10-120.5			TC-AS2	EOD-3.E	6
	Interior Egress Ltg.	ELP-9f	7	RD-39.3	L10.118.6	L10-120.6			TC-AS2	EOD-4.B	7
	Interior Egress Ltg.	ELP-9g	8	RD-39.4	L10.118.7	L10-120.7			TC-AS2	EOD-4.E	8
											9
											10
											11
											12
											13
											14
											15
											16
											17
											18

BARRIER

Class 1 (Line Voltage)

Class 2 (Low Voltage)

LEFT SIDE OF PANEL ONLY (See Next Page for Relays on the Right)

NOTES

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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

Relay Panel ELP

DOUGLAS lighting controls

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

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BARRIER

	Control6	Control5	Control4	Control3	Control2	Control1	Interface
19	EOD-5.B	PC/TC-AS1					RD-38.1
20	EOD-5.E	TC-AS2					RD-38.2
21	EOD-7.E	TC-AS2					RD-38.3
22	EOD-6.B		ES-201				RD-38.4
23	EOD-6.E	TC-AS2	ES-201				RD-40.1
24	EOD-7.B	TC-AS2					RD-40.2
25	EOD-8.E	TC-AS2					RD-40.3
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36	(CC)						RD-40.4

Class 2 (Low Voltage)

RIGHT SIDE OF PANEL ONLY (See Previous Page for Relays on the LEFT)

BARRIER

Rly	Circuit Number	Area	Rm
19	ELP-2	Exterior Egress Ltg.	
20	ELP-6	Interior Egress Ltg.	
21	ELP-8	Interior Egress Ltg.	
22	ELP-10h	Interior Egress Ltg.	
23	ELP-10k	Interior Egress Ltg.	
24	ELP-12	Interior Egress Ltg.	
25	ELP-14	Interior Egress Ltg.	
36		SPD Unit	

Class 1 (Line Voltage)

BARRIER

NOTES

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LEGEND

Relay # = H.I.D. Relay present
RD-#.# = Relay Driver - Number . Output Number
PC-# = Photometric - Building + Zone
TC-# = Time Clock - Building + Zone
MS-# = Master Switch - Buiding + Number
L##-###.# = Local Switch (Number of Buttons) - Number . Button
ES-# = Entry Sensor - Number (WV-PDT)
EOD-#.# = Emergency ON Device - Number . Output
BMS-#.# = Building Management System - Number . Channel (by others)
(CC) =Contactor Contol (by others)

ISSUE	DRAWN	DATE
Rev.# 2	BK	7-Nov-12
Rev. #3	BK	23-Nov-12
Rev. #4	BK	12-Apr-13
F.A.B.	BK	3-May-13

DOUGLAS lighting controls

Relay Panel ELP

PROJECT NAME	Norfolk County Agricultural High School
PROJECT LOCATION	Walpole, MA
PROJECT NUMBER	J12-38603_

35b

The following pages are the technical
'Product Monograms'
for the devices provided.

Dialog System Overview	PART No.	DESCRIPTION	SPECIFICATION
	Refer to individual data sheets for part #'s and descriptions.	• All of the Dialog devices (relay drivers, dimming devices, switches, etc.) connect to a single, common pair of wires: the Dialog data signal. • Data signal provides data and power for most Input devices and data to the outputs. • The Dialog data signal is supplied by the Lighting Control Unit. Each lighting controller can host up to 256 outputs (ON/OFF and Dimming) and all of the input devices that control those outputs. • Each input device (switch, occpancy sensor, photo sensor, contact input unit) is targeted to either an output address or to a collection of outputs that are addressed as groups or presets. More than one input device can be set to the same target. • Input devices targeted directly to an output require no programming. • Input devices targeted to a group or preset require programming. How presets and mode settings are to behave is also programmed. There are 127 groups, 512 local presets and 512 global presets. • For systems that require a higher number of outputs, a multi-LCU system can be utilized.	**Power** • Most Dialog input devices do not require 24VAC. They draw their power from the 2 conductor data signal. Dialog devices installed in panels that *do* require 24VAC are the Lighting Control Unit and Relay Drivers. • The Dialog data signal supplies 400mA of power for Input devices. **Communication** • Data signal is polarity insensitive. Recommended wire is 18AWG solid (standard LVT). • Total wire length with no amplifier(s) is 4000ft (1200m), with the longest length not exceeding 1000ft (300m) from the LCU. • To increase capacity or wiring length, use WAM-3190 500mA amplifier. Up to 3 amplifiers maximum per LCU. **Outputs** • Output modules are addressed: #.1, #.2, #.3, #.4...for a total of 256 addresses (64 x 4). Each address has independent control. • Output devices available: - Relay drivers compatible with all models of Douglas 2-wire relays. - 0-10V output for 0-10V ballasts* - Field mountable 4 relay units. **Physically seperate ballast and relay devices can be set to the same address.* **Inputs Devices** • Dialog switches, occupancy sensors and contact inputs can be set to an individual address, group address, preset address or mode. **Environment (all components)** • Stationary, non-vibrating, non-corrosive atmosphere & non-condensing humidity. • Ambient temp: +5°F to +120° F (-15° C to +50° C).

Input Devices

Input Devices consist of:

- Switches.
- Occupancy Sensors.
- Photo Sensors.
- Contact Input Units.

An Input Device can be set to:

- An individual relay (ON/OFF).
- An individual Dimmer (dim up/down).
- A group of outputs (ON/OFF, Dim Up/Down).
- A preset (scene).
- A mode (logic, e.g. Enable/Disable, timeout, quiet mode).

Outputs

- 256 Relay outputs.
- 256 Dimmer outputs.

Output Devices consist of:

- Relay drivers for Douglas relays.
- 0-10V Ballast controls.
- demandflex DS Ballast controls.

An Output Device can be set to:

- Activate individual and global presets.
- Activate individual and global photo control settings.

Lighting Control Unit (LCU):

- Generates the Dialog data signal.
- Stores lighting control properties.
- Stores and runs time schedules.
- Stores logging info.

Settings can be edited with:

- Built-in, touch screen interface.
- Web browser using built-in web server.
- Uploading data files using USB or web browser.

Interface connections:

- Dialog data signal.
- RS-485 for Multi LCU installations.

SYSTEM DESCRIPTION

Lighting Control Unit (LCU)

- The Lighting Control Unit (LCU) is the source of the Dialog signal. The Dialog signal combines the data signal and device power onto a single pair of wires (standard 18AWG solid is recommended).
- Most input devices - Dialog switches, occupancy sensors and photo sensors - do not require any other connection than the Dialog signal.
- Output devices also connect to the Dialog signal. Each output has a unique address and a maximum of 256 outputs can exist for each lighting controller.
- The LCU stores all of the control settings such as control presets, time schedules, demand response settings, etc.
- Changing the settings of the LCU is done via the built-in touch screen interface or via access to the LCU's web server over TCP/IP connection.

All Input Devices (Switches, Occupancy, Contact Input)

- Can be assigned to a single address to control a single output (ON/OFF for relays, Dim UP/DOWN for dimmers).
- Can be assigned to a group to control a collection of relays and dimmers (ON/OFF, Dim UP/DOWN).
- Can be assigned to presets to either create a lighting scene or activate a mode.
- There are 127 groups, 512 local presets, and 512 global presets.

Photo Sensors

- Can be assigned to 64 seperate local or global addresses.

MODE functions (optional)

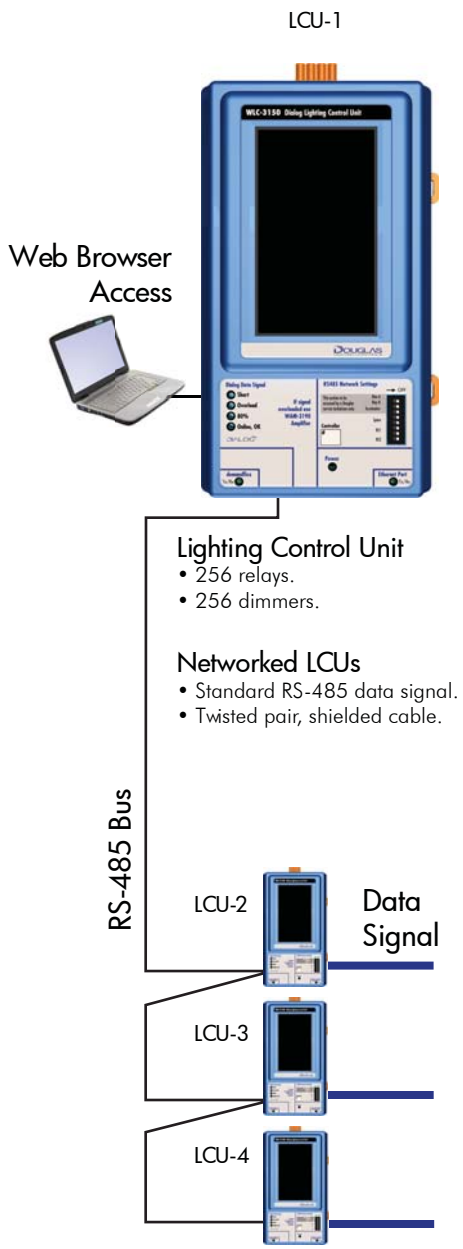
- Up to 4 MODEs can be programmed for each group.
  Examples of MODE functions:
  1) Ignore occupancy sensors during the day, operate at night.
  2) Switches in public area don't work during daytime, but do at night.
  3) Switches work normally during the day, but at night they operate in Timed-ON mode for automatic shut-off.

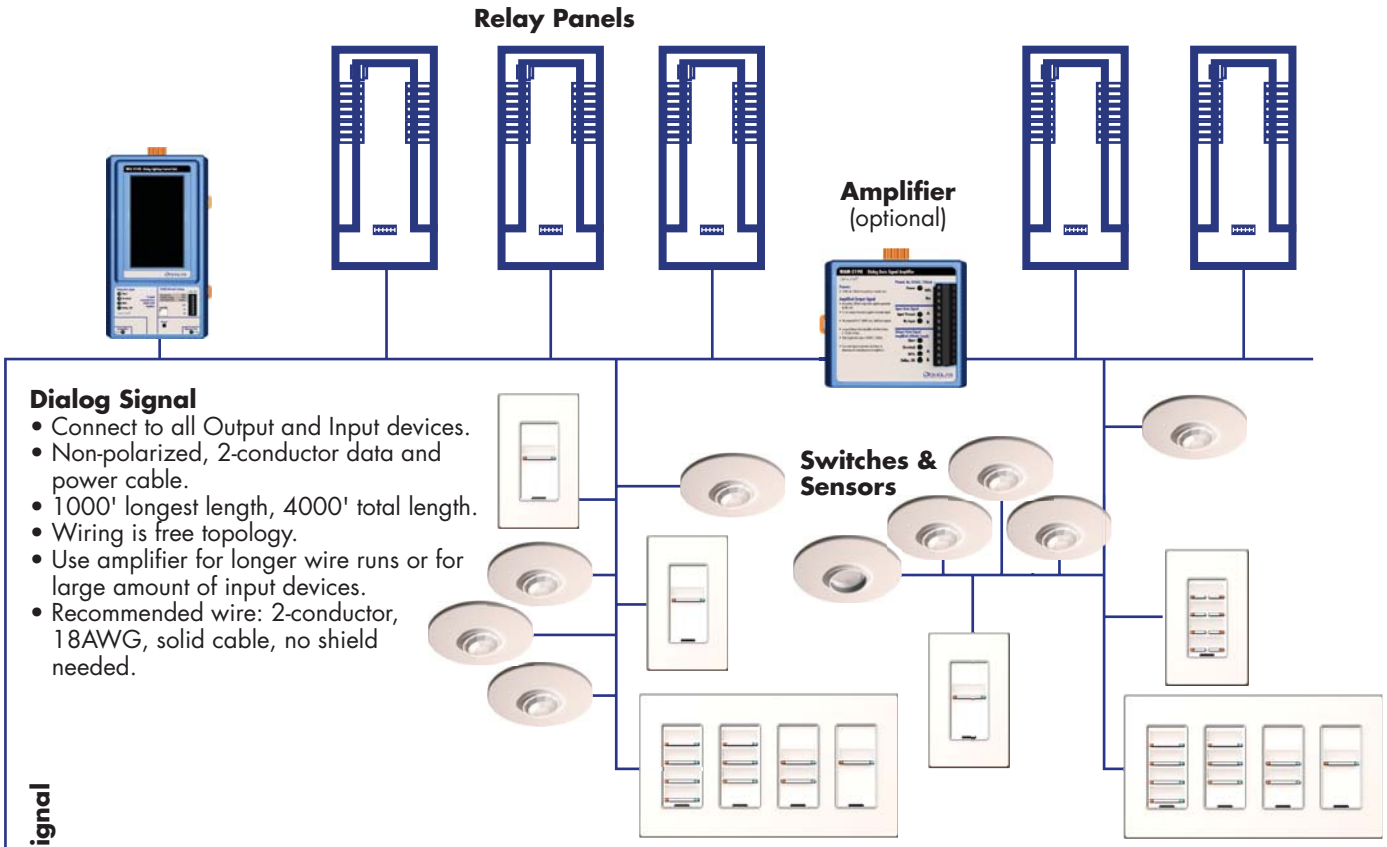
Time Scheduler

- Each LCU has a dedicated scheduler that can:
  1) Trigger and command individual addresses, group codes and preset addresses.
  2) Activate modes and photo controllers.

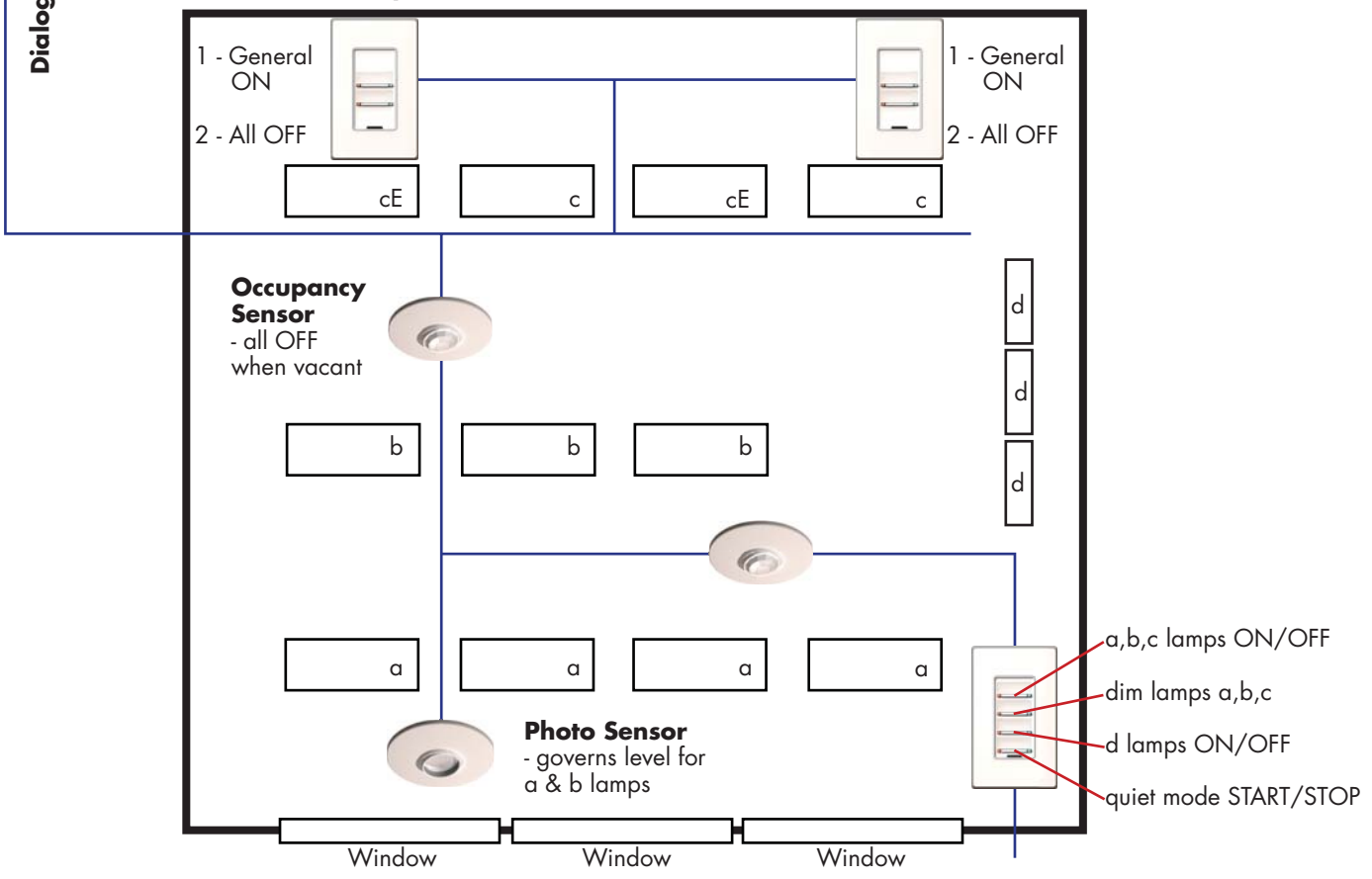
Lighting Control Unit

- Built-in touch screen interface.
- Web browser utilizing built-in web server.
- Uploading data files using USB or web.



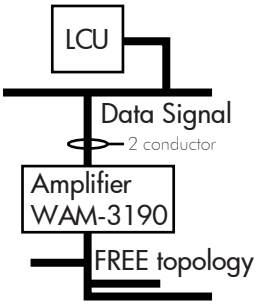


Classroom Example



Dialog Lighting Control System

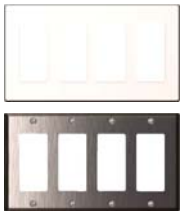
System Units

PART No.	DESCRIPTION
WLC-3150 **WIR-3110** 	**Lighting Control Unit** • Stores and manages all system data and programming. • Supplies Dialog signal (400mA). • 256 relays. • 256 dimmers. • Connectivity to TCP/IP devices. **Infrared Setting Unit** • Set input devices target and address. • Set input devices properties. • Uses infrared.
	**Data Signal** • 2 conductor, 18AWG solid is recommended.Twisted or shielded cable is not necessary. • FREE topology wiring. • 4000ft (1200m) total length, 1000ft (300m) longest length. Use amplifier (WAM-3190) to boost.

Output Devices

PART No.	DESCRIPTION
WRD-3408 	**Relay Driver, 8 outputs,** • Compatible with all Douglas relays. • Connect to 24VAC & Data Signal. • Set address with DIP switches. • Adjacent units can plug into each other to minimize wiring.
WDB-3314 	**Data line 0-10V ballast controller, 4 outputs** • 0-10V Dimming ballast module. • 4 Dimming address outputs. • Connect to 0-10V dimming ballasts (Maximum 50 ballasts per output).

Input Devices

PART No.	DESCRIPTION
WPS-3711 **WPS-3741** 	**Photo Sensors** • Auto-ranging, 0 - 50,000 Lux • Set target with iR setting unit. **WPS-3711** Data line photo sensor, interior ceiling, iR set **WPS-3741** Data line photo sensor, exterior, iR set
WOC-3801 	**PIR, ceiling mount, Occupancy Sensor** • Tilt and swivel lens. • Set target with iR setting unit.
WCI-3928 	**Contact Input, 8 inputs, c/w 24 VDC, 500 mA supply** • 8 Contact Input Unit & 24VDC Power Supply. • Connect to 24VAC and data signal. • Configure for momentary or maintained contact signals. • Set target with iR setting unit.
WSW-35xx Series **WSD-3501** **WSK-3502** **WSW-3511** **WSW-3528** 	**Wall Switches** • Fits Standard Decora switch plates. • Status and locator LEDs. **WSD-3501** Data line dimmer and switch, 1ch. **WSK-3502** Data line keyswitch, c/w pilot light. **WSW-3511** Data line switch - 1 gang, 1 button (1x1), iR set. **WSW-3512** Data line switch - 1 gang, 2 buttons (1x2), iR set. **WSW-3513** Data line switch - 1 gang, 3 buttons (1x3), iR set. **WSW-3514** Data line switch - 1 gang, 4 buttons (1x4), iR set. **WSW-3528** Data line switch - 1 gang, 8 buttons (2x4), iR set.
WNxx Series 	**Cover Plates** • **WN-80301, 9, 11, 12, 21** Sizes: 1 to 5 gang. Plastic cover plate. Invisible mounting screws. • **WN-97401, 2, 3, 4, 5** Sizes: 1 to 5 gang. Stainless steel cover. Visible mounting screws.

PART No.	DESCRIPTION
	• Douglas relays are 2-wire latching relays that are lighting load rated for standard 20A branch circuits. • Douglas 2-wire heavy duty HID relays are suitable for all types of lighting loads including capacitor corrected HID ballasts. • Manual operation lever and indicator are built-in for convenient operation and status check at the panel. • Douglas HID relays are available with auxilary contacts on the low voltage side of the relay. Contact not required for Douglas system, but may have application for specialty requirements. • Douglas HID 2-pole relay is available with a 480V rating intended for 480V lighting applications.
WR-6161	1 pole HID relay 20A: 120/277/347
WR-6161-382	1 pole HID relay with aux contacts 20A: 120/277/347 (aux contacts 1A: 125VAC)
WR-6172	2 pole HID relay 20A: 120/208/240/277/480
WR-6172-382	2 pole HID relay with aux contacts 20A: 120/277/347/480 (aux contacts 1A: 125VAC)

SPECIFICATION

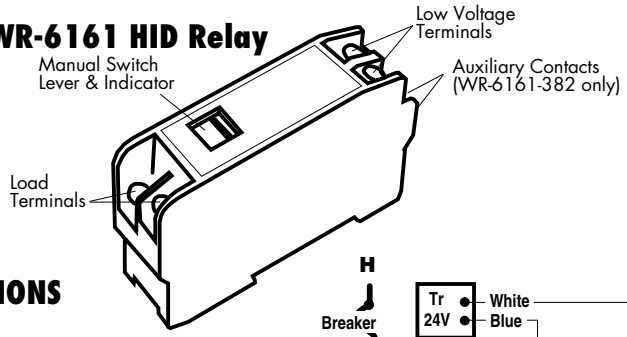
Control Input
- Class 2 circuit.
- 0.350A (350mA).
- 24V reversible polarity pulse.
- Input terminals: #16 - #20AWG

Output Contact Ratings
- More than 30,000 operations with 20A load, 2000A inrush @20 times / min. switch speed
- UL Listing
  20A 300VAC
  2400W 120VAC "T"
  20A 300 VAC "F"
  20A 480 VAC "F" (WR-6172 only)
  UL Endurance test 150,000 cycles
  Motor Rating:
  0.5HP at 110-125VAC
  1.5HP at 220-277VAC
  SCCR Rating:
  14KA (WR-6161, WR-6161-3)
  5KA (WR-6172, WR-6172-3).
- CSA Certifications
  20A 347VAC
  2400W 120VAC "T"
  20A 347VAC "F".
- Output terminals: #10 - #14AWG

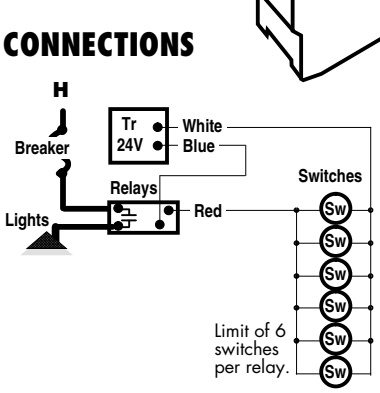
Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non-condensing humidity.
- Ambient temperature:
  +15°F to +120°F (-10°C to +50°C).

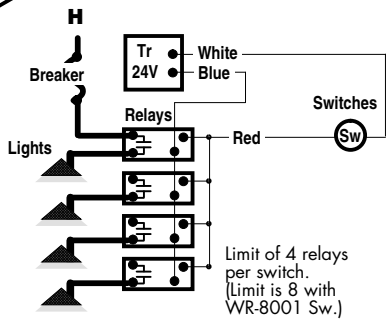
Note:
- The 2 pole relay (WR-6172) has the same input ratings as the 1 pole relay. Use this feature to double the load switching capacity of a low voltage switch.

WR-6161 HID Relay



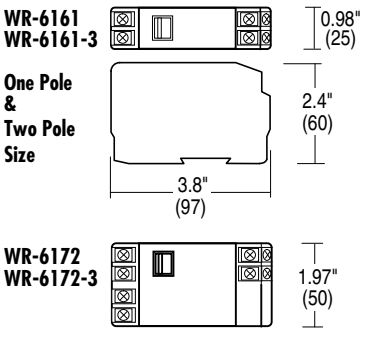
CONNECTIONS





DIMENSIONS & MOUNTING

WR-6100 series relays mount to a snap rail built into Douglas PWEx series relay panels.



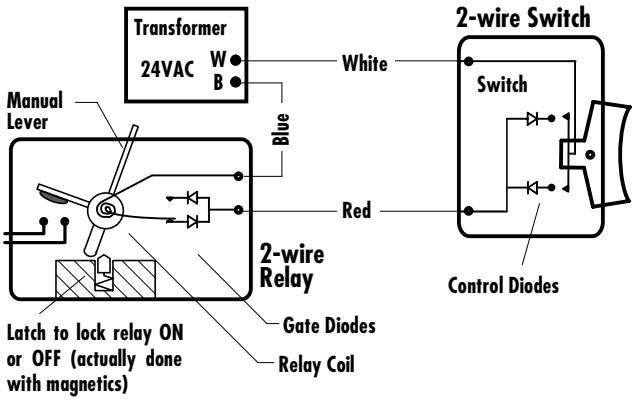
2-WIRE RELAY TECHNOLOGY

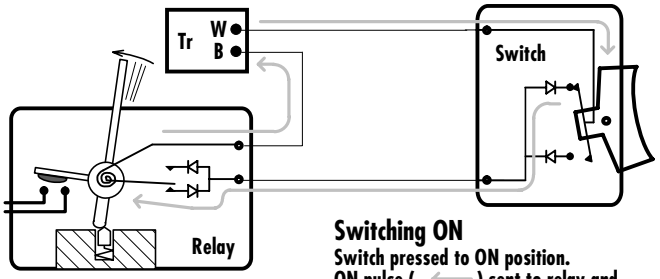
- Douglas 2-wire relays utilize an ingenious control method that permits simple and minimal wiring. All functions for low voltage control: on, off, indication and location are provided with only a 2-wire connection of which one is often a common. All Douglas relays manufactured over the past 30 years utilize the same principle. Thus, any Douglas switching device is compatible with any model of Douglas relay.

Operational Principle

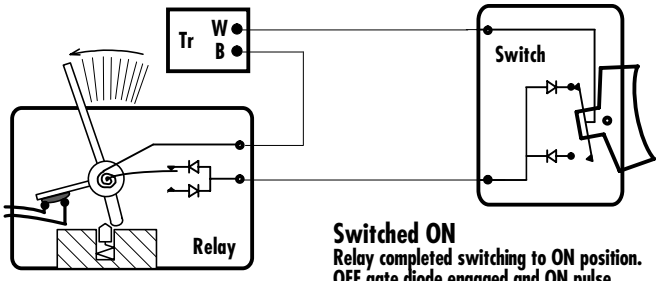
- A negative pulse turns the relay ON and a positive pulse turns it OFF. Using a diode, an AC signal can be rectified to turn the relay either ON or OFF. Douglas switches have 2 diodes built into the switch to provide the ON and OFF signals.
- The relay has 2 similar diodes built inside that are in series with the relay coil. The diodes in the relay act as gates for the switch signal.
- To turn the relay ON or OFF, the rocker switch completes the circuit by selecting the ON or OFF diode. If the diode selected is in the same direction as the gate diode in the relay, the relay will switch. If the gate diode is not in the correct direction, then nothing will happen since the relay is already in the correct state for the action selected by the switch. When the switch is released, a spring returns it to the central neutral position
- Indication (ON state) and location (OFF state) are obtained by utilizing LED diodes built into the switch. Only the LED which is connected in the same direction as the gate diode in the relay will light. Although the LED current passes through the relay coil, it is not large enough to cause the relay to trip. However, there is a limit: the maximum number of LED switches that can be connected to the same relay is 6
- For additional convenience (especially during installation) all standard models have a manual control lever and indicator permitting a non-electrical method of switching and status check at the panel.

Detailed 2-wire Relay / Switch Circuit

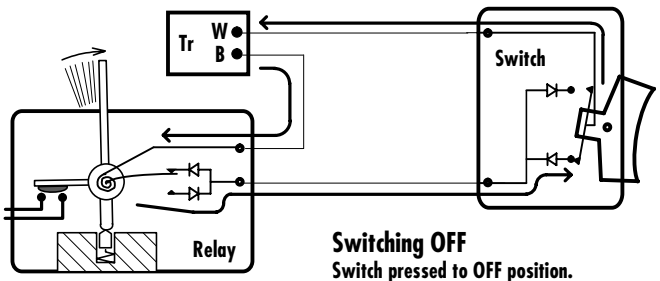




Switching ON
Switch pressed to ON position.
ON pulse (⟵) sent to relay and relay begins to switch over to ON .

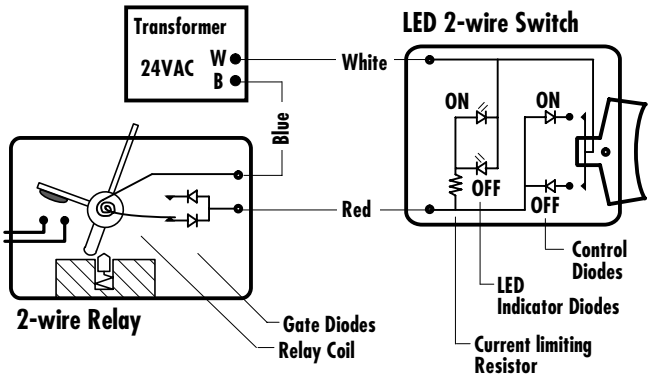


Switched ON
Relay completed switching to ON position.
OFF gate diode engaged and ON pulse from switch is stopped by OFF gate diode.
Relay ready for OFF pulse.

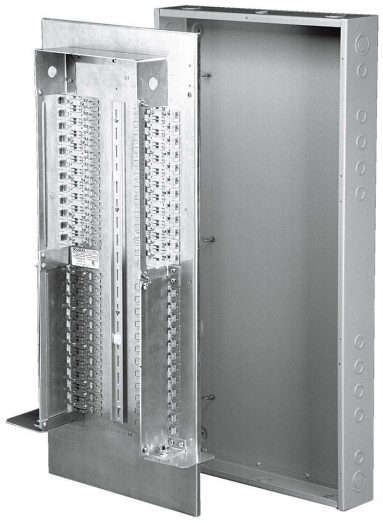


Switching OFF
Switch pressed to OFF position.
OFF pulse (⟶) sent to relay and relay begins to switch over to OFF.

Detailed LED Switch Circuit *

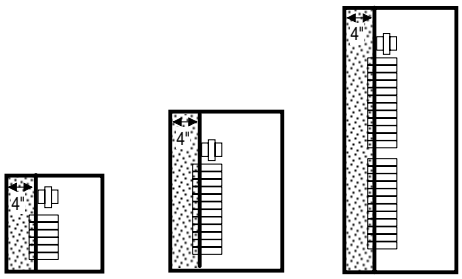


* LED Switch circuit actually not as shown. Switch is functionally similar except rocker switch is replaced with single push button.



PART No.	DESCRIPTION	SPECIFICATION
PWEx Panels	• Douglas PWEx series relay panels are a versatile line of panels used for WR-6161 & WR-6172 relays. • Standard sizes range from 6 - 72 relays. (Note:WR-6172= 2 relays). • A panel consists of the enclosure (tub), the interior and the cover. Enclosures are installed in the rough-in stage and interiors are installed and connected after wires are pulled. • Interior has snap brackets for mounting relays and DIN rail in the centre for mounting control components. • Box knockouts are located so that panels of the same horizontal or vertical dimension can be joined with conduit nipples.	• Enclosures and covers are made of steel coated with ANSI/ASA 61 Grey. Coating is heat fused polyesther epoxy finish applied on all surfaces. • Interior insert is made from aluminum, stell and plastic parts. **Certifications** • UL listed, CSA approved. EEMAC/NEMA 1 Standard. **Options** • Hinged, surface or flush covers. Covers are reversable for either left-to-right or right-to-left door opening. Driphoods (surface mount only). NEMA 3 standards. Special paint colors. Voltage dividers to divide line voltage compartment for different line voltages.

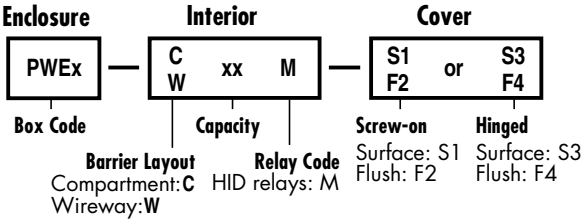
Compartment Style Barrier Layout



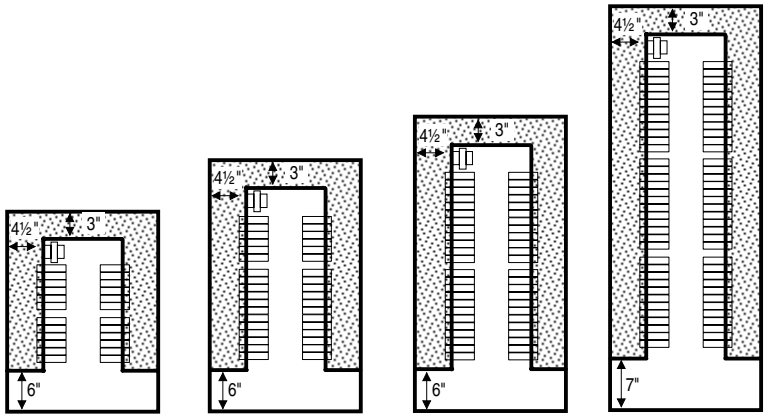
CAPACITY	6	12	24
PART No.	PWE0 - C06M - **	PWE1 - C12M - **	PWE2 - C24M - **
SIZE (H x W x D)	12 x 12 x 4.25	20 x 14 x 4.25	33 x 14 x 4.25

**Add cover style number at end of P/N

PWEx Panel Numbering System



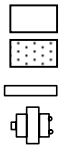
Wireway Style Barrier Layout



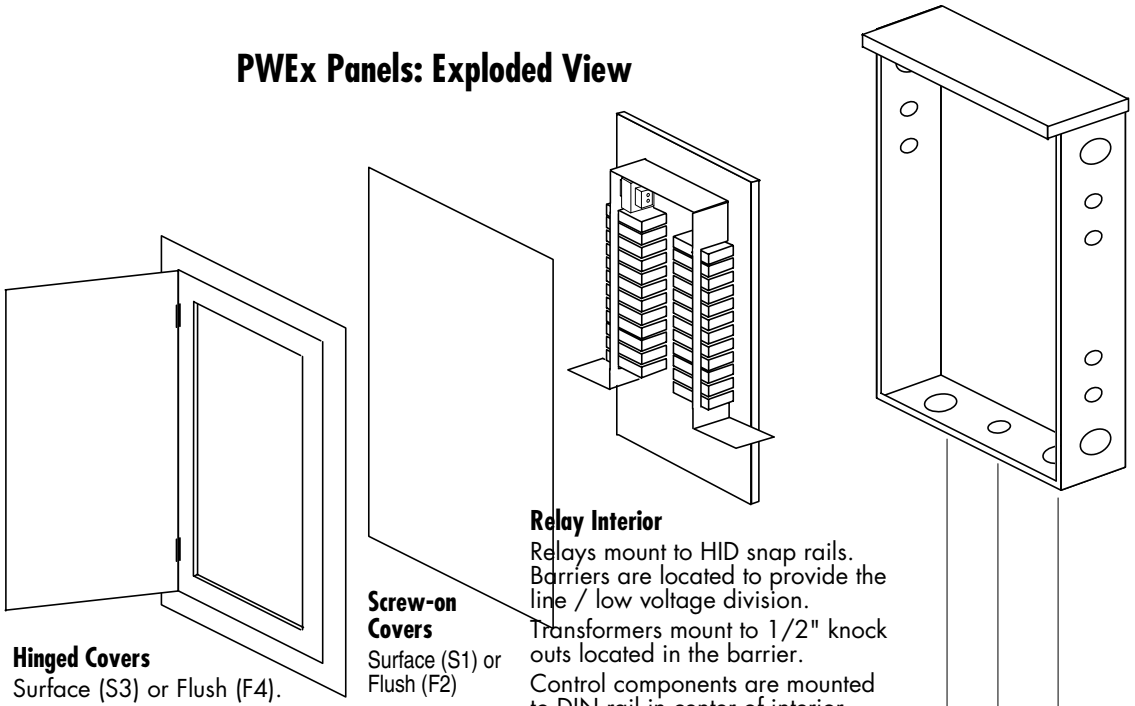
CAPACITY	24	36	48	72
PART No.	PWE3 - W24M - **	PWE4 - W36M - **	PWE6 - W48M - **	PWE8 - W72M - **
SIZE (H x W x D)	27 x 20 x 4.25	33 x 20 x 4.25	39 x 20 x 4.25	54 x 20 x 4.25

**Add cover style number at end of P/N

Symbols



PWEx Panels: Exploded View



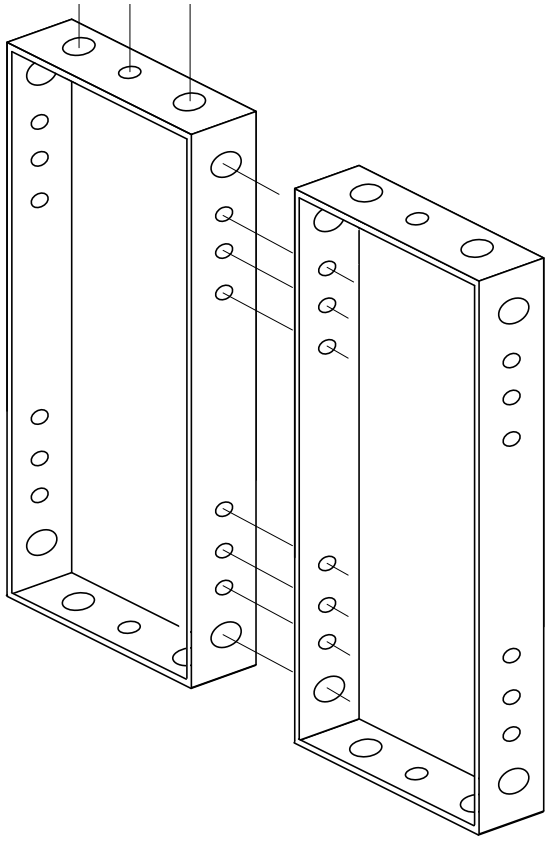
Drip Shields
Optional, surface cover panels only.

Relay Interior
Relays mount to HID snap rails. Barriers are located to provide the line / low voltage division.
Transformers mount to 1/2" knock outs located in the barrier.
Control components are mounted to DIN rail in center of interior.
Pre-assembled PWEx panels will have panel schedules completed according to information provided and all low voltage control connections pre-wired.

Screw-on Covers
Surface (S1) or Flush (F2)

Hinged Covers
Surface (S3) or Flush (F4).
Install right side up or upside down for right-to-left or left-to-right door.
The inner trim of the hinged cover covers over all of the line voltage wiring. Access to the relay's manual control levers is in the low voltage compartment.

Stacking Panels
Panels of equal dimension on a side have matching KO pattern to provide easy stacking.



INSTALLATION & ASSEMBLY

PWEx series relay panels for Douglas HID relays are supplied with a separate interior. All of the components and barriers are mounted to the interior.

PWEx panels are primarily intended for projects where the interior is factory pre-assembled. To install the relay panel the following sequence is recommended:

1) Mount the empty enclosure onto the wall and pull wires. It is recommended that all (or most) of the wires be pulled prior to installing the interior. This will prevent component damage from the wire pulling operation.
2) Relay line voltage terminals are sized for a maximum of 12AWG wire.

   For low voltage wiring 18AWG solid is recommended.
3) Once the wires have been pulled, install the interior and bolt it into place. Make line connections to relays according to the panel schedule provided. If there is no schedule, identify circuits on a blank schedule.
4) To test circuit, turn circuit breaker off, use manual lever to turn relay on and then turn on the circuit breaker. This will help prevent relay contact welding due to dead shorts.
5) Verify that the schedule matches the lights operated by the relay.
6) Once the line circuits are connected and verified, connect low voltage switch wiring to relays or devices.

PART No.	DESCRIPTION
	The transformer supplies the switching for Douglas 2-wire relay control. 2-wire relays are latching type and only require power to switch on or off. One transformer is sufficient to service many relays and devices.
WR-4075 Series: Standard Duty • 40VA steady draw, 75VA pulsed draw. • Current limiting and internally fused with an automatically resetting thermal fuse.	
WR-4075-120/277	120/277V Primary : 24VAC* Secondary
WR-4075-120/347	120/347V Primary : 24VAC* Secondary
WR-4075-240	240V Primary : 24VAC* Secondary
	* Secondary voltage varies from 24V to 29V depending upon load.
WR-4040 Series: Light Duty • 40VA steady draw, 40VA pulsed draw. • Current limiting and internally fused with a one time event fuse.	
WR-4040-120	120V Primary : 24VAC Secondary

SPECIFICATION

Input
- Line voltage 120,240,277 or 347V. Select correct model fo line voltage.

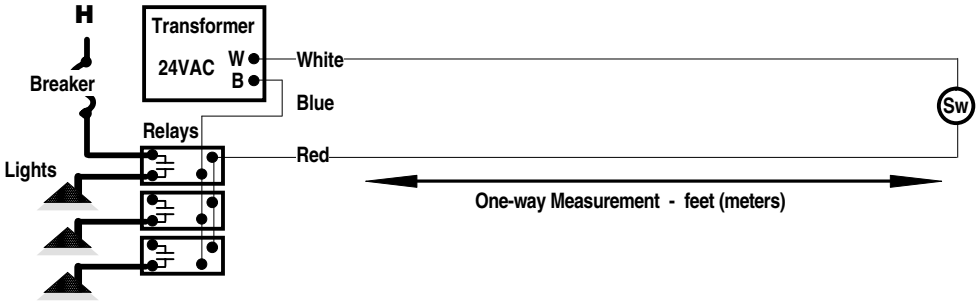
Output
- 24VAC at full load. At no or low loads, the voltage is 29V. As the current draw increases, the transformer voltage decreases. A fully loaded class 2 transformer will output 24V.
- Douglas products are designed to operate correctly over the entire range of voltages provided by th transformer.

Class 2 - Current Limiting
- Transformers that are approved for powering Class 2 circuits are current limited to prevent excessive currents caused by shorts. This is a key safety feature to help prevent fires from shorts.
- The Class 2 current limiting feature permits the use of wire that is of a light gauge and has less stringent insulation requirements.

Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non-condensing humidity.
- Ambient temperature: -20°F to +120°F (-28°C to +50°C)

Approvals & Certifications
- UL Approved
- CSA Certified

CONNECTIONS

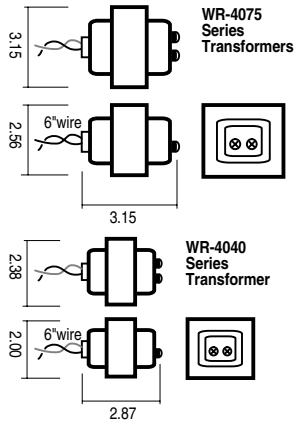


WIRE DISTANCE CHART - 18Ga Wire

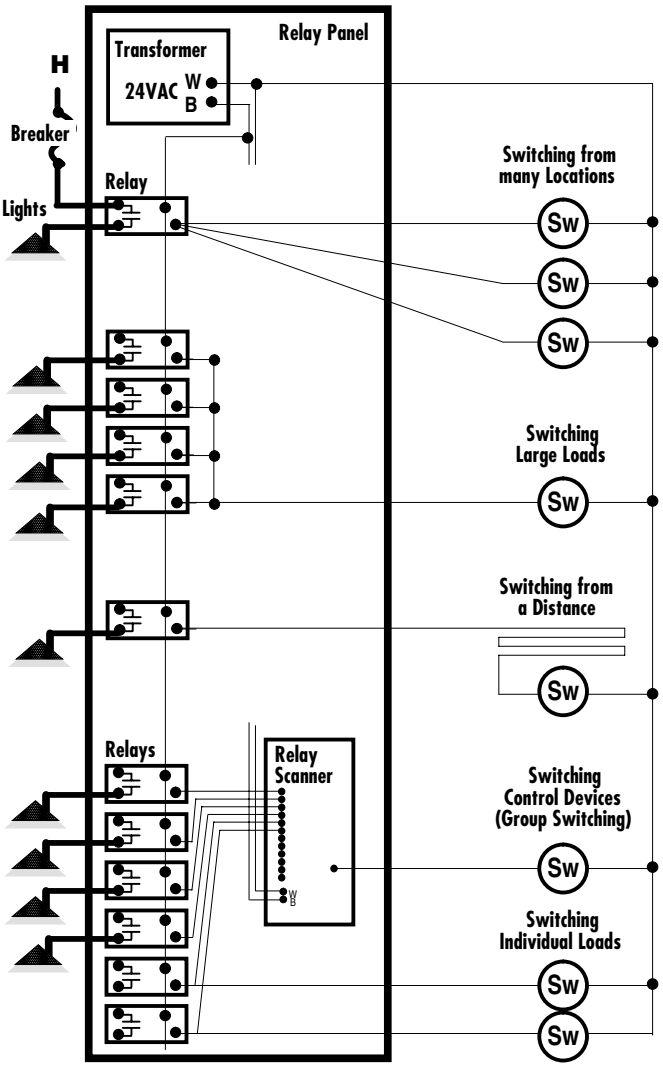
Number of Relays per Switch		*Wire Length* One way measure in feet (meters)	*Wire Gauge* American Wire Gauge
1.5A & 3.0A rated switches (WR-8001, WR-8501, WR-8503)	1	2000 (600)	18 AWG
	2	1500 (450)	18 AWG
	3	1000 (300)	18 AWG
	4	500 (150)	18 AWG
3.0 A rated switches (WR-8001, WRK-8201)	6	300 (90)	18 AWG
	8	160 (50)	18 AWG

DIMENSIONS & MOUNTING

Douglas transformers have a nipple & mounting nut suited for a 7/8" hole (1/2" pipe hole & tread size)

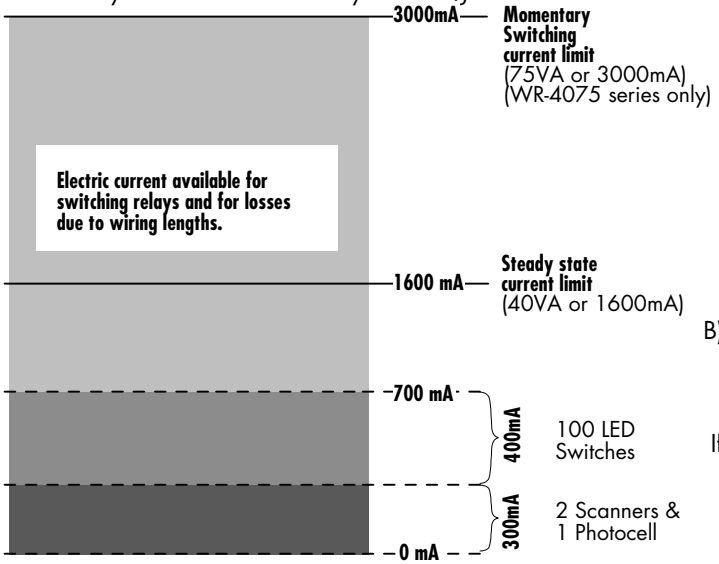


Relay Panel Schematic



Transformer Loading Diagram

Steady loads are deducted from current limit to determine momentary current available relay switching.



TRANSFORMER LOADS

Douglas relays do not use any power while in the latched on or off state. Power is only used when the relay switches over.

In the vast majority of cases, only 1 transformer per relay panel will be all that is required. Theoretically, there is no limit to the amount of relays that can be switched by 1 transformer.

There are Douglas devices other than relays that do use low amounts of steady state power. For example, the LEDs of the LED style switches use power. Relay scanners, time clocks, and other electronic devices also use power. If a large number of these devices are powered by one transformer, do a "LOADING CALCULATION" to ensure that there is no overload. In the rare case there is an overload, split the circuits and use more than 1 transformer.

LOADING CALCULATIONS

If a large number of devices are being connected to a transformer, check to ensure that the transformer loading is correct. The example shown below illustrates the method of calculation.

EXAMPLE: A system has the following components.

100 LED switches
48 2-wire relays
2 Relay scanners
1 Photocell controller

Check how many relays can be switched at one time.

A) Calculate the maximum number of relays that can be switched at one time ignoring wiring distance:

1) Total the steady state current requirement

Led Switches	100 x	4mA =	400mA
Relays	48 x	0mA =	0mA
Relay Scanners	2 x 100mA =		200mA
Photocell Controller	1 x 100mA =		100mA
			700mA

2) Check that the steady state current requirement does not exceed 1.6 Amperes. In the rare cases that the steady state current exceeds 1.6 A, extra transformers will have to be added and circuitry will have to be split.

For this example, the steady state current is 700mA which is less than 1.6 amperes (1600mA).

3) Subtract the steady state current from the total momentary current available to obtain the amount of current available for switching relays.

Total current available form a WR-4075 series transformer for a momentary switching pulse is 3000mA (75VA).

For this example, the current available for switching relays is 2300mA (3000 - 700).

4) Divide the total available relay current by the current draw of a relay (350mA) to obtain the maximum number of relays that can be switched at one time.

2300 ÷ 350 = 6.57 - Round the answer down to 6 relays.

B) The maximum number of relays that can be switched at one time is either the value obtained by the above calculation or the value determined by the maximum wiring distance allowed - WHICHEVER IS LESS.

If the wire distance is 600 feet and the wire gauge is #18 AWG, then the limit is 4 relays, not 6 relays (see wire distance chart).

PART No.	DESCRIPTION
WLC-3150 Lighting Control Unit	• The Lighting Control Unit (LCU) manages all of the devices in a system of 256 relays and 256 dimmers. • The LCU runs time schedules that automate switching and control functions. • To edit settings, the LCU has: - built-in touch screen interface - web server for remote connection • Upload data files using USB or web server • Astronomic & Photocell control • System application & data is stored in a non-volatile memory and lasts for a minimum of 10 years • Auto Leap Year adjustments • Auto Daylight Savings Adjustments • Time of day retention for 24hrs during power loss

WLC-3150
Lighting Control Unit (LCU)

- generates the Dialog data signal and stores lighting control properties.
- stores and runs time schedules and logging info.
- program and control demandflex Dialog Series ballasts

Touch Screen
Built-In touch screen interface.

RS-485 Network
Used in larger projects to connect multiple LCUs.

Web Server
Used to remotely access the LCU via TCP/IP.

USB Port
Allows for memory backup.

Power
24VAC - 1 Amp supply.

demandflex DS
Data signal for demandflex DS ballast system.

Data Signal
The source connection for the Dialog data signal, 400mA supply.
Diagnostic LEDs show overloading and if a short is present.

SPECIFICATION

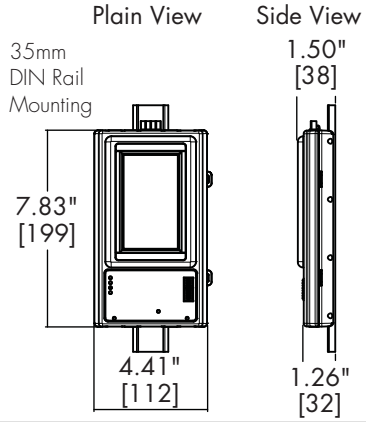
Power
- The power drawn by the LCU includes power used by devices connected to the data signal.
- Power specified for a fully loaded system: 24VAC, 1 Ampere.

Communication
- The LCU generates the Dialog data signal used by the Dialog system.
- Max current available: 400mA.
- Max longest length* :1000'(300m).
- Max aggregate length*: 4000' (1200m)
  **lengths are all a one way measurement.*
- Recommended cable:
  - 2 conductor
  - 18AWG solid.
  - Twisted or shielded not required.
  - Standard LVT wire is acceptable.

Interface & Operation
- Touch screen interface provided for rapid access to all functions.
- A computer can be used as interface by accessing the web server that is built into the LCU.
- LCU runs time schedules and logs traffic and actions of devices that are connected to the Dialog network.

Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non condensing humidity.
- Temperature: +5° to +120°F (-15° to +50°C)

DIMENSIONS & MOUNTING



PART No.	DESCRIPTION
WIR-3110 Infrared Setting Unit	• The Infrared Setting Unit is used to set the input devices target to an output address or group code. • A infrared signal is used to read and write the address or code information. • All Input Devices have an infrared transceiver built in that is compatible with the Infrared Setting Unit. • Point the Unit at the device to be set, and press the receive information button to identify the device and its contents to the Infrared Setting Unit. Then make edits as required and send the new settings back into the device.

SPECIFICATION

Power
- 2 AA standard alkaline or rechargeable NiMH batteries.

Communication
- Infrared communication to Dialog devices equipped with IR transceiver.

Interface & Operation
- IR Setting Unit can request, via IR link, from the device what type it is, display the options available edit and send those options back to the device.
- Settings include but are not limited to:
  - display present device target.
  - set device address or group target.
  - adjust device settings.

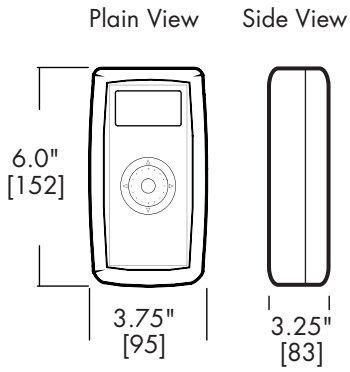
Environment
- Non-vibrating, non-corrosive atmosphere & non-condensing humidity.
- Ambient temp: 5°F to +120° F (-15° C to +50° C).

WIR-3110
Infrared Setting Unit

Use to set output address or group codes into Input Devices.
Input Devices include: switches, occupancy sensors and photo sensors.

IR Transceiver
Built-in IR transceiver for setting target address, group code and preset code of an input device.

DIMENSIONS & MOUNTING



WRD-3408 Relay Driver, 8 Outputs, DIP Set

PART No.	DESCRIPTION
WRD-3408 Relay driver, 8 outputs, DIP set	• To control standard Douglas relays with the Dialog system, use WRD-3408 relay driver. • Dialog relay drivers are compatible with all models of Douglas relays. 1) Install in relay panels and connect to relays. 2) Connect data signal to driver. 3) Set addresses with DIP switches built into driver. • WRD-3408 driver has 8 wires, each wire is a unique output for Douglas relays. • The relay driver can be signaled to switch the connected relay ON or OFF. • The relay driver continuously senses the state of the connected relays and reports the status to the LCU.

SPECIFICATION

Power
- Power from Data signal
- Class 2 Low Voltage device.
- Power rating does not include power used to switch relays.

Communication
- Dialog data signal, polarity insensitive.
- Data signal draw: 3mA.

Outputs
- 8 Douglas relay outputs.
- Connect a maximum of 2 relays to each output.

Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere & non-condensing humidity.
- Ambient operating temperature: +5°F to +120° F (-15° C to +50° C).

WRD-3408
Relay Driver, 8 Outputs

Install relay driver in panel. Set addresses with DIP switches on unit.

Address DIP Switches
- 2 sets of address DIP switches. One set for the left 4 outputs and the other for the right 4 outputs.

- Set addresses such that they are unique from all others. WLC-3150 will detect and warn of duplicate addresses.

Output Address
- Addresses organized by major and minor addresses.

- DIP switch sets the major address.

- one output wire for each of the 4 minor addresses.

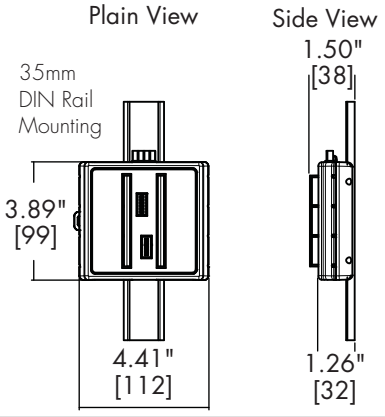
Outputs
- 8 relay outputs.

- 1 relay per output. 2 relays maximum can be connected to an output, but they will switch together.

- Adjacent units can plug into each other to minimize wiring.

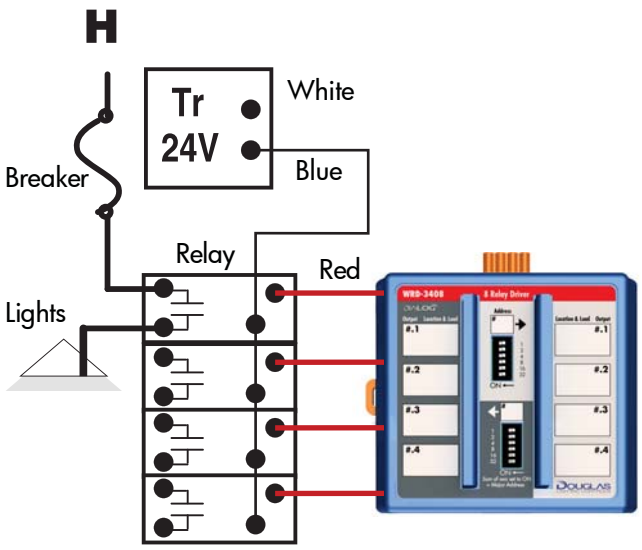
Data Signal
The source connection for the Dialog data signal, 500mA supply.

DIMENSIONS & MOUNTING



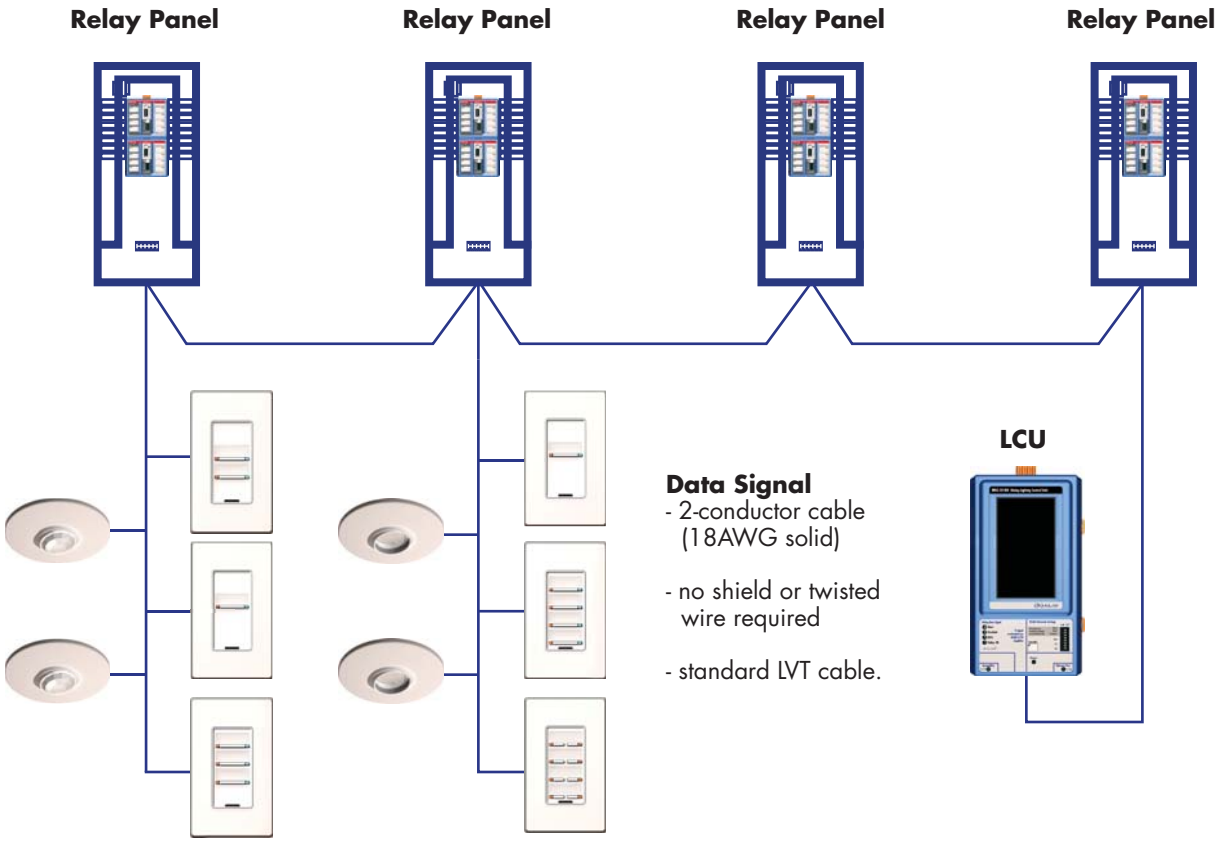
INSTALLATION & CONNECTIONS

- Install WRD-3408 into Douglas relay panels.
- The Relay Drivers can be connected to all models of Douglas relays. Connect the red relay control wire to the relay.
- Connect the local 24VAC white from the transformer to the relay driver. This provides the power required to switch the relay.
- Connect the Dialog data signal to the relay driver.
- The WRD-3408 relay driver has 2 output addresses, one for the 4 relays on the left side and one for the 4 relays on the right side. Each output address is set with a DIP switch block that sets the major part of the output address.
- In most cases each output is connected to 1 Douglas relay to give it a unique output address. Up to 2 relays can be connected to an output, however they will both switch together.



MULTIPLE RELAY PANELS

- Most installations will have more than one relay panel. Network relay panels together with the Dialog data signal.
- Good wiring practice is to wire direct from one panel to the next with no interruptions in between. Data signals for Input Devices should always originate from a relay panel, not in between relay panels.



PART No.	DESCRIPTION
WDB-3314 Data line 0-10V ballast controller, 4 outputs, DIP set	• The WDB-3314 Ballast Controller is designed for dimming 0-10V ballasts. • There are four dimming outputs. • If several ballasts are connected to the same 0-10V dimmer output, they will dim together. Depending upon the ballast type, up to 50 fluorescent ballasts can be connected per output. • To control the dimmer output unit, connect it to the Dialog data signal and set the unit to an output address using the dip switches. • For projects that require ON/OFF control for the same addresses as the dimmer unit, use a relay driver or relay module set to the same address.

SPECIFICATION

Power
- Signal draw: 13mA.

Communication
- Dialog Data Signal is required for communication to the Dialog system.
- Set the device's major address (0-63) with the DIP switch bank on the unit. The 4 dimming outputs each assume the minor addresses ##.1,##.2,##.3 and ##.4.

0-10V Outputs
- There are 4, 0-10V outputs.
- These outputs are designed for standard 0-10V fluorescent ballasts control.
- Up to 50 fluorescent ballast can be connected to a single 0-10V output.

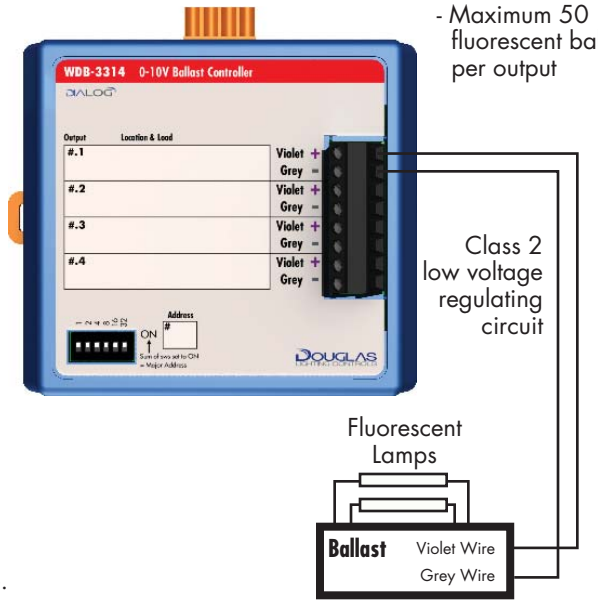
Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere & non-condensing humidity.
- Ambient temp: -5°F to +120° F (-15° C to +50° C).

WDB-3314
Data line 0-10V Ballast Controller

Install unit in relay panel. Set addresses with DIP switches on unit.

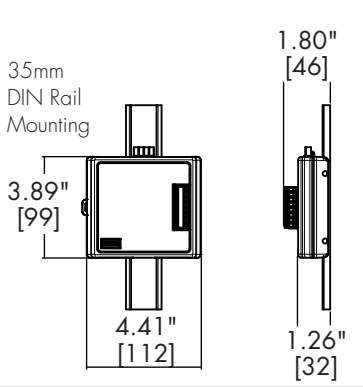
Data Signal
- The source connection for the Dialog data signal, 500mA supply.

0-10V Outputs
- FOUR, 0-10V Dimmer Outputs.
- Connect to standard 0-10V fluorescent dimmable ballasts.
- Maximum 50 fluorescent ballasts per output



Output Address
- Addresses are organized by major and minor address.
- The DIP switch sets the major address, the minor address is preset as shown on the output device.

DIMENSIONS & MOUNTING



PART No.	DESCRIPTION
WPS-3711 Interior ceiling mount Data line photo sensor, IR set. **WPS-3741** Exterior ceiling mount Data line photo sensor, IR set.	• The WPS-3711 Interior Photo sensor and WPS-3741 Exterior Photo Sensor are autoranging and can measure light levels from 0 to 65,000 lux (0-6500 fc). • Photo sensors connect to the data signal and require no other connection. • Algorithms, settings and trip points for the photo sensors are stored and run on the WLC-3150 Lighting Control Unit. • Photo sensor detects and transmits the light level measured.

Connections & Installation: WPS-3711

- The WPS-3711 indoor photo sensor mounts on the ceiling and points downward to measure the light reflected from the surface below.
- Take care to install photo sensor such that it can be aimed at a spot that is representative of the light being measured. The WPS-3711 has a tilt and swivel eyeball lens to aid aiming.
- Good targets are open floor areas and/or walls that receive natural light. Poor target areas are desktop surfaces, reflectivity changes depending on what is on the desk.

Data Signal
Sensor connects directly to the Dialog data signal. No other connections required.

Connections & Installation: WPS-3741

- The WPS-3741 Exterior Photo sensor can be mounted outdoors or indoors and can measure either reflected or natural light.
- When mounting outdoors and obtaining a direct natural light sample, consider the direction the sensor is pointed at.
- The WPS-3741 is weatherproof and designed to withstand harsh climate, however it should be mounted in a sheltered area so the sensor's measurements will be less affected by dirt, snow or ice buildup.

Data Signal
Sensor connects directly to the Dialog data signal. No other connections required.

SPECIFICATION

Power
- Signal draw: 3mA.

Communication
- Dialog Data Signal is the only connection required.

Output - Photo Sensor readings
- The WPS-3711 or WPS-3741 Photo sensors measure the photopic light present and report this value.
- Range: 0 to 65,000 lux.
- The photo sensor reports its value when the light level has changed in percentage from the last reported value and when requested by the LCU.

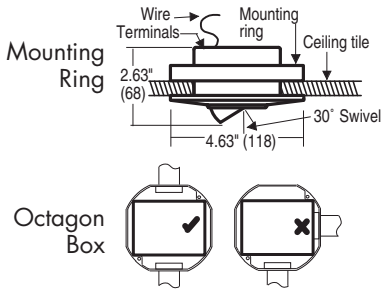
Environment

WPS-3711, Interior Photo Sensor
- Stationary, non-vibrating, non-corrosive atmosphere & non-condensing humidity. Ambient temp: +5°F to +120°F (-15°C to +50°C).

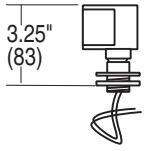
WPS-3741, Exterior Photo Sensor
- Stationary, non-vibrating, non-corrosive atmosphere & non-condensing humidity.
- Ambient operating temp: powered: -55°F to +130°F (-50°C to +55°C) unpowered: -10°F to +130°F (-25°C to +55°C)
- Photo sensor is water tight and able to withstand direct rain and snow. Mount to avoid coverage by snow and ice.

DIMENSIONS & MOUNTING

WPS-3711, Interior Photo Sensor



WPS-3741, Exterior Photo Sensor



PART No.	DESCRIPTION
WCI-3928 Contact input, Infrared set, c/w 24 VDC, 500 mA supply	• The WCI-3928 Contact input unit can receive contact closures to signal either output addresses or group codes. • The WCI-3928 has 8 contact inputs that can each be targeted to an output address (individual control) or a group code (group control). • To assign an address or code number, use the WIR-3110 IR Setting Unit. • The WCI-3928 unit is specially designed for interfacing 24V occupancy sensors to the Dialog system. It has a 24VDC power supply and accepts 24VDC contact inputs. • The WCI-3928 is connected to both the data signal and 24VAC.

SPECIFICATION

Power
- 24VAC is required for power.
- Signal draw: 4mA.

Communication
- The Dialog data signal is required for communication to the Dialog system.

Contact Input
- To activate a contact input, apply a +24VDC signal to the input.
- There are 8 contact inputs to provide a seperate ON and OFF control to the output or group targeted.
- Use the 8 contact inputs for connection to external devices.

24VDC Power Supply
- Max load: 400mA.
- Use 24VDC to signal inputs of the WCI-3928.
- Each input requires 4mA of signal.

Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere & non condensing humidity.
- Ambient temp: +5° to +120° F (-15° C to +50° C).

WCI-3928
8 Contact Input Unit

Install unit near contact signalling devices. Set addresses and contact types with WIR-3110.

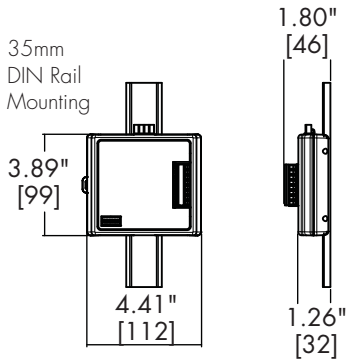
Power Supply
24VAC Input is needed to power a 24VDC, 500mA maximum power supply. Use power supply to power 24V motion sensors.

Infrared Link
The iR link is used by the WIR-3110 to set the output address or group code the contact input is targeted at.

Data Signal
Connect the WCI-3928 to the Dialog data signal.

Contact Input
8 contact inputs that permit contact closures from other systems or devices (24V occupancy sensors) to signal the Dialog system. 24VAC or 24VDC must be applied to the input to cause it to signal the Dialog system.

DIMENSIONS & MOUNTING



DRAFT

PART No.	DESCRIPTION
WNG-3131 BACnet IP Gateway	• The Douglas WNG-3131 IP Gateway can be used to incorporate a Dialog Lighting Control system into a Management Control Network that uses BACnet technology. • WNG-3131 communicates using BACnet-IP and is built using Field Server Technology. All BACnet vendors using standard BACnet-IP protocal can communicate with the WNG-3131.

SPECIFICATION

Saftey
• Suitable for mounting within low voltage compartments of UL508A enclosures

EMI/RFI
• FCC47 CFR Part 18, Non-Consumer Limits

Temperature
• -15° to 50°C
• 40°C ambient, while mounted in an enclosure with a 10°C cabinet rise.
• Storage Temperature -25 to 55°C

Humidity
• 10% to 95% relative humidity, non-condensing

Low Voltage Connections

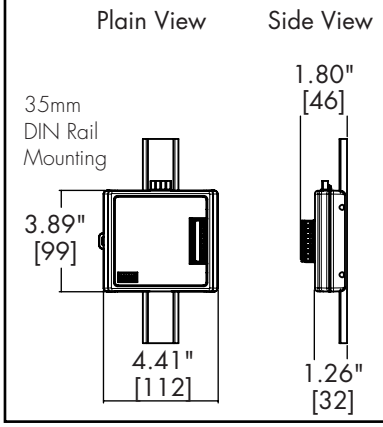
24 VAC Hot	1
24 VAC Rtn	2
Dialog+	3
Dialog -	4
Ethernet Port	RJ45

Electrical Connections & Electrical Ratings

Nominal input power is a single phase, 24VAC, 60Hz Class 2 circuit. Control power load shall be no greater than 24 watts.
All gateway units shall survive, without damage or malfunction, input voltage swings of -10% to +25% (21.6 through 30VAC). All gateway units will be functional with a ground referenced or floating input power circuit.

The WNG-3131 streamlines the inclusion of a Dialog lighting controls system into a larger BACnet IP network and significantly reduces the time required to integrate the lighting controls network into the larger network. After integration, network management and group programming will still be performed by the Dialog lighting control system. The WNG-3131 Gateway works with Dialog and allows the programming of the groups to be easily accomplished using the user friendly Dialog system interface.

DIMENSIONS & MOUNTING



- Pair (2-conductors) of **18AWG SOLID** wire.
- **LVT** type cable is recommended. LVT wire is commonly used for thermostats and similar Low Voltage Type (LVT) applications. This wire is typically sold with either a Red or Brown insulation.
- Common part numbers are: LVT18-02, LVTP18-02. The 'P' type designates 'parallel' (non-twisted). Twisted or non-twisted is acceptable

Technical Solid Wire vs. Stranded Wire

SOLID	STRANDED
ADVANTAGES: • Easier and faster to work with when making termination to screw type terminals. **DISADVANTAGES:** • Not as easy to form to the necessary shape that may be required. • Cannot be reformed easily.	**ADVANTAGES:** • Flexibility is quite useful for tight space applications **DISADVANTAGES:** • Individual strands may not be secured by the terminal connection. These strands can touch the adjacent terminal causing a short.

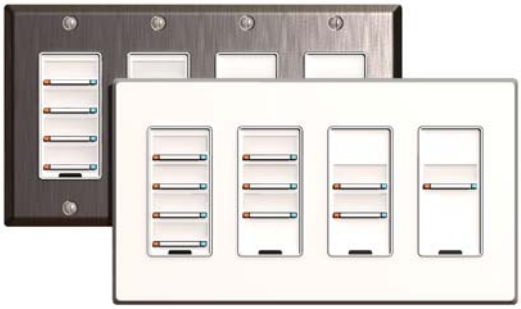
CAUTION NOTE

- Do not use both stranded and solid wire under the same terminal connection. The solid wire will hold the connection at one end while the stranded will compact and lose connection, perhaps even falling out all together.

DRAFT

BACnet Object List

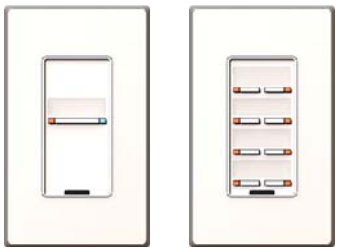
Function		Type		Values
Individual Relay	Status	Multi-State Inputs MI 1152-1407	(Read Only)	1 = Off 2 = On 3 = Not Used
	Control	Multi-State Values MV 1152-1407	(Read/Write)	1 = Off 2 = On 3 = No Action
Individual Dimmer	Status (256)	Analog Input AI 0-255	(Read Only)	% Percent (0-100%)
	Control (256)	Analog Values AV 0-255	(Read/Write)	% Percent (0-100%)
Group	Status (128)	Multi-State Inputs MI 0-127	(Read Only)	1 = Off 2 = On or Mixed 3 = Not Used
	Control (128)	Multi-State Values MV 0-127	(Read/Write)	1 = Off 2 = On 3 = No Action
Local Preset	Status (512)	Multi-State Inputs MI 128-639	(Read Only)	1 = Does Not Match Preset 2 = Match Preset 3 = Not Used
	Control (512)	Mutli-State Values MV 128-639	(Read/Write)	1 = No Action 2 = Active Preset
Global Preset	Status (512)	Multi-State Inputs MI 640-1151	(Read Only)	1 = Does Not Match Preset 2 = Match Preset 3 = Not Used
	Control (512)	Mutli-State Values MV 640-1151	(Read/Write)	1 = No Action 2 = Activated Preset
Local Photo Sensor	Status (64)	Analog Input AI 256-319	(Read Only)	0-65535 LUX
Global Photo Sensor	Status (64)	Analog Input AI 320-383	(Read Only)	0-65535 LUX
Occupancy Sensor	Individual Ctrl Status (256)	Multi-State Input MI 1408-1663	(Read Only)	1 = Unoccupied 2 = Occupied 3 = Not Used
	Group Ctrl Status (128)	Multi-State Input MI 1664-1791	(Read Only)	1 = Unoccupied 2 = Occupied 3= Not Used
	Local Preset Ctrl Status (512)	Multi-State Input MI 1792-2303	(Read Only)	1 = Unoccupied 2 = Occupied 3 = Not Used

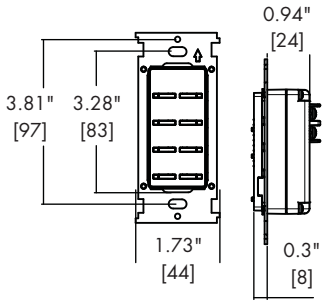


DIALOG SWITCH STATIONS

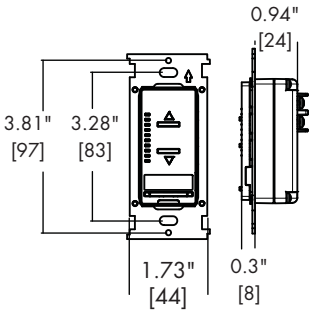
- The Dialog switch devices come in 1 to 8 button modules to provide flexible and attractive solutions for the switching of your lighting control system.
- Switch modules only require connection to the 2-wire data signal. Should a switch station require expansion, connect extra module to existing data signal. No special cat 5 connectors needed.

Technical Switch modules for ON/OFF and Presets

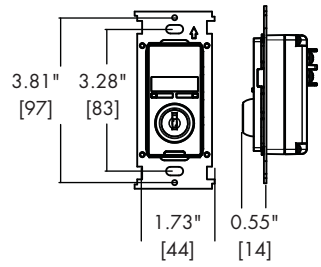


PART No.	DESCRIPTION	DIMENSIONS
WSW-3511 **WSW-3512** **WSW-3513** **WSW-3514** **WSW-3528**	• Dialog switches. • Connect to data signal and set the switch to target the output address or group code that is to be controlled. Use the WIR-3110 to set the output address or group code. • The switch has an LED indicator to show the status of the targeted output or group. Orange LED indicates ON and Blue LED indicates OFF.	

Technical Switch module for Dimmer control

PART No.	DESCRIPTION	DIMENSIONS
WSD-3501	• Dialog dimmer switch. • Connect to data signal and set the dimmer switch to target the output address or group code that is to be controlled. • UP/DOWN buttons control outputs that can dim up or down. LEDs along the edge show the operating level of the dimmer. • To control several dimming outputs together, target the dimmer at a group code that contains the desired outputs.	

Technical Switch module for Key control

PART No.	DESCRIPTION	DIMENSIONS
WSK-3502	• Dialog key switch. • Connect to data signal and set the key action to target the output address or group code that is being controlled. • The key can send a signal for clockwise turn and counterclockwise turn. • Typically used for ON and OFF control. • Orange LED indicates ON and Blue LED indicates OFF.	

INSTALLATION

- Connect the 2-wire Dialog signal to the back of each switch module and install modules in standard wall boxes.
- Each switch module must have an output address or group code assigned.
- A Dialog system local network can have a total of 256 outputs and 127 group codes. A group code can host one, some or all of the output addresses. There is no limit to the number of switches that can be set to the same address or group code.
- A switch targeted at a group code requires the group code to have an existing program to function.
- A switch targeted directly to an output address requires no extra programming.

Wiring a Dialog system switch

- Connect switches to the 2 conductor data signal. No other connections required.
- The maximum one way measurement from the controller to the switch device is 1000' . Should longer lengths be needed, use WAM-3190 amplifier.
- The Dialog system switches draw 24VDC power from the 2 conductor data signal. Each switch uses 3mA of power. There is 400mA of total power available from the Dialog signal for all devices. If power is insufficient, use WAM-3190 amplifiers for additional 400mA.

Programming a Group Code

- Switches targeted directly at an output address require no programming. Switch targeted at a group code require programming with the WLC-3150.
- A push button switch can send standard action commands:
  - ON/OFF (outputs or groups)
  - Dim UP/DOWN (outputs or groups)
  - Presets 1 to 8 (groups only)

  - In addition to standard action commands (for example: turn ON and set to 80% dim level), presets can also set operating modes. Modes determine how Input Devices (including switches) and outputs of the group are to behave.
  - Example 1: quiet time switch: disable motion sensor for 1 hour.
  - Example 2: during off hours, switch is to operate with a 30 minute timed-ON;
  - Example 3: for this period of time lock output to this level and allow nothing to change it.

Dialog Signal Connection

- Simple 2 conductor connection.
- Switch can be connected to the data signal while it is live.
- Set the output's address to the switch using the WIR-3110.
  - To do more complex controls, set the switch to target a group code. Program the outputs that the group code controls using the WLC-3150.

WSD-3501
Data line dimmer and switch, 1 channel

WSW-3511
Data line switch - 1 gang, 1 button (1x1), iR set. Signal draw: 3.5mA.

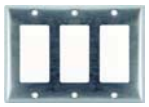
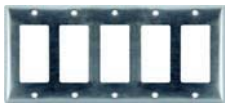
WSK-3502
Data line key switch - c/w pilot light. Signal draw: 3mA.

WSW-3528
Data line switch - 1 gang, 8 buttons (4x2), iR set. Signal draw: 2mA.

'Decora Style' Cover Plates for Dialog Switches

WN-974xx Series

WN-974xx series stainless steel cover plates. c/w screws.

PART No.	
WN-97401 (1-gang stainless steel)	
WN-97402 (2-gang stainless steel)	
WN-97403 (3-gang stainless steel)	
WN-97404 (4-gang stainless steel)	
WN-97405 (5-gang stainless steel)	

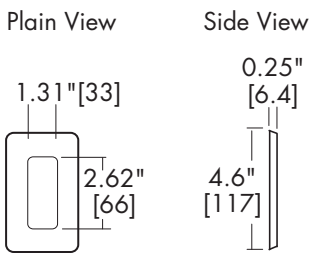
WN-803xx Series

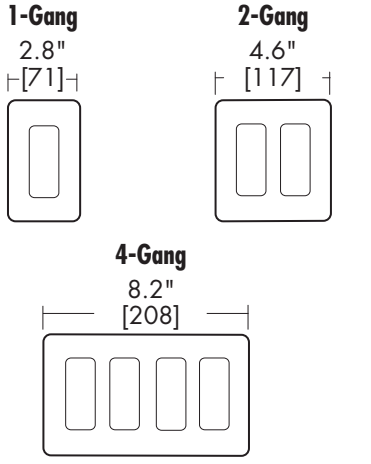
WN-803xx series screwless plastic cover plates.
White, semi-gloss finish.

PART No.	
WN-80301 (1-gang screwless plastic)	
WN-80309 (2-gang screwless plastic)	
WN-80311 (3-gang screwless plastic)	
WN-80312 (4-gang screwless plastic)	
WN-80321 (5-gang screwless plastic)	
WN-80200 (blank module)	

Dimensions

For ALL





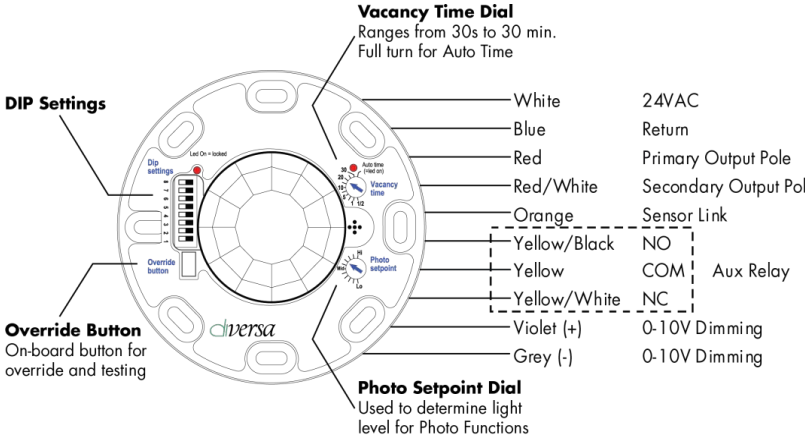
PART No.	FEATURES
WOR***-*-* *See "Part Number Definitions" table to determine the features you require	• The *Diversa* occupancy sensors use PIR and ADI-Voice technologies to determine the presence of people and perform the control actions when occupancy (or vacancy) is detected. • The WOR Series of sensors are designed to mount recessed on a ceilings giving a 360° coverage pattern. • The low voltage edition of this sensor gives the capability of operating and controlling the WP-PP20-D Power Pack and/or diode pulse relays.

Features

- Recessed ceiling mounted occupancy sensor provides 360° coverage using an adjustable swivel head to maximize the sensor area.
- The dual-tech sensor utilizes ADI-Voice Technology, which has advanced digital signal processing for accurate detection of human speech.
- A Self-adapting mode can be set to use both Passive Infrared (PIR) & Accurate Detection Intelligence (ADI) Voice technologies to automatically track occupancy tendencies for continuous maximizing of energy savings.
- Smart Sensing allows for an immediate return to occupied mode in the event of a false off being triggered.
- The photo sensor option is available to provide a 0-10VDC dimming ballast output for Daylight Harvesting.
- Can be programmed by on-board DIP switches and dials or an IR Setting Unit for added convenience, especially during commissioning.

Operation

Low voltage sensors are powered by 24VAC from either the WP-PP20-D Power Pack or a 24VAC transformer. When in operation, the sensor will detect initial motion using PIR; once motion is detected the internal contact will close. The ADI-Voice is then activated to work alongside the PIR to detect occupancy.



SPECIFICATION

Inputs
- 24 VAC ±25%
- Class 2 Low Voltage Source
- 60 Hz
- Use #18AWG wire

Outputs
- *Diode Pulse:* Each output is capable of driving up to four Diode Pulse relays.
- *0-10V Dimming:* Use to control up to 50 Ballasts. Connections are polarity sensitive.
- *Aux Relay:* SPDT Form-C contact rated for 1A at 30VDC

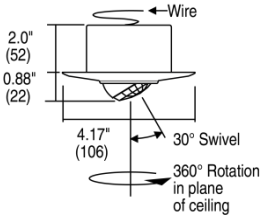
Power consumption
- 9.5 mA Standard
- 14.0 mA with Auxiliary Relay

Approvals
- FCC

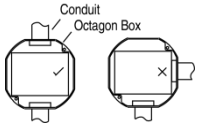
Environment
- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non-condensing humidity
- Ambient Operating Temperature: 14°F to 140°F (-10°C to 60°C)
- Storage Temperature: -14°F to 140°F (-25°C to 60°C)
- Low temp and high humidity option [-L] products: PCB conformal coated for resistance to damp environments and operation to -40°C/F

DIMENSIONS & MOUNTING

- Unit attaches to mounting ring with screws or it can be mounted into an octagon box.



- The WOR sensor will fit an octagon box. It is very important that conduits be attached at opposite ends of the box.



- Use a 2-1/8" or more, deep box. If the box is less, use the spacer ring.

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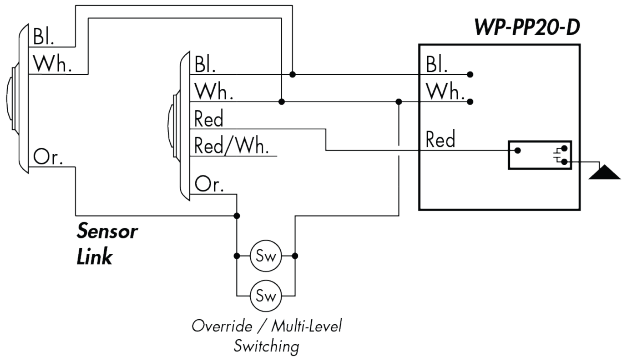
Wiring Instructions

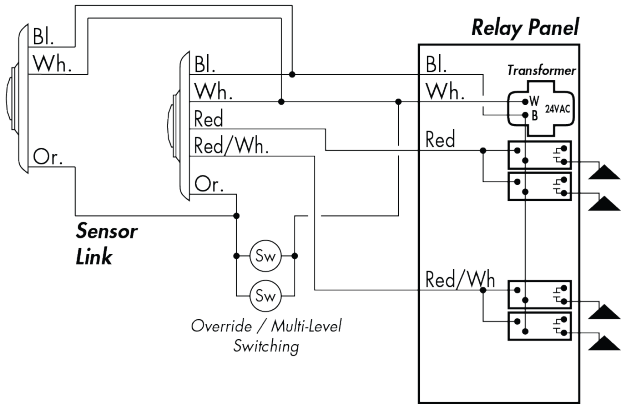
The WOR Series Low Voltage sensors are equipped with #22 AWG leads. Use appropriate sized wire-nuts to connect the wires to the incoming load terminations.

Electrical Connections

Wiring to a Power Pack



Wiring to a Relay Panel



Sensor Settings

Programming - IR / Manual Setting
Programming can be done either with the DIP switches and dials on-board the device or with the WA-OCC-IR setting unit. For more details and additional options please see the "WA-OCC-IR Manual"

Detection (Dual or PIR Only)
When in operation, the sensor will detect initial motion using Passive Infrared; once motion is detected the ADI-Voice is then is activated to work alongside the PIR to maintain occupancy. The ADI-Voice can be disabled on any dual tech sensors.

Automatic Timeout
By setting the timeout dial to maximum, the sensor will be put into automatic mode which will adjust the time out automatically to maximize energy savings and occupant comfort.

Smart Sensing
When vacancy occurs, sensitivity of the ADI-Voice technology transitions from maximum to zero over an adaptively determined time period, based on occupancy tendencies. During this period, ADI-Voice can turn the lights back on immediately, even with no line-of-sight to the sensor, assuring the best combination of user convenience and energy savings.

Energy consumption due to false triggers is minimized by the automatic walk-through mode. This feature turns the lights off after 3 minutes if no occupancy detection occurs in the first 30 seconds after initial turn on.

Vacancy Sensor
The low voltage sensor can be selected as a vacancy (Off only) sensor. This provides additional energy savings by forcing the user to turn the lights on manually. The low voltage sensor has a built-in override input; allowing for the sensor to be operated as a vacancy sensor. For two pole sensors, it provides multi-level control capability.

Photo Sensing (-P)
When enabled, occupancy alone will not trigger the output state to on. If occupancy is detected AND there is a deficiency of natural light, the output is triggered on. An increase in natural light will not force the lights off but as the ambient light level drops the lights will turn on automatically. This feature will also limit the manual switching, ensuring the lights are not turned on if adequate light is present.

Daylight Harvest Dimming (0-10V Output) (-D)
The 0-10V output can operate up to 50 ballasts. This output can be used for either a fixed tuned lighting level or in a full range daylight harvesting mode. When set to a fixed dim level, the dial can be used to raise or lower the light level. When set for photo dimming the dial is used to select the maintained light level.

Multi-Level Switching (2-Pole w/o Photo Sensing option)
A switch on the sensor link can be used to either trigger both poles simultaneously or step through a multi-level sequence as described in the manual.

Multi-Level Photo Sensing (2-Pole w/ Photo Option)
Photo sensing on a 2-pole sensor can be configured to either restrict both poles or the secondary pole only; if set to "Secondary Pole Only", the primary pole will trigger based on occupancy, regardless of the photo setting. This feature will also limit the manual switching. Please see the manual for sequences.

Sensor Link
The low voltage sensor is equipped with a connection which facilitates communication between sensors. The sensor link (orange wire) allows multiple sensors to coordinate their signals and act together as a cohesive zone. This connection provides additional control functions as described below.

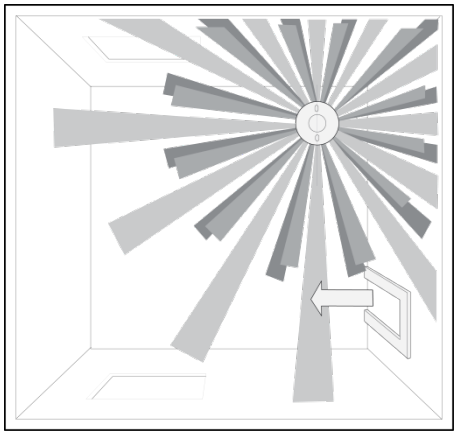
Diode Pulse: When a diode switch is connected to the sensor link it provides manual control. This can be used to toggle the lights ON/OFF. For two pole sensors, it can provide multi-level sequencing.

Maintained AC: If a maintained AC signal is applied to the sensor link, the sensors will be in an override mode. By default the sensor will turn the lights ON when disabled by this override. This is settable via the IR setting unit.

INSTALLATION

Installing in Smaller Room (Standard Lens)

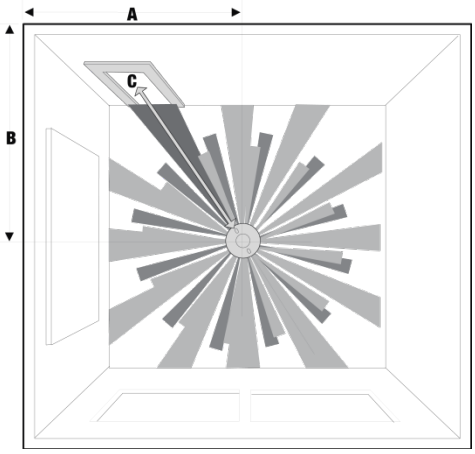
- Locate the sensor near the entrance door wall to prevent it from viewing out into the hallway.
- The lens can rotate, allowing the sensor to be pointed toward the area in front of the entrance door.
- Positioning the sensor in this manner ensures that an occupant moves across the longest detection beam upon entrance, utilizing the sensor's maximum PIR range.



Typical Enclosed Office

Installing in Larger Room (Extended Lens)

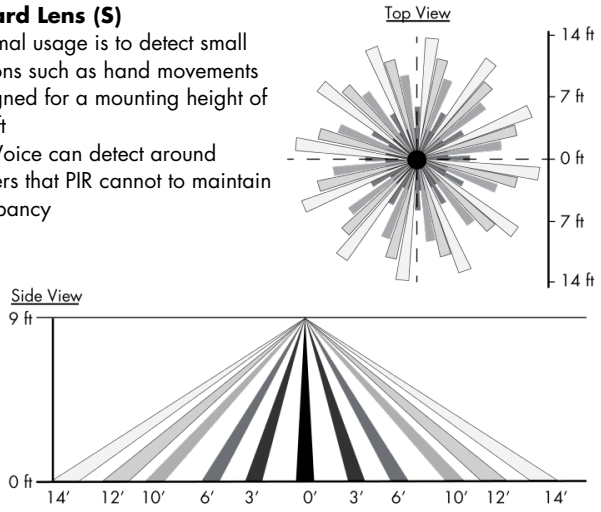
- Place the sensor near the center of the room ceiling. Locate it so the approximate distance of 27ft in and over (A & B) or in dead center of room.
- Tilt the lens to aim the detection zone to the bottom of the door. (C)
- Positioning the sensor in this manner ensures that the beam does not reach outside the room without reducing sensitivity.



Typical Classroom

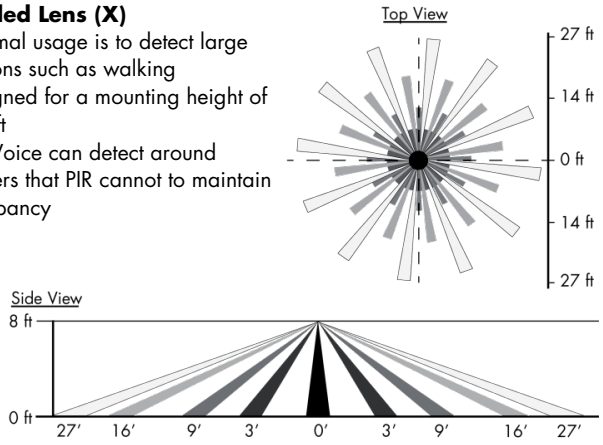
Standard Lens (S)

- Optimal usage is to detect small motions such as hand movements
- Designed for a mounting height of 7-15ft
- ADI-Voice can detect around corners that PIR cannot to maintain occupancy



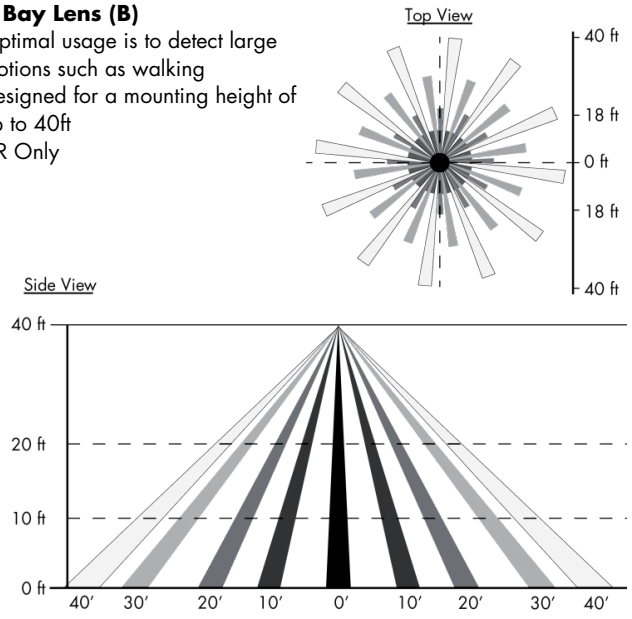
Extended Lens (X)

- Optimal usage is to detect large motions such as walking
- Designed for a mounting height of 7-15ft
- ADI-Voice can detect around corners that PIR cannot to maintain occupancy



Hi - Bay Lens (B)

- Optimal usage is to detect large motions such as walking
- Designed for a mounting height of up to 40ft
- PIR Only



Summary of Configuration Options

Each building is unique in its lighting needs. Di*versa* sensors provide the user with a wide variety of configuration options to ensure each building's individual needs are met.

- Timeout 30 sec - 30 min or self adapting
- Adjustable PIR Sensitivity
- Adjustable Detect Intelligence Voice (ADI-Voice) Sensitivity
- Enable/Disable ADI-Voice
- Manual override switch set to OFF only in addition to ON/OFF
- Enable/Disable LED Indicators
- Outputs configurable as ON/OFF, auto OFF (Vacancy Sensors excepted)
- Alternating outputs for 2-pole modules to provide even lamp wear
- 2-pole models settable for difference sequences (See manual for details)
- Auxiliary relay can be synchronized with output status or with occupancy status on low voltage models
- Photo sensor option set to light levels for dimming and switching control
- Enable/Disable Walk Through Mode
- Set parameters for light level setting upon occupancy detection

Part Number Definitions

Product Class
WOR = Ceiling Recessed Occupancy Sensor
WVR = Ceiling Recessed Vacancy Sensor

Sensing Range
S = Standard
X = Extended
B = High-Bay, PIR Only

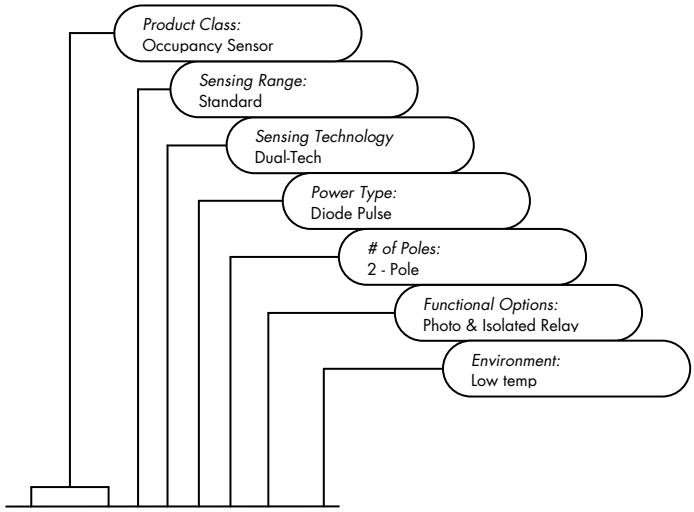
Sensing Technology
I = Passive Infrared
D = Dual Technology

Power Type
D = Diode Pulse: 24VAC Input

Number of Poles
1 = Single Pole
2 = Dual Pole

Functional Options
D = Dimming
P = Photo Sensing & Control
R = Isolated Relay
N = None

Environment
L = Low Temp/High Humidity
N = None



Example: WORSDD2-PR-L
Ceiling (Recessed Mounted) Occupancy Sensor, Standard Range, Dual-Tech, Diode Pulse 24VAC, 2-pole, Photo Control & Isolated Relay, Low Temp

* Application and Performance Specification Information Subject to Change without Notification

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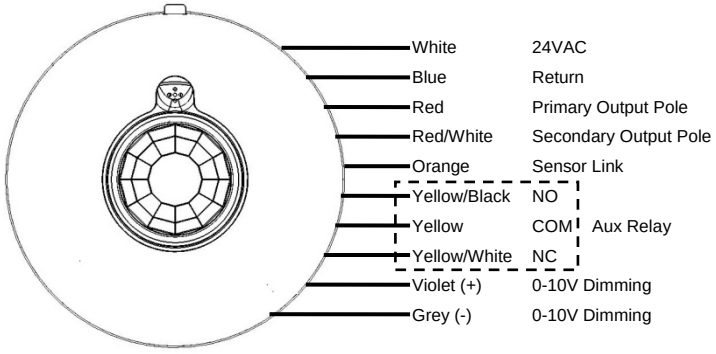
INSTALLATION & WIRING DIRECTIONS

Installation

Mounting of the device requires a 2-1/8" deep or more, octagonal junction box. Install by recessing the device into the octagon box; lining up the mounting holes and securing it using the screws provided. If too shallow, use the spacer ring is provided.

Wiring

The WOW Series Low Voltage sensors are equipped with plug-in harness for easy installation. This harness has #20 AWG leads. Use appropriate sized wire-nuts to connect the wires to the incoming load terminations.



DIP Switches

A bank of eight DIP switches and two rotating controls can be used to manually setup and configure the sensor.

WOR - - - - '-N'-		
DIP	**On Position**	**Off Position (Default)**
8	IR Settings	Manual Settings
7	Button Disabled	Button Enabled
6*	Multi-Level (ML)	All ON / OFF
5*	ML: 10> 11> 00	ML: 01 > 11 >00
4	Occupancy Sensor (Auto-On)	Vacancy Sensor Only
3	Detect LED Disabled	Detect LED Enabled
2	PIR High Sensitivity	PIR Normal Sensitivity
1	ADI-Voice Disabled	ADI-Voice Enabled

WOR - - - - '-P'-		
DIP	**On Position**	**Off Position (Default)**
8	IR Settings	Manual Settings
7	Button Disabled	Button Enabled
6*	Multi level: 10> 1P> 00	All Photo (P) / OFF
5	Photo Disabled	Photo Enabled
4	Occupancy Sensor (Auto-On)	Vacancy Sensor Only
3	Detect LED Disabled	Detect LED Enabled
2	PIR High Sensitivity	PIR Normal Sensitivity
1	ADI-Voice Disabled	ADI-Voice Enabled

WOR - - - - '-PD'-		
DIP	**On Position**	**Off Position (Default)**
8	IR Settings	Manual Settings
7	Button Disabled	Button Enabled
6*	Multi level: 10> 1P> 00	All ON / OFF
5*	Fixed Dim / Photo Disabled	Photo Enabled & Dim
4	Occupancy Sensor (Auto-On)	Vacancy Sensor Only
3	Detect LED Disabled	Detect LED Enabled
2	PIR High Sensitivity	PIR Normal Sensitivity
1	ADI-Voice Disabled	ADI-Voice Enabled

***Available in 2-Pole models (-2) only**

sensorswitch

STANDARD RANGE SENSOR - CEILING MOUNT, LOW VOLTAGE, PIR/MICROPHONICS™ (PDT)

TYPICAL APPLICATIONS
- Partitioned Cubical Spaces
- Restroom with Stalls
- Library Study Carrels & Stacks

FEATURES
- Patented Dual Technology with PIR/Microphonics™ Detection
- Communicates with Other Sensors
- Time Delay: 30 sec. to 20 minutes
- Push-Button Programmable
- Green LED Indicator
- 100 Hr. Lamp Burn-in Timer Mode

AVAILABLE OPTIONS
- Isolated SPDT Relay (-R)
- On/Off Photocell (-P)
- Auto Dimming Cntl. Photocell (-ADC)
- Low Temp/Hi Humidity (-LT)

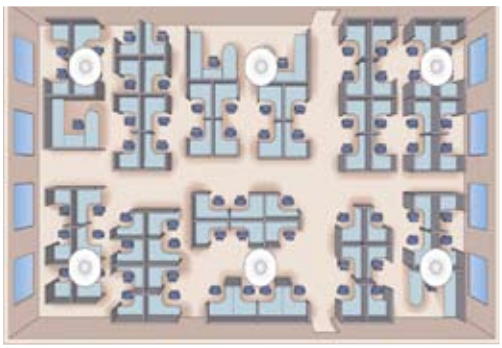
SPECIFICATIONS
- Size: Circular, 4.55" Dia., 1.55" Deep (11.56 cm Dia., 3.94 cm Deep)
- Sensor Weight: 5 Ounces
- Sensor Color: White
- Mounting: Ceiling Tile Surface, Round Fixture or Junction Box
- Relative Humidity: 20 to 90% non-condensing
- Operating Temp: 14º to 160º F (-10° to 71° C)
- Storage Temp: -14º to 160º F (-26° to 71° C)
- UL, CUL, and Title 24 Compliant
- 5 Year Warranty
- Made in U.S.A.

LOW TEMP/HI HUMIDITY(-LT)
- Conformally coated Circuit Board is corrosion resistant from moisture
- Operates down to -4º F(-20º C)

CM-PDT SERIES

w/ Enhanced Daylighting Control Options!

Open area office lighting control is made cost effective with the use of the *CM-PDT Series* Passive Dual Technology occupancy sensor. This small, yet powerful sensor provides line of sight PIR detection of small motion in a circular pattern and combines overlapping Microphonics™ coverage for detection of occupants working in their cubical space. By installing multiple *CM-PDTs* on 30 foot centers, large zones are created (typically one per circuit of lighting). The lighting is then controlled in blocks similar to manual switching, only no one will ever have to remember to turn off the lights! Restrooms with stalls, large storage areas with shelving, and libraries with study carrels are also easily and cost effectively controlled by the *CM-PDT*.



SENSOR OPERATIONS

Sensors with Passive Dual Technology (PDT) first "See" motion using Passive Infrared (PIR) and then engage Microphonics™ to "Hear" sounds that indicate continued occupancy. This patented technology uses Automatic Gain Control (AGC) to dynamically self adapt a sensor to its environment by filtering out constant background noise and detecting only noises typical of human activity. When occupancy is detected, a DC output goes high and can drive up to 200 mA of connected load. The sensor is powered with 12 to 24 VAC/VDC and typically operates with a PP-20 or MP-20 Power Pack; enabling complete 20 Amp circuits to be controlled. An internal timer, factory set at 10 minutes, keeps the lights "On" during brief periods of no activity. This timer is selectable at 2.5 minute increments from 30 seconds to 20 minutes, and is reset every time occupancy is re-detected.

DAYLIGHTING CONTROL OPTIONS

For spaces with abundant natural light from windows or skylights, this series offers an On/Off Photocell (-P) option and an Automatic Dimming Control (-ADC) Photocell option. The -P option is ideal for public areas like vestibules, corridors, or restrooms; while the -ADC option is perfect for classrooms and private offices. As the daylight levels change in the room, both options insure that an adequate light level is maintained according to a programmable set-point value. The -P option provides two modes of operation; one simply inhibits the lights from turning on, while the other has full On/Off control of the lights. The -ADC option allows the sensor to control a dimmable ballast. It also provides a secondary dim time-out that enables the lights to go to a dim setting after one time-out and then turn fully off after a second time-out. For more detailed information on these daylighting control features, see the CM-PC-ADC Technical Data Sheet.

SENSORS vs. LIGHTING PANELS

Lower cost, convenience, reliability, and greater energy savings are all provided by installing *CM-PDTs* rather than computer based lighting control panels. No programming, no confusing overrides, no chance of turning off while the area is still occupied, and no reason for leaving the lights on in "anticipation" of occupants! Real time detection of occupancy always outperforms a pre-programmed time clock. All this at a fraction of the total installed cost of a lighting panel!

CATALOG INFORMATION

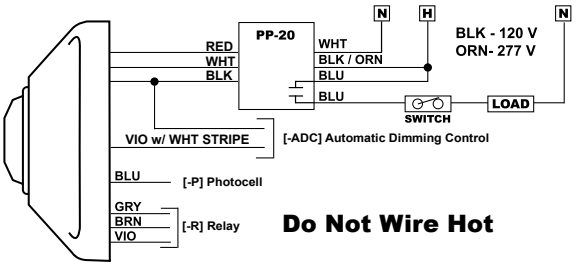
MODEL #	DESCRIPTION	TEMPERATURE	OP. VOLTAGE	CURRENT
CM-PDT	Dual Technology Ceiling Mount Sensor	14° to 160° F	12 to 24 VAC/VDC	4 mA
Add suffix				
-R	SPDT Relay, 1 Amp			16 mA
-P	On/Off Photocell			4 mA
-RP	Relay & On/Off Photocell			16 mA
-ADC	Automatic Dimming Control Photocell			4 mA
-LT	Low Temp/High Humidity	-4° to 160° F		

WIRING INSTRUCTIONS

Wire lead connections are Class II, 18 to 22 AWG.

STANDARD CM-9

RED - 12 to 24 VAC/VDC
BLACK - Common
WHITE - Output (HI DC for Occupancy)



INTERNAL LOW VOLTAGE RELAY OPTION

To enable a sensor to interface with a building management system, the -R option provides dry contact closure via a SPDT, 1 Amp, 40 Volt relay. The relay coil is energized and changes state when ALL connected sensors register "Unoccupied". When using multiple sensors, only one sensor per zone needs to have a relay.

Note: Sensor must have power at all times for the relay to function .

MOUNTING CONSIDERATIONS

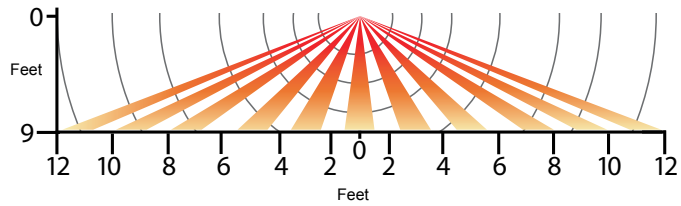
The *CM-PDT* is provided with 2 self tapping mounting screws. The sensor typically mounts directly to the ceiling tile, or to the metallic grid. However, if desired, the mounting holes are slotted to line up with a standard round or rectangular box (screws not provided).

Note: The ceiling tile provides insulation from stray plenum noises. Only penetrate tile to allow for mounting screws and wires (3 small holes).

FIELD OF VIEW

The *CM-PDT's* dome lens provides a maximum viewing angle of 56° in a complete 360° conical pattern. The Microphonics™ detects normal human activity up to 20 feet, but will detect greater distances in spaces with hard floors or very quiet rooms with little or no background noise. Place the sensor along the entrance door wall to prevent it from viewing out into the hallway. Avoid locating the sensor near HVAC air diffusers because the "noise" generated from air flow will decrease the sensitivity of the Microphonics™ sensor.

SIDE VIEW



RELAY OPTION (-R)

GRAY / BROWN - Connected during Occupied state
VIOLET / BROWN - Connected during Unoccupied state
Note: Relay is energized during Unoccupied state

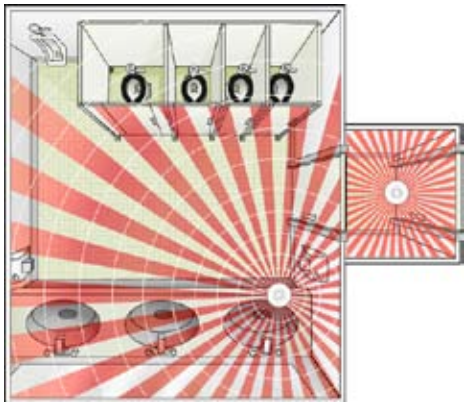
PHOTOCELL OPTION (-P)

BLUE - Photocell output (High: Occupied & Low Light)
Use Blue wire from sensor in place of White wire. For multi-level control, use 2 Power Packs and connect White to primary load and Blue to daylight load.

AUTOMATIC DIMMING CONTROL (-ADC)

VIOLET/WHITE striped - Connect to Violet wire from 0-10 VDC dimmable ballast. Also connect ballast Gray wire to sensor Black wire. **Note:** If both the -P and the -ADC options are selected the "Inhibit" mode of the -P option is not available.

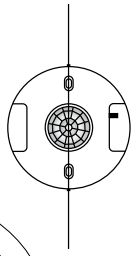
Multi-Stall Restroom w/Vestibule



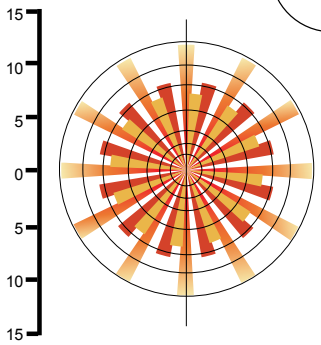
PIR used with PDT

- CM-9 PIR in vestibule initiating the light "On"
- Microphonics™ in CM-PDT is activated by the CM-9.
- CM-PDT detects occupants in stalls

Note: For maximum distance place the sensor so that the screw axis is positioned with the entrance axis.



TOP VIEW



WARRANTY: Sensor Switch, Inc. warrants these products to be free of defects in manufacture and workmanship for a period of sixty months. Sensor Switch, Inc., upon prompt notice of such defect will, at its option, provide a Returned Material Authorization number and a replacement product.

LIMITATIONS AND EXCLUSIONS: This Warranty is in full lieu of all other representation and expressed and implied warranties (including the implied warranties of merchantability and fitness for use) and under no circumstances shall Sensor Switch, Inc. be liable for any incidental or consequential property damages or losses.

sensorswitch
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120/277 VOLT POWER PACKS AND SLAVE PACKS

PP-20
PP-20-2P
SP-20
Plenum Rated

TYPICAL APPLICATIONS
- Used with Low Voltage Sensors
- Multiple Sensors
- Multiple Loads
- AC Switching Only

HIGHLIGHTS
- Dual Voltage Transformer
- Self-Contained Relay
- Patented Relay Circuit Protection (Tested to over 400,000 cycles)
- Powers up to 14 sensors

SPECIFICATIONS
- Size:(1/2" inch chase nipple not inc.)
  PP-20-2P: $4\frac{1}{8}$ x 3" x $1\frac{7}{8}$"
  PP-20 & SP-20: 3" x $2\frac{1}{4}$" x $1\frac{7}{8}$"
- Mounting: 1/2" inch chase nipple
- Operating Voltage: 120, 240, or 277 VAC (Single Phase only)
- Each Relay: 20 Amps
- 1 HP Motor Load
- Output Voltage: 15 VDC, 150 mA at 120 or 277 VAC
- Class II: 18 AWG, up to 2,000 ft.
- Plenum Rated
- Relative Humidity: 20 to 90% non-condensing
- Operating Temp: 14º to 160º F
- Storage Temp: -14º to 160º F
- UL and CUL Listed
- 5 Year Warranty
- Made in U.S.A.

LOW TEMP/HI HUMIDITY(-LT)
- Conformally Coated PCB
- Operates down to -40º F
- Corrosion resistant from moisture

PLENUM CONSIDERATIONS
Most local codes allow for small plastic controls in Return Air Plenums; *Some Do Not!* To meet local code, the Power Pack can be mounted inside an adjacent (Deep) junction box as shown below.

Power Packs are the heart of the Low Voltage Sensor System. The *PP-20* transforms 120, 240 or 277 Volts (single phase) to class II 15 VDC to power the remote sensors. Utilizing Patented Relay Circuit Protection the *PP-20* also switches the lighting load "On" and "Off": Tested to over 400,000 cycles at rated load! Although Plenum Rated, the elongated mounting nipple allows for the *PP-20* to be mounted either directly thru a 1/2" inch knockout in a junction box, or to be located inside an adjacent box for specific local code requirements. Up to 14 sensors may be connected to one *PP-20*. Multi-circuit control can be handled by multiple *PP-20's*, or 2-Pole Power Packs (*PP-20-2P*) and Slave Packs (*SP-20*) may be configured. *PP-20's* can be wired continuously hot (line side), or on the switch leg (load side) without nuisance delays upon turn "On".

LOW VOLTAGE OPERATION AND TEST
The Low Voltage Wires or Terminal is color coded Red (15 VDC), Black (Common), and White (Occupancy Signal). With no sensors connected, using a small wire, connect the Red terminal to the White. The lights should turn "On". Remove the connection and the lights should turn "Off". With the sensors connected, the Red and Black wires provide DC power to the remote sensors, and when there is occupancy detected, the White wire produces a 15 VDC signal from the sensor to the power pack initiating the lights to "On". Upon initial power up, the Sensors automatically send an "On" signal until the sensors have stabilized and "Timed Out".

SIZING OF THE SYSTEM - VARIOUS COMBINATIONS
Combining Power Packs provides for additional power to drive remote devices. Maximum numbers of remote sensors are shown below based on the Power Pack/Slave Pack being used. *Maximum number of "Relays" is 30.*

	Sensors	Sensors with Relay
1 PP-20	14	8
1 PP-20-2P	7	6
1 PP-20 w/SP-20	7	6
1 PP-20-2P w/SP-20	5	5
2 PP-20	28	16
2 PP-20-2P	14	12

Note 1: Only three relays may be controlled with one Power Pack. If more than three circuits are required, multiple Power Packs must be used.

Note 2: Only one "Sensor with Relay" is required in most cases. See Technical Datasheet on Low Voltage Sensors with -R Interface Option.

SYSTEMS CONSIDERATIONS
The local override switch may be upstream or downstream of a *PP-20*. However, if an *SP-20* Auxiliary Relay or a *PP-20-2P* controller is being used, the switch(es) should be downstream on the load side of the relay. If power is disconnected to the Power Pack all subsequent relays will open, turning off all of the loads. If wiring the local switches before the Power Pack and Slave Pack, use multiple *PP-20's*, one for each circuit. This will allow for one circuit to remain powered, keeping the system operational when the other is turned off. When controlling a dimming circuit, *PP-20* must be wired before dimmer, or *SP-20* may be wired after dimmer.

INTERFACING WITH ELECTRONIC CONTROL SYSTEMS
The Relay Switching System is designed to switch Alternating Currents Only. The relay will not switch DC signal inputs to EMS or Lighting Control Systems. Use model #MP-20, or "-R" for signal relay located in Low Voltage Sensor Heads.

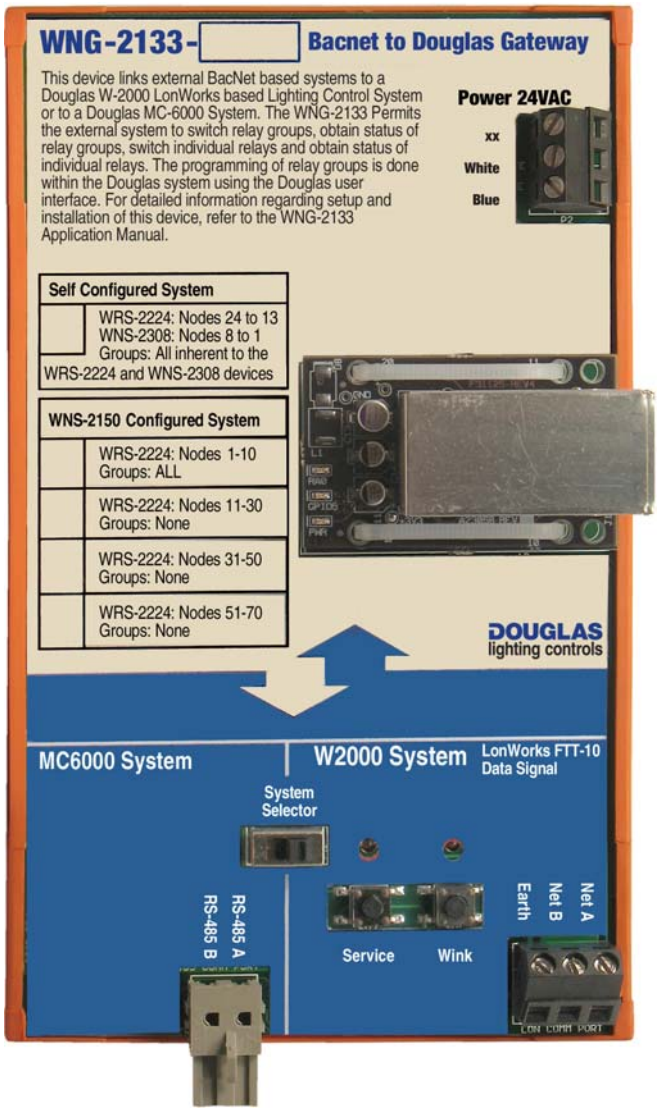
CATALOG INFORMATION

MODEL#	DESCRIPTION	OUTPUT VOLTAGE	OUTPUT CURRENT
PP-20	Power Pack with 20 Amp Relay	15 to 24 VDC	70 to 110 mA
PP-20-2P	Power Pack with two 20 Amp Relays	15 to 24 VDC	35 to 70 mA
SP-20	Slave Pack with 20 Amp Relay	N/A	40 mA (consumption)

**Add suffix -LT for Low Temp/Hi Humidity

WNG-2133

BACnet Gateway



Instruction Manual

DOUGLAS
lighting controls

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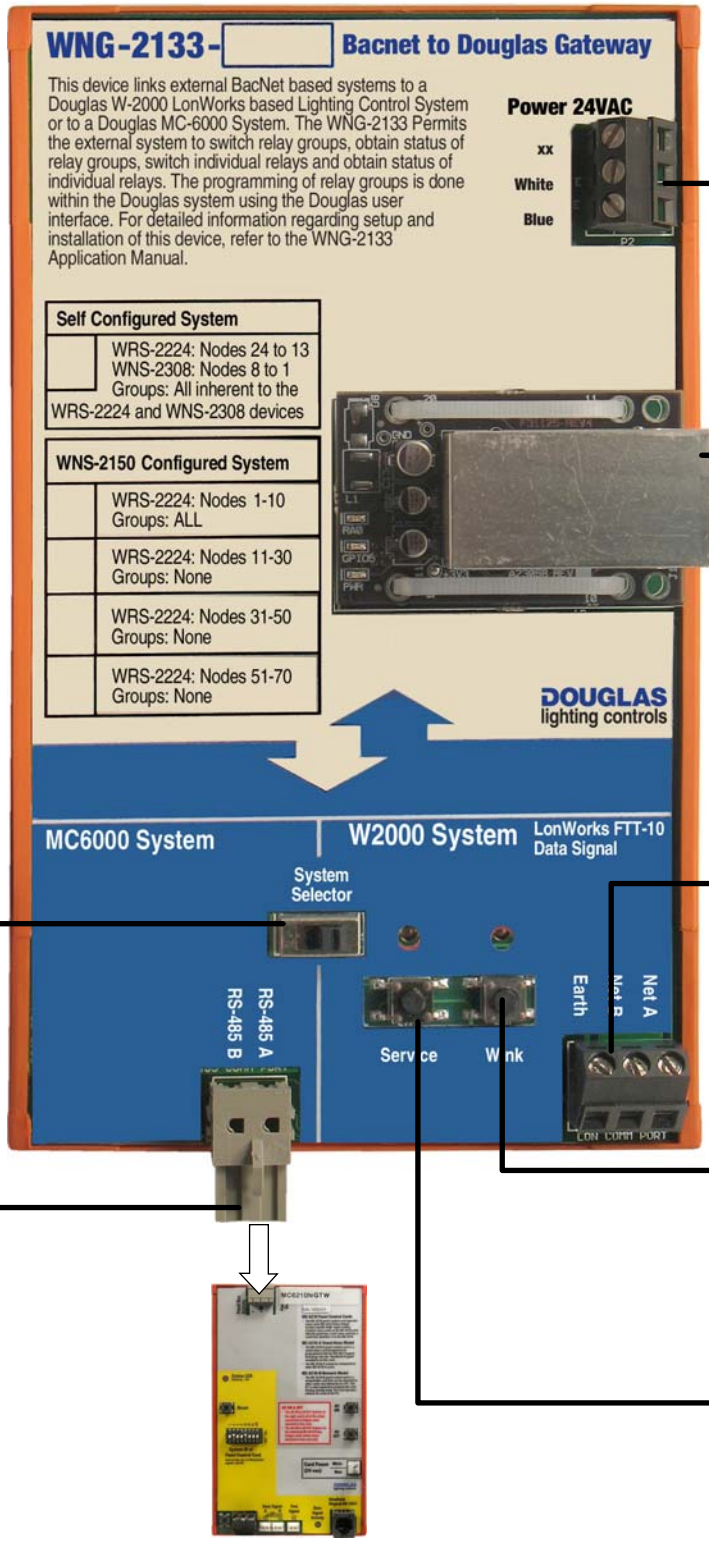
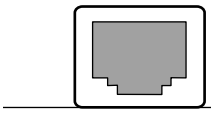
WNG-2133 Bacnet to Douglas System Gateway



24VAC Transformer Connections

BACnet Data Signal Connection

- IP from the external BACnet system.
- BACnet data signal cable is CAT-5e and plugs into the socket on the right side:



side view

Selector Switch, Douglas System

- Toggle to select type of Douglas System to be connected to BACnet network.
- Pushing switch to left selects MC-6000 system, pushing switch to right selects W-2000 system.

Data Signal Connection, Douglas W-2000 System

- FTT-10 (78kbs) data signal from the Douglas W-2000 LonWorks lighting control system, if used.
- Wiring type is twisted pair, unshielded, #16 AWG Belden.

Wink LED & Pin Douglas W-2000 System

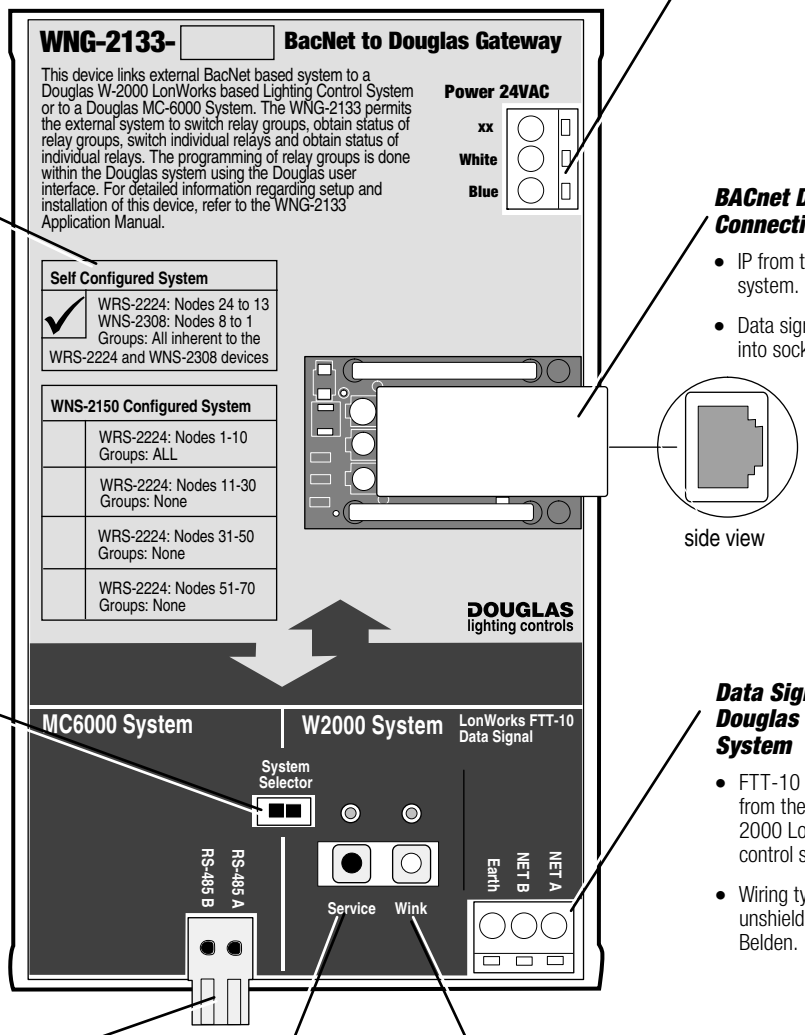
- Wink LED flashes, when prompted by network, to identify unit.
- Pressing the Wink pin disables the Wink LED.

Data Signal Connection, Douglas MC-6000 System

- RS-485 data signal from the Douglas W-2000 LonWorks lighting control system, if used.
- Socket plugs into a MC-6000 GTW Panel Control Card, which is equipped with a BACnet encoder.

Service LED & Pin Douglas W-2000 System

- Service LED flashes as diagnostic aid.
- Pressing the Service pin transmits WNG-2133 data to the W-2000 network.

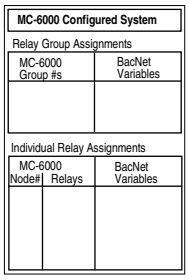


Power Connections

- 24VAC

Douglas System Identification Label

- Generally supplied at the factory.
- Other label, as shown below, can be supplied for a MC-6000 System.



BACnet Data Signal Connection

- IP from the external BACnet system.
- Data signal cable, which plugs into socket on side, is CAT-5e.

side view

Selector Switch, Douglas System

- Toggle to select type of Douglas system that is to be connected to the BACnet system.
- Pressing left side selects the MC-6000 System, pressing right side selects the W-2000 System.

Data Signal Connection, Douglas W-2000 System

- FTT-10 (78kbs) data signal from the the Douglas W-2000 LonWorks lighting control system, if used.
- Wiring type is twisted pair, unshielded, #16 AWG Belden.

Data Signal, Douglas MC-6000 System

- RS-485 data signal from the Douglas MC-6000 System, if used.
- Socket plugs into a MC-6210 Panel Control Card that has a BACnet encoder.

Service Pin & LED, Douglas W-2000 System

- The Service LED flashes as a diagnostic aid.
- Pressing the Service Pin transmits WNG-2133 data to a W-2000 network, if connected.

Wink Pin & LED, Douglas W-2000 System

- The Wink LEd flashes, when prompted by the W-2000 network, to identify unit.
- Pressing the Wlnk Pin disables the Wlnk LED.

Specifications: WNG-2133 BACnet Gateway

Power

- 24VAC / 100mA Class 2 Low Voltage devices.

Input

- Input is a BACnet/IP network signal.
- BACnet/IP connection medium is Ethernet.
- Communication format is native BACnet/IP.
- Follow the wiring specifications issued by the host BACnet system.

Outputs

- Data signals of either the Douglas MC-6000 Network or the Douglas W-2000 Network connect to the unit.
- Output connection from the Douglas Network is activated by setting the selector switch to that network connection.
- Douglas W-2000 Network is standard LonTalk Transceiver, FTT-10 (78kbs) type. Wiring type is twisted pair, unshielded, #16 AWG Beldon.
- Douglas MC-6000 Network is RS-485 Transceiver. Connection is a socket that plugs directly into an MC-6000 Panel Control Card that has a BACnet encoder.

Network Technology Specification

- Network signal: BACnet IP.

Programming

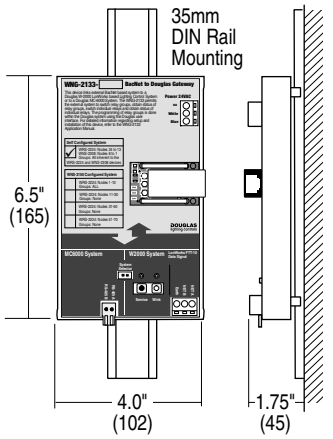
- Use Programming for groups and individual relays in the Douglas MC-6000 or W-2000 Network is done directly within the Douglas system interface.
- BACnet network is allowed up to 1000 points of control and status for the groups and relays within the Douglas System.

Environment

- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non-condensing humidity.
- Ambient operating temperature: 0^0 F to $+120^0$ F (-15^0 to $+50^0$ C).

Dimensions & Mounting

- Mount to 35mm DIN rail installed in relay panel.



INSTALLATION INSTRUCTIONS: PRE-ASSEMBLED DOUGLAS W-2000 SYSTEMS

In most cases, a Douglas BACnet-accessible W-2000 system is assembled panel-by-panel and initially configured at the factory.

For each panel in a pre-assembled system, it is necessary to install the panel, check the basic network settings, connect the switch inputs to the appropriate group inputs and connect the outputs to the appropriate relays.

After this is done for all the panels in the network, the panels are interconnected following the one-line diagram supplied with the system. If not previously done at the factory, outputs can be assigned to the group inputs of each relay scanner once the panels are interconnected.

1. Install the pre-assembled relay panels. Be sure that the panels are located closely enough together so that the network line length required to interconnect them does not exceed the specification called out in the *One-Line Diagram* page of the drawings supplied with the system.

2. Make sure the Douglas network select setting and connnections on the WNG-2133 BACnet Node are correct for a W-2000 System.

3. In each panel, connect the lighting loads to the output relays of the scanner. You should make note of which load is connected to each relay in the relay schedule for each panel.

4. In each panel, connect the group switching devices (switch or timer) to the scanner group inputs. If you are connecting 24V switching devices other than a default Douglas switch or time clock, you will have to first configure their inputs. Use the keyboard on the scanner, as detailed in the '*Scanner Input Configuration*' section on page 7 of this manual.

5. A maximum of 6 switching devices can be connected in parallel to the same master input, with a maximum wire length of 2000'/600m if using 18 AWG wire.

6. Interconnect the WNX-2624 Network Nodes with the data signal wire (shielded twisted pair in a single loop). Be sure to connect them in the exact order shown in the *One-Line Diagram* in the drawings supplied with the system.

7. Power the system up. LEDs will flash briefly on the scanners and nodes. Make sure that the Digital Link LED is ON on each scanner. If not, check the connnections and the node settings.

8. Determine which output relays are to be switched together as groups. Different output relays from any scanners in the network can be grouped together to be switched by the same group input. An output relay can also be in more than one group.

9. (SELF-CONFIGURED SYSTEMS)

   Use the keypad on each scanner to assign the output relays to each group input:

   a) Go to the scanner with the group input to be programmed and select that input by toggling the scanner's INPUT SELECT BUTTON.

   b) Press the scanner's PROGRAM MODE BUTTON. This places the entire network in Program mode. The Output LED for any output, on any scanner, that is controlled by the input will be lit.

   c) Add or remove an output relay on any scanner from the input by toggling its OUTPUT BUTTON.

   d) Press the NORMAL MODE BUTTON on the input's scanner to exit the network from Program mode.

   e) Repeat steps (a-d) for other inputs.

9. (WNP-2150-CONFIGURED SYSTEMS)

   Use the browser interface of the WNP-2150 Network Manager to assign the output relays to each group input:

   a) Connect computer with Internet Browser to WNP-2150 following directions on label. Enter WNP-2150's IP address in browser's address field to display Lighting Scheduling software.

   b) List relay groups using the GROUPS/NEW Submenu.

   c) Assign relays to groups using GROUPS/PROGRAM RELAYS Submenu. Go panel-by panel untill all relays have been added to all of the groups.

   d) Assign groups to inputs using GROUPS/PROGRAM INPUTS Submenu. For each input, also assign the action triggered and hardware type.

   e) Repeat steps (a-d) for other inputs.

INSTALLATION INSTRUCTIONS: PRE-ASSEMBLED DOUGLAS MC-6000 SYSTEMS

In most cases, a Douglas BACnet-accessible MC-6000 system is assembled panel-by-panel and initially configured at the factory.

For each panel in a pre-assembled system, it is necessary to install the panel, check the basic network settings, connect the switch inputs to the appropriate group inputs and connect the outputs to the appropriate relays.

After this is done for all the panels in the network, the panels are interconnected following the one-line diagram supplied with the system. If not previously done at the factory, outputs can be assigned to the group inputs of each relay scanner once the panels are interconnected.

1. Install the pre-assembled relay panels. Be sure that the panels are located closely enough together so that the network line length required to interconnect them does not exceed the specification called out in the *One-Line Diagram* page of the drawings supplied with the system.

2. Make sure the Douglas network select setting and connnections on the WNG-2133 BACnet Node are correct for a MC-6000 System.

3. In each panel, connect the lighting loads to the output relays of the output card. You should make note of which load is connected to each relay in the relay schedule for each panel.

4. In each panel, connect the group switching devices (switch or timer) to the input cards. If you are connecting 24V switching devices other than a default Douglas switch or time clock, you will have to first configure their inputs. Refer to the MC-6000 Programming Module Manual for details.

5. A maximum of 4 switching devices can be connected in parallel to the same master input, with a maximum wire length of 2000'/600m if using 18 AWG wire.

6. Interconnect the MC-6210N-CPU cards with the data signal wire. Be sure to connect them in the exact order shown in the *One-Line Diagram* in the drawings supplied with the system.

7. Power the system up. LEDs will flash briefly on the WNG-2133 device and then begin blinking to indicate OK status.

8. Determine which output relays are to be switched together as groups. Different output relays from any panels in the network can be grouped together to be switched by the same group input or network device. An output relay can also be in more than one group.

9. All programming and configuration of the system is implemented via the RS-485 dataline through a front-end PC.

   To configure the MC-6000 software:

   1. Change the shortcut by adding *-w1* after the executable file in the *Target*.
   2. Open the software with the BT files for the project.
   3. Go to: *Config/Remotes*.
   4. Create remote number *252*, name *252 Gateway*
   5. 0 for all components.
   6. Set all the address DIP switches to the down postion on the MC-6210N device.
   7. Go to: *Groups\Supergroups*.
   8. Create a supergroup *SNVTScene001* and add groups as required.
   9. Go to: *Misc\Online*.
   10. Click *Interface*, then select *252 Gateway*.
   11. Download, plus download to all panels afterwards.

Setting the IP Address

Table 1: Valid IP/Subnet Mask Ranges

Class	Range of first octet	Subnet mask
A	0 - 127 (e.g. 125.10.4.1)	255.xxx.xxx.xxx
B	128 - 191 (e.g. 159.10.4.1)	255.255.xxx.xxx
C	192 - 223 (e.g. 192.10.4.1	255.255.255.xxx

When configuring the IP address, please ensure that the IP address and Subnet mask are within the same class.

You will require the configuration software, *Ruinet*. Please contact technical support to obtain a link.

1. Configure your PC IP address to communicate with *192.168.10.11 / 255.255.255.0*
2. Connect the crossover cable.
3. Start *Ruinet*. The device should show up on the screen.
4. Change the *Subnet Mask*. Wait for the device to accept the change and the screen is accessible again.
5. Change the *IP Address*. Wait for the device to accept the change and the screen is accessible again.
6. Change the *Gateway*. Wait for the device to accept the change and the screen is accessible again.
7. Reboot the device.
8. Close *Ruinet*.
9. Configure your PC IP address to communicate with the new IP Address and the new Subnet Mask. Make sure the IP Address of the PC is the Gateway entered into the WNG-2133.
10. Start *Ruinet*. The device should show up and be brought up to the screen.

Recovering for Bad IP Address Setting (May not be recoverable).

If in error, the WNG-2133 may revert back to a default IP address and go into Broadcast mode.

To correct this:

1. Set your PCs address to:
   -IP Address: 192.168.1.1
   -Subnet Mask: 255.255.255.0
2. Start *Ruinet*.
3. The device should show up on to the screen. If it does not, you should use the *Wireshark* procedure as described below.

To use the freeware *Wireshark* program:

1`

2. Start *Wireshark* and initiate a capture.
3. Start *Ruinet*.
4. In *Wireshark* you will see packets coming from your Laptop's IP address and the lost WNG-2133.

Douglas Network Groups Status and Control

The WNG-2133 BACnet Gateway is a BACnet device that is used to simplify and streamline the inclusion of a Douglas Lighting Controls network into a larger BACnet network. The WNG-2133 is designed to work with the main Douglas network configurations, LonWorks and MC-6000. The WNG-2133 BACnet Gateway will simplify several of the otherwise awkward, although standard, data representations on a Lonworks system.

It will also isolate the Lighting subnet, effectively relieving the burden of lighting configuration from the integrator, allowing the 'user friendly' Douglas configuration tools to setup and bind the lighting portion of the network.

Group Status and Control

The WNG-2133 employs a FTT-10 and a RS-485 communication chip programmed to pass data to a Field Server Protocessor BACnet IP interface. Each processor has its own independent transceiver port for network communications to either the W-2000 system or the MC-6000 system. The BACnet IP interface will connect to the integrator toolset, while side B will connect to and monitor the lighting subnet using standard self-configuring routines.

Relay status will be made available for WNX-2624, WSP-2718, or MC-6210 devices. This “smart” status will consist of an ANALOG value per relay represented. **0=Not Connected, 1=On, 2=Off, 3=Error**. Relay status will be updated to the integrator whenever the gateway detects a change of relay state for a given device.

Relay activation is via a simple ANALOG value per relay represented. **0=Off, 1=On**.

Group Status will be made available for the system as a whole. This is via a simple BINARY POINT value per group represented. **0=Off, 1=On**.

Group Control is via a “smart” ANALOG value per group represented. When used with a MC-6000 System, **3=Off, 4=On**. With the W-2000 it has the full functionality of the LonWorks *SNVT_Scene*. The values entered into the value will operate the following functions:

	Name	Description
3	SC_GROUP_OFF	Network group OFF.
4	SC_GROUP_ON	Network group ON.
9	SC_FLICK	Relays are flicked as soon as this command is sent to warn occupant of an impending OFF sweep. After the flick warn is issued the tenant has 5 minutes to turn the relay OFF and back ON to exclude their light from the OFF sweep.
10	SC_TIMEOUT	The relays are set to Timeout mode. When the timeout period expires (default 2 Hours) the relays will go OFF without any warning. Relays will stay in Timeout mode until an SC_ENABLE_GROUP is issued.
11	SC_TIMEOUT_FLICK	Same as SC_TIMEOUT except relays are flicked 5 minutes before impending OFF sweep to warn the occupant. After the flick warn is issued the tenant has 5 minutes to turn the relay OFF and back ON to exclude their light from the OFF sweep. Relays will stay in Timeout mode until an SC_ENABLE_GROUP is issued.
12	SC_DELAYOFF	Relays are OFF after a timed period (Default delay time = 15 minutes).
13	SC_DELAYOFF_FLICK	Relays are OFF after a timed period (Default delay time = 15 minutes) with Flick Warn.
14	SC_DELAYON	Relays are ON after a timed period (Default delay time = 15 minutes).
15	SC_ENABLE_GROUP	Enable the group for network commands. This is also used to stop relays from Timeout mode.
16	SC_DISABLE_GROUP	Disable the group for network commands. Relays will be masked from all Network commands. Relays will stay in Disable mode until an SC_ENABLE_GROUP is issued.
17	SC_CLEANON	Cleaning mode, where relays turn ON then return to original state when manual OFF signal received, is activated.
18	SC_CLEANOFF	Cleaning mode is disabled.
19	SC_WINK	All group relays turn ON, then back to OFF after a delay period called 'wink'.

BACNET Control Points

The WNG-2133 BACnet Gateway has 1000 control points. Extensive lighting control networks may require more, due to the vast amount of data required to represent as many as to 255 groups overall and 72 points per panel. To overcome this constraint, multiple WNG-2133 Gateways of complementary configurations can be used. The best distribution of points is to group relays together by node. This would be done by bit-mapping each relay to an existing data structure.

WNG-2133 Profile Listing

Multiple WNG-2133's can be utilized within a system. Each profile has been created to maximize the 1000 points available.

BACnet to LonWorks Self-configured System

Self-configured systems up to 12 scanners:
Use one WNG-2133 Gateway.

Self-configured systems with more than12 scanners:
Use two WNG-2133 Gateways, *WNG-2133-NP1-10G & WNG-2133-NP11-30*.

BACnet to LonWorks WNG-2150 System

WNG-2133-NP1-10G - BASE UNIT:
Controls 10 scanners 1-10 PLUS all groups.

WNG-2133-NP11-30:
Controls 20 scanners 11-30 (Needs WNG-2133-NP1-10G).

WNG-2133-NP31-50:
Controls 20 scanners 31-50 (Needs WNG-2133-NP1-10G).

WNG-2133-NP51-70:
Controls 20 scanners 51-70 (Needs WNG-2133-NP1-10G).

BACnet to MC-6000 System

WNG-2133-MC05-11:
CPU5-11, Grp0-52, MC-6210 incl.

WNG-2133-MC12-18:
CPU12-18, Grp 53-104, MC-6210 incl.

WNG-2133-MC19-25:
CPU19-25, Grp 105-156, MC-6210 incl.

WNG-2133-MC-G500:
Grp 1-500 ONLY, MC-6210 incl.

Changing the BACnet Node ID: Uploading, Editing and Downloading the config.csv File

To upload the config.csv File from the WNG-2133 to your PC

1. From the main menu select <*U*> to go to the upload screen.
2. Begin the uploading by selecting <*U*> .

To edit the config.csv File on your PC

1. Locate the files where the Ruinet.exe executable resides.
2. Select and launch the NOTEPAD program to edit the file. (Using any other program may corrupt the file).
3. Within the *config.csv* file, locate the *Server Side Connections - BACnet IP* area . Adjust the number under the *Node_ID* line. This should appear as shown below:

```
//==================================
//
//  Server Side Connections -BACnet IP
//

Nodes
Node_Name, Node_ID, Protocol
WNG-2133_GTW1,11, BACnet_IP
//==================================
```

To download the edited File to the WNG-2133

1. From the main menu select <*D*> to go to the download screen.
2. Begin the download by selecting <*D*>.

BBMD: BACnet/IP Broadcast Management Device

The BACnet system relies on the use of broadcast messages. Routers join IP networks together so messages from one network can be sent to another. However, most routers do not forward broadcast messages and the BACnet signals do not get passed correctly.

To solve this problem BACnet provides a technology called BBMD which means **BACnet/IP Broadcast Management Device**.

BACnet/IP requires that a BBMD be defined on every subnet for cross-router communications. The WNG-2133 can act as a BBMD for the subnet that it resides on, while another BBMD must reside on the other subnet to pass the information forward. Setting the *Connection_Type* to *BBMD* will enable this functionality on the WNG-2133. Note that BBMD operation is not required if there is already another BBMD on the network.

The WNG-2133 supports the method of updating its internal broadcast distribution table to create BBMDs.

Two steps are needed:

1. Creating *a custom "bdt.ini*" file and downloading it to the WNG-2133
2. Uploading the *config.csv* file to the PC, editing the *config.csv* file then downloading it to the WNG-2133

1. Creating and Downloading the bdt.ini File

The Broadcast Distribution Table can be configured using the *bdt.ini* file. The *bdt.ini* file must be created and downloaded to the WNG-2133 using the Ruinet *Download Configuration* command. This example shows the WNG-2133 as IP *10.33.12.23* and the BBMD on the other subnet as IP *10.33.11.21*:

```
//=====================================
//                  bdt.ini
//
//  FST Customer  :  Douglas Lighting
//  Configured By   : CBR
//
//   Copyright (c) 2000-2002 WNG-2133 Technologies
//
//   BBMD ip_address BBMD port BBMD subnet Mask
//
10.33.12.23, 47808, 255.255.255.0
10.33.11.21, 47808, 255.255.255.0
//=====================================
```

To download the bdt.ini File to the WNG-2133

1. From the main menu select <*D*> to go to the download screen.
2. Use the <*O*> key to enable the downloading of 'other' files. When enabled you can download files other than *.csv* to the WNG-2133. Exercise caution with this option.
3. Specify the local file name by selecting <*L*>, then type the path and file name and press <*Enter*>.
4. If the remote filename is incorrect, select <*R*>, then type the file name and press <*Enter*>.
5. Begin the download by selecting <*D*>.

2. Uploading, Editing and Downloading the config.csv File

To upload the config.csv File from the WNG-2133 to your PC

1. From the main menu select <*U*> to go to the upload screen.
2. Begin the uploading by selecting <*U*> .

To edit the config.csv File on your PC

1. Locate the files where the *Ruinet.exe* executable resides.
2. Select and launch the *NOTEPAD* program to edit the file. (Using any other program may corrupt the file).
3. Within the *config.csv* file, locate the *Server Side Connections - BACnet IP* area. Append the *,Connection_Type,IP_Port* to the first line and ,BBMD,47808 to the next line. This should appear as shown below:

```
//=====================================
//
//  Server Side Connections -BACnet IP
//

Connections
Adapter, Protocol, Connection_Type,IP_Port
N1, BACnet_IP ,BBMD,47808
//=====================================
```

To download the edited File to the WNG-2133

1. From the main menu select <*D*> to go to the download screen.
2. Begin the download by selecting <*D*>.

General Guidelines:

- Make sure that 24V power exists in all panels (always measure between 22VAC and 30VAC);
- Make sure that data signal is connected to all Nodes;
- Make sure all inputs and outputs are tightly connected and inputs are configured properly;
- Make sure all relay groups are programmed correctly;
- Make sure the *Net Manager Select* switch is ON only for the Network Manager Node.

Problem Encountered	Possible Cause(s)	Corrective Action
Flashing Output LED(s) during NORMAL mode	Defective output relay.	- replace relay.
	2 relays connected to same output with one relay ON and the other OFF.	- reset relays to both ON or both OFF.
	External AC current leaking into circuit.	- check wiring for shorts or grounding.
Output relay(s) not tripping properly	Improper input voltage (must be between 22VAC and 30VAC).	- check input configuration. - check input switching device(s) and connections. - check power source.
	Input(s) not configured when non-default input device(s) or output function(s) used.	- configure input(s) per instructions on pages 7-8.
	Relay(s) also part of another input group with contradictory input signals.	- remove relay(s) from other group.
	Relay(s) not included in input group.	- check programming, re-program if necessary.
	Too many relays connected to one output.	- make sure there are 4 relays maximum per output.
FLICK WARN not working	FLICK WARN not properly programmed.	- check programming, re-program if necessary.
	HID lighting used in FLICK WARN group.	- use circuits with non-HID lighting.
TIME OUT not working	Inappropriate input switching device used.	- make sure input is only ON during TIME OUT period. - use timer as input instead of switch.
	Relay group not programmed properly.	- check programming, re-program if necessary.
	TIME OUT assigned to more than one group.	- assign TIME OUT only to one all-inclusive group.
Service LED flashing once every second	Node is unconfigured.	- (if Network Manager node) turn off node, designate another node as Network Manager and re-configure network. - (if not Network Manager node) restart panel, and Network Manager will automatically configure node and assign inputs to outputs as necessary.

W-2000 Network Troubleshooting Guide

General Guidelines:

- Make sure that 24V power exists in all panels (always measure between 22VAC and 30VAC);
- Make sure that data signal is connected to all Nodes;
- Make sure all inputs and outputs are tightly connected and inputs are configured properly;
- Make sure all relay groups are programmed correctly;
- Make sure the *Net Manager Select* switch is ON only for the Network Manager Node.

Problem Encountered	Possible Cause(s)	Corrective Action
Service LED flashing ON for 3 seconds, OFF for 1 second, repeatedly	Device is corrupt.	- replace node.
LEDs on, switch not giving ON/OFF status	Faulty wiring.	- check wiring.
	Incorrect hardware configuration for switch input.	- re-configure input to correct hardware type, per instructions on page 10.
Outputs responding erratically to switch input	Incorrect software configuration for switch input.	- re-configure input to correct software type, per instructions on page 8.
LEDs on, switch giving ON/OFF status but outputs not responding	Output relays not programmed properly.	- check programming, re-program if necessary.
	Faulty wiring.	- use Override buttons to check (If all relays respond to ON override & OFF override, wiring is OK.) Otherwise, check wiring.
Scanner LEDs all OFF	Scanner not receiving power.	- check 24VAC power.
	Scanner corrupt.	- replace scanner, re-program as necessary.

MC-6000 Network Troubleshooting Guide

Appendix A - Input/Output Log (copy this page for other panels used)

Panel _____ ***Node ID#***_____ Date _____

Input	***Input Switches***		***Output Relays*** *(numbered by panel # / output#)*			
	Type	***Remarks***	***#***	***Remarks***	***#***	***Remarks***
1.						
2.						
3.						
4.						
5.						

Additional Remarks: _____

Appendix A - Input/Output Log (copy this page for other panels used)

Panel _____ ***Node ID#***_____ Date _____

Input	***Input Switches***		***Output Relays*** *(numbered by panel # / output#)*			
	Type	***Remarks***	***#***	***Remarks***	***#***	***Remarks***
1.						
2.						
3.						
4.						
5.						

Additional Remarks: _____

Notes

Notes

WARRANTY

DOUGLAS products are warranted for one year from the date of purchase by the consumer against defects due to materials and the company's worksmanship only. The sole obligation hereunder shall be to repair, or at the company's option to replace, products as aforesaid, provided same are returned, upon authorization, 'Transportation Prepaid' to the company's Burnaby, CANADA office within the said period. Defects or failures due to improper or careless installation, storage or handling, or usage other than rated conditions, are specifically excluded from this warranty. No liability is accepted for return transportation charges following repair or replacement as aforesaid or for reinstallation costs. No other liability of any nature or kind, whether arising out of or from the use of the product, whether or not defective, is assumed.

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2.4 IESS-VISCOM

XR100/XR500
USER GUIDE

Silencing an Alarm

When the alarm bell or siren is sounding, enter your user code or present your card to a keypad or reader during the Status List display.

All/Perimeter, Home/Sleep/Away, or Home/Sleep/Away with Guest System

CANCEL VERIFY or IS THIS A FALSE ALARM? displays.

- If a burglar alarm is valid, press VERIFY or NO to send a verification message to the Central Station.
- If a valid alarm has not occurred, press CANCEL or YES to cancel the alarm and send an Abort or Cancel message to the Central Station and the security system will be disarmed.

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Security Command User Guide
for XR500/XR100 Series Command Processor™ Panels
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Introduction

XR500 and XR100 Security Command™ Systems

This Guide covers operation of the XR500 Series and the XR100 Series Security Command™ system.

About Your Security System

The system has been designed with your safety and comfort in mind. It uses the latest in computer based technology to create the most advanced, user friendly security, fire, and access control system available.

The system combines ease of use with a simple to understand DMP keypad to offer the full range of features requested by today's security system owners.

Use the system to turn portions of your protection on or off by pressing a few keys, or have the system turn on or off automatically by entering a simple schedule. You can add, delete, and change personal user codes at any time or check the status of protection devices in the system.

Parts of the System

There are two main parts to the security system, the keypad and the keypad User Menu.

LCD Keypad

This is the device we have placed at certain locations throughout the premises that allow you to turn the system protection on and off using your personal user code.

Keypad User Menu

The keypad provides a simple User Menu containing all of the functions you need to fully operate your system such as changing the time of day or a personal user code.

A Note About False Alarms

One of the most important concerns facing the security industry today is false alarms. The accidental dispatching of police and fire agencies places others in jeopardy by limiting the response capability of those emergency service units.

As part of our commitment to reducing false alarms, we would like to encourage you to read this guide thoroughly. All the information contained here can help you quickly, and comfortably, learn the Security Command™ system operation. If you have any additional questions, or feel that you need more training, please do not hesitate to contact your alarm dealer.

Note: There may be a 30-second alarm communication delay pre-programmed at installation to allow disarming if a false alarm occurs. This delay is optional and can be removed or increased to 45 seconds by your alarm dealer.

Test Your System Weekly

It is recommended that you test the burglary portion of your system at least once each week. Testing should involve an active test of all doors, windows, and motion detectors connected to your system. If your system also has fire protection, call the service department to find out how this portion of your system should be tested.

Refer to the System Test section of this guide for instructions on testing the burglary portion of your system and refer to the Fire Drill section for instructions on testing your system fire bells.

Emergency Evacuation Plans

The National Fire Protection Association recommends that you establish an emergency evacuation plan to safeguard lives in the event of a fire or other emergency.

Draw a Floor Plan of Your Home or Business

On a clean sheet of paper, draw the walls, windows, doors, and stairs. Also draw any obstacles that a person may encounter while exiting the building such as large furniture or appliances.

Develop Escape Routes

Determine at least two routes the occupants in each room can take to safely escape. One route can be the most obvious such as the door. Another can be through a window that can be easily opened. If the window is high off the ground, an escape ladder should be provided.

Draw arrows on the floor plan to show escape routes from each room.

Decide Where to Meet

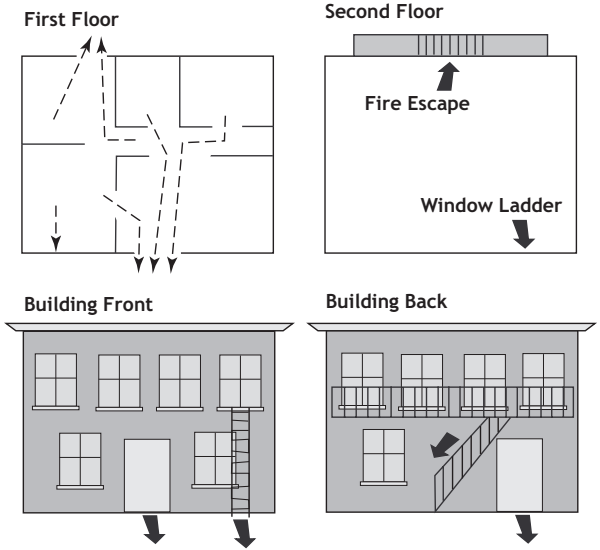
Prearrange a meeting place outside and away from where emergency personnel are likely to be working. A neighbor's house or across the street in front of the house are good locations. Always perform a head count to make sure all occupants safely exited. NEVER ENTER A BURNING BUILDING. If the head count shows one or more persons missing, give this information immediately to the authorities. Never enter a building to look for someone.

Practice Your Escape Plans

Devising an escape plan is only the beginning. For the plan to be effective everyone should practice escape routes from each room.

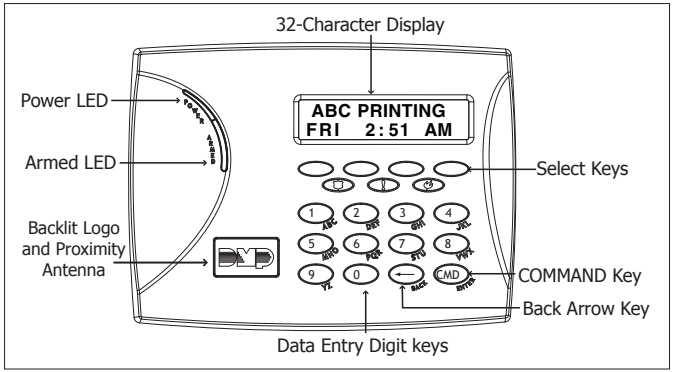
Early Detection

The best way to survive a fire or other emergency is to get out early. The installation of a fire alarm system, with smoke and carbon monoxide detectors in each room, can greatly decrease your risk of loss or injury.

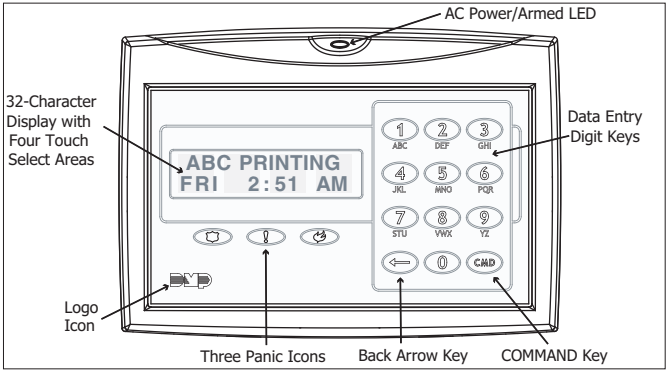


DMP Keypads

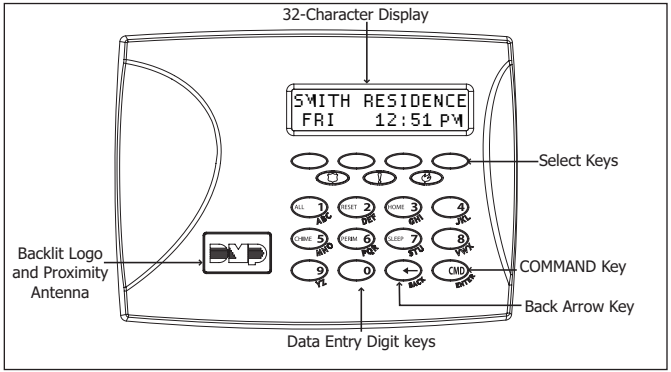
Your system may have one or more easy to use LCD keypads that allow you to properly operate the system.



Thinline™/Aqualite™ Keypad



Clear Touch™ Keypad



Thinline™ Wireless Keypad

The Select keys

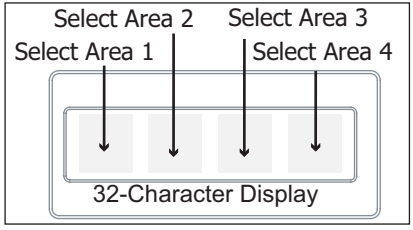
Thinline™, Aqualite™ and Wireless Keypads:

There are four keys under the display called the Select keys. These keys are one of the features that make your system so easy to operate. They allow you to make selections by pressing the Select key under a choice shown in the display.

Note: For the purposes of this guide, when instructed to press the first Select key, press the far left Select key; the second Select key is the second from the left; third Select key is second from the right; and the fourth Select key is the far right key.

Clear Touch™ Keypads:

There are four Select Areas in the display. These Select Areas are one of the features that make your system so easy to operate. They allow you to make selections by touching the area to choose the item in the display.



Clear Touch Select Areas

Note: For the purposes of this guide when using Clear Touch™ Keypads, when instructed to press the first Select key, touch Select Area 1; the second Select key touch Select Area 2; third Select key touch Select Area 3; and the fourth Select key touch Select Area 4.

Power/Armed LED

Thinline™ and Aqualite™ Keypads:

The Power LED indicates the panel Power status. It is recommended you contact the service department when the Power LED is off or blinks.

LED Operation	AC	Battery
ON (Steady)	OK	OK
OFF	Trouble	N/A
BLINKS	OK	Trouble

The Armed LED is ON steady anytime any burglary protection area is armed and is OFF when ALL areas are disarmed.

Clear Touch™ Keypads:

The LED indicates the Power and Armed status of the panel. Depending on the operation, the LED displays in Red or Blue as listed in the table.

Color and Activity	LED Operation
Blue Steady	Panel Disarmed, AC Power OK, Battery OK
Blue Blinking	Panel Disarmed, AC Power OK, Battery Fault
No Light	Panel Disarmed, AC Power Fault, Battery OK
Red Steady	Panel Armed, AC Power OK, Battery OK
Red/Blue Alternate	Panel Armed, AC Power OK, Battery Fault
Red Blinking	Panel Armed, AC Power Fault, Battery OK

Power/Armed Logo

Thinline™ Wireless Keypads:

The backlit logo on the keypad indicates the panel armed status and the keypad power status. Depending on the operation, the logo displays Red or Green as listed in the table.

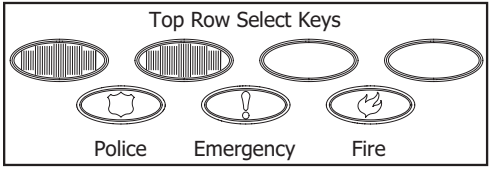
Color and Activity	Armed Status	Keypad Power Status
Green Steady	Panel Disarmed	AC Power OK, Battery OK
Green Blinking	Panel Disarmed	AC Power OK, Battery Fault
No Light	Panel Disarmed	AC Power Fault, Battery OK
Red Steady	Panel Armed	AC Power OK, Battery OK
Red/Green Alternate	Panel Armed	AC Power OK, Battery Fault
Red Blinking	Panel Armed	AC Power Fault, Battery OK

Panic Functions

Your keypad may be set up to send a Panic, Emergency, or Fire report to the central station. This function is optional. If this option is programmed for your keypad, icons display below the top row Select keys/areas.

Thinline™, Aqualite™ and Wireless Keypads:

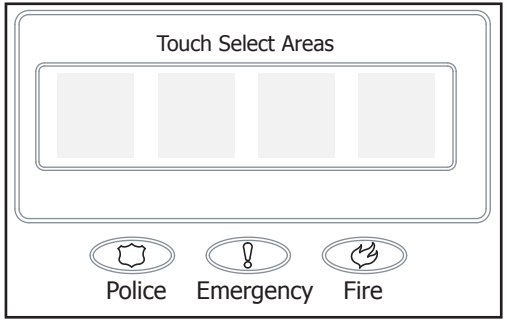
Press and hold the two Select keys adjacent to the desired icon for 2 seconds, until a beep from the keypad is heard.



Thinline™/Aqualite™/Thinline™ Icon Keypad Panic Keys With Shaded Buttons To Indicate Police Panic Keys

Clear Touch™ Keypads:

Touch the icon for 2 seconds until a beep is heard.



Clear Touch™ Keypad Panic Icons

7/0 Panic Function

Thinline™ and Aqualite™ Keypads:

Thinline™ and Aqualite™ Keypads may also be programmed at installation to allow the user to initiate an optional Panic alarm by simultaneously pressing and holding the 7 and 0 (zero) keys. When the 7 and 0 keys are pressed for a short time, the keypad sends a Panic alarm report to the central station.

Note: The 7/0 Panic Function is not available on Clear Touch™ or Thinline™ Icon or Wireless keypads.

Common Keys on All Keypads

Data Entry Digit keys

These keys allow you to enter your user code when arming or disarming or enter other information into the system.

COMMAND (CMD) key

The COMMAND key allows you to advance through the keypad displays, User Menu, or complete a data entry function.

Back Arrow (<—) key

The Back Arrow (<—) key is used to go back through the keypad displays while operating your system. You can press the Back Arrow key to back up through the list of functions in the User Menu or to erase the last character you entered.

Using the Keypad

Multi-lingual Display Option

Your system may be programmed to display the User Menu and Status Display text in multiple languages. When the COMMAND key is pressed, the option to choose the language displays. Select the language you want to use. The language chosen continues to display at this keypad until another language is chosen.

Keypad Displays Current Programming

Most User Menu options displayed at the keypad show the currently selected option in the panel memory. These options are either shown as a number, a blank, or a **NO** or **YES**. To change a number press any top row Select key. The current option is replaced with a dash. Press the number(s) on the keypad you want to enter as the new number for that option.

It is not necessary to enter numbers with leading zeros. The panel automatically right justifies when you press the COMMAND key. To change an option that requires a **NO** or **YES** response, press the top row Select key for the response not selected. For example, if the current option is **YES** and you want to change it to **NO**, press the third Select key. The display changes to **NO**. Press the COMMAND key to go to the next option.

Multiple Displays (XR500 System Only)

For some User Menu options, such as **Access Areas** under **User Profiles** there are several displays containing lists. For example, when using **Access Areas,** areas 1 through 32 display on four separate displays. First, areas 1 through 8 display. Press the COMMAND key to display areas 9 through 16. Press the COMMAND key again to display areas 17 through 25. Press the COMMAND key one more time to display areas 26 through 32.

Note: Only areas pre-programmed at installation can be viewed.

Asterisks in Area Armed Displays

Asterisks display next to a programming option that is already selected. As shown in the example, options that are selected to display the current programming selection have an asterisk next to the number. Those that are not selected simply display the number. In the Areas example, areas 3, 8, 9, 15, 19, 23, 25, and 31 are not selected. The area numbers with asterisks are selected.

Areas

*1	*2	3	*4	*17	*18	19	*20
*5	*6	*7	8	*21	*22	23	*24
9	*10	*11	*12	25	*26	*27	*28
*13	*14	15	*16	*29	*30	31	*32

To select or deselect a number, simply enter the number using the digit keys on the keypad. This same scheme is used when viewing the panel armed status and other programming and operational functions. Remember to press the COMMAND key to display the rest of the area numbers on XR500 systems.

Note: XR100 Systems support 8 areas.

32-Character Name Display

Your system may be programmed to display up to 32-character names. When a name is displayed at the keypad, the top line of the display shows the first 16 characters. If a name is longer than 16 characters, after two seconds the display automatically scrolls to display the remaining characters.

If displayed as part of the Status List, the entire 32-character name is displayed for four seconds followed by the number and status.

Keypad User Options

The User Options allow you to make adjustments to your keypad to best fit your environment and needs.

Thinline™, Aqualite™ and Wireless keypads: Press and hold the Back Arrow and COMMAND keys for two seconds. The keypad display changes to SET BRIGHTNESS. Press the COMMAND key to display the next option or the Back Arrow key to exit.

Clear Touch™ keypads: Touch and hold the center of the logo icon for two seconds. The display changes to SET BRIGHTNESS. Touch the COMMAND (CMD) key to display the next option or touch the Back Arrow (<—) to exit the User Options function.

Backlighting Brightness

At the SET BRIGHTNESS display, use the left Select key to lower the keypad brightness. Use the right Select key to increase the brightness.

Note: If the brightness level is lowered, it temporarily reverts back to maximum intensity whenever a key is pressed.

On Thinline™ or Aqualite™ keypads: This sets the LCD display, AC LED, and the Green keyboard backlighting brightness level.

On Clear Touch™ keypads: The user selected brightness may be set to off which allows the glass graphic display to turn off (clear glass). Simply touch the glass anywhere and the backlight illuminates for data entry. When the speaker is sounding, the backlight illuminates at one-half (1/2) brightness.

On Wireless keypads: This sets the LCD display, keyboard, and logo backlighting brightness level.

Internal Speaker Tone

Set the tone of the keypad internal speaker. At the SET TONE display, use the top left Select key to make the tone lower. Use the right Select key to make the tone higher.

Volume level

Set the volume level of the keypad internal speaker for key presses. During alarm, trouble, and prewarn conditions, the volume is always at maximum level. At SET VOLUME LEVEL, use the left Select key to lower the keypad volume. Use the right Select key to raise the volume.

Model Number

Thinline™, Aqualite™, and Wireless Keypads:

The keypad model number, firmware version, and date display, but cannot be changed.

Serial Number

Thinline™ Wireless Keypads:

The serial number assigned to the keypad displays. Press the Back Arrow key to exit the User Options function.

Keypad Address

The current address assigned to the keypad displays, but cannot be changed. Press the Back Arrow key to exit the User Options function.

Special Keypad Tones

Your keypad also contains a small speaker that alerts you about events as they occur on your system. For burglary alarms, as soon as the first digit key is pressed to enter a user code, the keypad tone stops. If a valid user code is not entered or an invalid user code is entered within five seconds, the tone begins sounding again. Below are brief descriptions of the different tones you hear from the keypad.

Fire Alarm tone: An intermittent sweeping siren that sounds until the fire alarm is silenced. From LCD keypads only.

Burglary Alarm tone: A constant siren tone that continues until the alarm is silenced. From LCD keypads only.

Key press tone: A short beep each time you press a key on the keypad and it is acknowledged by the system.

Prewarn tone: A continuous pulsed tone that sounds when you open an entry delay door on a system that is armed (turned on) reminding you to disarm the burglary protection. The tone silences as soon as the first user code digit key is pressed. If a valid user code is not entered or an invalid user code is entered within five seconds, the prewarn tone begins sounding again.

Exit tone: A continuous pulsing tone that sounds during the exit countdown just after arming all areas of your system to remind you to exit the premise. At ten seconds prior to the end of the countdown, the rate of pulsing increases.

Monitor tone: A pulsed tone for one second, one pulse only that sounds whenever a door or window is opened while you are using the zone monitor function from the User Menu. LCD keypads sound a doorbell chime. See Zone Monitor.

Note: When toggling to a RMV monitor state, the Zone Monitor tone does not sound.

Trouble tone: A steady tone indicating a trouble condition on your system. Press a Select key to silence.

What to do when the trouble tone sounds
You can silence the trouble tone by pressing any key. This only silences the keypad and does not correct the condition that originally caused the trouble.

DMP Wireless

Your system may have DMP wireless devices including key fob(s). There are three types of DMP wireless key fobs available:

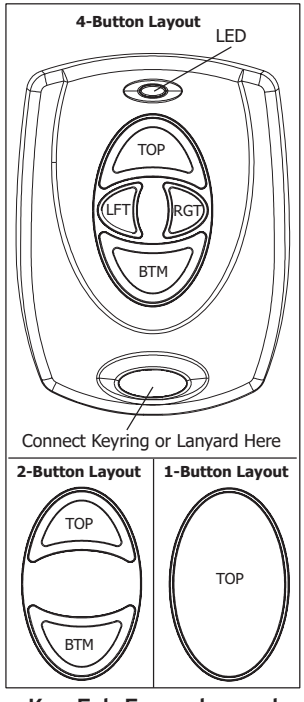
4-Button Model 1145 Key Fob
2-Button Model 1146 Key Fob
1-Button Model 1147 Key Fob

The drawing shows the button layout for all three models. Each button on the key fob is programmed to perform a specific action. The button names are listed below.

TOP = the Key Fob Top button
BTM = the Key Fob Bottom button
LFT = the Key Fob Left button
RGT = the Key Fob Right button

The button programming list for the key fob(s) connected to your system is located in the System Setup section of this guide. Refer to Appendix D for LED Status operation information. Specific function labels can be added to each button to indicate button operation.

For best operation, allow the LED to light and turn off before pressing another button. The key fob may not complete sending the signal for the button press if another button is pressed too soon.



Key Fob Examples and Button Names

If there is no LED light, the battery for your key fob may need replacing or you could be out of range.

Special Wireless Displays

Your system may use wireless transmitters to send alarm and trouble information from the protection devices to the panel. Wireless systems have a few unique keypad displays.

BACK DOOR - LOBAT - (Low Battery) The battery in a wireless transmitter is low. (BACK DOOR is used as an example only.)

BACK DOOR - MISNG - (Missing) The panel is not receiving the wireless transmitter periodic test report.

WIRELESS - TRBL - (Trouble) Some part of your wireless system is operating improperly. Call the service department for assistance.

WIRELESS RECEIVER JAMMED - ALARM - Your system may be programmed for wireless interference detection and, if displayed, your wireless receiver has detected a jamming signal while the system is armed.

WIRELESS RECEIVER JAMMED - TRBL - (Trouble) Your system may be programmed for wireless interference detection and, if displayed, your wireless receiver has detected a jamming signal while the system is disarmed.

Special Keypad Displays

As you use your system, you occasionally see a keypad display that asks you to enter a code or that describes a condition on the system. Below are some examples of the keypad displays:

ALARM

A 24-hour zone (for example fire or panic) or an armed burglary zone has been tripped. Your system may sound bells or sirens.

TRBL (TROUBLE)

There is a problem with a protection device or system component. This display is accompanied by a description of the problem.

ALARM NOT SENT

The alarm signal was aborted and was not sent to the central station because a user code was entered to disarm the system before the alarm signal was sent to the central station. Also, your system may be pre-programmed at installation to send an Abort signal to the Central Station that an alarm occurred but was not sent because the user entered a code before the delay time expired. Refer to the Introduction section of this guide.

ALARM CANCELLED

An Alarm signal just sent to the central station was cancelled because a user code was entered to disarm the system after the alarm was sent. Also, an Alarm Cancel signal is sent to the Central Station.

ALARM VERIFIED

A valid burglar alarm has occurred and has been manually verified by the user. The alarm system also transmits a VERIFY message to the Central Station.

ENTER CODE OR PRESENT CARD

The system requires you to enter your user code or present your user card/proximity credential to a keypad or card reader. User codes or reads can be required for turning your system on (arming), turning your system off (disarming), and many other functions.

As you enter your user code, the keypad display shows an asterisk (*) in place of each digit pressed. This keeps others from seeing your user code on the display as it is entered.

TRY AGAIN OR INVALID CODE/CARD/PIN

The user code, card read, or PIN you have used is not recognized by the system. Check the user code or PIN or present the card to the reader again.

INVALID PROFILE
All user codes have a profile that allow the user to only access certain functions. When users attempt functions outside their authority, the INVALID PROFILE message displays.

INVALID AREA
A user has attempted a door access for an area they are not assigned.

INVALID TIME
A user code assigned to a specific schedule is entered outside of the valid schedule. See Schedules and User Codes.

ARMED AREA
A user has attempted a door access to an armed area to which they do not have arming and disarming authority.

FAILED TO EXIT (ANTI-PASSBACK)
Anti-passback requires users to properly exit (egress) an area they have previously accessed. If they fail to exit through the proper card reader location, they are not granted access on their next attempt. A Failed to Exit message appears when a user assigned the anti-passback option attempts to re-enter an area which they did not exit properly. The user must exit the area through the proper door. If not possible, your system administrator should select the Forgive option in the User Codes menu option.

SYSTEM TROUBLE or SERVICE REQUIRED
There is a problem with one or more of the components in your system. Contact our service department as soon as possible.

SYSTEM BUSY
The system is performing another task of a higher priority. This usually only takes a few moments.

TEST IN PROGRESS
The system is currently being tested by an installation or service technician.

Email/Cell Phone Messages

Your system may be programmed at installation to send a variety of messages to your personal email and cell phone.

The message option uses your security system's reporting capability to send reports using an email address or cell phone number in much the same way as someone sending an email would do. You can receive reports of alarms, troubles, or system arming and disarming and know at a glance your system status. See Appendix F for more information.

In Touch™ Text Messaging Commands

Your system may be programmed to allow simple text messages to be sent to the security system to perform basic user operations. By texting a message from your cell phone or PDA, the following actions can be performed: Arm/Disarm, check Armed Status, Cancel Alarm, and turn Outputs On/Off. See Appendix F for more information.

Understanding Security System Terms

Throughout this guide, and in some displays on your keypad, you may see certain words or phrases that might be unfamiliar. Below are some terms you may see here and on your keypad display:

Access (Door Access)
Entry/Exit doors that are used to restrict access to the building or provide door access to authorized users. When a user code is entered at the keypad by entering a code or presenting a card to a reader, the system verifies authority and unlocks the door for a short period of time. See Easy Entry User's Guide in Appendix E.

Areas
An area is made up of burglary zones that can be armed or disarmed together. One area might consist of the office doors and windows. When you arm the office, these zones arm together and sound an alarm if opened.

Arming
Turns on the burglary protection in one or more areas of the system. When armed, the system is able to sound alarm bells or sirens and, if monitored, send alarm reports to a central station when a burglary zone is tripped.

Fire, panic, and other 24-hour devices are always turned on and do not need to be armed.

Central Station Monitoring
Your system can also be programmed to automatically send alarm, trouble, and arming and disarming reports to a central station. Operators at the central station dispatch the appropriate authorities or contact you with the specific event information.

Disarming
Turns off one or more areas of the system. When disarmed, the system does NOT sound alarms or send alarm reports to a central station when a burglary zone faults.

Fault
You may see the keypad display FRONT DOOR —FAULT. This means that there is a problem with the front door, such as the door being open when you are arming the system. If you see a —FAULT display, attempt to correct the problem (in this case shut the door). After the zone is in a normal state, you may arm the system. You may also bypass the zone and then arm the system.

Zone
A zone refers to one or more protected openings (doors or windows) or protection devices (motion or glassbreak detectors) grouped together under the same zone name and number.

Often, similar devices in the same general location share the same zone. For example, the windows on the east side of the premises can all be grouped together in a zone named E. WINDOWS.

Instant Zone
Interior protection devices and perimeter devices, such as exterior windows, passive infrared detectors (PIR), and non entry doors, are typically not programmed with delay times. If these zones are tripped while the system is armed, an alarm instantly occurs.

24-hour Zone
A 24-hour zone is not turned on or off by arming or disarming your system. Some examples of 24-hour zones are fire zones, panic zones, and temperature control zones.

Entry or Exit zone
Almost all systems have one or more doors through which you can access the premises. These doors are programmed with a delay time to allow you to enter or exit without setting off the alarm.

When you arm the system, activity on this zone is ignored until the exit delay time expires. Once that time has expired and the system is fully armed, opening the door causes the panel to start the entry delay time. During the entry delay time, you must enter a valid user code to disarm the system or an alarm occurs.

Status
Status is a feature that automatically displays the armed or disarmed status of your system on the keypads. Alarm or trouble conditions on a zone or a system monitor such as AC or battery trouble can also display. There are two types of status information available: Armed Status and Status List.

Status List

The keypad Status List displays any alarm or trouble condition on a zone, and any trouble condition on an internal system monitor. The system monitors include the AC power, battery power, panel box tamper, printer, and phone lines. If more than one alarm or trouble condition occurs at the same time, the keypad sequences this information on its display.

If the alarm is from a 24-hour zone or a system monitor, it remains in the Status List until it restores. If one or more armed burglary zones trip at the same time, the last one to trip remains in the Status List. This is to ensure that if a burglary has occurred the last zone tripped remains displayed even if it has been restored.

Armed Status

Armed Status is the keypad display of the current armed condition of areas within your security system.

If your system is set up as an Area system with areas one to eight, the display shows: 1 2 3 4 5 6 7 8. When you arm areas 1, 3, 5, and 7 the keypad displays: 1 3 5 7.

If your Area system is setup with nine or higher areas and the system is armed, the display reads: ALL SYSTEM ON or SYSTEM ON. Refer to Checking Armed Areas for information about checking the armed areas.

If your system is set up as a Home/Sleep/Away or All/Perimeter system, one of the following displays indicate the current Armed Status:

The keypad displays	When
HOME SYSTEM ON	The perimeter is armed in a Home/Sleep/Away system.
PERIMETER ON	The perimeter is armed in an All/Perimeter system.
ALL SYSTEM ON	All areas are armed.
SLEEP SYSTEM ON	The perimeter and interior are armed but the bedroom area is disarmed.

If your system is set up as a Home/Sleep/Away with Guest system, the arming status of the main system is the same as a standard Home/Sleep/Away system. The current arming status of the Guest systems displays as follows:

The keypad displays	When
HOME GUEST 1 ON	The first guest house perimeter is armed in a Home/Sleep/Away with Guest system.
SLEEP GUEST 1 ON	The first guest house perimeter and interior are armed but the bedroom area is disarmed.
ALL GUEST 1 ON	All first guest house areas are armed.

Note: The XR100 system allows one guest house system while the XR500 allows two guest house systems.

Also, for keypads that include an Armed LED, the Armed LED is ON steady when ALL areas assigned to that keypad are armed and OFF when any area assigned to that keypad is disarmed.

View Zone Status

To view disarmed zones that are in fault, press any Select key when the status list displays.

Browser Feature

Refer to Appendix B at the back of this guide for diagrams showing you how to use the built-in browsers.

Arming and Disarming

General Arming Operation

Your system has been programmed to operate in one of four configurations: Area, All/Perimeter, Home/Sleep/Away, or Home/Sleep/Away with Guest.

- **Area —** Your burglary protection is divided into up to 32 areas. Each area can have a custom name, be turned on or off independently of other areas, and limit access to only those users with proper authority.
- **All/Perimeter —** Your burglary protection is divided into two areas: Interior and Perimeter.

  Perimeter arming is when you are staying inside but want the comfort of knowing the exterior doors and windows are armed. Perimeter arming allows you to move freely about inside without setting off any interior alarms.

  All arms both the Perimeter and the Interior of the system. You want to arm both of these areas when leaving the building and no one is left inside.
- **Home/Sleep/Away** — Your burglary protection is divided into two or three areas: Perimeter, Interior, and Bedrooms.

  Home (Perimeter) arming is when you are staying inside but want the comfort of knowing the exterior doors and windows are armed.

  Sleep (Optional) (Perimeter and Interior) arms all areas except those near bedrooms and nighttime areas.

  Away (Perimeter, Interior, and Bedrooms) arms all three areas when you leave the building and no one is left inside.
- **Home/Sleep/Away with Guest** — Your burglary protection has a main house system and up to two guest house systems (XR100 has 1 guest house system while XR500 offers 2). Each house is separate and works just like the Home/Sleep/Away system previously mentioned.

Regardless of which configuration is programmed, much of the operation is similar. Throughout this guide, any differences between the systems are noted for your convenience.

Arming Functions

Arming or Disarming: You can arm and disarm all areas at one time or each area individually. You can only arm or disarm areas authorized for your user code.

Arm All or Selective Arming: After entering your user code, the system allows you to arm either all of the areas to which you have access or one or more selected areas. If you choose to arm all areas, the system begins verifying that all zones in those areas are in a good condition. If you choose to arm selected areas, the system prompts you to choose the areas you want to arm.

After making your arming selection, the keypad displays any zones that are currently bypassed. These zones remain bypassed until the system is armed and then disarmed. Any 24-hour zones in a faulted condition also display.

Bypassing Zones: Before arming, the system verifies that all doors, windows, and other protection devices to be armed are in normal condition. If everything is verified, the system arms. If there is a problem on one or more burglary zones, the system cannot arm until the problem is corrected. If the problem is simply an open door or window, correct the problem and try arming again.

If the problem cannot be corrected, you can force arm or bypass the zone or wait until the zone can be repaired by a service technician. A force armed zone is ignored by the system until it restores to normal. A bypassed zone is ignored by the system during the entire armed period. A zone remains bypassed until the system is disarmed.

In some cases, you might see the keypad display FRONT DOOR — FAULT. The keypad then displays priority zone which is a zone that cannot be bypassed. The problem on the zone must be corrected before the system can be armed.

When choosing to bypass a protection device or zone, there **may** be a pre-programmed maximum number of zones (up to 8) that can be bypassed in an area when that area is being armed. This limit is programmed at installation.

Arming Messages:

For **Area systems** the keypad briefly displays SYSTEM ON if only selected areas are armed. The keypad briefly displays ALL SYSTEM ON when all areas in the system are armed.

For **All/Perimeter** systems the keypad briefly displays PERIMETER ON if only selected areas are arming. The keypad briefly displays ALL SYSTEM ON when all areas in the system are armed.

For **Home/Sleep/Away** systems the keypad displays HOME SYSTEM ON or SLEEP SYSTEM ON if only selected areas are arming. The keypad briefly displays ALL SYSTEM ON when all areas in the system are armed.

For **Home/Sleep/Away with Guest** systems the main system arms the same as a Home/Sleep/Away system. A keypad assigned to the first guest house system displays HOME GUEST 1 ON or SLEEP GUEST 1 ON if only selected areas are arming. The keypad displays ALL GUEST 1 ON when all areas in the guest house system are armed.

Exit Delay: The keypad then displays the exit delay time as it counts down. Your system may be pre-programmed at installation to beep the exit delay tone at eight-second intervals until the last 10 seconds when the keypad beeps at three-second intervals. After exiting the building, if you re-enter during the countdown the exit countdown restarts, allowing additional time to then disarm or again exit the building during the countdown. This restart can occur only one time. When the exit delay time expires, all disarmed zones are armed.

Note: If your system uses a keyswitch to arm an area, the exit delay time does NOT show on the keypad display.

When you arm both the Perimeter and Interior to leave the building but then you do not exit by the time the exit delay ends, the system automatically arms but the interior area(s) will remain disarmed because you have not exited.

Should you exit the building and the door does not close properly, your system may be programmed so that when the exit delay countdown ends, then the entry delay starts and the bell will sound to alert you to the situation. Enter your user code to stop the bell and disarm the system. Rearm the system, exit the building, and make sure the door is securely closed.

ONE MOMENT . . . Message: If your system is monitored, it may be programmed to wait for the arming report transmission to the central station before displaying the armed message. This verifies your phone lines are working properly. While the system is waiting for the transmission, the display reads ONE MOMENT... If the report is received, the keypad displays the armed message. If the report is not received, the keypad displays LOCAL ALARM ONLY before displaying the armed message.

Note: Your system may be pre-programmed at installation to:

- send arming or zone bypassing reports to a central station
- arm and/or disarm specific areas at specific keypads.

Key Fob Arming

Press and hold the key fob button programmed for Arming or the Toggle arm/disarm button. The Red LED two-second acknowledgement light indicates All System On. The Green/Red two-second acknowledgement light indicates System On with some areas armed.

Key Fob Disarming

Press and hold the key fob button programmed for Disarming or the Toggle arm/disarm button. The Green LED two-second acknowledgement light indicates All System Off.

Area System Arming Operation

Area Assignment: Your security system has been set up into separate areas. The number of areas and their names are listed on the table in System Setup.

Arming the Area System

1. Press the COMMAND key until ARM DISARM is displayed.
2. Select ARM to arm the system.
3. Enter your user code if required. The keypad displays ALL? NO YES.
4. Select NO to arm only selected areas. Go to step 5. Select YES to arm all areas authorized for your user code. Go to step 6.
5. If you selected NO in step 4, the display begins to list each area to which you have access followed by NO YES.

   Example: OFFICE NO YES

   5a. Select **YES** for each area you want to arm.

   5b. Select **NO** for each area you do not want to arm.
6. The system displays any bypassed zones or faulted 24-hour or Priority zones. A faulted Priority zone cannot be armed.
7. At this point you can force arm or bypass any faulted zones. A zone that is force armed is restored into the system if it later returns to normal. A zone that is bypassed remains bypassed until the system is disarmed. See steps 7a through 7d.

   7a. If a problem exists on a zone, the zone name and problem is shown followed by: OKAY BYPASS STOP.

   7b. Select **OKAY** to force arm the faulted zone.

   7c. Select **BYPASS** to bypass all faulted zones being displayed.

   Note: 24-hour zones cannot be bypassed.

   7d. Select **STOP** to stop the system from arming. Correct the zone problem(s) and return to step 1.

   Your system may be programmed to require a user code that has authorization to force arm or bypass a faulted zone. To force arm or bypass a faulted zone, the system asks you to enter a user code.
8. The display reads SYSTEM ON if at least one area in the system is armed, and ALL SYSTEM ON if all areas in the system are armed.

   Note: Your system may be pre-programmed at installation for the Instant Arming option.
9. The keypad next displays EXIT: ## INSTANT and begins to count down the number of seconds remaining for you to exit. When the delay expires, the exit zones are armed.
10. You can select INSTANT while EXIT: ## INSTANT is displayed to immediately arm all exit zones and make them instant. The keypad displays INSTANT.

Quick Arming

To quickly arm a desired area, enter the area number followed by the COMMAND key when the **ALL? NO YES** option displays.

Checking the Armed Areas

After you have armed the system, you may press any Select key to check the armed areas when ALL SYSTEM ON or SYSTEM ON displays. The keypad then displays CHK ARMED AREAS: NAME NBR LIST.

Select NAME to list all of the armed areas by name. Select NBR to enter the area number you would like to check. Select LIST to list all of the armed areas by number.

Area System Disarming Operation

While the system is armed, you can only enter the premises through an entry/exit delay door without causing an alarm. After opening the door, the keypad sounds a prewarn tone to remind you to disarm the system. You must disarm the system before the entry delay time expires or an alarm on the door zone occurs.

During the entry delay time, the keypad displays ENTER CODE: and the name of the zone causing the entry delay. Enter your code to disarm the system. Only those areas assigned to your code disarms.

Note: The prewarn tone silences as soon as the first user code digit key is pressed. If a valid user code is not entered or an invalid user code is entered within five seconds, the prewarn tone begins sounding again.

Schedules: If you have programmed schedules for your system and a code is entered outside of a schedule and that code does not have authorization to disarm outside of schedules, the keypad displays INVALID TIME. This lets users know that they are attempting to disarm outside of their authorized time.

All or Selective Disarming: After entering your user code, the system allows you to disarm either all of the areas to which you have access or just selected areas. If you choose to disarm all areas, the system automatically disarms them. If you choose to disarm selected areas, the area names display on the keypad.

Alarm Display: After disarming, the keypad displays any zones that tripped or any transmission problems that occurred during the armed period. All burglary zones are then disarmed and any bypassed zones are automatically reset.

Disarmed Message: The keypad displays ALL SYSTEM OFF after the system disarms.

Central Station Report: Your system may be pre-programmed at installation to transmit a system disarming report to the central station.

Door Access Disarming: Your system may be programmed to allow area disarming when a card is presented to a door access reader located outside of the building. Simply present your card to the reader and after the card code is validated for the appropriate authority, a door access is granted and your matching areas are automatically disarmed. See the Easy Entry™ User's Guide in Appendix E.

Disarming the Area System from the keypad

1. Press the COMMAND key until ARM DISARM displays. During entry delay this process starts at step 3.
2. Select DISARM to disarm areas.
3. The keypad displays ENTER CODE: . Enter your user code and press COMMAND. The keypad displays ALL? NO YES.
4. Select YES to disarm all areas authorized for your user code.

   Select NO to disarm only certain areas individually. The keypad then displays the name of each area authorized for your user code followed by the NO YES display.

   Select YES to disarm the area displayed.

   Select NO to not disarm the area and display the next area.
5. If you are disarming the system out of a normally scheduled time and you have the authority to extend a schedule, the keypad then displays 2HR 4HR 6HR 8HR. Select the number of hours to extend the schedule.

   Note: If you do not have the authority to extend a schedule, this option does not display.
6. After all areas have displayed and schedules extended, any alarms or communication problems that occurred during the armed period display.
7. If all areas have been disarmed, the keypad next displays ALL SYSTEM OFF.

Quick Disarming

To quickly disarm a desired area, enter the area number followed by the COMMAND key when the **ALL? NO YES** option displays.

All/Perimeter System Arming

Area Assignment: Your security system is divided into two separate areas. Motion detectors, inside doors, and other interior protection devices are assigned to the Interior area while windows and exterior doors are assigned to the Perimeter area.

Perimeter or All: When arming an All/Perimeter system, the keypad displays PERIM ALL. If you select ALL, you are arming both the Perimeter and the Interior areas of the system. You will want to arm both of these areas when leaving the premises with nobody left inside. Selecting PERIM arms only the perimeter of the system. Perimeter arming is when you're staying inside but want the comfort of knowing the exterior doors and windows are armed. Perimeter arming allows you to move freely about inside without setting off any interior alarms.

Instant: During the exit delay time, you can cancel the exit and entry delays and cause all zones to be instant zones. Just press the far right Select key under INSTNT while the exit delay is displayed. This immediately arms the exit zones. However, no entry delay is provided and an alarm will occur should an entry door be opened.

System Ready/System Not Ready

When all zones in the system are in a normal condition and can be armed without bypassing, the keypad displays SYSTEM READY. If there are one or more zones that are not in a normal condition, the keypad displays SYSTEM NOT READY. Pressing any Select key during this display shows the zone number and name allowing you to investigate the problem.

All/Perimeter Shortcut Key Arming

Arm Perimeter — Press 6 for 2 seconds.

Arm All — Press 1 for 2 seconds.

Arming an All/Perimeter System

1. Enter your 4-digit user code. The keypad displays PERIM ALL.
2. Select PERIM to arm the Perimeter area only.
3. Select ALL to arm both the Perimeter and Interior areas.
4. The keypad displays zones that have been bypassed prior to arming and zones that are now in a faulted condition.
5. At this point you can force arm or bypass any faulted zones. A zone that is force armed is restored into the system if it later returns to normal. A bypassed zone remains bypassed until the system is disarmed. See steps 5a through 5d.
   - 5a. If a problem exists on any zones, the zone name and problem display followed by: OKAY BYPASS STOP.
   - 5b. Select OKAY to force arm the zone(s) before arming.
   - 5c. Select BYPASS to bypass the zone(s) before arming.
   - 5d. Select STOP to stop the system from arming. Correct the zone problem(s) and return to step 1.
6. The keypad displays PERIMETER ON if only the perimeter is being armed and ALL SYSTEM ON if both the perimeter and interior are being armed.
7. The keypad next displays EXIT: ## INSTNT and begins to count down the number of seconds remaining for you to exit. When the delay expires, all zones are armed.
8. You can select INSTNT while EXIT: ## INSTNT displays to immediately arm all zones and make them instant. The keypad displays INSTANT. When you select INSTANT, any entry/exit zone that trips immediately activates an alarm and the exit delay countdown immediately stops.
9. When the system is fully armed, the keypad displays PERIMETER ON for perimeter arming and ALL SYSTEM ON for perimeter and interior arming.

All/Perimeter System Disarming

Disarming: While the system is armed, you can only enter the premises through an entry/exit delay door without causing an alarm. After opening the door, the keypad sounds a prewarn tone to remind you to disarm the system. You must disarm the system before the prewarn tone expires or an alarm on the door zone will occur.

During the prewarn tone, the keypad displays ENTER CODE:. Enter your user code to disarm the system.

Schedules: If you have programmed schedules for your system and a user code is entered outside of a schedule, the keypad displays INVALID TIME. This lets the user know that they are disarming outside of their authorized time.

Alarm Display: After disarming, the keypad displays any zones that tripped or any transmission problems that occurred during the armed period. All burglary zones are then disarmed and any bypassed zones are automatically reset.

Disarmed Message: The keypad displays ALL SYSTEM OFF after the system disarms.

Central Station Report: A report of the system disarming can be transmitted to the central station. This is optional and can be programmed for you at any time.

Disarming an All/Perimeter System

1. During the entry delay time, the keypad displays ENTER CODE:. Enter your 4-digit user code.
2. The keypad then displays any zones that went into alarm or any communication problems that occurred during the armed period.
3. The keypad next displays ALL SYSTEM OFF to confirm the system is disarmed.

Disarming During an Alarm

1. While the alarm bell or siren sounds, enter your user code to silence the alarm. The keypad tone silences as soon as the first key is pressed.

   For a burglary alarm, the keypad displays CANCEL VERIFY or IS THIS A FALSE ALARM?.

   This allows you to investigate the alarm prior to disarming the system. This display remains on the keypad until a selection is made, the Back Arrow is pressed, or the internal system bell cutoff timer expires.

2. If a valid alarm has not occurred, select CANCEL or YES to disarm the system and cancel the alarm.

   The keypad next displays ALL SYSTEM OFF to confirm the system is disarmed.

   OR

   If the alarm is valid, select VERIFY or NO to send a verify message to the Central Station.

Home/Sleep/Away and Home/Sleep/Away with Guest System Arming

Area Assignment: Your security system is divided into two or three separate areas. Motion detectors, inside doors, and other interior devices are assigned to an Interior and Bedroom areas while windows and exterior doors are assigned to a Perimeter area.

Arming the system: When arming a Home/Sleep/Away or a Home/Sleep/Away with Guest system, the keypad displays HOME AWAY or HOME SLEEP AWAY. If you select AWAY, you arm all areas of the system. You will want to arm all areas when leaving with nobody staying inside. Selecting HOME arms only the Perimeter of the system. Perimeter arming is when you are staying inside but want the comfort of knowing the exterior doors and windows are armed. Perimeter arming allows you to move freely about inside without setting off any interior alarms. Selecting SLEEP arms the Perimeter and Interior devices but leaves devices near bedrooms or other nighttime areas off.

System Ready/System Not Ready Keypad Displays

When all zones in the system are in a normal condition and can be armed without bypassing, the keypad displays SYSTEM READY. If there are one or more zones that are not in a normal condition, the keypad displays SYSTEM NOT READY. Press and hold any top row Select key during this display shows the zone number and name allowing you to investigate the problem.

Home/Sleep/Away and Home/Sleep/Away with Guest Shortcut Key Arming

Arm Home — Press 3 for 2 seconds to arm the perimeter.

Arm Sleep — Press 7 for 2 seconds to arm the perimeter and interior areas and leave the bedroom area off.

Arm Away — Press 1 for 2 seconds.

Arming a Home/Sleep/Away or a Home/Sleep/Away with Guest System

1. Enter your 4-digit user code. The keypad displays HOME SLEEP AWAY.
2. Select HOME to arm the Perimeter only.
3. Select SLEEP to arm the Perimeter and Interior.
4. Select AWAY to arm the Perimeter, Interior, and Bedroom.
5. The system displays any Bypassed zones or faulted 24-hour or Priority zones. A faulted Priority zone cannot be armed.
6. At this point you can force arm or bypass any faulted zones. A zone that is force armed will be restored into the system if it later returns to normal. A zone that is bypassed will remain bypassed until the system is disarmed. See 6a through 6d.
   - 6a. If a problem exists on a zone, the zone name and problem is shown followed by OKAY BYPASS STOP.
   - 6b. Select OKAY to force arm the zone(s) before arming.
   - 6c. Select BYPASS to bypass the zone(s) before arming.
   - 6d. Select STOP to stop the system from arming. Correct the zone problem(s) and return to step 1.
7. A Home/Sleep/Away system keypad displays HOME SYSTEM ON if you selected HOME, SLEEP SYSTEM ON if you selected SLEEP, and ALL SYSTEM ON if you selected AWAY.

   A Home/Sleep/Away with Guest system keypad displays HOME GUEST 1 (or 2) ON if you selected HOME, SLEEP GUEST 1 (or 2) ON if you selected SLEEP, and ALL GUEST 1 (or 2) ON if you selected AWAY.
8. The keypad next displays EXIT: ## INSTNT and begins to count down the number of seconds remaining for you to exit. When the delay expires, the exit zones are armed.
9. You can select INSTNT while EXIT: ## INSTNT is displayed to immediately arm all exit zones and make them instant. The keypad displays INSTANT.

Home/Sleep/Away and Home/Sleep/Away with Guest System Disarming

Disarming: While the system is armed, you can only enter the premises through an entry/exit delay door without causing an alarm. After opening the door, the keypad sounds a prewarn tone to remind you to disarm the system. You must disarm the system before the prewarn tone expires or an alarm on the door zone will occur.

During the prewarn tone, the keypad displays ENTER CODE:. Enter your user code to disarm the system.

Schedules: If you have programmed schedules for your system and a user code is entered outside of a schedule, the keypad displays INVALID TIME. This lets the user know that they are disarming outside of their authorized time.

Alarm Display: After disarming, the keypad displays any zones that tripped or any transmission problems that occurred during the armed period. All burglary zones are then disarmed and any bypassed zones are automatically reset.

Disarmed Message: The keypad displays ALL SYSTEM OFF after the system disarms.

Central Station Report: A report of the system disarming can be transmitted to the central station. This is optional and can be programmed for you at any time.

Disarming a Home/Sleep/Away or a Home/Sleep/Away with Guest System

1. During the entry delay time, the keypad displays ENTER CODE:. Enter your 4-digit user code.
2. The keypad then displays any alarms or communication problems that occurred during the armed period.
3. The keypad next displays ALL SYSTEM OFF to confirm the system is disarmed.

Disarming During an Alarm

1. While the alarm bell or siren sounds, enter your user code to silence the alarm. The keypad tone silences as soon as the first key is pressed.

   For a burglary alarm, the keypad displays
   CANCEL VERIFY or IS THIS A FALSE ALARM?

   This allows you to investigate the alarm prior to disarming the system. This display remains on the keypad until a selection is made, the Back Arrow is pressed, or the internal system bell cutoff timer expires.
2. If a valid alarm has not occurred, select CANCEL or YES to disarm the system and cancel the alarm.

   The keypad next displays ALL SYSTEM OFF to confirm the system is disarmed.

   OR

   If the alarm is valid, select VERIFY or NO to send a verify message to the Central Station.

Extending Schedules

Depending on your system programming, when the open schedule ends, you can extend the schedule to a later time. The keypad buzzer sounds and the keypad displays “area name” and LATE or CLOSING TIME!. This reminds users still on the premises to arm the system or extend the schedule.

To extend the system schedule:

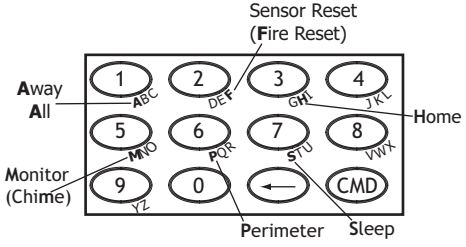
1. Press any Select key. The keypad displays ENTER CODE: - .
2. Enter your code and press COMMAND or present your access card to a valid reader.
3. The keypad then displays 2HR 4HR 6HR 8HR. Select the number of hours to extend the schedule.

   Note: If the system is not armed by the scheduled closing time, a Late to Close report is sent to the central station. If the schedule is extended, a Schedule Change report may be sent to the central station.

For information about extending a schedule before the scheduled closing time is reached, see Extending Schedules (EXT) in the User Menu portion of this guide.

Keypad Shortcut Keys

Your LCD keypad provides one-button shortcut keys. Holding down a keypad button for two seconds until the tone re-sounds allows you to arm, monitor, or reset your system. These options can still be accessed through the User Menu if desired.



Keypad Shortcut Keys

Keypad Key	Arming System Operation
Press Key 1	Arm **A**way for Home/Sleep/Away systems Arm **A**way for Home/Sleep/Away with Guest systems Arm **A**ll for All/Perimeter systems
Press Key 2	Sensor (**F**ire) Reset on all systems
Press Key 3	Arm **H**ome for Home/Sleep/Away systems Arm **H**ome for Home/Sleep/Away with Guest systems
Press Key 5	**M**onitor (Chi**m**e) on all systems
Press Key 6	Arm **P**erimeter for All/Perimeter systems
Press Key 7	Arm **S**leep for Home/Sleep/Away systems Arm **S**leep for Home/Sleep/Away with Guest system

Arming Function

System Operation: Home/Sleep/Away, Home/Sleep/Away with Guest, or All/Perimeter.

You can use the Arming shortcut keys, 1, 3, 6, and 7 when the system is disarmed. You may be prompted to enter your user code. If any zones are faulted, select force arm or bypass. Refer to the Arming Section for detailed arming operation.

Home/Sleep/Away and Home/Sleep/Away with Guest Arming

Arm Home — Press 3 for 2 seconds to arm the perimeter.

Arm Sleep — Press 7 for 2 seconds to arm the perimeter and interior areas and leave the bedroom area off.

Arm Away — Press 1 for 2 seconds.

All/Perimeter Arming

Arm Perimeter — Press 6 for 2 seconds.

Arm All— Press 1 for 2 seconds.

Sensor (Fire) Reset Function

System Operation: Area, Home/Sleep/Away, Home/Sleep/Away with Guest, or All/Perimeter.

You can use the Sensor (**F**ire) Reset, shortcut key 2, when the system is armed or disarmed. When pressed, detectors that have latched due to an alarm condition are returned to normal function. The keypad displays SENSORS ON and SENSORS OFF to acknowledge the shortcut key press.

Note: You may be prompted to enter your User Code.

Monitor (Chime) Function

System Operation: Area, Home/Sleep/Away, Home/Sleep/Away with Guest, or All/Perimeter.

You can use the **M**onitor (Chi**m**e), shortcut key 5, when the system is disarmed. When pressed, the Zone Monitor operation is initiated. As needed, refer to the Zone Monitor section. The keypad displays MONITOR ON and chimes or displays MONITOR OFF and no tone is sounded.

Note: The **M**onitor (Chi**m**e) shortcut key applies to all Exit zones in an Area system and to all zones assigned to the perimeter in a Home/Sleep/Away, Home/Sleep/Away with Guest, or All/Perimeter system.

User Menu

Many system features are programmed into a User Menu that you can access from any keypad. The menu requires you to enter your user code and then it only shows those functions to which you have access.

Accessing the User Menu

1. Press the COMMAND key, if the multi-language option is enabled, the available languages display. Select the language to use for text display.
2. Press the COMMAND key until MENU? NO YES displays.
3. Select YES. The keypad displays ENTER CODE: –. Enter your user code and press COMMAND. You can now scroll down through the list of system features available to you.

User Menu Options

The list below shows the User Menu options in order:

Menu Option	Description
ALARM SILENCE	Silences an alarm bell or siren.
SENSOR RESET	Resets smoke or glassbreak detectors that have latched due to an alarm condition.
DOOR ACCESS	Momentarily opens the keypad door lock relay.
ARMED AREAS	Displays the name of any areas in the system that are currently in the armed state.
OUTPUTS ON/OFF	Allows you to turn on or off any of the outputs described in the System Setup section of this guide.
ZONE STATUS	Allows you to see if a zone is either armed, bypassed, in alarm, open, or shorted.
BYPASS ZONES	Allows you to Bypass a zone or reset an already bypassed zone.
ZONE MONITOR	Allows you to add or remove a zone from the monitor mode.
SYSTEM STATUS	Displays the current condition of the system AC power, backup battery, and optional panel tamper.
SYSTEM TEST	Tests the system siren, communication to the central station, and backup battery on all XR500 Series and XR100 Series panels. XR500N or XR500E panels allow additional panic zone testing.
USER PROFILES	Allows you to add, delete, or change user profiles.
USER CODES	Allows you to add, delete, or change user codes.
SCHEDULES	Allows you to add, remove, or change system schedules.
TIME	Allows you to change the Day, Date, or Time that is currently programmed in the system.
DISPLAY EVENTS	Allows you to view or print the last 10,000 door accesses or 2,000 system events that occurred on your system.
SERVICE REQUEST	Allows you to send a message to the Central Station requesting service on the alarm system.
FIRE DRILL	Allows you to test the system fire bells.

Alarm Silence

Silences the alarm bells or sirens during an alarm.

Alarm Silence allows you to turn off the alarm bells and sirens connected to your system during an alarm. Using Alarm Silence does NOT stop an alarm report from being sent to the central station and does not reset any alarmed devices. Use the Sensor Reset function to reset devices such as smoke detectors that have latched in alarm.

Note: The keypad tone silences as soon as the first user code digit key is pressed. You can silence the alarm by entering your user code or by presenting your card to a reader during the Status List display. If using a card, areas assigned to your code are disarmed and door access occurs.

Using the Alarm Silence Function

1. Access the User Menu.
2. The keypad displays ALARM SILENCE?.
3. Press any Select key to silence the bells and exit the User Menu.

Sensor Reset

Resets smoke or glassbreak detectors. Also clears Fire/Supervisory alarm, trouble displays or low battery displays on systems using wireless sensors.

Sensor Reset is used to reset smoke and glassbreak detectors after they have tripped. Once these detectors trip, they must be reset before they can detect any additional alarm conditions. When you select Sensor Reset, power to the detectors is temporarily removed by the system allowing them to reset.

Make sure all smoke is cleared from around the area of the smoke detectors before performing a Sensor Reset to prevent the alarm from occurring again.

Sensor (Fire) Reset Shortcut Key

All Systems — Press 2 for 2 seconds, then enter your user code if required, to reset the system.

Resetting the Sensors

1. Access the User Menu.
2. Press COMMAND until SENSOR RESET displays.
3. The keypad displays SENSORS OFF followed by SENSORS ON.
4. The keypad automatically exits the User Menu.

Door Access

Operates an electric door strike from the keypad.

Note: The door strike function is not available on Clear Touch™ keypads.

Door Access is used to operate the door strike relay that is built into some keypads. Power for the door strike is connected to the keypad relay and can be interrupted by using the Door Access function.

When Status List displays, you can operate Door Access by simply entering your user code and pressing COMMAND. See Easy Entry™ User's Guide in Appendix E. If you are using a keypad that has a built-in card reader, you may simply present your card to be allowed Door Access.

Note: Your system may be pre-programmed at installation to transmit a door access report to the central station.

Using the Door Access

1. Access the User Menu.
2. Press COMMAND until DOOR ACCESS? displays.
3. Press any Select key. The door strike relay turns on momentarily.
4. The keypad returns to the Status List display.

Armed Areas Display

Displays all armed area names in the system.

The Armed Areas display lists all of the names of the armed areas in your system at the keypads.

Using the Armed Areas Function

1. Access the User Menu.
2. Press COMMAND until ARMED AREAS? displays.
3. Press any Select key. The keypad displays the first armed area name. To scroll through the list of armed area names, press the COMMAND key.
4. If there are no armed areas, the keypad displays NONE.

Outputs On Off

Allows you to manually turn the system or door access relay outputs ON and OFF.

This function is used to individually turn your system relay and access door outputs ON and OFF. Your system may use these outputs to control door access, interior and exterior lighting, heating, air conditioning, or other appliances.

The names and numbers of the relays connected to your system are located in the System Setup section of this guide.

Outputs can be turned ON or OFF regardless of the output settings in Schedules.

Your system may be programmed to require that your user code profile have access to areas assigned to the keypad. INVALID AREA displays when your user code does not have access to the keypad's areas and the output does not turn on.

Under certain conditions, some outputs cannot be turned on. If you select a restricted output, the keypad displays CANNOT TURN ON.

Turning the Outputs ON and OFF

1. Access the User Menu.
2. Press COMMAND until OUTPUTS ON/OFF? displays.
3. Press any Select key to display OUTPUTS DOOR.
4. Select OUTPUTS or DOOR for the type of output you want to turn ON or OFF.
5. Enter the output number you want to turn ON or OFF. The output number displays.
6. With the output number displayed, select ON or OFF. The output then turns ON or OFF depending on your selection, and remains in that state until you change it. The keypad displays the first 12 characters of the output or door name followed by either ON or OFF for four seconds to provide visual verification of the action. Press the COMMAND key to end the four second display.
7. The system automatically returns to the output or door option and a new output can be selected to turn ON or OFF. Refer back to step 4.
8. Press the Back Arrow key to exit the User Menu.

Browser Feature

If you are unsure of the output number, refer to Appendix B at the back of this guide for a diagram showing you how to use the built-in Outputs ON/OFF browser.

Zone Status

Displays a list of armed, bypassed, or alarmed zones. Also allows you to check the status of individual zones. Zone Status can be used to give you a list of zones by category or display the current status of an individual zone number. The four categories are:

- Armed Zones - zones that are currently armed.
- Bypassed Zones - zones that are currently bypassed.
- Alarmed Zones - zones that have gone into alarm during the current or previous armed period.
- Number - enter the number of any zone to check its status.

Using the Zone Status Function

1. Access the User Menu.
2. Press COMMAND until ZONE STATUS? displays.
3. Press any Select key to display ARM BYPS ALR NBR.
4. Select ARM for a list of zones that are currently armed. You can scroll through the list by pressing the COMMAND key.
5. Select BYPS for a list of zones that are currently bypassed.
6. Select ALR for a list of zones that have gone into alarm during the current or previous armed period.
7. Press NBR and ZONE NO: - displays.
8. At the ZONE NO: - option, enter the zone number you want to check and press COMMAND. The zone number and name display followed by the zone status. For example, a zone status for zone 1 might be BACK DOOR - OKAY.
   Below is a list of the zone status displays:
   -OKAY = the zone is in a normal condition
   -BYPAS = the zone is bypassed
   -BAD = the zone is in a bad or faulted condition
9. After displaying the zone status, ZONE: - returns for you to enter another zone number.

Browser Feature

If you are unsure of the zone number or description, refer to Appendix B at the back of this guide for a diagram showing you how to use the built-in Zone Status browser.

Bypass Zones

Allows you to bypass a zone prior to arming.

Bypassing is usually done when a zone cannot be restored to normal. A significant benefit of bypassing a zone is to allow a zone in a faulted or bad condition to be bypassed so arming can occur. The faulted zone can be serviced the next day.

A zone can be bypassed only while it is disarmed. Fire, panic, emergency, and supervisory type zones are always armed, so they can never be manually bypassed.

Bypass Zones can also be used to reset a zone that has been bypassed and restore it back into the system.

When Bypass Zones is selected, a report can be transmitted to your central station.

During arming, when choosing to bypass a zone or device, there **may** be a pre-programmed maximum number of zones (up to 8) that can be bypassed in an area. This limit is programmed at installation.

Using the Bypass Zones Function

1. Access the User Menu.
2. Press COMMAND until BYPASS ZONES? displays.
3. Press any Select key. The keypad displays ZONE: - RST BYPS.
4. To Bypass a zone, enter the zone number and select BYPS. The zone number automatically disappears and a new zone number can be entered. Refer back to step 3.
5. To Reset a zone, enter the zone number and select RST.

Browser Feature

If you are unsure of the zone number or description, refer to Appendix B at the back of this guide for a diagram showing you how to use the built-in Bypass Zones browser.

Zone Monitor

Allows the system to monitor selected disarmed zones (doors, windows, or motion detectors) and display their name at the keypad as they are faulted. This feature could be used to monitor an access door.

Zone Monitor works with any disarmed zone and also sounds the keypad monitor tone when the zone faults. The zone name displays at all keypads designated for the area in your system.

You can place any combination of disarmed zones in Zone Monitor but only the most recent zone faulted displays. The displayed zone name clears automatically after a short time or when the zone is armed.

Monitor (Chime) Shortcut Key

All Systems — Press 5 for 2 seconds when the system is disarmed. This initiates the Zone Monitor operation for all Exit zones in an Area system or all zones assigned to the perimeter in a Home/Sleep/Away, Home/Sleep/Away with Guest, or All/Perimeter system. The keypad displays MONITOR ON and chimes or displays MONITOR OFF and no tone is sounded.

Testing your system's burglary protection

After using the System Test function, place all zones in Zone Monitor. Starting at the front door, go around and open and then close each door and window. You should hear the keypad beep each time. The keypad also displays the name of each zone as its device is opened.

Once the protected doors and windows test is complete, walk in front of each motion detector. The keypad should beep to confirm the zone has tripped. If at any time during your weekly testing a device does not cause the keypad to beep, call the service department for assistance.

Using the Zone Monitor Function

1. Access the User Menu.
2. Press COMMAND until ZONE MONITOR? displays.
3. Press any Select key. The keypad displays ALL NBR or PERIM ALL NBR.
4. Select PERIM to place all disarmed perimeter zones into Zone Monitor.
   - 4a. The keypad displays ALL? ADD RMV.
   - 4b. Select ADD to add all disarmed zones to Zone Monitor.
   - 4c. Select RMV to remove all disarmed zones.
5. Select ALL to place all disarmed zones into Zone Monitor.
   - 5a. The keypad displays ALL? ADD RMV.
   - 5b. Select ADD to add all disarmed zones to Zone Monitor.
   - 5c. Select RMV to remove all disarmed zones.
6. Select NBR to enter a specific zone number for zone monitor.
7. If you select NBR, the keypad displays ZONE: - ADD RMV.
   - 7a. Enter any zone number and select ADD to add this zone.
   - 7b. Enter any zone number and select RMV to remove this zone.
8. The zone number automatically disappears. You can then enter a new zone number and repeat step 7a or 7b.

Browser Feature

If you are unsure of the zone number or description, refer to Appendix B at the back of this guide for a diagram showing you how to use the built-in Zone Monitor browser.

System Status

Displays the current condition of internal system hardware.

System Status shows the panel condition of AC power, battery power, and optional panel tamper. When System Status is selected, each monitor displays followed by OKAY or TRBL (Trouble) to indicate the current condition.

Using the System Status Function

1. Access the User Menu.
2. Press COMMAND until SYSTEM STATUS? displays.
3. Press any Select key. The display starts listing each system monitor and status.

   For example: AC POWER - OKAY

Below are the System Monitor displays:

Keypad Display	What it monitors
AC POWER	AC power
BATTERY	Battery power
TAMPER	Panel box tamper

These are followed by either OKAY or TRBL (trouble).

If TRBL displays, call the service department for assistance.

4. The system then displays its firmware version, the panel mode, and then exits the User Menu.

   For example: VER_118_1/20/07 MODEL XR500

System Test

System Test is used to test the battery, alarm bell or siren, and communication to a central station. The System Test function begins automatically as soon as you select it.

Note: If an area is in an armed state, the system test will not operate.

Using the System Test Function

1. Access the User Menu.
2. Press COMMAND until SYSTEM TEST? displays.
3. The keypad displays SYSTEM PANICS. Select SYSTEM.
3. The System Test begins automatically and the keypad displays the following messages in this order:
   1) **BELL SOUNDING** during a two second bell test
   2) **KEYPAD SOUNDING** all keypads assigned to the same area sound their burglary alarm tone for two (2) seconds during the keypad sounder test
   3) **BATTERY - OKAY** or **BATTERY - TRBL** to indicate the battery condition
   4)* **TRANSMIT TEST NO: 1** during the transmit test
   5) **TRANSMIT OKAY** or **TRANSMIT FAILED** to show the results of the transmit test
   6) **TEST END** to indicate the System Test is complete.
   7) You can press the Back Arrow key to end the transmit test.

   * The transmit test does not occur on local systems.

Using the Panic Zone Test (XR500N/E Only)

1. Access the User Menu.
2. Press COMMAND until SYSTEM TEST? displays.
3. Press any Select key. The keypad displays SYSTEM PANICS.
4. Select PANICS.
5. The Panic Zone Test begins automatically and the keypad displays TRIPS: END.

   During the Panic Zone Test, trip each panic zone (or button) by pressing and holding the panic for 1 to 2 seconds.

Note: You do NOT have to hold the panic for 2 seconds in normal mode. The Panic Zone Test takes additional time to display when the system is in test mode.

   Each time you trip a panic zone, the display number increments and the keypad buzzer sounds for two seconds.

   The number of panic zones tripped constantly displays until the test ends or no panic zone activity has occurred for 20 minutes.

6. Select END to stop the Panic Zone Test.
7. PANIC TEST OKAY displays when the Panic Zone Test is completed and all zones tested OK.
8. When the Panic Zone Test ends and a zone failed (did not trip) during the test, the keypad displays the zone name and number and the buzzer sounds for one second. Press the COMMAND key to display the next failed zone.

Note: If testing a key fob, a message will not display if it fails, only the verification message is displayed.

Note: During the Panic Zone Test, any zones that fail are not sent to the receiver unless pre-programmed at installation to be sent.

Note: Your system may be programmed to limit the Panic Zone Test to only be performed during the Area 32, Shift 4 schedule.

User Profiles

Add, delete, or change User Profiles, that define the authority of each user code in the system. Several characteristics define the authority of each User Profile within the system. Always make sure that at least one administrator in your system has a profile with **all** authorities and **all** areas.

In All/Perimeter or Home/Sleep/Away operation, User Profiles will not display in the User Menu. When adding User Codes, use the default profiles 1 through 10. Refer to the User Profiles Chart.

In Home/Sleep/Away with Guest operation, the User Profiles option does not display in the User Menu but when adding User Codes, enter a profile number 1 through 9 for the main house system, profiles 11-19 for the Guest 1 house system, and profiles 21-29 for the Guest 2 house system (XR500 only). Profiles 2-9 will default to have Arming/Disarming for all eight areas, while profiles 12-19 and 22-29 only have Arm/Disarm assigned to Guest 1 and Guest 2 respectively. Profiles 1, 11, and 21 do not have any Arming/Disarming authority assigned. Refer to the User Profiles Chart.

Profile Number - Each profile may be assigned a unique number from 1 to 99.

Profile Name - Each profile may be assigned a 32-character name. The Profile Number is the default name.

Area Number - Each profile may be assigned specific areas of the system for arming and disarming. When profiles 1 to 98 are created, NO areas are assigned by default. The default for profile 99 is ALL areas assigned. Profile 99 is predefined in the system by the factory. In an XR500 Series system you can assign areas 1 to 32. In an XR100 Series panel you can assign areas 1 to 8.

Access Area Number - Each profile may be assigned door access area assignments. Default for profile 1 to 98 is NO areas assigned. Default for profile 99 is ALL areas assigned. Profile 99 is predefined at the factory.

Output Group Assignment - Each profile may be assigned an output group number from 1 to 10. Default for profile 1 to 98 is NO output group assigned. Default for profile 99 is output group **10**. Your system may by programmed to turn on an output group at certain keypads when door access occurs.

User Menu Assignments - Each user profile may have any of the menus assigned to it as shown in the User Profile Record. The User Profile Record lists the user menu profile assignments and the system functions users are allowed to access based on the profile numbers assigned to their codes.

Adding User Profiles

1. Access the User Menu. Press COMMAND to USER PROFILES?.
2. Press any Select key. The keypad displays ADD DEL CHG. Select ADD to add a new user profile.
3. At the PROFILE NO: - option, enter an unused profile number and press COMMAND. The display changes to PROFILE NAME.
4. Press any Select key. Enter a profile name of up to 32 characters. Press COMMAND. See Appendix C.
5. At the ARM/DIS AREAS: option, select the area numbers for arming and disarming assigned to this profile.
6. The keypad displays ACCESS AREAS: . Select the area numbers assignment to allow door access for this profile. Press the COMMAND key.
7. The keypad displays OUTPUT GROUP: -. Enter the number for the Output Group assigned to this profile. Press the COMMAND key.
8. The keypad displays each of the menus as shown in the Profile Table for you to enable for this profile number. Select YES or NO and press the COMMAND key to advance to the next menu Selection.
9. When you have completed selecting all User Profile menu assignments, the keypad displays the PROFILE ## ADDED message for 4 seconds.

Browser Feature

Refer to Appendix B in this guide for a diagram showing you how to use the Add User Profiles browser.

Changing User Profiles

1. Access the User Menu.
2. Press COMMAND until USER PROFILES? displays.
3. Press any Select key. The keypad displays ADD DEL CHG.
4. Select CHG to change a user profile.
5. At the PROFILE NO: - option, enter a profile number and press COMMAND. The display changes to PROFILE NAME.
   Note: The panel's authority check determines whether your User Profile is authorized to change another profile. The message NO AUTHORITY appears if you are not authorized to change the profile.
6. Press any Select key to display -. Enter a profile name of up to 32 characters. The default Profile Name uses the Profile Number. Enter the name and press COMMAND.
7. At the ARM/DIS AREAS: option, enter the area numbers for arming and disarming assigned to this profile.
8. The keypad displays ACCESS AREAS: . Enter the area numbers assignment to allow door access for this profile. Press the COMMAND key.
9. The keypad displays OUTPUT GROUP: -. Enter the number for the Output Group assigned to this profile. Press the COMMAND key.
10. The keypad displays each of the menus as shown in the Profile Table. You then enable or disable the menu function for this profile number. Select YES or NO and press the COMMAND key to advance to the next menu selection.
11. When you complete Selecting all User Profile menu assignments, the keypad displays the PROFILE CHNGD message for 4 seconds, indicating the profile is changed.

Browser Feature

Refer to Appendix B in this guide for a diagram showing you how to use the Change User Profiles browser.

Deleting User Profiles

1. Access the User Menu.
2. Press COMMAND until USER PROFILES? displays.
3. Press any Select key. The keypad displays ADD DEL CHG.
4. Select DEL to delete a user profile.
5. At the PROFILE NO: - option, enter a profile number and press COMMAND. The display changes to DELTD.

Note: User codes assigned to deleted profiles will not function.

Browser Feature

Refer to Appendix B in this guide for a diagram showing you how to use the Delete User Profiles browser.

TEMP CODE

When you select YES for this menu option, and this profile is assigned to a user code (see next section), the keypad displays TEMP EXPIRE DATE:. Enter the ending date for the profile to expire. Default is seven days from today. The system deletes Temp users at 12:00 AM on the last date.

ANTI PASS NO

Anti-passback requires that you properly exit (egress) an area previously accessed. If you fail to exit through the proper location you cannot access it until you properly exit. Default is No. See Failed to Exit (Anti-Passback) for more information.

EASY ARM/DISARM?

When entering your code, Easy Arm/Disarm allows you to automatically arm or disarm all areas that are assigned to your code. The ALL NO YES? option does not display when this option is enabled.

SHIFT TIME ACCESS: 1 2 3 4 ANYTIME

This menu option defines the time schedules that the User Code operates for door access and disarming. Selecting 1, 2, 3, and/or 4 indicates operation during the S1-S4 shift schedules. Selecting ANYTIME from the menu indicates the code operates any time, regardless of schedules. An asterisk displays next to the shift or Anytime choice. You may select all shift schedules for one user. Menu access is not affected by this option. An UNAUTHORIZED ENTRY message is sent to the central station if disarming occurs outside the open/close schedule.

RE ARM DELAY

RE ARM DELAY allows the entry of 0 to 720 minutes to be used to delay automatic rearming when the user disarms an area outside of schedule. If zero is selected, the rearming occurs based on permanent programming in the panel. If another user enters a valid user code or credential after the RE ARM DELAY countdown has started, and their user profile RE ARM DELAY is greater, then the RE ARM DELAY countdown starts over with the new time.

RE ARM DELAY is also used to delay a late to close message to the central station when the panel does not use automatic arming.

If the user has Extend Schedule authority, 2HR 4HR 6HR 8HR displays at disarming. If the user does not make a choice, the RE ARM DELAY is used to extend the schedule.

Application example: An exit door near the trash is scheduled to be armed at all times. When the custodian needs to remove trash, program 10 minutes for the activity. Or, an overhead door only requires access when a delivery is made. Program up to 720 minutes to allow the loading dock supervisor to load or unload a semi-truck.

USE SECONDARY LANGUAGE

This options allows you to set the programmed secondary user language to display when the Easy Arm/Disarm option is enabled and the user presents their credential or enters their user code at the Status List.

User Profiles Chart

Note: For All/Perimeter or Home/Sleep/Away systems use the default profiles 1 through 10. For Home/Sleep/Away with Guest systems use the default profiles 1 through 9 for the main house system, default profiles 12-19 for the Guest 1 house system, and default profiles 22-29 for the Guest 2 house system. Profiles 12-19 and 22-29 default to the same privileges as profiles 2-9. For example, profile 13 and 23 have the same privileges as profile 3.

Menu Display			Privilege	Predefined Profile Number											
				1	2	3	4	5	6	7	8	9	10	11-98	99
ARM	NO	YES	Arm	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
DISARM	NO	YES	Disarm	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
ALM SLNC	NO	YES	Alarm Silence	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
SNSR RST	NO	YES	Sensor Reset	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
DOOR ACS	NO	YES	Door Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
ARM AREA	NO	YES	Armed Areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
OUTPUTS	NO	YES	Outputs ON/OFF	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes
ZN STATS	NO	YES	Zone Status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
BYPAS ZN	NO	YES	Bypass Zones	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes
ZONE MON	NO	YES	Zone Monitor	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
SYS STAT	NO	YES	System Status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
SYS TEST	NO	YES	System Test	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
PROFILES	NO	YES	User Profiles	No	No	No	No	No	No	No	No	Yes	No	No	Yes
USR CODE	NO	YES	User Codes	No	No	No	No	No	No	No	No	Yes	No	No	Yes
SCHEDULS	NO	YES	Schedules	No	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes
TIME	NO	YES	Time	No	No	No	No	No	No	No	Yes	Yes	No	No	Yes
DIS EVNT	NO	YES	Display Events	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
SERV REQ	NO	YES	Service Request	No	No	No	No	No	No	No	Yes	Yes	No	No	Yes
FIRE DRILL	NO	YES	Fire Drill	No	No	No	No	No	No	No	Yes	Yes	No	No	Yes
EXTEND	NO	YES	Extend Schedules	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes
TEMP CODE	NO	YES	Temp User Code	No	No	No	No	No	No	No	No	No	No	No	No
ANTI PASS	NO	YES	Anti-Passback	No	No	No	No	No	No	No	No	No	No	No	No
EASY ARM/DISARM	NO	YES	Arm/Disarm	No	No	No	No	No	No	No	No	No	No	No	No
1234 ANYTIME	___	ANYTIME	Shift Time Access	1234	1234	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME	ANYTIME
RE ARM DLY	0 – 720		Re-Arm Delay	No	No	No	No	No	No	Yes	Yes	Yes	No	No	Yes
SEC LANGUAGE	NO	YES	Preferred Language	No	No	No	No	No	No	No	No	No	No	No	No

User Codes

This option allows you to add, delete, or change a user code. You may also assign specific User Profiles to individual users.

1234	=	User Number
34812	=	User Code
89456	=	PIN (XR500E Code Plus PIN systems only)
John Smith	=	User Name
7	=	Profile

User Number - Every user is numbered 1 through 9999. This number identifies the user to the system and is transmitted to the central station when the user arms or disarms areas.

User Code - Each user also has a 3- to 6-digit number to 999999, to enter into the keypad when arming or disarming the system. Only 4-digit user codes can be assigned to All/Perimeter, Home/Sleep/Away, or Home/Sleep/Away with Guest system users.

Note: A User Code cannot begin with zero and 3-digit codes cannot begin with 98.

For UL installations, avoid using repetitive (111) or sequential (123) codes.

PIN - In an XR500E Card Plus PIN system, each user is assigned a unique PIN (up to 6 digits) to enter into the keypad after presenting their card/proximity credential to the reader when accessing system functions.

User Names - Each code may also be programmed with the user name. You may enter up to 32 characters for the name. As needed, refer to Appendix C for Entering User Names information.

User Profile - The user is also assigned a Profile (1 to 99) by the person administrating the system. The profile number determines the areas and functions the user can access.

Adding User Codes

1. Access the User Menu.
2. Press COMMAND until USER CODES? displays.
3. Press any Select key. The keypad displays ADD DEL CHG BAT.
4. Select ADD or BAT (Batch) to add a new user code.
5. At the USER NUMBER: - option, enter a user number and press COMMAND. The display changes to USER CODE: - .

   Note: Do NOT program a code for user number 1 unless you intend to use the Ambush function. See Ambush.
6. Enter a user code of 3 to 6 digits and press COMMAND. The user enters this number to arm, disarm, etc. If using access cards, present the card instead of entering a code. After entering the code the keypad displays USER NUMBER ### as the user name.
7. A 32-character name may be entered to identify the user. Press any top row key to clear the current name. You may then enter the new name. After entering the name press COMMAND. See Entering Names in Appendix C.
8. The display changes to PROFILE NO: -. Select the profile number to assign a set of authorized functions to the user code as outlined in the Profile Table on the previous page.

   Note: On All/Perimeter or Home/Sleep/Away systems use the default profiles 1 through 10. For Home/Sleep/Away with Guest systems use the default profiles 2 through 9 for the main house system, default profiles 12-19 for the Guest 1 house system, and default profiles 22-29 for the Guest 2 house system.

9. At the PROFILE NO: - display, enter a profile number from 1 to 99, and press COMMAND. The displays shows USER # ADDED.

   If BAT (Batch) was chosen in step 4 instead of ADD, the next available user number is automatically selected and only steps 6 and 7 repeat. The User Profile assignment is automatically selected for the next user based on the previous user entered. This batch entry method speeds up user entry in large systems.

Browser Feature

Refer to Appendix B at the back of this guide for a diagram showing you how to use the Add User Codes browser.

Changing User Codes

To change a user code, you must have a user code with a profile that has user code authority.

1. Access the User Menu.
2. Press the COMMAND key until USER CODES? displays.
3. Press any Select key. The keypad displays ADD DEL CHG BAT.
4. Select CHG to change a user code.
5. At the USER NUMBER: - option, enter the user number to change and press COMMAND.

Refer to the System Setup section for the number of user codes available for your system.

6. The display changes to USER CODE: * * * * * *. Press any Select key and enter the new user code. Press COMMAND.
7. The display then shows the current user name. Press any top row key to clear. See Entering Names in Appendix C to enter a new name.

Note: Changing a user code does not change the user number.

8. The display changes to PROFILE NO: -. Select the profile number to assign a set of authorized functions to the user code as outlined in the Users Profile Chart.
9. After entering the profile number, the keypad displays USER # CHANGED for five seconds followed by USER NUMBER: -. This display allows you to enter another user number to change. Press the Back Arrow key twice to exit the User Menu.

Changing Own User Code

Your system may be programmed at installation to allow users to change their own user code.

1. Access the User Menu.
2. Press the COMMAND key until USER CODES? displays. Press any Select key.
3. The display changes to USER CODE: * * * * * *. Press any Select key.
4. Type your new user code. Press Command.

Browser Feature

Refer to Appendix B for diagrams showing you how to use the Change User Codes browser.

Deleting User Codes

1. Access the User Menu.
2. Press COMMAND until USER CODES? displays.
3. Press any Select key. The keypad displays ADD DEL CHG BAT.
4. Select DEL to delete a user code from the system. To delete a user code, you must have a user code with a profile that has user code authority.

Note: Your system must have at least one user with user code authority in order to be able to add or delete user codes. Be careful not to delete all users with user code authority from your system. Also, the user code used to enter the user menu to delete codes cannot be deleted. In other words, you can not delete yourself.

5. At the USER NUMBER: - option, enter the user number you want to delete and press COMMAND. The display changes to USER # DELETED.
6. The display then changes back to USER NUMBER: - allowing you to delete another user. Press the Back Arrow key twice to exit the User Menu.

Browser Feature

Refer to Appendix B at the back of this guide for a diagram showing you how to use the Delete User Codes browser.

Forgive Failure to Exit

Failure to Exit is an Anti-passback violation in which a user assigned with anti-passback has attempted to re-enter an area that they did not exit through.

Forgive Failure to Exit removes the anti-passback violation. See Failed to Exit (Anti-Passback) for more information.

1. After the USER CODES? menu is accessed and ADD DEL CHG BAT displays, press COMMAND.
2. Select FRGV to forgive the Failure to Exit and press COMMAND.
3. At the USER NUMBER:- option, enter the user number to be forgiven and press COMMAND. The User Code Browser described in Appendix B can help find the appropriate user by name if you do not know the number.

   To clear the FAILURE TO EXIT (Anti-passback) violation for all users, enter 000 at the USER NUMBER:- option.
4. The keypad displays USER XXXX FORGVN to confirm, then returns to step 3 for the next user. Press the Back Arrow key to exit this menu.

Ambush Code

Your system may be programmed to allow user number 1 to be used as an Ambush code. This Ambush code functions identically to a standard code with the exception that it sends a silent alarm to the central station. This silent alarm alerts the operator to a duress situation at the premises and prompts immediate notification of authorities.

Refer to the System Setup section of this guide to see if your system is programmed for Ambush. If so, do NOT program a code for user number 1 unless you intend to use the Ambush function.

Schedules

Schedules are ideal for individual area auto arming and disarming and for creating Opening/Closing windows during which users can access the building or disarm the system. Having separate schedules allows you to create Opening/Closing windows for each day. One could be for normal business activity and another could be for cleaning crews or a second shift. Once programmed, these schedules operate continually until changed.

The Schedules function allows you to program into the system the times at which you normally turn your burglary protection on and off each day of the week. Your system may be pre-programmed at installation to allow automatic arming and disarming. When pre-programmed, you can enter a schedule for the arming and disarming times.

If your system does not use automatic arming, you can use the Closing Check/Extend feature with Schedules to help ensure your system is armed manually at a specific time. This option sounds the keypad buzzer and displays CLOSING TIME! or AREA LATE! when a schedule expires. This reminds users still on the premises to arm the system or extend the schedule to a later time.

Your system provides you with five different types of schedules:

Shift (S1, S2, S3, S4) allow you to set access and disarm schedules that occur at the same time each day until you change them. Users are assigned to shifts using the ALOW authority.

Output (OUT) schedules allow you to set the times when relay outputs or door strikes connected to your system turn ON and OFF automatically.

Door (DOOR) schedules allow you to set times when door strikes turn ON and OFF automatically.

Holiday (HOL) dates allow you to enter special dates that activate Holiday Schedules that supersede all other schedules.

Extend (EXT) schedules allow you to set a time for a one time extend of the currently running shift (S1 - S4) schedule.

Setting Shift (S1 S2 S3 S4) Schedules

1. Access the User Menu and press COMMAND until SCHEDULES? displays. Press any Select key.
2. The keypad displays S1 S2 S3 S4. Select the shift you want to program. This allows you to enter a schedule that remains in place until you change or delete it.
3. Your system may be programmed to allow four shift schedules per area, if so, AREA NO:- displays. Enter the area number that you want to assigning to this schedule. Press the COMMAND key to accept your Selection and continue setting schedules.
4. The keypad displays SUN MON TUE WED. Press the COMMAND key to display THU FRI SAT HOL. Select the day you want the schedule to begin. If you select HOL, go to Setting Holiday ABC Schedules for additional instructions.

   Note: After Selecting the day of the week or holiday for the schedule to begin, the keypad displays any currently programmed Opening and Closing times previously set for that day. This feature allows you to review programmed schedules at any time.

   A schedule entered in HOL (holiday) activates and overrides SUN MON TUE etc. schedules anytime a holiday date occurs.

5. If Opening and Closing times display, the keypad then displays DELETE KEEP. Select DELETE to enter new times.
6. The keypad then displays OPENING TIME? followed by the display MON – : AM PM. Enter the new opening time and select AM or PM.

   Enter all schedule times using a 12 hour clock. For example, to enter 6 AM you would enter a 0 + 6 + 0 + 0 and select AM. For 11 PM you would enter a 1 + 1 + 0 + 0 and select PM.

   The keypad then displays CLOSING TIME? followed by the display MON – : AM PM. Enter the new closing time and select AM or PM. Select whichever day displays, for example, MON, allows you to scroll through the days of the week and create a schedule window that spans multiple days.

   Note: You must enter an Opening and Closing time or the system will not recognize the schedule.

   The new schedule is now programmed into your system.
7. The keypad goes back to the SUN MON TUE WED display allowing you to enter another schedule.
8. To clear a schedule press DELETE and then AM when the opening time is requested.

   Press the Back Arrow key to exit the User Menu.

Note: Your system may be programmed to limit the Panic Zone Test to only be performed during the Area 32, Shift 4 schedule.

Setting Output (OUT) and Door (DOOR) Schedules

The Schedules function allows you to set up to 100 different scheduled times for relay outputs and door access relays connected to your system to turn ON and OFF automatically. The maximum number of schedules that can be assigned per door access relay or relay output is 8.

1. Access the User Menu.
2. Press COMMAND until SCHEDULES? displays.
3. After you have accessed the SCHEDULES? menu and the schedule options, S1 S2 S3 S4, display, press the COMMAND key once more and the display changes to OUT DOOR HOL EXT. Select OUT or DOOR.
4. At the OUTPUT NO: – or DOOR NO: – display, enter the output or door number you want to program. Press the COMMAND key.

If adding a schedule and all 100 scheduled times are currently in use, OUT SCHEDS FULL displays. You must then delete an existing schedule.

5. The keypad displays SCHEDULE NO: -. Enter the schedule number (1 to 8) and press the COMMAND key.
6. The keypad displays SUN MON TUE WED. Press the COMMAND key to display THU FRI SAT HOL.
7. Select the day you want to program. If you select HOL go to Setting Holiday ABC Schedules for more information.

Note: After Selecting the day of the week for the schedule to occur, the keypad displays any currently programmed ON OFF times previously set for that day. This feature allows you to review programmed schedules at any time.

8. If ON OFF times display, the keypad then displays DELETE KEEP. Select DELETE to enter new times.
9. The keypad then displays ON TIME?. This is followed by the display – : AM PM.

   Enter a new relay ON time and select AM or PM.

   The display changes to OFF TIME?. This is followed by the display – : AM PM.

   Enter a new OFF time for the relay.

   Enter all schedule times using a 12 hour clock. For example, to enter 6 AM you would enter 0 + 6 + 0 + 0 and select AM. For 11 PM you would enter 1 + 1 + 0 + 0 and select PM.
10. The keypad returns to the day of the week display allowing you to enter another Output or Door schedule. To exit the user menu or to go back to the S1 S2 S3 S4 display, press the Back Arrow key.

Setting Holiday ABC Schedules for S1, S2, S3, S4, OUT, and DOOR Schedules

Three Holiday schedules are available for each shift (S1, S2, S3, S4), each output relay (OUT), each door access relay (DOOR), and through their respective menu options. This allows a shift, output, or door to have three different schedules for holidays. For example, Holiday Schedule A for those holidays when the building stays closed, Holiday Schedule B for a day that only opens for a morning, etc. Also, Holiday Schedules can be used to cross multiple days. These schedules become active and supersede the current day's schedule when a Holiday Date occurs. See Setting Holiday Dates (HOL).

1. After you have accessed the SCHEDULES? menu and the schedule options, S1 S2 S3 S4, display, press the COMMAND key until the display changes to SUN MON TUE WED. Press the COMMAND key again to display THU FRI SAT HOL.
2. Select HOL to program holiday schedules.
3. The keypad displays HOL: A B C . Select A to set the first of three holiday schedules.
4. The keypad displays A - : AM PM.

Note: After Selecting the schedule, the keypad displays any current times previously set for that holiday. This feature allows you to review the programmed times.

5. If times display, the keypad then displays DELETE KEEP. Select DELETE to enter new times.
6. The keypad then displays ON TIME? or OPENING TIME?. This is followed by the display – : AM PM.

   Enter a new time and select AM or PM.

   The display changes to OFF TIME? or CLOSING TIME?. This is followed by the display – : AM PM.

   Enter a new time.

   Enter all schedule times using a 12 hour clock. For example, to enter 6 AM you would enter 0 + 6 + 0 + 0 select AM. For 11 PM you would enter 1 + 1 + 0 + 0 and select PM.
7. The keypad returns to HOL: A B C allowing you to enter a B and/or C holiday schedule for the same Shift (S1, S2, S3, or S4), Output or Door. Go back to step 3 to add additional holiday schedules.

Setting Holiday Dates (HOL)

Setting Holiday Dates provides the system with dates in the year when the normal opening and closing schedules are not used and superseded by one of the Holiday Schedules A or B or C. When the panel determines that it is a holiday, the Holiday Schedule supersede the current schedule for that day. Up to twenty different holiday dates can be entered.

1. After you access the SCHEDULES? menu and the schedule options, S1 S2 S3 S4, display, press the COMMAND key once more. The display changes to OUT DOOR HOL EXT. Select HOL to program Holiday dates.
2. The keypad display changes to HOL: xx mm/dd A. You can now enter the month and day for the first holiday. Select A to change to HOL B. Pressing again changes to HOL C. Example: July fourth would be entered by pressing the 0704 keys. The keypad displays HOL:1 07/04 B.
3. To step to the next holiday number, press COMMAND. To clear a holiday press any top row Select key when the appropriate holiday number displays. Press the Back Arrow key when HOL: 1 or the COMMAND key when HOL: 20 displays to exit the menu.

Note: The Holiday Dates entered indicate the days of the year when HOL schedules are used. For information on setting holiday schedules for Shift, Output, and Door, see Setting Holiday ABC Schedules.

Extending Schedules (EXT)

Extending schedules (EXT) allows the Closing Check operation to delay until the new closing time expires. This allows the current shift schedule to ignore its closing time and not send a LATE TO CLOSE message to the central station. This function is designed to allow workers to stay later and does not extend door access authority. The extended schedule erases when it expires.

1. After you access the SCHEDULES? menu and the schedule options, S1 S2 S3 S4, displays, press the COMMAND key once more. The display changes to OUT DOOR HOL EXT. Select EXT to program Extended Schedules.
2. The keypad displays - : AM PM. Enter a time to extend the current Closing Check open period. Press COMMAND to exit the menu.

A shift may be extended up to 23 hours and 59 minutes from the time the extend function is performed.

To extend the system schedule after the closing time is reached:

1. Press any Select key. The keypad displays ENTER CODE.
2. Enter your code and press COMMAND. The system schedule automatically extends one hour.
3. The keypad then displays -: AM PM. You can enter a time to extend the schedule for greater than one hour. Press AM or PM.

Note: If the system is not armed by the scheduled closing time, a Late to Close report is sent to the central station. If the schedule is extended, a Schedule Change report is sent to the central station.

Setting the Date and Time

Allows you to change the current date and time displayed on the keypad and used by the system.

Setting the System's Date and Time

1. Access the User Menu.
2. Press COMMAND until TIME? displays. Press any Select key.
3. The keypad displays the current day and time. Press the COMMAND key. The keypad displays the current date. Press the COMMAND key to make any changes.
4. The keypad displays TIME DAY DATE.
5. Select TIME to change the time. The keypad displays – : AM PM. Enter the current time and select AM or PM. The display changes back to TIME DAY DATE.
6. Select DAY to change the day of week. The keypad displays SUN MON TUE WED. Press the COMMAND key to display THU FRI SAT. Select the correct day. Use the Back Arrow key to toggle between the different day of the week displays.
7. Select DATE to change the date. The keypad displays:

   MONTH:- Enter up to 2 digits for the month. Press COMMAND.

   DAY:- Enter up to 2 digits for the day. Press COMMAND.

   YEAR:- Enter up to 2 digits for the year. Press COMMAND.

   The display returns to the TIME DAY DATE display.

   Press the Back Arrow key to exit the User Menu.

Display Events

Allows you to review up to 12,000 past door access and system events. There are six event types:

Zone Activity - Zone alarms, troubles, and restorals.

Opening and Closing - System arming and disarming.

User Code - Adding, deleting, and changing user codes.

Schedule Changes - Adding, deleting, and changing schedules.

Door Access - Each door access function used at a keypad.

Supervisory - Problems with system hardware components.

The system memory holds a maximum of 12,000 past events for 45 days. Any event older than 45 days automatically clears from the system memory. Also, once the full 12,000 events are stored, any new event causes the oldest event to be cleared. See Appendix A for Display Events.

Service Request

Your user code profile may be programmed for Service Request. This User Menu feature allows you to simply press any Select key when SERVICE REQUEST? displays and have the system automatically send a "Request for Service" message to the central station. The display changes momentarily to REQUEST MADE to confirm your request was sent.

Fire Drill

Fire Drill is used to test the fire bells or fire horns in your system. The Fire Drill test turns your system bell circuit on, but does not send a message to the central station.

Starting a Fire Drill test

1. Access the User Menu.
2. Press COMMAND until FIRE DRILL? displays. Press any Select key.
3. The keypad displays SURE? YES NO.
4. Select YES to start the Fire Drill test.

Ending a Fire Drill test

1. Enter your code at the keypad and press COMMAND to end the Fire Drill.
2. The Fire Drill test automatically ends with ALARM SILENCE or the programmed Bell Cutoff time.

System Setup

System Setup Record

This System Setup section allows you to track the current and future status of the programmable options on your system. If changes are made to the system, update the information contained on these pages.

❒ **XR500 System** ❒ **XR100 System**

Your system operation configuration.

❒ Area ❒ Home/Sleep/Away
❒ All/Perimeter ❒ Home/Sleep/Away with Guest

Your system is monitored by a central station.

❒ Yes ❒ No

C/S Name: _____

Address: _____

City/State: _____

Emergency Phone: _____

Service Phone: _____

Service Manager: _____

Your system sends Opening and Closing reports.

❒ Yes ❒ No

Your system sends Zone Bypass reports.

❒ Yes ❒ No

Your system sends Ambush reports.

❒ Yes ❒ No

Your XR500E system uses Card Plus PIN operation.

❒ Yes ❒ No

Keypad Record

Note: XR500 systems support 16 keypad devices. XR100 systems support 8 keypad devices.

Device #	Name	Areas
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

Which keypads display System Status?

❒ 1 ❒ 2 ❒ 3 ❒ 4

❒ 5 ❒ 6 ❒ 7 ❒ 8

❒ 9 ❒ 10 ❒ 11 ❒ 12

❒ 13 ❒ 14 ❒ 15 ❒ 16 ❒ N/A

Which keypads display Armed Status?

❒ 1 ❒ 2 ❒ 3 ❒ 4

❒ 5 ❒ 6 ❒ 7 ❒ 8

❒ 9 ❒ 10 ❒ 11 ❒ 12

❒ 13 ❒ 14 ❒ 15 ❒ 16 ❒ N/A

Which keypads provide Door Access reports?

❒ 1 ❒ 2 ❒ 3 ❒ 4

❒ 5 ❒ 6 ❒ 7 ❒ 8

❒ 9 ❒ 10 ❒ 11 ❒ 12

❒ 13 ❒ 14 ❒ 15 ❒ 16 ❒ N/A

Key Fob Button Programming

Enter the user name assigned to each key fob and the button action programmed for each button in the table below. Refer to the Introduction and Appendix D for more information.

Key Fob User Name	Button	Programmed Action
	TOP	
	BTM	
	LFT	
	RGT	
	TOP	
	BTM	
	LFT	
	RGT	
	TOP	
	BTM	
	LFT	
	RGT	
	TOP	
	BTM	
	LFT	
	RGT	
	TOP	
	BTM	
	LFT	
	RGT	
	TOP	
	BTM	
	LFT	
	RGT	

Area Names and Numbers Record

XR500 systems may be divided into 32 separate areas. XR100 systems may be divided into 8 separate areas. All/Perimeter systems are divided into two separate areas. Home/Sleep/Away and Home/Sleep/Away with Guest systems are divided into two or three separate areas. Each area can have a name or description that displays at the keypad. This can help you easily track events when and wherever they occur in your system.

Area	Name	Area	Name
1	_____	17	_____
2	_____	18	_____
3	_____	19	_____
4	_____	20	_____
5	_____	21	_____
6	_____	22	_____
7	_____	23	_____
8	_____	24	_____
9	_____	25	_____
10	_____	26	_____
11	_____	27	_____
12	_____	28	_____
13	_____	29	_____
14	_____	30	_____
15	_____	31	_____
16	_____	32	_____

User Profiles Record

Note: For All/Perimeter or Home/Sleep/Away systems use the default profiles 1 through 10. For Home/Sleep/Away with Guest systems use the default profiles 2 through 9 for the main house system, default profiles 12-19 for the Guest 1 house system, and default profiles 22-29 for the Guest 2 house system.

Profile #	Profile Name	Arm/Disarm Areas	Access Areas	Output Group	Arm	Disarm	Alarm Silence	Sensor Reset	Door Access	Armed Area	Outputs On/Off	Zone Status	Bypass Zones	Zone Monitor	System Status	System Test	User Profiles	User Codes	Schedules	Time	Display Events	Service Request	Fire Drill	Extend Schedules	Temp User Code	Anti-passback	Easy Arm/Disarm	Shift Time Access	Re Arm Delay	Sec Language
																												1 2 3 4 A		
																												1 2 3 4 A		
																												1 2 3 4 A		
																												1 2 3 4 A		
																												1 2 3 4 A		
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																												1 2 3 4 A		
																												1 2 3 4 A		

User Codes Record

As you add new users or change current user codes, you can keep track of their profile number in the system. Use the following table to track custom user codes in your system. Only 4-digit user codes can be assigned to All/Perimeter, Home/Sleep/Away, or Home/Sleep/Away with Guest system users.

User #	User Name	Profile #

User #	User Name	Profile #

Schedules Record

Schedule	Area Name	Status	SUN	MON	TUE	WED	THU	FRI	SAT	HOL A	HOL B	HOL C
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
S1 S2 S3 S4 Area #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
Door# Output #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
Door# Output #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
Door# Output #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M
Door# Output #		Open Close	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M	: _M : _M

Holiday Date Record

Your system has up to 20 holiday dates available that supersede all regular scheduled times for that day.

#	Date (mm/dd)	HOL (circle one)
1.	_____/_____	A or B or C
2.	_____/_____	A or B or C
3.	_____/_____	A or B or C
4.	_____/_____	A or B or C
5.	_____/_____	A or B or C
6.	_____/_____	A or B or C
7.	_____/_____	A or B or C
8.	_____/_____	A or B or C
9.	_____/_____	A or B or C
10.	_____/_____	A or B or C
11.	_____/_____	A or B or C
12.	_____/_____	A or B or C
13.	_____/_____	A or B or C
14.	_____/_____	A or B or C
15.	_____/_____	A or B or C
16.	_____/_____	A or B or C
17.	_____/_____	A or B or C
18.	_____/_____	A or B or C
19.	_____/_____	A or B or C
20.	_____/_____	A or B or C

Output Record

Your system has outputs that are used to control various functions within the building or access around its perimeter. The list below identifies the output numbers and device names.

Output #	Output Name
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Use the Output number in the User Menu when setting Output Schedules or using the Outputs ON OFF option to manually toggle the relays.

Appendix A

About the Display Events Section

This section of the User's Guide shows the Display Events items. While in the Display Events function, use the COMMAND and Back Arrow keys to go forward or backward through the list of events.

To view more information about each display, press the Select key as directed in the explanations below.

Using the Display Events

1. Access the User Menu.
2. Press the COMMAND key until DISPLAY EVENTS? displays. Press any Select key.
3. The keypad displays FRST LST PRT SRT. Select FRST (first) to view the oldest to newest events. Select LST (last) to view the newest to oldest events. If you select FIRST, use the COMMAND key to scroll up through the events. If you select LAST, use the Back Arrow key to scroll down through the events.

   Select SRT to sort through the Display Events log and collect information specific to a user or system event.

   Select PRT to print the complete Display Events log.
4. To use the Sort feature, select SRT. The keypad displays FRST DATE: 8/21. Press any Select key and enter a 4-digit beginning date for the sort. Press COMMAND.
5. The keypad displays LAST DATE: 10/17. Press any Select key and enter a 4-digit ending date for the sort. Press COMMAND.
6. The keypad displays USER NUMBER: -. To sort events for a particular user, enter their user number or press COMMAND to sort for all users. To search for a user, press any Select key then use the COMMAND and Back Arrow keys to browse through the user names in the system. When the user you want displays, press any Select key then press COMMAND.
7. The keypad next displays five event types that you can include in the sort. Press the fourth Select key to display YES when the event type name displays on the keypad. Press COMMAND. The following are the sort event types:

   ACCESSES = door accesses granted.

   DOOR NUMBER = leave blank for all doors.

Note: If you select yes for access then only Door Access Granted Events are included in the sort.

   ZONE EVENTS = zone alarms, troubles, and restorals.

   ARM/DISARM = arming and disarming events.

   USER EVENTS = adding, deleting, and changing user codes.

   SUPERVISORY = system hardware problems and door access denied events.

8. After the last event type displays, the keypad again displays FRST LST PRT SRT. You can now view or print the sorted Display Events or press SRT to define a new sort.

Arming and Disarming Event Displays

This displays any system area arming or disarming events.

Keypad Display

```
ARM     5:10P    10/17
WAREHOUSE
```

Description

The Warehouse was armed on October 17 at 5:10 PM. Press any Select key to display the area number and user number, and then any Select key to display the user name.

Arming Event Types - There are two event types you may see:

ARM - User armed the system **DIS -** User disarmed the system

Zone Event Displays

This displays alarms, troubles, and other events that may occur on your protection zones.

Keypad Display

```
ALR     10:23P    10/17
BASEMENT DOOR
```

Description

An alarm occurred on October 17 at 10:23 PM. Press any Select key to see the zone number and zone type.

Zone Type - There are seven possible zone types you may see:

FIRE - Fire **PANC -** Panic **BURG** - Burglary
EMRG - Emergency **SUPV -** Supervisory
AUX1 - Auxiliary 1 **AUX2 -** Auxiliary 2

Event Types - There are seven event type you may see:

ALR - Alarm **TBL** - Trouble **RST** - Restore
FLT - Zone Fault **SVC** - Service smoke detector
LOW - Low battery **MIS -** Missing wireless transmitter

Note: LOW and MIS are for wireless systems only.

Supervisory Event Displays

This displays the date and time of an automatic test report.

Keypad Display

```
MSG     11:58P  10/ 17
AUTO RECALL
```

Description

The test report was sent to the central station at the date and time shown.

User Code Change Event Displays

This displays any addition, deletion, or change to a user code.

Keypad Display

```
ADD     11:41A  10/17
U:19    BY      U:12
```

Description

User 19 added at 11:41 AM by user 12. Select either user (US:) number for the user name.

User Code Event Types - There are three event type you may see:

ADD - User added **DEL -** User deleted
CHG - User code or authority level changed.

Zone Bypass Event Displays

This displays zone bypass events.

Keypad Display

```
BYP     5:18P    10/17
EAST WINDOW
```

Description

The east window zone was bypassed. Press any Select key for the zone number and user number. Press again for the user name.

Bypass Event Types - There are three event types:

BYP - Bypass **RST** - Restore **FRC** - Force Arm

Note: You may sometimes see the user as SWG. This is short for Swinger Bypass which is an automatic function that allows the system to automatically bypass a zone.

Door Access Event Displays

This displays the keypad address where a Door Access occurred and the user number of the person granted access.

Keypad Display	Description
ACC 5:18P 10/17 3 USER:024	User 24 accessed door (keypad) #3 at 5:18 PM on October 17. Press the first Select key to display the Door name where the access occurred. Press the second Select key to display the reason access was denied. Press the third Select key for the name of the device, or the fourth Select key for the user name.

About Door Access

Door Access is a feature available on certain keypads that contain a built-in door releasing relay and proximity readers. When power for an electric door strike or magnetic lock is connected to the relay contacts, only users entering a valid user code can release the lock and gain access to the area.

The Display Events feature logs the user number and name of the person granted access, the date and time, and from which keypad they entered their code.

System Monitor Event Displays

This displays any problems with the system AC power, battery, or phone line(s), or any opening of a tampered panel box.

Keypad Display	Description
TBL 11:41A 10/17 POWER	An AC failure occurred on October 17 at 11:41 AM.

System Monitor Event Types - There are two event types:

TBL - Trouble **RST -** Restore

System Monitor Event Names - There are five system monitors:

POWER - AC power to panel **BATTERY -** On panel

LINE 1 - Phone line number 1 **LINE 2 -** Phone line number 2

TAMPER - On panel box

Schedule Change Event Displays

This displays Changes made to the system schedules.

Keypad Display	Description
S1 9:41A 10/17 MON USER:024	S1 schedule for Monday was changed by user 24 at 9:41 AM on October 17.

Schedule Types - There are five possible schedule types:

S1 S2 S3 S4 - Standard **OUT -** Output
DOOR - Door **HOL -** Holiday **EXT -** Extend

MON - This is the day of the week in which the schedule change occurred. The days display using three letters. Press the first Select key to display the scheduled Opening time and once again for the scheduled Closing time.

024 - User number of the person who made the change. Press the third Select key under 024 to display the user name.

Wireless Jamming Event Displays

This displays wireless jamming events that have occurred.

Keypad Display	Description
ALM 11:41A 10/17 WIRELESS	The DMP wireless receiver detected jamming on October 17 at 11:41 AM.

Wireless Jamming Event Types - There are three event types:

TBL - Trouble (a jamming event occurred when the panel was disarmed)
ALM - Alarm (a jamming event occurred when any area was armed)
RST - Restore

Note: Trouble and Restore events display WIRELESS as the device.

Wireless Trouble Event Displays

This displays events when the wireless receiver was not communicating with the panel.

Keypad Display	Description
TBL 11:41A 10/17 WIRELESS	A DMP wireless device trouble occurred on October 17 at 11:41 AM.

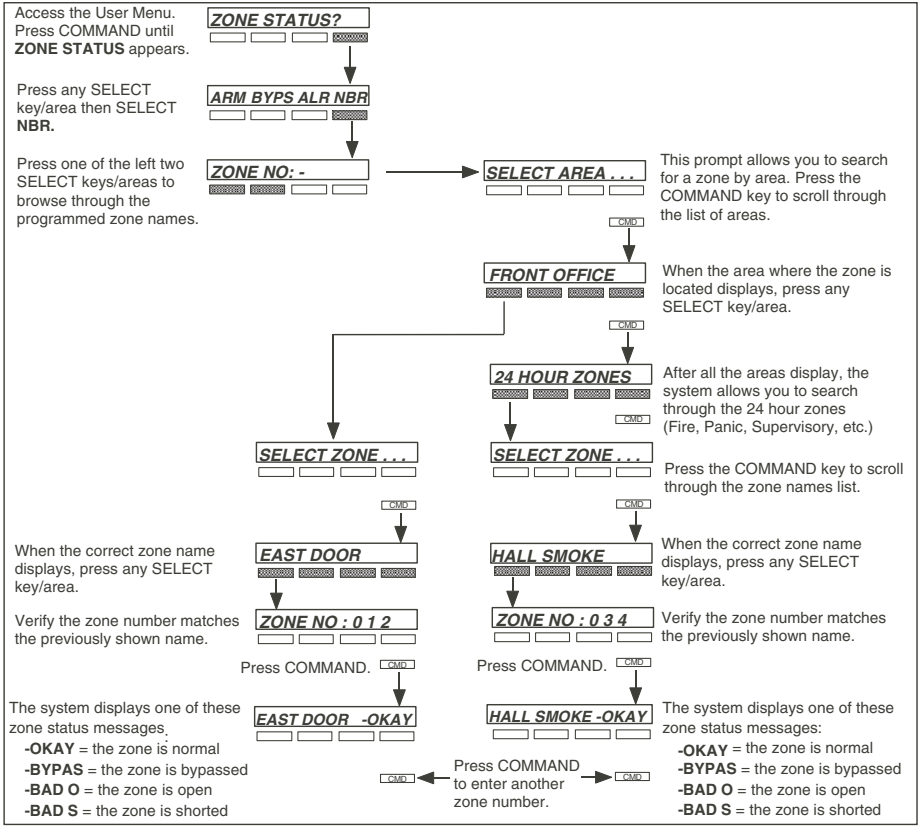
Wireless Trouble Event Types - There are two event types:

TBL - Trouble **RST -** Restore

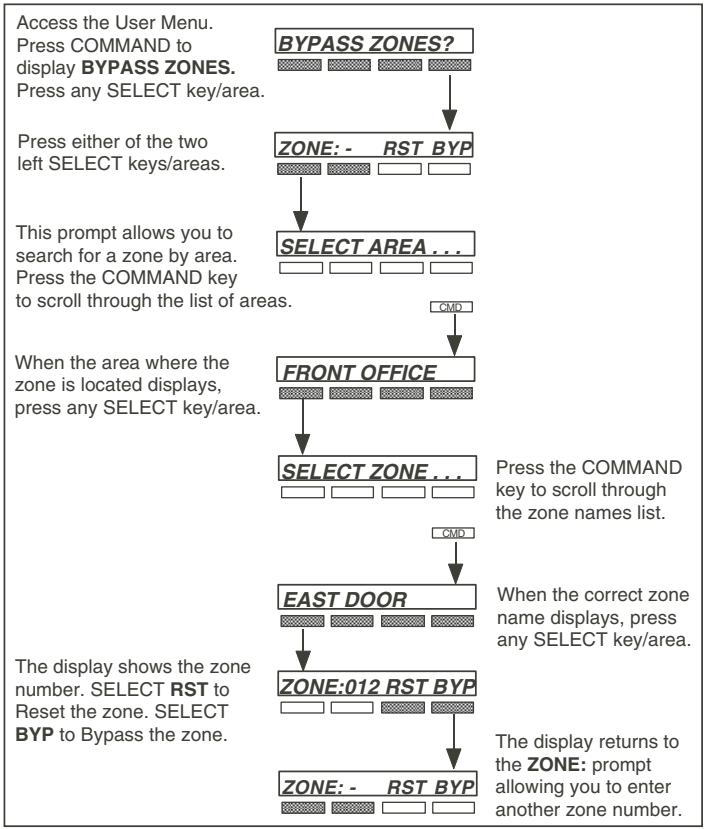
Note: Trouble and Restore events display WIRELESS as the device.

Appendix B

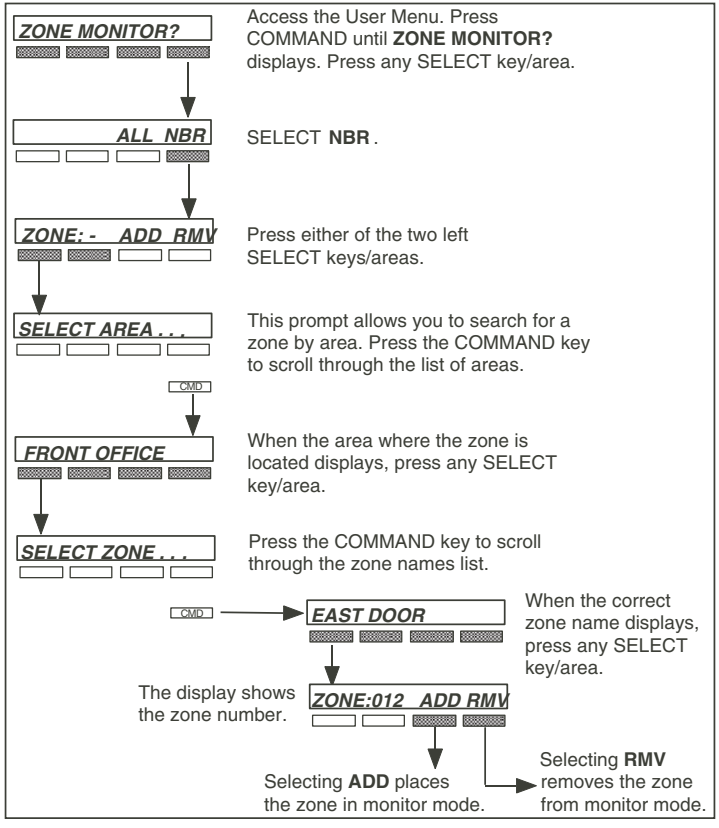
Zone Status Browser



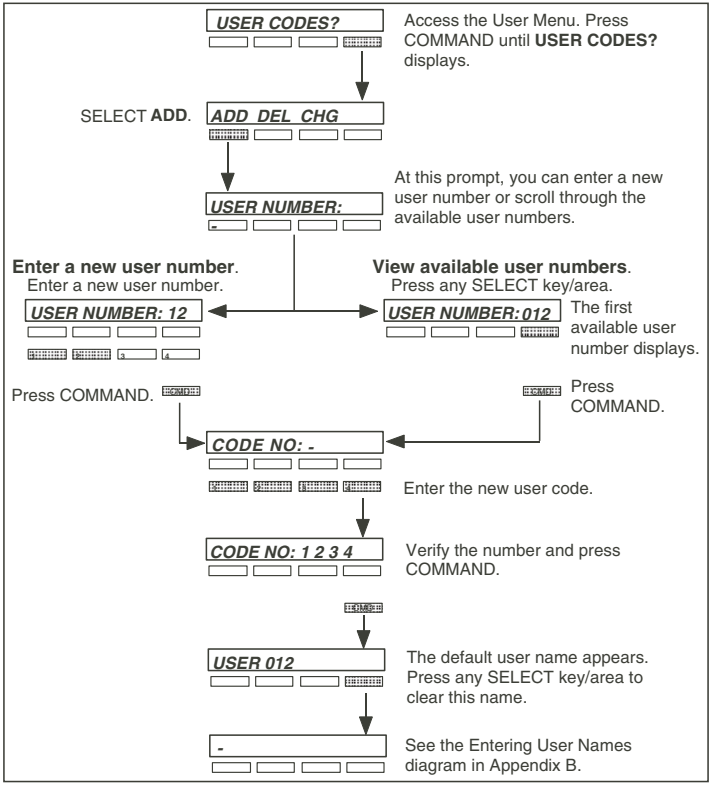
Bypass Zones Browser



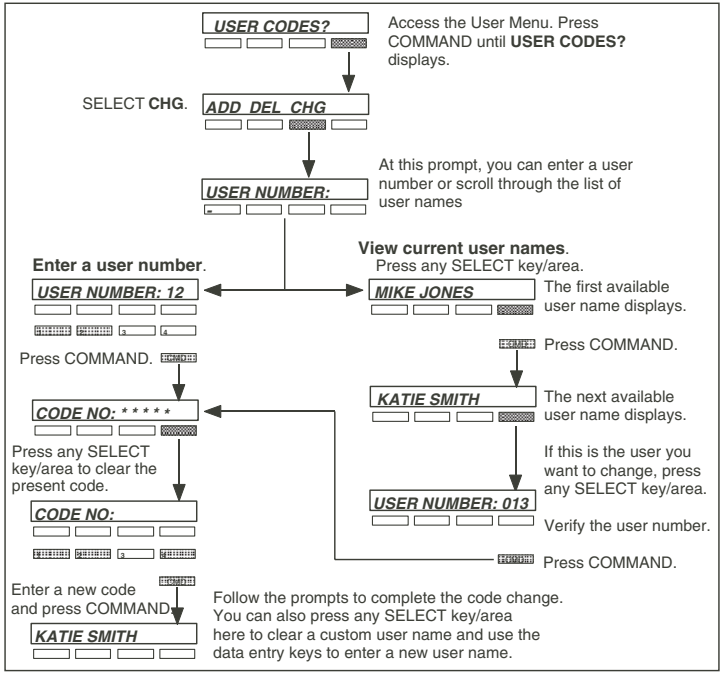
Zone Monitor Browser



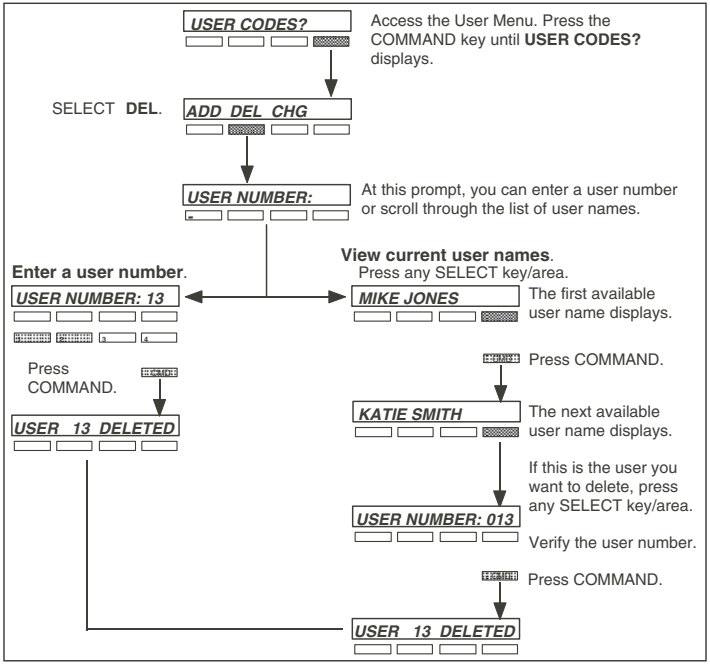
Add User Codes Browser



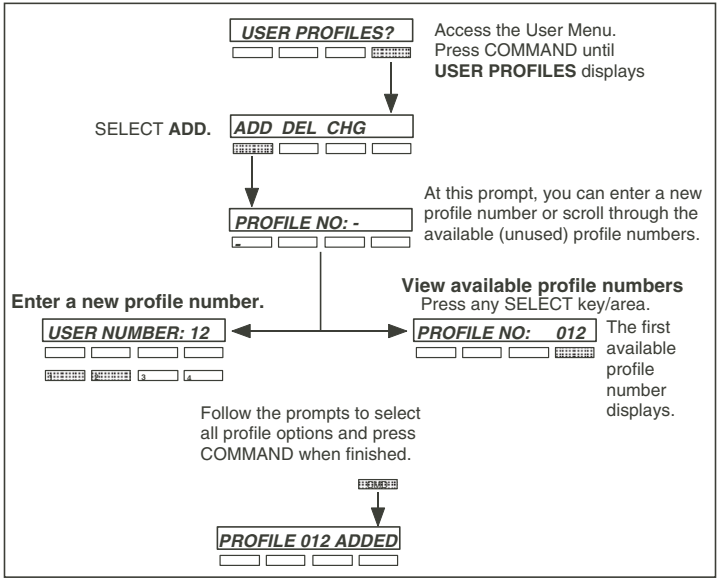
Change User Codes Browser



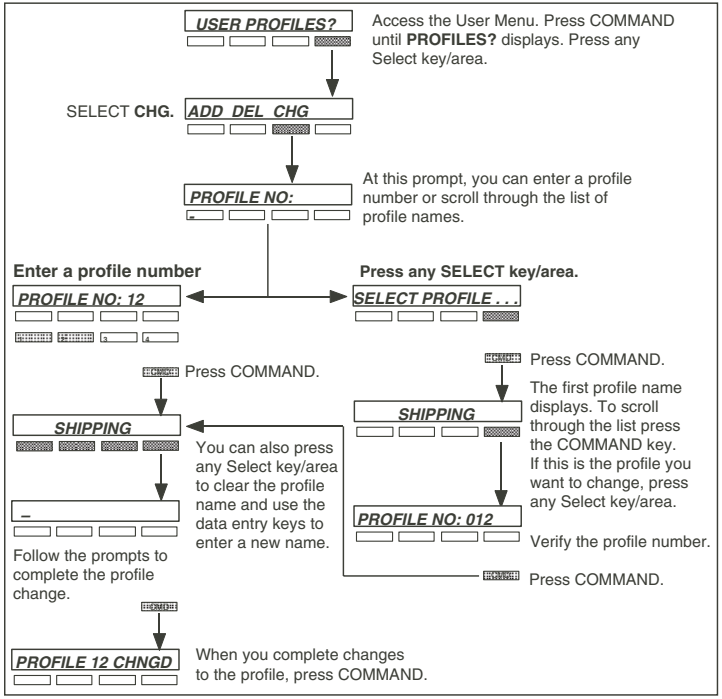
Delete User Codes Browser



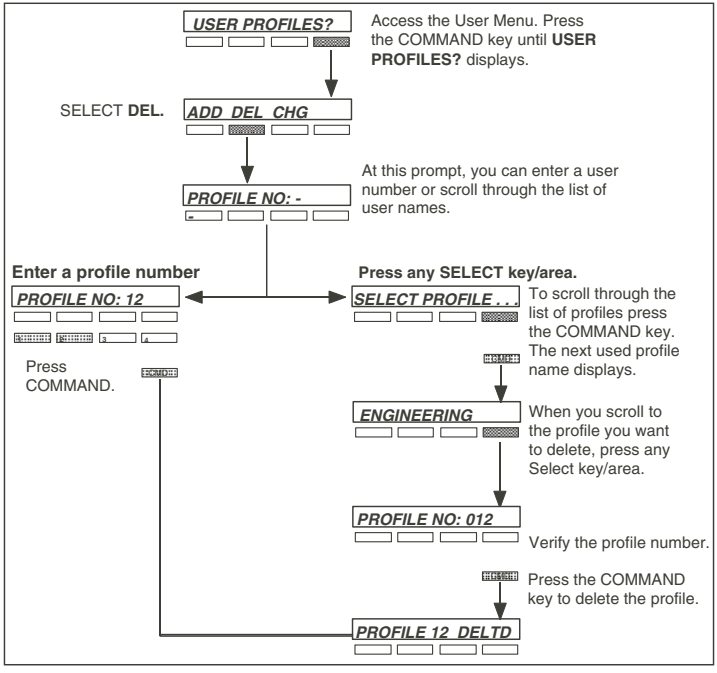
Add User Profiles Browser



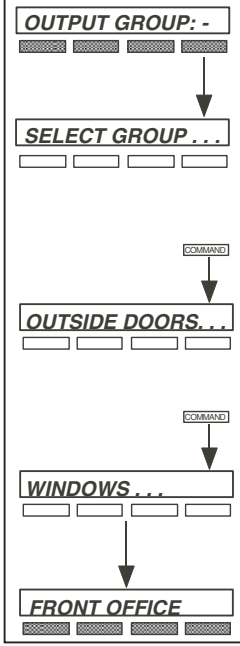
Change User Profiles Browser



Delete User Profiles Browser



Output Groups Browser



Access OUTPUT GROUP: - in the USER PROFILES? menu. Press any Select key/area.

At this prompt you can scroll through the list of output group names.

Press COMMAND.

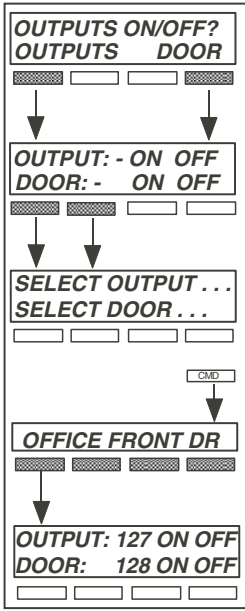
The first output group name displays.

Press COMMAND.

The next output group name displays.

Press any Select key/area and the output group number displays.

Outputs On/Off Browser



Access the **User Menu**. Press the COMMAND key to display **OUTPUTS ON/OFF?**. Press the Select key/area under **OUTPUTS** or **DOOR.**

Press either of the two left SELECT keys/areas.

This prompt allows you to search for a door or an output. Press the COMMAND key to scroll through the list of doors or output names.

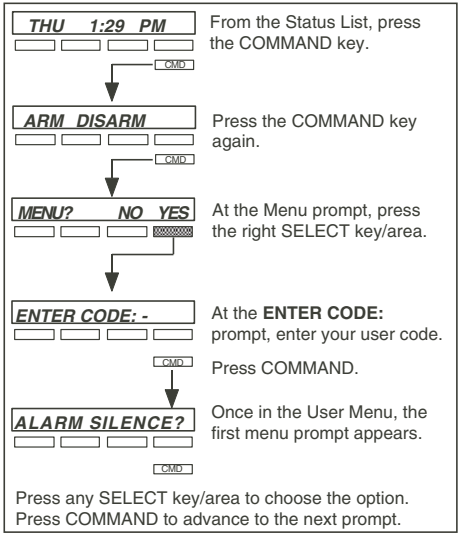
When the door or output you want displays, press any Select key/area.

The display shows the door or output number.

Appendix C

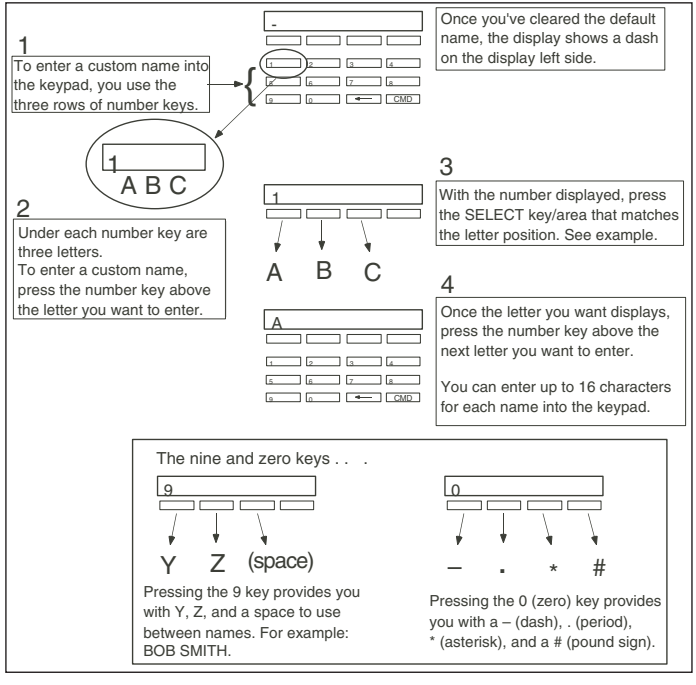
User Disarm and Entry

Use the following steps to disarm your system and silence an alarm.



Entering User Names

Refer to the following when entering names information into the keypad.



Appendix D

DMP Wireless Description

If your system uses DMP Wireless devices and includes key fob(s), refer to the following information. The DMP Wireless section includes a brief discussion of key fob(s) and a drawing identifying the key fob buttons. Refer to the System Setup section of this guide to check the button programming list for key fob(s) connected to your system.

For best operation, allow the LED to light and turn off before pressing another button. The key fob may not complete sending the signal for the button press if another button is pressed too soon.

LED Status Operation

Depending on the programmed action of a key fob button, the Status LED lights to acknowledge a button press or to indicate the armed state of the system.

- When the button is programmed for Panic, Panic 2, Emergency, Emergency 2, Output, or Sensor Reset, a 1/2 second Green light displays to acknowledge the button press.
- When the button is programmed for Arm, Disarm, Toggle arm/disarm, or Status, the system armed status is received by the key fob and the LED lights once as shown in the table below.

LED Color	Duration	Description
Red	2.0 Seconds	All System On
Green	2.0 Seconds	All System Off
Green/Red	2.0 Seconds	System On (Some Areas Armed)

When a button programmed as Unused is pressed, the LED does not operate.

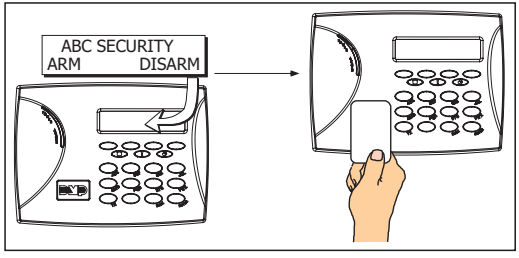
Appendix E

Easy Entry™ User's Guide

Door Strike

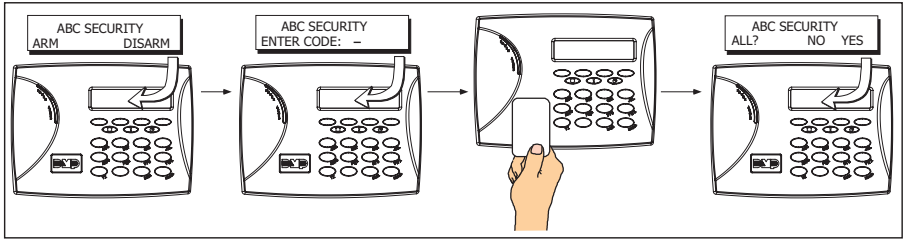
From the Status List, present your card to the reader. Once validated by the system, the Door Strike relay activates. If you are entering an armed area to which you are assigned, accessing the area automatically causes it to be disarmed.

While the keypad displays the Status List, present your access card. The relay activates momentarily during which you must open the door. Once you open the door, you have 30 seconds to exit and close the door before the zone 2 Soft-Shunt expires and triggers an alarm.



Arming and Disarming an Area System

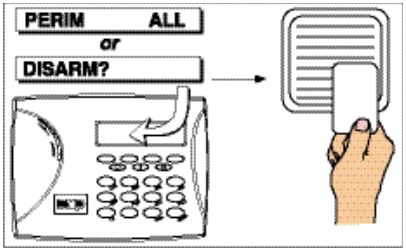
Press Command, the keypad displays **ARM DISARM**. Press the Select key under the desired option. The keypad displays **ENTER CODE-** . Present your card to the reader. Once validated by the system, all areas assigned to your code arm or disarm automatically. Select **NO** to arm or disarm individual areas. Select **YES**, or simply wait, and the keypad automatically arms or disarms all areas for which you are authorized.



Arming and Disarming an All/Perimeter System

Press COMMAND. The keypad displays **PERIM ALL** (when arming) or **DISARM?**. Press the Select key under the desired option. The keypad displays **ENTER CODE: -**.

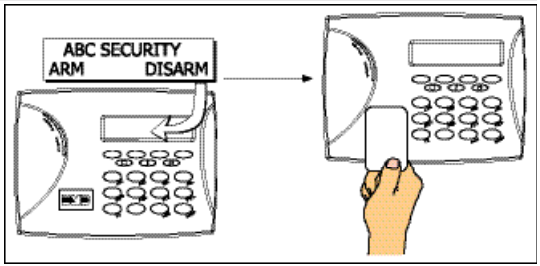
Present your card to the reader. Once the system validates the card, if you choose **PERIM,** only the perimeter arms. If you choose **ALL,** both areas arm. If programmed on a 32-character keypad, **ALL** may be automatically chosen for you after a short delay. Present your card to the reader and all armed areas disarm automatically.



Arming and Disarming a Home/Sleep/Away System and a Home/Sleep/Away with Guest System

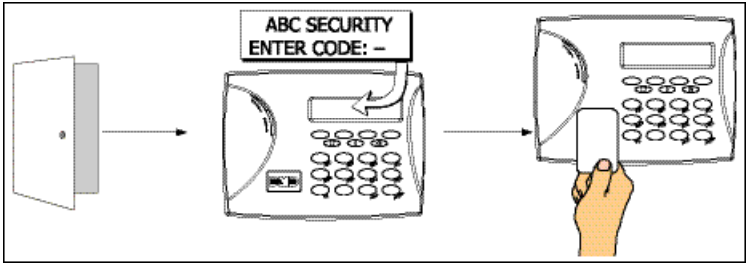
Present your card to the reader. If the system is armed, once the system validates the card, all areas are disarmed and the keypad displays **ALL SYSTEM OFF**.

If the system is disarmed when you present your card, once the system validates the card, **HOME SLEEP AWAY** displays. You can manually press the Select key under the desired option or after short time all areas may be automatically armed in the **AWAY** mode.



Disarming with Entry Delay

All Systems - Once the protected door is opened and the entry delay starts, the keypad displays **ENTER CODE: -** . Present your card to the reader. Once validated, the system disarms all areas accessible by you. Area systems provide a delay to allow selected areas only to be disarmed. See Arming and Disarming above and on the previous page.



Using the Access Reader for User Menu Access

You can also use a card reader to access the User Menu. When **MENU? NO YES** displays, select YES and enter a code when requested.

Appendix F

Email/Cell Phone Message User's Guide

Your security system's reporting capability can be used to send reports to an email address or cell phone number in much the same way as someone sending you an email would do. You can receive reports of alarms, troubles, or system arming and disarming and know at a glance your system status.

The following are types of messages that can be sent:

* Zone Alarms by Zone Name
* Zone Troubles by Zone Name
* Zone Bypass by User
* Armings (Closings) by User
* Disarming (Openings) by User
* Late to Close
* AC Power (and restoral)
* System Low Battery
* Ambush
* Abort & Cancel by User
* Alarm Verified by User
* System Test

For alarm messages, the message provides the system name, zone name, zone number, message type, and the time at which the panel sent the message.

For alarm messages sent to a cell phone number, you have the option to reply with "cancel" to cancel the existing alarm.

From: John's Home System (mailto: AlarmAdmin@ABCSecurity.com)
Sent: Wednesday, October 07, 2009 8:33 AM
To: JohnSmith@myhome.com
Subject: Fire Alarm Message

The John's Home System has a **Fire Alarm** on the Hall Smoke Alarm.
Message sent at: 8:31 AM

From: John's Home System (mailto: AlarmAdmin@ABCSecurity.com)
Sent: Wednesday, October 07, 2009 9:01 AM
To: JohnSmith@myhome.com
Subject: Check-in Message

Cindy H has checked in at the John's Home System.
Message sent at: 9:00 AM

From: John's Home System (mailto: AlarmAdmin@ABCSecurity.com)
Sent: Wednesday, October 07, 2009 10:05 AM
To: JohnSmith@myhome.com
Subject: System Message

John's Home System has an AC Power Failure.
Message sent at 10:02 AM

Examples of email messages

In Touch™ Text Messaging Commands

Your system may be programmed to allow simple text messages to be sent to the security system to perform basic user operations. By texting a message from your cell phone or PDA, the following actions can be performed: Arm/Disarm, Cancel Alarm, turn Outputs On/Off, and check Armed Status.

The user that is texting commands to the system must have the authority to perform the commands as if it occurred at the keypad. The cell phone number and user numbers are setup during programming.

After programming is completed, you will receive a welcome message text from the panel. Write down the phone number that the message comes from. This will be the number you use to text user operations to the system.

Note: When texting commands listed below, the commands can be either upper or lowercase.

A list of In Touch™ SMS Text commands can be obtained by texting "help" to the system phone number. Store this number in your cell phone and write the number on the Quick Reference Wallet Card located at the back of this manual.

Arming All Areas with Text Message Commands

1. Text message your system panel with the following command:
   - ARM, AWAY, or ALL: To arm all areas, depending on your system

Arming Partial Areas with Text Commands

1. Text message your system panel with the following command:
   - SLEEP: To arm the perimeter and interior of a Home/Sleep/Away system.
   - HOME: To arm just the perimeter of a Home/Away/Sleep system.
   - PERIM: To arm the perimeter of an All/Perimeter system.
   - ARM "Area Number" or ARM "Area Name": To arm specific areas of an Area system.

The NAME should identify the area name. The NUMBER should identify the area number. Names and numbers can be mixed. A comma should be used to separate areas. If only ARM is sent, all areas are armed.

If the system is already armed, you can arm it again only if you are arming more areas than were originally armed.

Disarming All Areas with Text Message Commands

1. Text message your system panel with the following command:
   - DISARM: To disarm all areas.

Disarming Partial Areas with Text Message Commands

1. Text message your Area system panel with the following command:
   - DISARM "Area Number" or DISARM "Area Name": To disarm specific areas of an Area system.

The NAME should identify the area name. The NUMBER should identify the area number. Names and numbers can be mixed. A comma should separate the areas. If only DISARM is sent, all areas will be disarmed.

If the system is already disarmed, you will receive a message saying the system is already disarmed.

Cancelling an Alarm with Text Messaging

While the alarm bell or siren sounds, you may choose to cancel the alarm via text messaging.

1. If a valid alarm has not occurred, text **CANCEL** to disarm the system and cancel the alarm.

Turning Outputs On/Off/Momentary with Text Messaging

Allows you to set the state of any output to on, off, or momentary.

1. To set the Output to ON Steady, text ON followed by the Output name or number. For example, to turn Output 3 on, you would text: ON 3 or ON LIGHTS.
2. To turn the Output to OFF, text OFF followed by the Output name or number. For example, to turn Output 3 off, you would text: OFF 3 or OFF LIGHTS.
3. To turn the Output to ON MOMENTARY (the output turns on for one second, and then off), text MOMENTARY followed by the Output name or number. For example, to turn Output 3 to momentary, you would text: MOMENTARY 3 or MOMENTARY LIGHTS.

Check Armed Status Text Command

Allows you to check the system armed status. If armed, the system will send a message stating the type of system you have followed by ON, such as ALL SYSTEM ON or HOME SYSTEM ON. If disarmed and no open zones, the system will send SYSTEM READY. If disarmed with open zones, it will send SYSTEM NOT READY followed by any open zones. A message of AC POWER TROUBLE will indicate when a power failure occurs. If in alarm or trouble, the system will send ALARM ON or TROUBLE ON followed by up to 3 zone names that are in alarm or trouble.

1. To receive the Armed Status, text: STATUS.

Subscribe to Text Messages

Allows you to set which text messages you receive from the panel. When your system is programmed to allow text messages, you will automatically be subscribed to ALL as described below. To change your subscription status, follow the instructions below for desired messages.

1. Text the words SUBSCRIBE STATUS ALL to receive a text message for all arming and disarming occurrences in addition to any alarm.
2. Text the words SUBSCRIBE STATUS NONE to not receive a text message for arming and disarming occurrences, but still receive a text message for any alarm.
3. Text the words SUBSCRIBE STATUS OTHERS to receive a text message for all arming and disarming occurrences originating from other users, in addition to any alarm. This option will send a text message for all arming and disarming occurrences except for the ones you initiate at a keypad.
4. Text the word SUBSCRIBE to show the current subscription status and the available subscription options.

Frequently Asked Questions

This section attempts to answer questions you might have regarding system operation.

Q. If I bypass an exit delay door when I arm the system, will I get an alarm if I come through it later?

A. You will not get an alarm from the door because it is bypassed, but if you happen to walk through a motion detector space or other armed door inside the premises an alarm activates.

Q. When I arm or disarm my Area system, **ALL? NO YES** displays. Does this mean all areas in the system?

A. Selecting **YES** arms or disarms all areas that are authorized for your user code.

Q. How do I create a schedule that starts at 8:00 AM on Monday and ends at 5:00 PM on Friday.

A. In the days of the week display, select **MON** (Monday). For the **OPENING TIME?**, enter 0 + 8 + 0 + 0 AM. For the **CLOSING TIME?**, at the **MON — : AM PM** display, select **MON**; this scrolls through the days of the week. Stop at the day you want the schedule to end. Next, enter 0 + 5 + 0 + 0 PM into the **FRI — : AM PM** closing time display. Press COMMAND. Press the Back Arrow key to exit the User Menu.

This sets the opening time to 8:00 AM Monday and the closing time to 5:00 PM Friday. You can substitute any other day or time in this example.

Q. What do I do if I want to be in the building past the scheduled closing (arming) time?

A. If your system is programmed for closing check, the keypad emits a steady tone prior to the system arming. During this tone, press any Select key to display **ENTER CODE:** . Enter your user code and press COMMAND.

The keypad now displays **2HR 4HR 6HR 8HR**. Select the number of hours to extend the schedule. If the system is not armed by the scheduled closing time, a Late to Close report is sent to the central station. If the schedule is extended, a Schedule Change report may be sent to the central station.

Common Keypad Displays

Listed below are several keypad messages you may see on the display. Follow the instructions in the Possible Solutions column to correct the problem. In many cases, you need to call a service person to correct the problem. Displays that are not discussed here mean that your service representative should be called.

Message	Meaning	Possible Solutions
INVALID AREA	The user has attempted a door access for an area they are not assigned.	Change the user access areas if access to the area is needed. If access is not needed, the user cannot enter the area.
INVALID CODE	The user code you entered is not recognized by the system.	Check the user code and try again.
INVALID PROFILE	A user has attempted a function that is outside of the assigned profile.	Check the user profile settings.
INVALID TIME	A user code assigned to a specific schedule has entered outside of the valid schedule.	See Schedules and User Codes.
ENTER 2ND CODE	The area you are attempting to disarm or access is a Two Man Area.	A second and different user code must be entered.
CLOSING TIME	The scheduled has expired but the area has not been armed.	Users still on the premise should arm the system or extend the schedule to a later time.
LATE TO CLOSE	The system was not armed at its scheduled closing time.	Users still on the premise should arm the system or extend the schedule to a later time.
FAILED TO EXIT	A user assigned the anti-passback option has attempted to re-enter an area from which they did not exit properly.	The user must exit the area through the proper door. If not possible, your system administrator should select the Forgive option in the User Codes menu.

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Milestone Systems

XProtect® Professional 8.1

Administrator's Manual

milestone

The Open Platform Company

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CLEAR YOUR INTERNET BROWSER'S CACHE UPON UPGRADE ..... ERROR! BOOKMARK NOT DEFINED.

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DOWNLOAD MANAGER ..... ERROR! BOOKMARK NOT DEFINED.

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All names of people and organizations used in the examples in this text are fictitious. Any resemblance to any actual organization or person, living or dead, is purely coincidental and unintended.

This product may make use of third party software for which specific terms and conditions may apply. When that is the case, you can find more information in the file **3rd_party_software_terms_and_conditions.txt** located in your Milestone surveillance system installation folder.

XPP81-am-1(a2)-100912

Introduction

XProtect Professional overview

XProtect Professional is the right product for small to mid-sized installations that need robust single-server surveillance software with the full functionality of advanced management, flexible scheduling, fast searching and analysis. XProtect Professional supports up to 64 simultaneously with the widest choice of network video and computer hardware equipment.

XProtect Professional consists of a number of components, each targeted at specific tasks and user types:

Name	Description
Management Application	The main application used by surveillance system administrators for configuring the XProtect Professional surveillance system server, upon installation or whenever configuration adjustments are required, for example when adding new cameras or users to the system.
Recording Server service	A vital part of the surveillance system. Video streams are only transferred to XProtect Professional while the Recording Server service is running. The Recording Server service is automatically installed and runs in the background on the XProtect Professional surveillance system server. You can manage the service through the Management Application.
Event Server	Handles configuration of alarms and maps from all servers within XProtect XProtect ProfessionalXProtect Professional installations—including Master & Slave setups (see "Configure master and slave servers" on page 175)—throughout your organization. This enables monitoring and instant overview of alarms and possible technical problems within your systems. The event server is automatically installed on, and runs in the background of, the XProtect Professional surveillance system server.
Microsoft® SQL Server Express Database	The surveillance system's alarm data is stored in a SQL Server Express database. The SQL database is a lightweight, yet powerful, version of a full SQL server which is automatically installed on, and runs in the background of, your XProtect Professional surveillance system server.
Image Server service	Handles access to the surveillance system for users logging in with clients. The Image Server service is automatically installed and runs in the background on the XProtect Professional surveillance system server. You can manage the service through the Management Application.
Download Manager	Manage which XProtect Professional-related features your organization's users will be able to access from a targeted welcome page on the surveillance system server.

Name	Description
XProtect® Smart Client	Designed for Milestone XProtect surveillance systems, the XProtect Smart Client is a powerful, easy-to-use client application for the daily operations of security installations. A new, streamlined interface helps improve usability, making it easy to monitor installations of all sizes, manage security incidents and access and export live and recorded video. We recommend that you always use the latest version of the Smart Client to best use any possible new features and functions included in your XProtect Professional surveillance system.
XProtect® Mobile client	A free application designed by Milestone that allows you to view video from your XProtect Professional surveillance system from almost anywhere on your smartphone or tablet. You can also control outputs, such as opening and closing doors and switching lights on or off, allowing you to gain control and dynamically respond to incidents in the system.
XProtect® Web Client	A simplified web-based client application for XProtect surveillance systems for viewing, playing back and sharing video from most operating systems and web browsers. With no need to install additional software, you can monitor your XProtect system from any Internet-enabled computer or device.

Clients

Clients are applications used for viewing live and recorded video from the hardware devices set up in the Management Application.

XProtect Smart Client

About XProtect Smart Client

The XProtect Smart Client has many features and prepares for future integration of plugins, etc. The Smart Client must be installed on users' computers.

Surveillance system administrators manage clients' access to the surveillance system through the Management Application. Recordings viewed by clients are provided by the surveillance system's Image Server service. The service runs in the background on the surveillance system server. It does not require separate hardware.

To download a Smart Client, users connect to the surveillance system server which will present them with a welcome page. The welcome page will list the available clients and language versions. Surveillance system administrators use the Download Manager to control which clients and language versions should be available to users on the welcome page.

The Smart Client is unlicensed and can be freely downloaded and installed as many times as needed.

Install the XProtect Smart Client

The XProtect Smart Client must be installed on your computer before you can use it. Typically, you download the XProtect Smart Client from the surveillance system server, then install it on your computer. Alternatively, your surveillance system administrator may ask you to install the XProtect Smart Client from a DVD.

Tip: To uninstall the XProtect Smart Client, follow the normal Windows procedure for uninstalling programs (see the Windows Help for more information).

Surveillance system administrators: For information on silent installation (when available), see the separate administrator's documentation for your surveillance system's server software.

- **Install from the surveillance server** (on page 14)
- **Install from a DVD** (on page 15)

Install from the surveillance server

1. Verify that your computer meets the XProtect Smart Client's minimum system requirements.
2. Open an Internet Explorer browser (version 6.0 or later) and connect to the surveillance system server using the URL or IP address specified by your system administrator.
3. On the Welcome page, click **Language** and select your required language.

Tip: You can easily change the language in the **Options** menu of the XProtect Smart Client. Under XProtect Smart Client **Installers**, click the relevant XProtect Smart Client link to start the installer.

4. If you receive a security warning (**Do you want to run or save this file?**, **Do you want to run this software?** or similar), accept this (by clicking **Run** or similar—the exact name depends on your browser version).

5. The XProtect Smart Client **setup** wizard starts. In the wizard, follow the installation instructions.

The wizard suggests an installation path. Normally, you can use the suggested installation path. However, if you have previously used add-on products, such as XProtect Analytics or XProtect Transact, this path might not be valid anymore (see "Install from a DVD" on page 15).

Install from a DVD

1. Verify that your computer meets the XProtect Smart Client's minimum system requirements.

2. Insert the surveillance system software DVD, select the required language, and then click **Install** XProtect Smart Client.

3. If you receive a security warning (**Do you want to run or save this file?**, **Do you want to run this software?** or similar), accept this (by clicking **Run** or similar—the exact name depends on your browser version).

4. The XProtect Smart Client **installation** wizard starts. In the wizard, follow the installation instructions.

MIP Plug-ins

Your XProtect Smart Client may contain a **MIP Plug-ins** pane. The pane is used for handling plug-in functionality, typically for third-party applications, for example an access control system or similar, which can be controlled through the XProtect Smart Client. If your **MIP Plug-ins** pane has no content, it is because your XProtect Smart Client has no plug-in functionality.

On some surveillance systems, you can add more types of content to views in your XProtect Smart Client. This may be the case if your organization uses add-on products for increasing the capabilities of its surveillance system.

Examples:

- XProtect Transact, which is used for tracking transactions from cash registers, ATMs, etc. linked with video recordings

- XProtect Analytics, which provides video content analysis tasks such as license plate recognition, perimeter protection, left-objects detection, etc.

The XProtect Professional plug-in for XProtect Analytics can only run on a 32-bit version of the XProtect Professional. The plug-in cannot run on a 64-bit installation. By default, in XProtect Professional versions **earlier than 4.0a**, the XProtect Professional is installed in:

```
C:\Program Files\Milestone\Milestone XProtect Professional\
```

and plug-ins for add-on products are installed in:

```
C:\Program Files\Milestone\Milestone XProtect Professional\plugin
```

By default, in XProtect Professional **version 4.0a and later**, the XProtect Professional is installed in:

```
C:\Program Files\Milestone\XProtect Professional\
```

and plug-ins for add-on products are installed in:

```
C:\Program Files\Milestone\XProtect Professional\plugin
```

The change to the default installation path means that if you have plug-ins for add-on products for XProtect Professional versions earlier than 4.0a, these plug-ins will not work with your new XProtect Professional because your new XProtect Professional will look for plug-ins at a different location.

If you want your new XProtect Professional to work with older plug-ins for add-on products, the solution is therefore either:

to copy the existing plug-ins from the old default installation path for plug-ins to the new default installation path for plug-ins

- or -

to change the XProtect Professional installation path to the old default, C:\Program Files\Milestone\Milestone XProtect Professional\, during the installation of your new XProtect Professional.

Install silently

1. Locate the Smart Client installation program (.exe) file - **MilestoneXProtectSmart Client.exe** or **MilestoneXProtectSmart Client_x64.exe** for 32-bit and 64-bit versions respectively. You find the file in a subfolder under the folder **httpdocs**. The **httpdocs** folder is located under the folder in which your Milestone surveillance software is installed.

   The path is typically:
   C:\Program Files (x86)\Milestone\Milestone Surveillance\httpdocs\Smart Client Installer\[version number] [bit-version]\All Languages\en-US

   For example:
   C:\Program Files (x86)\Milestone\Milestone Surveillance\httpdocs\Smart Client Installer\6.0a (32-bit)\All Languages\en-US

2. Run a silent installation using one of the following two options:

a Run with default parameter settings:

To run a silent installation using the default values for all parameters, start a command prompt (cmd.exe) in the directory where the installation program is located and execute following command:

For XProtect Smart Client installation:

>MilestoneXProtectSmart Client.exe -–quiet

For XProtect Professional installation:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --quiet

This will perform a quiet installation of the XProtect Smart Client/XProtect Professional using default values for parameters such as target directory etc. To change the default settings, please see next topic.

b Customize default parameters using an xml argument file as input:

In order to customize the default installation settings, an xml file with modified values must be provided as input. In order to generate the xml file with default values, open a command prompt in the directory where the installation program is located and execute following command:

For XProtect Smart Client:

> MilestoneXProtectSmart Client.exe --generateargsfile=args.xml For XProtect Professional:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --generateargsfile=args.xml

Open the generated args.xml file, using for example Notepad.exe, and perform any changes needed. Then, in order to run silent installation using these modified values, execute following command in the same directory
For XProtect Smart Client:

>MilestoneXProtectSmart Client.exe --arguments=args.xml --quiet

For XProtect Professional:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --arguments=args.xml --quiet

XProtect Mobile client

About XProtect Mobile client

XProtect® Mobile client is a mobile surveillance solution closely integrated with the rest of your XProtect surveillance setup. It runs on your Android tablet or smartphone or your Apple® device (tablet, smartphone or portable music player) and gives you access to cameras, views and other functionality set up in the Management Application.

In order to use XProtect Mobile client with XProtect Professional, you must add a Mobile server (see "About Mobile server" on page 185) to establish the connection between the XProtect Mobile client and XProtect Professional.

Install XProtect Mobile client

1. Access Google Play or App Store℠ on your device.
2. Search for and download the application XProtect Mobile.
3. Once the download of the application is completed, the XProtect Mobile client application is ready for use on your mobile device.

For detailed information about how to set up your XProtect Mobile client, visit the Milestone website at www.milestonesys.com.

XProtect Web Client

About XProtect Web Client

XProtect Web Client is a web-based and touch-enabled surveillance solution that provides users access to view live video, play back recorded video, print and export evidence, and more (access to features depend on individual user rights).

In order to use XProtect Web Client with XProtect Professional, you must add a Mobile server (see "About Mobile server" on page 185) to establish the connection between the XProtect Web Client and XProtect Professional.

Access XProtect Web Client

If you have an XProtect Mobile server (see "About Mobile server" on page 185) installed on your computer, you can use the XProtect® Web Client to access your cameras and views. Since you do not need to install XProtect Web Client, you can access it from the local computer on which you installed the XProtect Mobile server or any other computer you want to use for this purpose.

To access the XProtect Web Client:

1. Set up the XProtect Mobile server in the Management Application.
2. Open an Internet browser (Internet Explorer, Mozilla Firefox, Google Chrome, Opera, or Safari) or click **Open XProtect Web Client** in the Mobile Server Manager (see "About Mobile Server Manager" on page 191).
3. Type in the IP address and port of the server on which the XProtect Mobile server is running.

   Example: The XProtect Mobile server is installed on a server with the IP address 127.2.3.4 and is configured to accept HTTP connections on port 8081 and HTTPS connections on port 8082 (these port settings are the default settings of the installer).

   In the address bar of your browser, type: http://127.2.3.4:8081/XProtectMobile/Web/ or https://127.2.3.4:8082/XProtectMobile/Web/, depending on whether you want to use a standard HTTP connection or a secure HTTPS connection. You can now begin using the XProtect Web Client.
4. Add the address as a favorite in your browser for easy future access to the XProtect Web Client. If you use the XProtect Web Client on the local computer on which you installed the XProtect Mobile server, you can also use the desktop shortcut created by the installer. When you click the shortcut, this launches your default browser and opens the XProtect Web Client.

Clear your Internet browser's cache upon upgrade

Note that Internet browsers running the XProtect Web Client must have their cache cleared before a new version of the XProtect Web Client can be used. System administrators must ask their XProtect Web Client users to clear out their browser's cache upon upgrade or force this action remotely (this action can only be done in Internet Explorer in a domain).

Recording Server Manager

The Recording Server service is a vital part of the surveillance system. Video streams are only transferred to XProtect Professional while the Recording Server service is running. The Recording Server Manager informs you about the state of the Recording Server service. It also lets you manage the service.

In the notification area (the system tray), the Recording Server Manager's icon indicates whether the Recording Server service is running or not. Green indicates running (default), red indicates not running.

By right-clicking the icon, you can open the Management Application, start and stop the Recording Server service, view log files, and view version information.

A green icon in the notification area indicates that the Recording Server service is running.

A red icon in the notification area indicates that the Recording Server service has stopped.

Monitor System Status

By right-clicking the notification area's Recording Server icon and then selecting **Show System Status**, you get access to the **Status** window.

Tip: Alternatively, simply double-click the icon to open the **Status** window.

The **Status** window lets you view the status of the image server(s) and connected cameras. The status of each server/camera is indicated by a color:

- **Green** indicates that the server or camera is running correctly.
- **Gray** indicates that the **camera** (not the server) is not running. Typically, a camera will be indicated in gray in the following situations:
  - The camera is not online (as defined in the camera's online period schedule (see "Online period" on page 156)).
  - The Recording Server service has been stopped.
- **Red** indicates that the server or camera is not running. This may because it has been unplugged or due to a network or hardware error. Errors are listed in the Recording Server log file.

Place your mouse pointer over a camera in the status window to view details about the camera in question. The information appears as a pop-up and updates approximately every 10 seconds.

Name	Description
Resolution	The resolution of the camera.
FPS	The number of frames per second (frame rate) currently used by the camera. The number updates each time the camera has received 50 frames.
Resolution	The resolution of the camera.

Name	Description
Frame count	The number of frames received from the camera since the Recording Server service was last started.
Received KB	The number of kilobytes sent the by camera since the Recording Server service was last started.
Offline	Indicates the number of times the camera has been offline due to an error.

Download Manager

The Download Manager lets you manage which XProtect Professional-related features your organization's users can access from a targeted welcome page on the surveillance system server. You access the Download Manager from Windows' **Start** menu: Select **All Programs** > **Milestone XProtect Download Manager** > **Download Manager**.

Examples of user-accessible features

- **The Smart Client**. With a regular Internet Explorer browser, users connect to the surveillance server where they are presented with a welcome page. From the welcome page, users download the Smart Client software and install it on their computers.
- **Language packs**, which let users add additional language versions to their existing Smart Clients. Users download such language packs from the welcome page.
- **Various plug-ins**. Downloading such plug-ins can be relevant for users if your organization uses add-on products with the XProtect Professional system.

The welcome page

The welcome page has links to downloads of various features. It is available in a number of languages; users select their required language from a menu in the top right corner of the welcome page.

To view the welcome page, simply open an Internet Explorer browser (version 6.0 or later) and connect to the following address:

`http://[surveillance server IP address or hostname]`

If the Image Server service has been configured with a port number other than the default port 80 (you configure this as part of the server access properties), users must specify the port number as well, separated from the IP address or hostname by a colon:

`http://[surveillance server IP address or hostname]:[port number]`

The content of the welcome page is managed through the Download Manager; therefore the welcome page will often look different in different organizations.

Initial look

Immediately after you install XProtect Professional, the welcome page will provide access to a Smart Client in all languages. In addition, the Smart Client can be downloaded in 32- or 64-bit if you run a 64-bit operating system and in 32-bit if you run a 32-bit operating system.

This initial look of the welcome page is automatically provided through the Download Manager's default configuration—for more information, see **Default configuration of Download Manager** in the following.

Default configuration of Download Manager

The Download Manager has a default configuration. This ensures that your organization's users can access standard features without the surveillance system administrator having to set up anything.

The Download Manager configuration is represented in a tree structure.

Download Manager's Tree Structure Explained

- The **first level of the tree structure** simply indicates that you are working with a XProtect Professional system.
- The **second level** indicates that this is the default setup.
- The **third level** refers to the languages in which the welcome page is available. In the example, the welcome page is available in a dozen languages (English, Arabic, Danish, Dutch, French, and more).
- The **fourth level** refers to the features which are—or can be made—available to users. For example, these features could be limited to the Smart Client.
- The **fifth level** (**5**) refers to particular versions of each feature, for example, version 4.0, 32-bit, etc. which are—or can be made—available to users.
- The sixth **level** (**6**) refers to the language versions of the features which are—or can be made—available to users. For the Smart Client, which is only available with all languages embedded, the only option is **All Languages**.

The fact that only standard features are initially available helps reduce installation time and save space on the server. There is simply no need to have a feature or language version available on the server if nobody is going to use it.

You can, however, easily make more features and/or languages available as required. See **Making new features available** in the following for more information.

Making new features available

Making new features—plug-ins or special language versions—available to your organization's users involves two steps: first install the required features on the surveillance system server and then use the Download Manager to fine-tune which features you want available on the various versions of the welcome page.

Installing new features on the server

1. If the Download Manager is open, close it before installing new features on the server.

2. Download the relevant installation file(s) to to C:\Program Files\Milestone\Milestone Surveillance\[relevant subfolder, often **Installers** or relevant language folder]. Double-click the required installation (.exe) file.

3. When a new feature has been installed on the surveillance system server, you will see a confirmation dialog. If required, you can open the Download Manager from the dialog.

Making new features available through the Download Manager

When you have installed new features, by default they will be selected in the Download Manager, and immediately be available to users via the welcome page.

You can always show or hide features on the welcome page by selecting or clearing check boxes in the tree structure.

Tip: You can change the sequence in which features and languages are displayed on the welcome page by simply dragging items and dropping them in the required position.

Hiding and removing features

You can remove features in several ways:

- You can **hide features** from the welcome page by clearing check boxes in the Download Manager's tree structure. In that case, the features will still be installed on the surveillance system server, and by selecting check boxes in the tree structure you can quickly make the features available again.

- You can **remove features** which have previously been made available through the Download Manager. This will remove the installation of the features on the surveillance system server. The features will disappear from the Download Manager, but installation files for the features will be kept in the surveillance system server's **Installers** or relevant language folder, so you can re-install them later if required.

  1. In the Download Manager, click **Remove features...**

  2. In the **Remove Features** window, select the features you want to remove.

  3. Click **OK** and then click **Yes**.

Updates

Milestone Systems A/S regularly releases service updates for its products, offering improved functionality and support for new devices.

If you are a surveillance system administrator, we recommend that you check www.milestonesys.com for updates at regular intervals in order to make sure you are using the most recent version of your surveillance software.

Before you start

Minimum system requirements

Surveillance system server:

Name	Description
Operating system	• Microsoft® Windows® XP Professional (32-bit or 64-bit*) • Windows Server 2003 (32-bit or 64-bit*) • Windows Server 2008 R1/R2 (32-bit or 64-bit*) • Windows Vista™ Business (32-bit or 64-bit*) • Windows Vista Enterprise (32-bit or 64-bit*) • Windows Vista Ultimate (32-bit or 64-bit*) • Windows 7 Professional (32-bit or 64-bit*) • Windows 7 Enterprise (32-bit or 64-bit*) • Windows 7 Ultimate (32-bit or 64-bit*).
CPU	Intel® Pentium® 4, 2.4 GHz or higher (CoreTM 2 recommended).
RAM	Minimum 2 GB (4 GB or more recommended).
Network	Ethernet (1 Gbit recommended).
Graphics adapter	AGP or PCI-Express, minimum 1024 x 768, 16-bit colors.
Hard disk type	E-IDE, PATA, SATA, SCSI, SAS (7200 RPM or faster).
Hard disk space	Minimum 1 GB free hard disk space available, excluding space needed for recordings.
Software	• Microsoft .NET 4.0 Framework. • DirectX 9.0 or newer. • Windows Help (WinHlp32.exe) All can be downloaded from http:// www.microsoft.com/downloads/.

XProtect Smart Client

Name	Description
Operating system	• Microsoft® Windows® XP Professional (32-bit or 64-bit*) • Windows Server 2003 (32-bit or 64-bit*) • Windows Server 2008 R1/R2 (32-bit or 64-bit*) • Windows Vista™ Business (32-bit or 64-bit*) • Windows Vista Enterprise (32-bit or 64-bit*) • Windows Vista Ultimate (32-bit or 64-bit*) • Windows 7 Professional (32-bit or 64-bit*) • Windows 7 Enterprise (32-bit or 64-bit*) • Windows 7 Ultimate (32-bit or 64-bit*).
CPU	Intel Core2™ Duo, minimum 2.4 GHz or higher (more powerful CPU recommended for Smart Clients running high number of cameras and multiple views and displays).
RAM	Minimum 1 GB (higher RAM recommended for Smart Clients running high number of cameras and multiple views and displays).
Network	Ethernet (100 Mbit or higher recommended).
Graphics adapter	AGP or PCI-Express, minimum 1024 x 768 (1280 x 1024 recommended), 16-bit colors.
Hard disk space	Minimum 1 GB free hard disk space available.
Software	• Microsoft .NET 4.0 Framework. • DirectX 9.0 or newer.

Administrator rights

When you install XProtect Professional, it is important that you have administrator rights on the computer that should run XProtect Professional. If you only have standard user rights, you cannot configure the surveillance system.

Important port numbers

XProtect Professional uses particular ports when communicating with other computers, cameras, etc.

Make sure that the following ports are open for data traffic on your network when you use XProtect Professional:

Name	Description
Port 20 and 21 (inbound and outbound)	Used for FTP traffic. FTP (File Transfer Protocol) is a standard for exchanging files across networks. FTP uses the TCP/IP standards for data transfer, and is often used for uploading or downloading files to and from servers.
Port 25 (inbound and outbound)	Used for SMTP traffic. SMTP (Simple Mail Transfer Protocol) is a standard for sending e-mail messages between servers. This port should be open since, depending on configuration, some cameras may send images to the surveillance system server via e-mail.
Port 80 (inbound and outbound)	Used for HTTP traffic between the surveillance server, cameras, and Smart Client, and the default communication port for the surveillance system's Image Server service.
Port 554 (inbound and outbound)	Used for RSTP traffic in connection with H.264 video streaming.
Port 1024 (outbound only)	Used for HTTP traffic between cameras and the surveillance server.
Port 1234 (inbound and outbound)	Used for event handling.
Port 1237 (inbound and outbound)	Used for communication with the XProtect Central add-on product (if used by your organization).
Port 22331 (inbound and outbound)	Used for communication with the Event Server service.

Your organization may also have selected to use any other port numbers, for example if you have changed the server access (on page 173) port from its default port number (80) to another port number.

Virus scanning information

Virus scanning uses a considerable amount of system resources on scanning all the data which is being archived or used by the Download Manager. The scanning process may temporarily lock each file it scans, which can further impact system performance negatively.

If allowed in your organization, you should therefore disable any virus scanning of affected areas (such as camera databases, etc.) on the XProtect Professional server as well as on any archiving destinations.

Time server recommended

All images are time-stamped by XProtect Professional upon reception, but since cameras are separate units which may have separate timing devices, power supplies, etc., camera time and XProtect Professional system time may not correspond fully, and this may occasionally lead to confusion.

If your cameras supports timestamps, we recommend that you auto-synchronize camera and system time through a time server for consistent synchronization.

For information about how to configure a time server, try searching www.microsoft.com (see http://www.microsoft.com/ - http://www.microsoft.com/) for **time server**, **time service**, or similar.

Install and upgrade

About installing surveillance server software or XProtect Smart Client silently

If you are a surveillance system administrator, you can deploy the XProtect Smart Client or XProtect Professional to users' computers by using tools such as Microsoft Systems Management Server (SMS). Such tools let you build up databases of hardware and software on local networks. You can then use the databases for distributing and installing software applications, such as the XProtect Smart Client, over local networks.

Install your surveillance server software

Do not install XProtect Professional on a mounted drive. A mounted drive is a drive that is attached to an empty folder on an NTFS (NT File System) volume, with a label or name instead of a drive letter. If you use mounted drives, critical system features may not work as intended. You will, for example, not receive any warnings if the system runs out of disk space.

Prerequisites: Shut down any existing surveillance software. If you are upgrading, read Upgrade from a previous version (on page 29) first.

1. Run the installation file. Depending on your security settings, you may receive one or more security warnings. Click the **Run** button if you receive a warning.
2. When the installation wizard starts, select language for the installer and then click **Continue**.
3. Select if you want to install a trial version of XProtect Professional or indicate the location of your license file.
4. Read and accept the license agreement, and indicate if you want to participate in the Milestone data collection program.
5. Select **Typical** or **Custom** installation. If you select **Custom** installation, you can select application language, which features to install and where to install them.
6. Let the installation wizard complete.

IMPORTANT: If you are installing on a Windows Server 2003 and installation fails, installing a Microsoft hotfix might solve the issue and allow you to complete your XProtect Professional installation. The Microsoft hotfix can be downloaded here:

http://www.microsoft.com/downloads/en/details.aspx?FamilyId=8EFFE1D9-7224-4586-BE2B-42C9AE5B9071&displaylang=en
http://www.microsoft.com/downloads/en/details.aspx?FamilyId=8EFFE1D9-7224-4586-BE2B-42C9AE5B9071&displaylang=en

When you have installed the hotfix, restart the XProtect Professional installation.

You can now begin to configure your XProtect Professional through its Management Application. See more under Get your system up and running (on page 32).

Install silently

1. Locate the Smart Client installation program (.exe) file - **MilestoneXProtectSmart Client.exe** or **MilestoneXProtectSmart Client_x64.exe** for 32-bit and 64-bit versions respectively. You find the file in a subfolder under the folder **httpdocs**. The **httpdocs** folder is located under the folder in which your Milestone surveillance software is installed.

   The path is typically:
   C:\Program Files (x86)\Milestone\Milestone Surveillance\httpdocs\Smart Client Installer\[version number] [bit-version]\All Languages\en-US

   For example:
   C:\Program Files (x86)\Milestone\Milestone Surveillance\httpdocs\Smart Client Installer\6.0a (32-bit)\All Languages\en-US

2. Run a silent installation using one of the following two options:

a Run with default parameter settings:

To run a silent installation using the default values for all parameters, start a command prompt (cmd.exe) in the directory where the installation program is located and execute following command:

For XProtect Smart Client installation:

>MilestoneXProtectSmart Client.exe -–quiet

For XProtect Professional installation:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --quiet

This will perform a quiet installation of the XProtect Smart Client/XProtect Professional using default values for parameters such as target directory etc. To change the default settings, please see next topic.

b Customize default parameters using an xml argument file as input:

In order to customize the default installation settings, an xml file with modified values must be provided as input. In order to generate the xml file with default values, open a command prompt in the directory where the installation program is located and execute following command:

For XProtect Smart Client:

> MilestoneXProtectSmart Client.exe --generateargsfile=args.xml For XProtect Professional:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --generateargsfile=args.xml

Open the generated args.xml file, using for example Notepad.exe, and perform any changes needed. Then, in order to run silent installation using these modified values, execute following command in the same directory
For XProtect Smart Client:

>MilestoneXProtectSmart Client.exe --arguments=args.xml --quiet

For XProtect Professional:

> MilestoneXProtectXProtect ProfessionalInstaller.exe --arguments=args.xml --quiet

Upgrade

About upgrading

When you upgrade from one product to a more advanced product, you get access to new functionality, but you can also expand the use of the functionality that were already available. Your settings from the previous product are transferred to the new product. This means that you will sometimes need to update the settings of your old product in order to make use of the expanded functionality.

For further information about the various differences between products, check the Milestone website at www.milestonesys.com.

Example: If you upgrade from XProtect Go to XProtect Professional, you should, among other things, be aware of:

- Smart Client: In XProtect Go, only one Smart Client can be connected at a time. When you upgrade, you get the possibility of connecting more Smart Clients. Since you come from XProtect Go, the Management Application is set to only allow one Smart Client connection at a time. You can change this setting **manually** in the Management Application. In general, you will gain the full use of Smart Client functionality when upgrading.

- Number of Cameras: XProtect Go allows you to use up to eight cameras at the same time, while XProtect Professional lets you use many more. The number of cameras added will be inherited by the upgraded product, but you must, of course, add any additional cameras to the Management Application yourself.

Upgrade from a previous version

You can upgrade your entire XProtect Professional system configuration from one XProtect Professional version to another. The following information applies if you upgrade from one XProtect Professional version to another and if you upgrade to XProtect Professional from a streamlined product in the XProtect product range.

Back up your current configuration

When you install the new version of XProtect Professional, it inherits the configuration from your previous version.

We recommend that you make regular backups of your server configuration as a disaster recovery measure. You should also do this when you upgrade your server. While it is rare that you lose your configuration (cameras, schedules, views, etc), it **can** happen under unfortunate circumstances. Fortunately, it takes only a minute to back up your existing configuration.

IMPORTANT: If you are upgrading from XProtect Professional 6.5 or earlier, you must back up your configuration before you upgrade.

The following describes backing up XProtect Professional 6.5 or earlier. If you need information about how to back up configuration for XProtect Professional7.0 or newer, see Back up system configuration (on page 201).

1. Create a folder called **Backup** on a network drive, or on removable media.
2. On the XProtect Professional server, open **My Computer**, and navigate to the XProtect Professional installation folder.
3. Copy the following files and folders into your **Backup** folder:
   - All configuration (.ini) files
   - All scheduling (.sch) files
   - The file **users.txt** (only present in a few installations)
   - Folders with a name ending with **...ViewGroup** and all their content

Note that some of the files/folders may not exist if upgrading from old software versions.

If you installed your XProtect Professional as a custom version to a non-default file-path, make a backup of your existing configuration and restore it to a new installation folder called **[relevant folder]\Milestone Surveillance**. When you run the installer, select **Custom** installation and when you are prompted for an installation folder, select the **[relevant folder]** created for restoring.

Remove the current version

You do not need to manually remove the old version of XProtect Professional before you install the new version. The old version is removed when you install the new version. Note, however, XProtect Basis+ versions earlier than 6.0 must be removed manually before installing the new version.

Video device drivers

Video device drivers are installed automatically during the initial installation of your XProtect Professional system. New versions of video device drivers, known as XProtect Device Pack, are released from time to time and made available for free on the Milestone website.

We recommend that you always use the latest version of video device drivers. When you update video device drivers, you can install the latest version on top of any version you may have installed.

IMPORTANT: When you install new video device drivers, your system cannot communicate with camera devices from the moment you begin the installation until the moment installation is complete and you have restarted the Recording Server service. Usually, the process takes no longer than a few minutes, but it is highly recommended that you perform the update at a time when you do not expect important incidents to take place.

1. On the XProtect Professional server on which you want to install the new video device drivers version, shut down any running surveillance software, including any running Recording Server service.
2. Run the XProtect Device Pack installation file and follow the wizard.
3. When the wizard is complete, remember to start the Recording Server service again.

If you use the Add Hardware Devices Wizard's Import from CSV File (on page 52) option, you must—if cameras and server are offline—specify a **HardwareDriverID** for each hardware device you want to add. To view a current list of IDs, view the release notes for the XProtect Device Pack used in your organization. Alternatively, visit the Milestone website for the latest information.

Removal

To remove the entire XProtect Professional surveillance system (that is the surveillance server software and related installation files, the video device drivers, the Download Manager and the Smart Client) from your server, follow the normal Windows procedure for uninstalling programs (see the Windows Help for more information).

Individual components, such as Smart Client and video device drivers, can also be removed individually using the normal Windows procedure for uninstalling programs.

If you remove your XProtect Professional surveillance system, your recordings will not be removed. They will remain on the server even after the server software has been removed. Likewise, the XProtect Professional configuration files will remain on the server. This allows you to reuse your configuration if you install XProtect Professional again at a later time.

Getting started

Get your system up and running

This checklist outlines the tasks typically involved when you set up a working XProtect Professional system. Note that although information is presented as a checklist, a completed checklist does not in itself guarantee that the system matches the exact needs of your organization. To make the system match the needs of your organization, it is highly recommended that you monitor and adjust the system once it is running.

For example, it is often a good idea to spend time on testing and adjusting the motion detection sensitivity settings for individual cameras under different physical conditions (day/night, windy/calm, etc.). Do this once the system is running. The setup of events and associated actions typically also depends on your organization's needs.

You can print and use this checklist as you go along.

Verify initial configuration of cameras and other hardware devices

Before doing anything on XProtect Professional, make sure the hardware devices (cameras, video encoders, etc.) that you want to use are correctly installed and configured with IP addresses, passwords, etc. as specified by the manufacturers. Such initial configuration is required in order to be able to connect the devices to the network and XProtect Professional.

Register your XProtect Professional software

This step may not be required; your XProtect Professional vendor often takes care of the process for you.You must first register your software and next activate your licenses. See Manage licenses **(see "**About activating licenses**" on page 36).**

Install XProtect Professional

See Install surveillance server software **(see "**Install your surveillance server software**" on page 27).** If you are upgrading an existing version of XProtect Professional, see Upgrade from a previous version **(on page 29).**

Open the Management Application

See Access the Management Application**.**

Add hardware devices in XProtect Professional

XProtect Professional can quickly scan your network for relevant hardware devices (cameras, video encoders, etc.), and add them to your system. See Add hardware devices (see "The Add Hardware Devices wizard" on page 45).

Configure cameras in XProtect Professional

You can specify a wide variety of settings for each camera connected to your XProtect Professional system. Settings include video format, resolution, motion detection sensitivity, where to store and archive (see "About archiving" on page 144) recordings, any PTZ (Pan/Tilt/Zoom) preset positions, association with microphones , speakers etc. See About video and recording configuration (on page 78).

Configure events, input and output

If required, system events, for example based on input from sensors, can be used to automatically trigger actions in XProtect Professional. Examples of actions: starting or stopping recording on cameras, switching to a particular video frame rate, making PTZ cameras move to specific preset positions. Events can also be used to activate hardware output, such as lights or sirens. See Overview of events.

Configure scheduling

When do you want to archive? Do you want some cameras to transfer video to XProtect Professional at all times, and other cameras to transfer video only within specific periods of time, or when specific events occur? With the scheduling feature, you can specify this. You can also specify when you want to receive notifications from the system. See Configure general scheduling and archiving (on page 150) and Configure camera-specific schedules (on page 80).

Configure clients' access to XProtect Professional

A number of different client applications (see About clients) is included with XProtect Professional. You can specify whether you want clients to access the XProtect Professional server from the internet, how many clients you want to be able to connect simultaneously, etc. (see Configure server access (on page 172)).

Configure master/slave servers

This step is only required if you want to run several XProtect Professional servers together. A master/slave setup allows you to combine several XProtect Professional servers and thereby extend the number of cameras you can use beyond the maximum allowed number of cameras for a single server. In such a setup, clients will still have a single point of contact: they connect to the master server but also get access, transparently, to cameras and recordings on the slave servers. See Configure master and slave servers (on page 175).

Configure users

Now specify who should be able to access your XProtect Professional system, and how. Do you want password protection for the Management Application? Who should have client access, and with which rights? See Configure User Access wizard (on page 69), Add basic users (on page 178), Add user groups (on page 179) and Configure user and group rights (on page 180).

The above list represents the configuration steps that most administrators are likely to cover. Additional configuration is of course possible, for example if your organization wants to use the Matrix (see "Configure Matrix" on page 159)video sharing feature or similar.

Note that the behavior of the Management Application can be customized (see "Change/restore Management Application behavior" on page 42). Descriptions here are, however, always based on the Management Application's default behavior.

Use the built-in help system

To use the XProtect Professional built-in help system, click the **Help** button in the Management Application's toolbar. Alternatively, press the F1 key on your keyboard.

The help system opens in a separate window and allows you to easily switch between help and XProtect Professional itself. The help system is context-sensitive. This means that when you press F1 for help while you work in a particular XProtect Professional dialog, the help system displays help that matches that dialog.

Navigating the built-in help system

To navigate between the contents of the help system, use the help window's tabs: **Contents**, **Search**, and **Favorites,** or use the links inside the help topics.

- Contents Tab: Navigate the help system based on a tree structure. Many users are familiar with this type of navigation from, for example, Windows Explorer.
- Search Tab: Search for help topics that contain particular terms of interest. For example, you can search for the term **zoom** and every help topic that contains the term **zoom** is listed in the search results. When you double-click a help topic title in the search results list, the required topic opens.
- Favorites Tab: Build a list of your favorite help topics. Whenever you find a help topic of particular interest to you, add the topic to your favorites list. You can then access the topic with a single click—also if you close the help window and return to it later.

Help topics contain various types of links, notably so-called expanding drop-down links. When you click such a link, detailed information is displayed immediately below the link itself and the content of the topic expands. Expanding drop-down links help save space.

Tip: To quickly hide all texts from expanding drop-down links in a help topic, click the title of the topic on the help system's **Contents** tab.

Printing help topics

To print a help topic, navigate to the required topic and click the help window's **Print** button. A dialog box may ask you whether you wish to print the selected topic only or all topics under the selected heading; when this is the case, select **Print the selected topic** and then click **OK**.

Tip: When you print a help topic, it is printed as you see it on your screen. Therefore, if a topic contains expanding drop-down links, click each required drop-down link to display the text to include it when you print. This allows you to create targeted printouts that contain exactly the amount of information you require.

Licenses

About licenses

When you purchase XProtect Professional, you also purchase a certain number of licenses for device channels. Device channels are typically cameras but could also be dedicated input/output boxes. One device channel license enables you to run one camera or one dedicated input/output box. You can use and define an unlimited number of microphones, , speakers inputs, and outputs.

When you have installed the various XProtect Professional components, configured the system, and added recording servers and cameras through the Management Application, the surveillance system initially runs on temporary licenses that need to be activated before a certain period ends. This is called the grace period.

If grace periods have expired on one or more of your devices and no licenses have been activated, recording servers and cameras do not send data to the surveillance system. We therefore recommend that you activate your licenses (see "About activating licenses" on page 36) before you make final adjustments to your system and its devices.

If you want to add—or have already added—more device channels than you currently have licenses for, you must buy additional licenses before the cameras can send data to your XProtect Professional system.

To get additional licenses for XProtect Professional, contact your vendor, or visit www.milestonesys.com to log into the software registration service center. When your license file (.lic) is updated, you can activate your licenses. See Manage licenses for more information on activating.

Tip: If short of licenses—until you get additional ones—you can disable some less important cameras to allow some of the new cameras to run instead. To disable or enable a camera, expand **Hardware Devices** in the Management Application's navigation pane. Then select the relevant hardware device, right-click the required camera, and then select **Enable** or **Disable**.

Which devices require a license?

About replacing cameras

You can replace a camera that is licensed in XProtect Professional and have the new camera activated and licensed instead. The total number of purchased device channels corresponds to the total number of cameras that can run on the surveillance system simultaneously. If you remove a camera from a recording server, you also free a license.

When you replace a camera, you must use the Management Application Replace Hardware Device wizard (see "About the Replace Hardware Device wizard" on page 72) to map all relevant databases of cameras, microphones, inputs, outputs, etc. Remember to activate the license once you are finished.

Overview of license information (on page 36)

About getting additional licenses

If you want to add—or have already added—more device channels than you currently have licenses for, you must buy additional licenses before the cameras can send data to your XProtect Professional system.

To get additional licenses for XProtect Professional, contact your vendor, or visit www.milestonesys.com to log into the software registration service center. When your license file (.lic) is updated, you can activate your licenses. See Manage licenses for more information on activating.

Overview of license information

You get an excellent overview of your XProtect Professional licenses from the Management Application's navigation pane. Expand **Advanced Configuration** and select **Hardware Devices**. This presents you with the **Hardware Device Summary** table.

Name	Description
Hardware Device Name	Hardware devices (typically cameras but could also be dedicated input/output boxes).
License	Licensing status of your hardware devices. Can be either **Licensed**, **[number of] day(s) grace, Trial,** or **Expired**.
Video Channels	Number of available video channels on your hardware devices.
Licensed Channels	Number of video channels on each of your hardware devices for which you have a license.
Speaker Channels	Number of available speaker channels on your hardware devices.
Microphone Channels	Number of available microphone channels on your hardware devices.
Address	http addresses of your hardware devices.
WWW	Links to http addresses of your hardware devices.
Port	Port used by your hardware devices.
Device Driver	Names of device drivers associated with your hardware devices.

You can activate licenses online or offline. On the Management Application's toolbar**,** click **File** and either **Activate License Online** or **Manage License Offline**.

Cameras (or dedicated input/output boxes) for which you are missing a license will not send data to the surveillance system. Cameras added after all available licenses are used are unavailable.

About activating licenses

When you purchase XProtect Professional, you receive a temporary license file (.lic) including a Software License Code (SLC). You must use this temporary license file when you install your system.

Also, in order to get your permanent license, you should register your SLC before you activate licenses.

When you have registered your SLC, you can activate your licenses in two ways: **online** or **offline**.

Tip: If the computer that runs the Management Application has internet access, use online activation.

You cannot activate more licenses than you have bought. If you have added more cameras than you have licenses for, you must buy additional licenses before you can activate them.

Tip: To get an overview of your licenses, go to the Management Application's navigation pane, expand **Advanced Configuration,** select **Hardware Devices** and view your **Hardware Device Summary** table.

In the following examples, it is assumed that XProtect Professional is installed with a temporary license (.lic) file.

About activating licenses after grace period

If the grace period is exceeded before activation, all cameras that are not activated within the given period become unavailable and cannot send data to the surveillance system.

If you exceed the grace period before you activate a license, the license is not lost. You can activate the license as usual.

Configuration, added cameras, and other settings are not removed from the Management Application if a license is activated too late.

Register SLC

If you do not have your SLC, contact your vendor.

1. Go to the Milestone website at www.milestonesys.com, and click the Software registration link in the menu.
2. Log in to the Software Registration Service Center with your user name (e-mail address) and password.

   Tip: If you have not used the Software Registration Service Center before, click the **New to the system?** link, and follow the instructions for registering yourself as a user, then log into the Software Registration Service Center by using your registered user name and password.
3. In the Software Registration Service Center, click the **Add SLC** link.
4. Type your SLC. Confirm that you want to add the SLC to your account, and then click **OK**.
5. Once your SLC has been added, click the **Main menu** link.
6. Click the **Logout** link to log out of the Software Registration Service Center.

   Tip: If you plan to use online activation when you activate your licenses, make sure you use the same user name (e-mail address) and password that you used when you registered the SLC.

Activate License - Online

Precondition

Add at least one device (see "The Add Hardware Devices wizard" on page 45) to your XProtect Professional system.

This starts the grace period of 30 days for the device in question. You must activate a license for the device before the end of the grace period.

Activate a license

On the Management Application's toolbar, click **File**, **Activate License Online**.

1. Specify how many licenses you want for each device, and then click **OK.**
2. Next:
   - If you are **an existing user**, enter your user name and password to log into the Software Registration Service Center.
   - If you are **a new user,** click the **Create new user...** link to set up a new user account in the Software Registration Service Center and then follow the registration procedure. If you have not yet registered your SLC, you must do so, see earlier.
3. When done, click **Activate**.
4. When your temporary license file (.lic) is successfully updated, click **Close**. Your license file (.lic) is now updated and permanent. Updates are visible in your Hardware Device Summary table.

Activate by using this process each time you add a new device.

If you receive an online activation error message

Under rare circumstances, you may receive one of the following error messages during online activation. Should you receive one, the following list of Problems and What to do will help you identify the problem:

- Unable to access license server, Error activating license, License not allowed, Feature not registered, Feature already in use, Failed to login.
  - Problem: Online activation was not possible, either due to a problem on the online activation server itself, a problem with your connection to the online activation server, or to a problem with the specified information (such as username or password).
  - What to do: Contact Milestone Support (support@milestonesys.com), who will investigate the issue for you. If activation has already taken place on another system, activation should not be necessary, as another system is already running with your activated licenses. If you believe that this is wrong, contact Milestone Support (support@milestonesys.com), who will investigate the issue for you.

Activate License - Offline

Precondition

Add at least one device (see "The Add Hardware Devices wizard" on page 45) to your XProtect Professional system.

This starts the grace period of 30 days for the device in question. You must activate a license for the device before the end of the grace period.

Step 1: Export license for activation (offline)

To export a license file with your currently added devices for activation, do the following:

1. On the Management Application's toolbar, click **File**, **Manage License Offline, Export License for Activation.**

2. Specify a file name and a location for the license request (.lrq) file (automatically generated by XProtect Professional). If your computer does not have internet access, use external, removable data storage.

3. If needed, move the external data storage with the .lrq file to a computer with internet access. Open an internet browser and go to Milestone's website at www.milestonesys.com. Select **Software Registration** from the top menu. If you have used the Software Registration Service Center before, log in with your e-mail and password. Otherwise, click **New to the System?** to create a new user account and register your SLC.

1. Under **Current SLCs**, select the SLC**.**

   2. In the menu for SLC properties, use the **Upload LRQ** function to upload the generated .lrq file.

4. Next, you receive the updated permanent license file (.lic) from Milestone via e-mail. Save it to a location accessible from the Management Application.

Step 2: Import license (offline)

When you have received your permanent license file (.lic) from Milestone via e-mail and saved it to a location accessible from the Management Application, you are ready to import it to your surveillance system.

Tip: The following procedure is also used for changing SLC/licenses.

1. On the Management Application's toolbar, click **File**, **Manage License Offline**, **Import License**, and select your saved .lic file to import it**.**

2. When the permanent license file is successfully imported, click **OK.**

Activate by using both step 1 and 2 in this process each time you add a new device.

Change SLC

If you need to change your SLC and you have received a new permanent license file (.lic) from Milestone via e-mail and saved it to a location accessible from the Management Application, you are ready to import it to your surveillance system.

1. On the Management Application's toolbar, click **File**, **Manage License Offline**, **Import License**, and select your saved .lic file to import it**.**

2. When the new permanent license file is successfully imported, click **OK.**

About replacing cameras

You can replace a camera that is licensed in XProtect Professional and have the new camera activated and licensed instead. The total number of purchased device channels corresponds to the total number of cameras that can run on the surveillance system simultaneously. If you remove a camera from a recording server, you also free a license.

When you replace a camera, you must use the Management Application Replace Hardware Device wizard (see "About the Replace Hardware Device wizard" on page 72) to map all relevant databases of cameras, microphones, inputs, outputs, etc. Remember to activate the license once you are finished.

Application settings

About privacy options

To help Milestone improve the usability and customer experience of XProtect Professional, you were presented with the option **Sign me up for the Customer Experience Improvement Program** during the installation of XProtect Professional.

- If you **declined**, **no software** contributing statistical information is included in your XProtect Professional installation.
- If you **accepted**, a cookie issuing a Global Unique IDentifier (GUID) is included as part of your XProtect Professional installation. As a result, XProtect Professional anonymously collects relevant information about your installation and operation of XProtect Professional at regular intervals. See the following for a detailed list of what is collected.

Also, if you accepted, a setting makes it possible to turn the collection of information off or on as needed.

What information is collected from XProtect Professional?

No personal information about the equipment (PC) XProtect Professional is installed on, or about any of the recordings you make.

This is collected:

- The country where the software is installed
- Hardware platform information, such as operating system version, Microsoft .NET framework version, CPU type, and memory size
- XProtect Professional version information
- Information about the number, and type of hardware devices (cameras) used with XProtect Professional
- Information on which XProtect Professional features are used, and how often they are used
- Information about which XProtect Professional menus and buttons are activated, and how often they are used
- Execution time for specific operations in your XProtect Professional installation
- Error reports and exceptions generated by your XProtect Professional installation.

When is information collected from XProtect Professional?

Information is only collected when the Management Application or Smart Client is active.

You can disable the automatic collection of information by either removing XProtect Professional or by disabling it using the Management Application (see earlier for details on how).

How does Milestone protect collected information?

Milestone is committed to protecting the security of the information collected from XProtect Professional installations.

Milestone has implemented security measures to help protect against the loss and misuse of data being collected.

The information is stored in a secure server environment that uses firewall and other advanced technologies to prevent interference or unauthorized access from outside intruders.

Disable information collection

1. In the Management Application toolbar, click **Help**, **Privacy Options**.
2. On the **Privacy Options** tab, clear the Yes, I would like to improve Milestone XProtect Professional information collection check box.
3. Click **OK**.

Change/restore Management Application behavior

You can change the way the Management Application behaves. For example, by default, the Management Application asks you to confirm many of your actions. If you feel this is not necessary, you can change the behavior of the Management Application so it will not ask you again.

1. In the Management Application's menu bar, select **Application Settings** > **Application Behavior...**
2. For each action, you can now select how the Management Application should behave. Examples:
   - When you attempt to delete a hardware device, should the Management Application ask you to confirm that you want to delete the hardware device, or should it delete the hardware device straight away without asking?
   - You can use a maximum of 64 cameras at a time on a single XProtect Professional server. If you add more than 64, should the Management Application warn you or not?

   Note that selectable behavior may vary, depending on the type of action.
3. Click **OK**.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Tip: You can quickly restore default settings by clicking the button below the behavior list.

Change language

The Management Application is available in several languages. To change the language of the Management Application:

1. Go to the Management Application's menu bar and select **Application Settings** and then **Application Behavior**. In the dialog, click **Language**. This will display a drop down list that contains the available languages for the Management Application.
2. Select the relevant language that you want to switch to and then click **OK**.

The Management Application must be restarted for the change of language to take effect.

Analytics events settings

To change Analytic Events (see "Overview of events and output" on page 126) settings in the Management Application, go to the Management Application's menu bar and select **Application Settings** and then **Application Behavior**. In the dialog, click **Analytics Events Settings** and fill in the properties (see "Analytics event settings (for alarms) (properties)" on page 43).

Analytics event settings (for alarms) (properties)

Name	Description
Enabled	Lets you enable the analytics event feature
Port	Specify the port used by this service. Default port is 9090. Make sure that relevant VCA tool providers also use this port number. If you change the port number, make sure that VCA tool providers change their port number accordingly.
All network addresses or Specified network addresses	Specify whether events from all IP addresses/host names are accepted, or only events from IP addresses/host names specified in a list—see the following. In the **Address** list specify a list of trusted IP addresses/host names that you want this service to recognize. The list is used to filter incoming data so that only events from certain IP addresses/host names are allowed. Both Domain Name System (DNS) and IPv4 address formats can be used in the list. You have two ways of adding addresses to the list: either manually or by importing an external list of addresses. Manual entering: type the required IP address/host name in the address list. Repeat for each required address.
Import	Click the **Import...** button to browse for the required external list of addresses. To import an external list, the list must be saved in a .txt file format and each IP address or host name must appear on a separate line in the file. Windows' simple text editor Microsoft Notepad is an excellent tool for creating such .txt files.

Event Server settings

Event Server settings let you configure general settings for alarms and specify the following:

Name	Description
Keep closed alarms for	Specify the number of days for which to keep closed alarms, i.e. alarms in the states Closed, Ignore, and Reject. This is normally set to a low number, such as 3 days, but you can define any number up to 99999 days, server space permitting. The value 0 can be used to indicate keep closed alarms indefinitely, server space permitting.
Keep all other alarms for	Specify the number of days for which to keep all other alarms, i.e. alarms not in the states Closed, Ignore, and Reject. This is normally set to a somewhat higher number, such as 30 days, but you can define any number up to 99999 days, server space permitting. The value 0 can be used to indicate keep all other alarms indefinitely, server space permitting. IMPORTANT: Alarms often have associated video recordings. While the alarm information itself is stored on the event server, the associated video recordings are fetched from the relevant surveillance system server when users wish to view them. Therefore, if it is vital to have access to video recordings from all your alarms, make sure that video recordings from relevant cameras are stored on relevant surveillance system servers for at least as long as you intend to keep alarms on the event server.
Keep logs for	Specify the number of days for which to keep the Alarms log. Default is 30 days. The value of 0 will indicate keep log indefinitely (server space permitting).
Log server communication	Specify if you want to save a separate log of server communication in addition to the regular log for the number of days specified.

Wizards

The Add Hardware Devices wizard

You add cameras and other hardware devices, such as video encoders, to your XProtect Professional system through the **Add Hardware Devices...** wizard. If microphones or speakers are attached to a hardware device, they are automatically added as well.

You can use up to 64 cameras per XProtect Professional server. Note that, if required, it is possible to add more cameras than you are allowed to use. If you use video encoder devices on your system, bear in mind that many video encoder devices have more than one camera connected to them. For example, a fully used four-port video encoder will count as four cameras.

The wizard offers you four different ways of adding cameras:

Name	Description
Express (recommended)	Scans your network for relevant hardware devices, and helps you quickly add them to your system. To use the Express method, your XProtect Professional server and your cameras must be on the same layer 2 network, that is a network where all servers, cameras, etc. can communicate without the need for a router. See Add Hardware Devices wizard - Express (see "Express" on page 46).
Advanced	Scans your network for relevant hardware devices based on your specifications regarding required IP ranges, discovery methods, drivers, and device user names and passwords. See Add Hardware Devices wizard - Advanced (see "Advanced" on page 48).
Manual	Specify details about each hardware device separately. A good choice if you only want to add a few hardware devices, and you know their IP addresses, required user names and passwords, etc. See Add Hardware Devices wizard - Manual (see "Manual" on page 50).
Import from CSV file	Import data about cameras as comma-separated values from a file. An effective method if you are setting up several systems. See Add Hardware Devices Wizard - Import from CSV File (see "Import from CSV file" on page 52).

Express

The Express option scans your network for relevant hardware devices, and helps you quickly add them to your system. With the Express option, the wizard only scans for hardware devices supporting device discovery, and only on the part of your network (subnet) where the XProtect Professional server itself is located.

To use the Express method, **your XProtect Professional server and your cameras must be on the same layer 2 network**; that is a network where all servers, cameras, etc. can communicate without the need for a router. The reason for this is that device discovery relies on direct communication between the XProtect Professional server and the cameras. If you know that routers are used on your network, use the advanced (on page 48) or manual (on page 50) method instead.

When using the Express option, the wizard is divided into these pages:

- Hardware detection and verification (on page 46)
- Overview and names (on page 47)

What is device discovery? Device discovery is a method with which hardware devices make information about themselves available on the network. Based on such information, XProtect Professional can quickly recognize relevant hardware devices, such as cameras and video encoders, and include them in the scan.

Hardware detection and verification

The wizard automatically scans your network for hardware devices, and lists devices real-time as they are detected. All properties on a white background are editable, properties on a **light blue background** cannot be edited.

Wait until the scan is complete. If the scan takes very long, you can stop it with the **Stop Scan** button. The wizard will remember any devices detected up to that point.

When the scan is complete:

1. Go through the list of detected hardware devices to see if it contains unwanted devices. If it does, clear the check box in the **Use** column for each unwanted device.
2. If any hardware devices are missing from the list, verify that the missing hardware devices support device discovery, verify that they are working and connected to the same part of the network as the XProtect Professional server, then click the Rescan button. If hardware devices detected in the first scan cannot be detected in the second scan, the wizard will still remember them.
3. In the User name column, select or type the user name required to access the administrator account on each hardware device. The administrator account gives full access, and XProtect Professional is going to need that for each hardware device. Many organizations use the hardware device manufacturer's default user names for their hardware devices. If that is the case in your organization, select <default> (do not type a manufacturer's default user name as this can be a source of error; trust that XProtect Professional will know the manufacturer's default user name). Other typical user names, such as admin or root are also selectable from the list. If requiring a user name which is not on the list, simply type the required user name.

   Tip: User names you type yourself will subsequently be added to the list, so you can easily select them later.

4. In the Password column, specify the password required to access the administrator account on each hardware device. The administrator account gives full access, and XProtect Professional is going to need that for each hardware device. If the same password is used for all the hardware devices, use the Password field below the list, then click the Set on All button (which becomes available when you specify a password in the field).

   Tip: If you are in doubt about which user name/password to use, ask yourself: Have I previously used a web page to connect to the hardware device and view video? While I did this, was I also able to configure camera settings, such as resolution, etc.? If you can answer yes to both questions, you were probably using the hardware device's administrator account, in which case you will also know the user name/password. If still in doubt, look in the XProtect Device Pack release notes.

5. When you have specified a password for all hardware devices on the list (except unwanted devices), click Next. This will verify that all passwords are correct, and mark each device in the Verified column. If any hardware devices cannot be verified, make sure you have specified the correct passwords.

6. Click Next.The next wizard page provides you with an overview where you can select names for cameras, etc.

Overview and names

The wizard provides you with a detailed overview, listing each camera and microphone/speaker attached to the hardware devices. All properties on a white background are editable, properties on a light blue background cannot be edited.

- All cameras, etc. are by default enabled (selected in the **Enable** column). This means that they can communicate with XProtect Professional. If required, you can disable individual cameras or microphones/speaker, to prevent them from communicating with XProtect Professional.

- All cameras, etc. get automatically generated names based on their type plus a number (examples: Camera 1, Microphone 26). Such names are shown in the **Name** column. If required, you change names manually, or select another name format in the **Auto-generated name format** list.

Name	Description
Device type + number	The default name format. Example: Camera 1.
Custom text - Device type + number	Names will consist of a text of your choice (specified in the **Custom text** field) followed by a dash, type information and a number. Example: Airport Security - Camera 1
Address - Device type + number	Names will consist of the hardware device address followed by a dash, type information and a number. Example: 10.10.123.73 - Camera 1

Name	Description
Custom text - Address - Device type + number	Names will consist of a text of your choice (specified in the Custom text field) followed by a dash, then the hardware device address followed by a dash, type information and a number. Example: Airport Security - 10.10.123.73 - Camera 1
Hardware model - Device type + number	Names will consist of hardware device model information followed by a dash, type information and a number. Example: Axis P1311 - Camera 1
Hardware model - Custom text - Device type + number	Names will consist of hardware device model information followed by a dash, then a text of your choice (specified in the Custom text field), a dash, type information and a number. Example: Axis P1311 - Airport Security - Camera 1
Hardware model - Address - Device type + number	Names will consist of hardware device model information followed by a dash, then the hardware device address, a dash, type information and a number. Example: Axis P1311 - 10.10.123.73 - Camera 1

Tip: Need other name formats? Remember you can change names manually by overwriting all or parts of them in the **Name** column. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

When done, click **Finish**.

Advanced

The Advanced option scans your network for relevant hardware devices based on your specifications regarding required IP ranges, discovery methods, drivers, and device user names and passwords.

When using the Advanced option, the wizard is divided into these pages:

- Device discovery, IP ranges, drivers and authentication (see "IP ranges, drivers and authentication" on page 48)
- Detected and verified hardware devices (on page 50)
- Overview and names (on page 47)

IP ranges, drivers and authentication

All properties on a white background are editable, properties on a **light blue background** cannot be edited.

First specify which IP address ranges you want to scan. By default, the wizard suggests scanning the subnet on which the XProtect Professional server is located. To add additional ranges, or edit existing ones, click the **Add** or **Edit** button as required, then specify:

Name	Description
Start address	Specify the first IP address in the required range.

Name	Description
End address	Specify the last IP address in the required range. The start and end IP address may be identical, allowing you to only scan for a single hardware device.
Use TCP port scanning	If scanning for hardware devices which support TCP/HTTP—most devices do—keep the check box selected.
Perform scanning on port number(s)	Port number(s) on which to scan. If you want to scan on more than one port number, separate them by commas (example: 80,88,90). If you want to scan on a range of port numbers, separate the first and last port number in the range by a colon (example: 80:90 will scan on all ports from 80 up to and including 90). You can also combine individual port numbers and ranges (example: 77,80:90,97,99). Default is port 80. If your hardware devices are located behind a NAT-enabled router or a firewall, you may need to specify a different port number. When this is the case, also remember to configure the router/firewall so it maps the port and IP addresses used by the hardware devices.

Then select which drivers to use when scanning. By default, XProtect Professional will use all known drivers. If your organization only uses certain hardware device makes and/or models, you can achieve faster scanning by selecting only the drives required for those hardware devices. If that is the case, click **Select...**, then in the Select Drivers to Use for IP Scan, select the drivers you want to use when scanning.

Tip: The list of drivers is typically very long, and by default all drivers are selected. With the **Select All** and **Clear All** buttons, you can avoid having to select/clear all check boxes manually.

Next add user name/password combinations required to access the administrator account on each of your hardware devices. The administrator account gives full access, and XProtect Professional will need that for each hardware device.

User name	User name for the hardware device's administrator account. Many organizations use the hardware device manufacturer's default user names for their hardware devices. If that is the case in your organization, select <default> (do not type a manufacturer's default user name as this can be a source of error; trust that XProtect Professional will know the manufacturer's default user name). Other typical user names, such as admin or root are also selectable from the list. If you want a user name which is not on the list, simply type a new user name. **Tip:** User names you enter will subsequently be added to the list, so you can easily select them later.

Password	Password required to access the administrator account. A few hardware devices do not require user name/password for access; if such hardware devices are used in your organization, you can leave the field blank. **Tip:** If you are in doubt about which user name/password to use, ask yourself: Have I previously used a web page to connect to the hardware device and view video? While I did this, was I also able to configure camera settings, such as resolution, etc.? If you can answer yes to both questions, you were probably using the hardware device's administrator account, in which case you will also know the user name/password. If still in doubt, look in the XProtect Device Pack release notes.

Click to add user a name/password combination.

When ready, click **Next**.

Detected and verified hardware devices

The wizard automatically scans your network for hardware devices, and lists devices real-time as they are detected. All properties on a white background are editable, properties on a **light blue background** cannot be edited.

Wait until the scan is complete. If the scan takes very long, you can stop it with the **Stop Scan** button; the wizard will remember any devices detected up to that point.

When the scan is complete:

1. Go through the list of detected hardware devices to see if it contains unwanted devices. If it does, clear the check box in the **Use** column for each unwanted device.
2. If any hardware devices are missing from the list, verify that the missing hardware devices are working and that they are located within the specified IP address ranges, then click the **Rescan** button. If hardware devices detected in the first scan cannot be detected in the second scan, the wizard will still remember them.
3. For all detected hardware devices, XProtect Professional has verified that user names/passwords are correct, and marked each device in the **Verified** column. If any hardware devices could not be verified, make sure you have specified the correct user names/passwords.
4. Click Next.The next wizard page provides you with an overview where you can select names for cameras, etc.

Manual

The Manual option lets you specify details about each hardware device separately. A good choice if you only want to add a few hardware devices, and you know their IP addresses, required user names and passwords, etc.

When using the Manual option, the wizard is divided into these pages:

- Hardware device information, driver selection and verification (see "Information, driver selection and verification" on page 51)
- Overview and names (on page 47)

Information, driver selection and verification

Specify information about each hardware device you want to add. All properties on a white background are editable, properties on a light blue background cannot be edited.

Name	Description
Use	Indicates that you want to include the hardware device in the scan. To begin with, leave the box cleared. Provided XProtect Professional can find a suitable driver for the hardware device, the **Use** box will automatically be selected later.
Address	IP address or host name of the hardware device.
Port	Port number on which to scan. The default is port 80. If a hardware device is located behind a NAT-enabled router or a firewall, you may need to specify a different port number. When this is the case, also remember to configure the router/firewall so it maps the port and IP address used by the hardware device.
User name	User name for the hardware device's administrator account. Many organizations use the hardware device manufacturer's default user names for their hardware devices. If that is the case in your organization, select <default> (do not type a manufacturer's default user name as this can be a source of error; trust that XProtect Professional will know the manufacturer's default user name). Other typical user names, such as admin or root are also selectable from the list. If you want a user name which is not on the list, simply type a new user name. **Tip:** User names you enter will subsequently be added to the list, so you can easily select them later.
Password	Password required to access the administrator account. A few hardware devices do not require user name/password for access; if such hardware devices are used in your organization, you can leave the field blank. **Tip:** If you are in doubt about which user name/password to use, ask yourself: Have I previously used a web page to connect to the hardware device and view video? While I did this, was I also able to configure camera settings, such as resolution, etc.? If you can answer yes to both questions, you were probably using the hardware device's administrator account, in which case you will also know the user name/password. If still in doubt, look in the XProtect Device Pack release notes.
Hardware Driver	Driver to use with the hardware device. If the Auto-detect option is selected, the hardware the XProtect Professional can find the relevant driver automatically.

Name	Description
Verified	Indicates whether access to the hardware device has been verified. Hardware devices for which you have specified correct address, port, user name and password will be verified immediately if you use the auto-detect method. If you select drivers manually, access will be verified once you click Next. **Tip:** To save time, when using the **Auto-detect** feature, you can enter information about other devices while the auto-detection is in progress.

Import from CSV file

This option lets you import data about hardware devices and cameras as comma-separated values (CSV) (see "CSV file format and requirements" on page 53) from a file; a highly effective method if setting up several similar systems.

First select whether cameras and the XProtect Professional server is online (that is having working network connections) or offline.

Then point to the CSV file, and click **Next**.

Add Hardware Devices wizard - Import from CSV File - example of CSV file

The following is an example of a CSV file for use when cameras and server are **online**. It includes the mandatory parameters **HardwareAddress** and **HardwarePort** as well as the optional parameters **HardwarePassword** and **CameraName**.

Note that some of the hardware devices in the example have more than one camera attached. In the example, we therefore use four versions of the **CameraName** parameter (**CameraName1**, **CameraName2**, etc.). Had all the hardware devices only had one camera attached each, we would only have needed **CameraName1**. See Add Hardware Devices Wizard - Import from CSV File (see "Import from CSV file" on page 52) for detailed descriptions of all mandatory and optional parameters.

```
HardwareAddress;HardwarePort;HardwarePassword;CameraName1;CameraName2
;CameraName3;CameraName4

192.168.200.220;80;T0P53cr3T;Reception;;;

192.168.200.221;80;tOpSeCrEt;Staircase A;Fire Exit;Staircase B;Lobby

192.168.200.222;80;TOP53CR3T;Car Park East;;;

192.168.200.223;80;topZKRID;Car Park West;;;

192.168.200.224;80;TopsEcreT;Street Exit;Street Entrance;Station
Exit;Station Entrance

192.168.200.225;80;tercespot;Production Level 2;;;

192.168.200.226;80;TOpsECreT;Production Level 3;;;

192.168.200.227;80;top$!cr!t;Storage Room;;;

192.168.200.228;80;ttooppssecrett;Canteen;;;
```

```
192.168.200.229;80;ecsotpert;Admin Office;;;
192.168.200.230;80;SECRETtop;Annex;;;
192.168.200.231;80;optescter;VIP Parking;;;
192.168.200.232;80;scteropte;Workshop;;;
192.168.200.233;80;scopetetr;Alleyway;;;
192.168.200.234;80;optescter;Demo Room;;;
192.168.200.235;80;oPtEscEr;Meeting Room 1;Meeting Room 2;Meeting
Room3;Meeting Room 4
```

CSV file format and requirements

The CSV file must have a header line (determining what each value on the subsequent lines is about), and subsequent lines must each contain information about one hardware device only.A minimum of information is always required for each hardware device:

Name	Description
HardwareOldMacAddress	The MAC address of the hardware device used in the template configuration. Required format: 12 hex characters without spaces or six groups of two hex characters separated with dashes (-) or colons (:).
HardwreNewMacAddress	The MAC address of the new hardware device to be used in the real configuration. Required format: 12 hex characters without spaces or six groups of two hex characters separated with dashes (-) or colons (:).
HardwareAddress	IP address of the hardware device.
HardwareUsername	User name for hardware device's administrator account. In the extremely rare cases where a particular user name has previously been required for a device, but you now want the user name to be <blank>, you cannot use the CSV file to specify <blank>. The reason is that no information is interpreted as "leave the user name as it currently is." If you need the new user name to be <blank>, you should not change it through the CCV file. Instead, change it as part of the hardware device's network, device type and license properties after you have imported the other changes through the CSV file.

Name	Description
HardwarePassword	Password for hardware device's administrator account. In the extremely rare cases where a particular password has previously been required for a device, but you now want the password to be <blank>, you cannot use the CSV file to specify <blank>. The reason is that no information is interpreted as "œleave the password as it currently is." If you need the new password to be <blank>, you should not change it through the CSV file. Instead, change it as part of the hardware device's network, device type and license properties after you have imported the other changes through the CSV file.
HardwareDeviceName	Name of the hardware device. Name must unique, and must not contain any of the following special characters: **< > & ' " \ / : * ? | [ ]**
HardwareDriverID	If cameras and server are offline—specify a **HardwareDriverID** for each hardware device you want to add. Example: **ACTi ACD-2100 105** indicates that you should use **105** as the ID if adding an ACTi ACD-2100 hardware device.
CameraName[number]	Name of the camera. Must appear as CameraName1, CameraName2, etc. in the header line since a hardware device can potentially have more than one camera attached. Names must be unique, and must not contain any of the following special characters: **< > & ' " \ / : * ? | [ ]**
CameraShortcut[number]	Number for keyboard shortcut access to the camera in the Smart Client. Must appear as CameraShortcut1, CameraShortcut2, etc. in the header line since a hardware device can potentially have more than one camera attached**.** A camera shortcut number must not contain any letters or special characters, and must not be longer than eight digits.
GenerateNewCameraGuid[optional number]	Lets you specify whether to generate a new GUID for a camera; this is especially relevant if using a cloned configuration (see "Export and import management application configuration" on page 205) as your template, since all GUIDs are removed from cloned configurations. If specified as, for example, **GenerateNewCameraGuid1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device. Any character means "yes, generate a new GUID."•
PreBufferLength[optional number]	Required length (in seconds) of pre-recording. If specified as, for example, **PreBufferLength1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
PostBufferLength[optional number]	Required length (in seconds) of post-recording. If specified as, for example, **PostBufferLength1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
RecordingPath[optional number]	Path to the folder in which a camera's database should be stored. If specified as, for example, **RecordingPath1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.

Name	Description
ArchivePath[optional number]	Path to the folder in which the camera's archived (see "About archiving" on page 144) recordings should be stored. Remember that an archiving path is only relevant if not using dynamic paths for archiving (see "Dynamic path selection" on page 87). If specified as, for example, **ArchivePath1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
OldRecordingsNewPath[optional number]	Lets you specify what to do with old recordings in case **RecordingPath** or **ArchivePath** have been changed. If this parameter is not specified, default behavior is **Leave** (see the following). If specified as, for example, **OldRecordingsNewPath1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device. Valid options are: **Delete** (deletes old recordings), **Leave** (leaves old recordings for offline investigation but unavailable for online system), or **Move** (moves old recordings to archive).
OldRecordingsNewMac[optional number]	Lets you specify what to do with old recordings in case a new MAC address has been specified for the hardware device. If this parameter is not specified, default behavior is Leave (see the following). If specified as, for example, OldrecordingsNewMac1, information relates to a specific camera, otherwise to all cameras attached to the hardware device. Valid options are: Delete (deletes old recordings), Leave (leaves old recordings for offline investigation but unavailable for online system), or Inherit (renames all old recording folders according to the new MAC address, thus making them available for the online system).
RetentionTime[optional number]	Required retention time (in minutes). Remember that retention time is the total of recording time plus archiving time. If specified as, for example, **RetentionTime1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
MjpegLiveFrameRate[optional number]	Required MJPEG live frame rate (in number of frames; depending on what has been configured on the camera, it will then know whether it is frames per second, minute, or hour). If specified as, for example, **MjpegLiveFrameRate1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
MotionSensitivity[optional number]	A value between 0-256; corresponds to using the **Sensitivity** slider when configuring motion detection settings in the Management Application. If specified as, for example, **MotionSensitivity1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
MjpegRecordingFrameRate[optional number]	Required MJPEG recording frame rate (in number of frames; depending on what has been configured on the camera, it will then know whether it is frames per second, minute, or hour). If you need to specify a value which includes a decimal separator, use the full stop character (example: 7.62). If specified as, for example, **MjpegRecordingFrameRate1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.

Name	Description
MotionDetectionThreshold[optional number]	A value between 0-10000; corresponds to using the **Motion** slider when configuring motion detection settings in the Management Application. If specified as, for example, **MotionDetectionThreshold1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
MotionDetectionInterval[optional number]	Lets you specify how often motion detection analysis should be carried out on video from the camera. Specified in milliseconds. The interval is applied regardless of the camera's frame rate settings. If specified as, for example, **MotionDetectionInterval1**, information relates to a specific camera, otherwise to all cameras attached to the hardware device.
ServerName	Name with which the XProtect Professional will appear when listed in clients. Name must be unique, and must not contain any of the following special characters: **< > & ' " \ / : * ? | [ ]**
ServerPort	Port number to use for communication between the XProtect Professional server and clients.
OnlineVerification	If this parameter is used, all online hardware devices found using **HardwareOldMacAddress** are updated. All other hardware devices are not updated. Any character means "yes, use online verification.

Existing configuration parameters that are not specified in CSV file will remain unchanged. If a parameter value for an individual camera in the CSV file is empty, the existing parameter value will remain unchanged on that camera.

Most system integrators store hardware device information in spreadsheets like Microsoft Excel, from which they can save the information as comma-separated values in a CSV file. These examples show hardware information in Excel (**1**) and when exported to a CSV file (**2**); note the header lines:

Whichever method is used, the following applies:

- The first line of the CSV file must contain the headers, and subsequent lines must contain information about one hardware device each
- Separators can be commas, semicolons or tabs, but cannot be mixed
- All lines must contain valid values—pay special attention to the fact that camera names, user names, etc. must be unique, and must not contain any of the following special characters: **< > & ' " \ / : * ? | [ ]**
- There is no fixed order of values, and optional parameters can be omitted entirely
- Boolean fields are considered true unless set to 0, false or no
- Lines containing only separators are ignored
- Empty lines are ignored

Even though the CSV file format is generally ASCII only, Unicode identifiers are allowed; **even without Unicode identifiers, the entire file or even individual characters are allowed to be Unicode strings**

If you need to include separator characters in a value—for example if a camera name is Reception; Camera 1—you can encapsulate the value in quotes to indicate that the separator should not be interpreted as separating values in the file. Such quote-encapsulated values are interpreted as they appear. If a separator, a quote or a space is needed in a value, the whole value has to be encapsulated in quotes. Leading and trailing spaces outside the quote-encapsulated value are removed, while spaces inside the quote-encapsulated value are maintained. No characters (except spaces) are allowed outside the quote-encapsulated value. A double quote inside a quote-encapsulated value is interpreted as a single quote. Nested quotes (quotes inside quotes) are not allowed.

Some examples (using semicolon as the separator):

- "camera"; is interpreted as camera
- "cam;""era"; is interpreted as cam;"era
- """camera"""; is interpreted as "camera"
- ""; is interpreted as an empty string
- ...; " cam"" era " ;... is interpreted as **|** cam" era **|** (where the character **|** is not part of the interpretation but only used to show the start and end of the interpretation)
- ""camera; is not valid as there are characters outside the quote-encapsulated value
- "cam" "era"; is not valid as the two quotes are separated with a space and quotes cannot be nested
- "cam"er"a"; is not valid as you cannot nest quotes
- cam"era"; is not valid as there are characters outside the quotes

The Configure Video and Recording wizard

The **Configure Video and Recording** wizard helps you quickly configure your cameras' video and recording properties.

Pages in this wizard:

Video settings and preview 57
Online schedule 58
Live and recording settings Motion-JPEG cameras 59
Live and recording settings MPEG cameras 61
Drive selection 64
Recording and archiving settings 65

Video settings and preview

Video settings typically let you control bandwidth, brightness, compression, contrast, resolution, rotation, etc.

All properties on a white background are editable, properties on a **light blue** background cannot be edited.

Use the list in the left side of the wizard window to select a camera and adjust its video settings. Then select the next camera and adjust its settings, and so on. Video settings are to a large extent camera-specific, and must therefore be configured individually for each camera.

Click **Open Settings Dialog** to configure the camera's settings in a separate dialog.

When you change video settings, they are applied immediately. This means that—for most cameras—you are immediately able to see the effect of your settings in a preview image. However, it also means that you cannot undo your changes by exiting the wizard.

For cameras set to use the video formats MPEG or H.264, you are typically able to select which live frame rate to use for the camera.

Video settings may feature an **Include Date and Time** setting. If set to **Yes**, date and time from the camera will be included in video. Note, however, that cameras are separate units which may have separate timing devices, power supplies, etc. Camera time and XProtect Professional system time may therefore not correspond fully, and this may occasionally lead to confusion. As all frames are time-stamped by XProtect Professional upon reception, and exact date and time information for each image is already known, it is recommended that the setting is set to **No**.

Tip: For consistent time synchronization, you may—if supported by the camera—automatically synchronize camera and system time through a time server.

Online schedule

Specify when each camera should be online. An online camera is a camera that transfers video to the XProtect Professional server for live viewing and further processing. The fact that a camera is online will not in itself mean that video from the camera is recorded (recording settings are configured on one of the wizard's next pages).

All properties on a white background are editable, properties on a **light blue** background cannot be edited.

By default, cameras added to XProtect Professional will automatically be online (**Always on**), and you will only need to modify their online schedules if you require cameras to be online only at specific times or events. Note, however, that this default may be changed as part of the scheduling options (on page 154).

For each camera, you are initially able to select between two online schedules:

- **Always on:** The camera is always online.
- **Always off:** The camera is never online.

If these two options are too simple for your needs, use the **Create / Edit...** button to specify online schedules according to your needs, and then select these schedules for your cameras. This way, you can specify whether cameras should be online within specific periods of time, or whether they should start and stop transferring video when specific events occur within specific periods of time.

The **template** can help you configure similar properties quickly. For example, if you have 20 cameras and you want a particular frame rate on all of them, you can simply enter it once in the template, and then apply the template to the 20 cameras.

Name	Description
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Apply template on selected cameras	Lets you apply the value from the template to selected cameras.

Live and recording settings Motion-JPEG cameras

This wizard page only appears if one or more of your cameras use the MJPEG video format.

Specify which frame rates to use for each camera. You can also select pre- and post-recording, allowing you to store recordings from periods preceding and following detected motion and/or specified events.

All properties on a white background are editable, properties on a **light blue** background cannot be edited.

Name	Description
Frame Rate	Required average frame rate for video from the camera. Select number of frames, then select the time unit interval (second, minute or hour).
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.

Name	Description
Record on	Lets you select under which conditions video from the camera should be recorded: • **Always:** Record whenever the camera is enabled (see "General" on page 101) and scheduled to be online (see "Online period" on page 156) (the latter allows for time-based recording). • **Never**: Never record. Live video will be displayed, but—since no video is kept in the database—users will not be able to play back video from the camera. • **Motion Detection**: Select this to record video in which motion (see "Motion detection & exclude regions" on page 111) is detected. Unless post-recording (see the following) is used, recording will stop immediately after the last motion is detected. • **Event**: Select this to record video when an event occurs and until another event occurs. Use of recording on event requires that events have been defined, and that you select start and stop events. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields. • **Motion Detection & Event**: Select this to record video in which motion is detected, or when an event occurs and until another event occurs. Remember to select start and stop events in the neighboring columns.
Pre-recording	You can store recordings from periods preceding detected motion and/or start events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column. **How does pre- and post-recording work?** XProtect Professional receives video in a continuous stream from the camera whenever the camera is enabled and scheduled to be online. This is what lets you view live video, but it also means that XProtect Professional can easily store received video for a number of seconds in its memory (a.k.a. buffering). If it turns out that the buffered video is needed for pre- or post-recording, it is automatically appended to the recording. If not, it is simply discarded.

Name	Description
Seconds [of pre-recording]	Specify the number of seconds for which you want to record video from before recording start conditions (that is motion or start event) are met. Usually, only some seconds of pre-recording is required, but you can specify up to 65535 seconds of pre-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long pre-recording time, you can potentially run into a scenario where your pre-recording time spans scheduled or unscheduled archiving (see "About archiving" on page 144) times. That can be problematic since pre-recording does not work well during archiving.
Post-recording	You can store recordings from periods following detected motion and/or stop events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column.
Seconds [of post-recording]	Specify the number of seconds for which you want to record video from after recording stop conditions (that is motion or stop event) are met. Usually, only some seconds of post-recording is required, but you can specify up to 65535 seconds of post-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long post-recording time, you can potentially run into a scenario where your post-recording time spans scheduled or unscheduled archiving times. That can be problematic since post-recording does not work well during archiving.

The **template** can help you configure similar properties quickly. For example, if you have 20 cameras and you want a particular frame rate on all of them, you can simply enter it once in the template, and then apply the template to the 20 cameras.

Name	Description
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Apply template on selected cameras	Lets you apply the value from the template to selected cameras.

Live and recording settings MPEG cameras

This wizard page only appears if one or more of your cameras use the MPEG video format.

Specify which frame rate to use for each camera, and whether to record all frames or keyframes only. You can also select pre- and post-recording, allowing you to store recordings from periods preceding and following detected motion and/or specified events.

Note that all of the properties can also be specified individually for each camera.

Name	Description
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Record Keyframe Only	Keyframes stored at specified intervals record the entire view of the camera, whereas the following frames record only pixels that change; this helps greatly reduce the size of MPEG files. Select the check box if you only want to record keyframes.
Record on	Lets you select under which conditions video from the camera should be recorded: • **Always:** Record whenever the camera is enabled (see "General" on page 101) and scheduled to be online (see "Online period" on page 156) (the latter allows for time-based recording). • **Never**: Never record. Live video will be displayed, but—since no video is kept in the database—users will not be able to play back video from the camera. • **Motion Detection**: Select this to record video in which motion (see "Motion detection & exclude regions" on page 111) is detected. Unless post-recording (see the following) is used, recording will stop immediately after the last motion is detected. • **Event**: Select this to record video when an event occurs and until another event occurs. Use of recording on event requires that events have been defined, and that you select start and stop events. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields. • **Motion Detection & Event**: Select this to record video in which motion is detected, or when an event occurs and until another event occurs. Remember to select start and stop events in the neighboring columns.

Name	Description
Pre-recording	You can store recordings from periods preceding detected motion and/or start events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column. **How does pre- and post-recording work?** XProtect Professional receives video in a continuous stream from the camera whenever the camera is enabled and scheduled to be online. This is what lets you view live video, but it also means that XProtect Professional can easily store received video for a number of seconds in its memory (a.k.a. buffering). If it turns out that the buffered video is needed for pre- or post-recording, it is automatically appended to the recording. If not, it is simply discarded.
Seconds [of pre-recording]	Specify the number of seconds for which you want to record video from before recording start conditions (that is motion or start event) are met. Usually, only some seconds of pre-recording is required, but you can specify up to 65535 seconds of pre-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long pre-recording time, you can potentially run into a scenario where your pre-recording time spans scheduled or unscheduled archiving (see "About archiving" on page 144) times. That can be problematic since pre-recording does not work well during archiving.
Post-recording	You can store recordings from periods following detected motion and/or stop events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column.
Seconds [of post-recording]	Specify the number of seconds for which you want to record video from after recording stop conditions (that is motion or stop event) are met. Usually, only some seconds of post-recording is required, but you can specify up to 65535 seconds of post-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long post-recording time, you can potentially run into a scenario where your post-recording time spans scheduled or unscheduled archiving times. That can be problematic since post-recording does not work well during archiving.

The **template** can help you configure similar properties quickly. For example, if you have 20 cameras and you want a particular frame rate on all of them, you can simply enter it once in the template, and then apply the template to the 20 cameras.

Name	Description
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Apply template on selected cameras	Lets you apply the value from the template to selected cameras.

Drive selection

Specify which drives you want to store cameras' recordings on. You can specify separate drives/paths for recording and archiving (see "About archiving" on page 144).

All properties on a white background are editable, properties on a **light blue** background cannot be edited.

Name	Description
Drive	Letter representing the drive in question, for example C:.
Purpose	Select what you want to use the drive for: **Not in use:** Do not use the drive. **Recording:** Only available if the drive is a local drive on the XProtect Professional server. Network drives cannot be used for recording. Use the drive for storing recordings in the regular database for XProtect Professional. **Archiving:** Use the drive for archiving. For archiving, it is generally a good idea to use a drive which has plenty of space. With dynamic path selection for archives (see description in the following), you do not have to worry about drive space. **Rec. & Archiving:** Only available if the drive is a local drive on the XProtect Professional server. Network drives cannot be used for recording. Use the drive for storing recordings in the regular database for XProtect Professional as well as for archiving.
Recording Path	Path to the folder in which the camera's database should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can only specify a path to a folder on a **local** drive. You cannot specify a path to a network drive. If you use a network drive, it is not be possible to save recordings if the network drive becomes unavailable. If you change the recording path, and you have existing recordings at the old location, you are asked whether you want to move the recordings to the new location (recommended), leave them at the old location, or delete them. **Tip:** If you have several cameras, and several local drives are available, you can improve performance by distributing individual cameras' databases across several drives.

Name	Description
Archiving Path	Only editable if not using dynamic paths for archiving (see "About archiving" on page 144). Path to the folder in which the camera's archived recordings should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can specify a path to a local or network drive. If you change the archiving path, and there are existing archived recordings at the old location, you will be asked whether you want to move the archived recordings to the new location (recommended), leave them at the old location, or delete them. Note that if you move archived recordings, XProtect Professional will also archive what is currently in the camera database. In case you wonder why the camera database is empty just after you have moved archived recordings, this is the reason.
Total Size	Total size of the drive.
Free Space	Amount of unused space left on the drive.
Dynamic path selection for archives	If using this option (highly recommended), you should select a number of different local drives for archiving. If the path containing the XProtect Professional database is on one of the drives you have selected for archiving, XProtect Professional will always try to archive to that drive first. If not, XProtect Professional automatically archives to the archiving drive with the most available space at any time, provided there is not a camera database using that drive. Which drive has the most available space may change during the archiving process, and archiving may therefore happen to several archiving drives during the same process. This fact will have no impact on how users find and view archived recordings.
Network Drive	Lets you add a network drive to the list of drives. First specify the network drive, then click **Add** (the button becomes available when you specify a network drive) . Note that network drives cannot be used for recording, only for archiving.
Archiving Times	Specify when you want XProtect Professional to automatically move recordings to your archiving path(s). You can specify up to 24 archiving times per day, with minimum one hour between each one. Select the hour, minute and second values and click the **up** and **down** buttons to increase or decrease values, or simply overwrite the selected value, and then click **Add**. The more you expect to record, the more often you should archive.

Recording and archiving settings

Select recording and archiving (see "About archiving" on page 144) paths for each individual camera.

All properties on a white background are editable, properties on a **light blue** background cannot be edited.

Name	Description
Recording Path	Path to the folder in which the camera's database should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can only specify a path to a folder on a **local** drive. You cannot specify a path to a network drive. If you use a network drive, it is not be possible to save recordings if the network drive becomes unavailable. If you change the recording path, and you have existing recordings at the old location, you are asked whether you want to move the recordings to the new location (recommended), leave them at the old location, or delete them. **Tip:** If you have several cameras, and several local drives are available, you can improve performance by distributing individual cameras' databases across several drives.
Archiving Path	Only editable if not using dynamic paths for archiving (see "About archiving" on page 144). Path to the folder in which the camera's archived recordings should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can specify a path to a local or network drive. If you change the archiving path, and there are existing archived recordings at the old location, you will be asked whether you want to move the archived recordings to the new location (recommended), leave them at the old location, or delete them. Note that if you move archived recordings, XProtect Professional will also archive what is currently in the camera database. In case you wonder why the camera database is empty just after you have moved archived recordings, this is the reason.
Retention Time	Total amount of time for which you want to keep recordings from the camera (that is recordings in the camera's database as well as any archived recordings). Default is 30 days. Note that the retention time covers the **total** amount of time you want to keep recordings for. In earlier XProtect Professional versions, time limits were specified separately for the database and archives.

The **template** can help you configure similar properties quickly. For example, if you have 20 cameras and you want a particular frame rate on all of them, you can simply enter it once in the template, and then apply the template to the 20 cameras.

Name	Description
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.

Name	Description
Apply template on selected cameras	Lets you apply the value from the template to selected cameras.

Adjust Motion Detection wizard

The Adjust Motion Detection wizard helps you quickly configure your cameras' motion detection properties.

Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Pages in this wizard:

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Exclude regions

Exclude regions let you disable motion detection in specific areas of cameras' views. Disabling motion detection in certain areas may help you avoid detection of irrelevant motion, for example if a camera covers an area where a tree is swaying in the wind or where cars regularly pass by in the background.

Cameras that do not support multiple simultaneous video streams will not be able to connect to the surveillance server and the Management Application at the same time; therefore it is recommended to stop (see "Start and stop services" on page 185) the Recording Server service when you configure such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

For each camera for which exclude regions are relevant, use the list in the left side of the wizard window to select the camera and define its exclude regions. Exclude regions are camera-specific, and must therefore be configured individually for each camera on which they are required.

When you have selected a camera, you will see a preview from the camera. You define regions to exclude in the preview, which is divided into small sections by a grid.

- To make the grid visible, select the Show Grid check box.
- To define exclude regions, drag the mouse pointer over the required areas in the preview while pressing the mouse button down. Left mouse button selects a grid section; right mouse button clears a grid section. Selected areas are highlighted in blue.

Tip: With the **Include All** button, you can quickly select all grid sections in the preview. This can be advantageous if you want to disable motion detection in most areas of the preview, in which case you can clear the few sections in which you do not want to disable motion detection. With the **Exclude All** button you can quickly deselect them all.

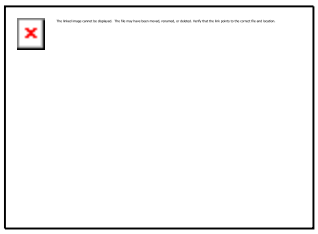
Motion Detection

Motion detection is a key element in most surveillance systems. Depending on your configuration, motion detection settings may determine when video is recorded (saved on the surveillance system server), when notifications are sent, when output (a light or siren) is triggered, etc.

It is important to find the best possible motion detection settings for each camera to avoid unnecessary recordings, notifications, etc. Depending on the physical location of your cameras, it is a good idea to test settings under different physical conditions (day/night, windy/calm weather, etc.).

Cameras that do not support multiple simultaneous video streams will not be able to connect to the surveillance server and the Management Application at the same time; therefore it is recommended to stop (see "Start and stop services" on page 185) the Recording Server service when you configure such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

You can configure motion detection settings for each camera, or for several cameras at once. Use the list in the left pane of the wizard window to select cameras. To select several cameras at a time, press CTRL or SHIFT while selecting. When you select a camera, you will see a preview from that camera. If you select several cameras, you will see a preview from the last camera you select. A green area in the preview indicates motion.



Name	Description
Sensitivity	Adjust the **Sensitivity** slider so that irrelevant background noise is filtered out, and only real motion is shown in green. Alternatively, specify a value between 0 and 256 in the field next to the slider to control the sensitivity setting. The slider determines how much each pixel must change before it is regarded as motion. With a high sensitivity, very little change in a pixel is required before it is regarded as motion. The more you drag the slider to the left, the more of the preview becomes green. This is because with high sensitivity, even the slightest pixel change is regarded as motion.

Name	Description
Motion	Adjust the **Motion** slider so that motion detection is only triggered by the required level of motion. The selected motion level is indicated by the black vertical line in the **Level** bar above the sliders. The black vertical line serves as a threshold. When motion is above (to the right of) the selected level, the bar changes color from green to red, indicating a positive motion detection. Alternatively, specify a value between 0 and 10000 in the field on the left to control the motion setting. The more you drag the slider to the left, the more positive motion detections you see because less change will be needed to trigger a positive motion detection. The number of positive motion detections may also affect the amount of video you record, the amount of notifications you receive, etc.
Keyframe Only	If you want motion detection to take place only on keyframes of the video stream to reduce the system resources used on motion detection, select **Keyframe only**.
Detection interval	Specify how often motion detection analysis is carried out on video from the camera. The default is every 240 milliseconds (close to once a quarter of a second). The interval is applied regardless of your cameras' frame rate settings. Adjusting this setting can help lower the amount of system resources used on motion detection.
Detection resolution	Specify whether the full image or a selected percentage of the image should be analyzed. For example, by specifying 25%, every fourth pixel is analyzed instead of all pixels, reducing the system resources used but also offering less accurate motion detection.

Configure User Access wizard

The Configure User Access wizard helps you quickly configure clients' access to the XProtect Professional server as well as which users should be able to use clients. The access summary at the end of the wizard lists the cameras your users have access to.

When you use the wizard, all users you add will have access to all cameras, including any new cameras added at a later stage. You can however, specify access settings, users and user rights (see "Configure user and group rights" on page 180) separately. see Configure server access (on page 172). You cannot add users to groups (see "Add user groups" on page 179) through the wizard.

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Configure User Access wizard: access summary 71

Server access settings

Name	Description
Server name	Name of the XProtect Professional server as it will appear in clients. Client users with rights to configure their clients will see the name of the server when they create views in their clients.
Local port	Port number to use for communication between clients and the surveillance server. The default port number is 80; you can change the port number if port 80 is used for other purposes in your organization.
Character encoding/Language	Select required language/character set. Example: If the surveillance server runs a Japanese version of Windows, select Japanese. Provided access clients also use a Japanese version of Windows, this will ensure that the correct language and character encoding is used in clients' communication with the server.
Internet access	Select if you want the server to be accessible from the internet through a router or firewall. If you select this option, you must also specify the public (“outside”) IP address and port number in the following fields. When using public access, the router or firewall must be configured so requests sent to the public IP address and port are forwarded to the local (“inside”) IP address and port of the XProtect Professional server.
Internet address	Lets you specify a public IP address or hostname for use when the XProtect Professional server should be available from the internet.
Internet port	Specify a port number for use when the XProtect Professional should be available from the Internet. The default port number is 80. You can change the port number if needed.

Basic & Windows Users

You can add client users in two ways, which may be combined.

- Basic user: create a dedicated surveillance system user account with basic user name and password authentication for each individual user. To add a basic user, specify required user name and password, and click the **Add Basic User** button. Repeat as required.
- Windows user: import users defined locally on the server and authenticate them based on their Windows login. This generally provides better security, and is the recommended method.

The users must have been defined as local PC users on the server. Simple file sharing must be disabled on the server. Depending on your operative system, this can be done in different ways.

- Windows 7: click the Windows logo and type **file sharing** in the search results window and press **Enter**. Under **File and Printer Sharing**, make sure that **Turn off file and printer sharing** is selected. Under **Public Folder Sharing**, make sure that **Turn off public folder sharing** is cleared.

- Windows Vista: click **Start** > **Control Panel**. Under **Network and Internet**, select **Set up file sharing**. The **Network and Sharing Center** window appears. Under **Sharing and Discovery**, set the option for file sharing to **Off** by clicking the down arrow next to **File Sharing** and select the radio button to **Turn off file sharing**. Click **Apply** and continue through the warning messages.
- Windows XP: click **Start** > **My Computer**. In the **My Computer** window, select **Tools** and in the top menu, select **Folder Options**. A new **Folder Options** window opens. Click on the **View** tab and scroll down to find **Use simple file sharing (recommended)**. Clear the box to disable file sharing. Click **OK**.

Add Windows users the following way:

1. Click **Add Windows User...** to open the S**elect Users or Groups** dialog.

   Note that you will only be able to make selections from the local computer, even if you click the **Locations...** button.

2. In **Enter the object names to select,** enter the required user name(s), then use the **Check Names** feature to verify that they are recognized. If you enter several user names, separate each name with a semicolon. Example: **Brian; Hannah; Karen; Wayne.**

3. When done, click **OK**.

When a user who has been added from a local database logs in with a client, the user should not specify any server name, PC name, or IP address as part of the user name. Example of a correctly specified user name: USER001, not: PC001/USER001. The user should of course still specify a password and any required server information.

Configure User Access wizard: access summary

The access summary simply lists which cameras your users will have access to. When using the wizard, all users you have added will have access all to cameras, including any new cameras added at a later stage. You can, however, limit individual users' access to cameras by changing their individual rights (see "Configure user and group rights" on page 180).

Advanced configuration

Hardware devices

About hardware devices

You add cameras and other hardware devices, such as video encoders, to your XProtect Professional system through the **Add Hardware Devices...** wizard (see "The Add Hardware Devices wizard" on page 45). If microphones or speakers are attached to a hardware device, they are automatically added as well.

About the Replace Hardware Device wizard

The Replace Hardware Device wizard helps you replace a hardware device that you have previously added to and configured on your surveillance system. To open the Replace Hardware Device wizard, right-click the device that you want to replace and select **Replace Hardware Device**.

The wizard is divided into these pages:

- New hardware device information (on page 72)
- Database action (see "Camera and database action" on page 73)

New hardware device information

Specify details about the new hardware device:

Name	Description
Address	IP address or host name of the hardware device.
Port	Port number on which to scan. The default is port 80. If a hardware device is located behind a NAT-enabled router or a firewall, you may need to specify a different port number. When this is the case, also remember to configure the router/firewall so it maps the port and IP address used by the hardware device.
User name	User name for the hardware device's administrator account. Many organizations use the hardware device manufacturer's default user names for their hardware devices. If that is the case in your organization, select <default> (do not type a manufacturer's default user name as this can be a source of error; trust that XProtect Professional will know the manufacturer's default user name). Other typical user names, such as admin or root are also selectable from the list. If you want a user name which is not on the list, simply type a new user name. **Tip:** User names you enter will subsequently be added to the list, so you can easily select them later.

Name	Description
Password	Password required to access the administrator account. A few hardware devices do not require user name/password for access; if such hardware devices are used in your organization, you can leave the field blank. **Tip:** If you are in doubt about which user name/password to use, ask yourself: Have I previously used a web page to connect to the hardware device and view video? While I did this, was I also able to configure camera settings, such as resolution, etc.? If you can answer yes to both questions, you were probably using the hardware device's administrator account, in which case you will also know the user name/password. If still in doubt, look in the XProtect Device Pack release notes.

To specify which device driver to use for the new hardware device, you can:

- Select the video device driver in the **Hardware device type** list, and then click **Auto-detect/Verify Hardware Device Type** to verify that the driver matches the hardware device.

  - or -

- Click **Auto-detect/Verify Hardware Device Type** to automatically detect and verify the right driver.

When the right driver is found, the **Serial number (MAC address)** field will display the MAC address of the new hardware device.

When done, click **Next**.

Camera and database action

The last page of the Replace Hardware wizard lets you decide what to do with the camera and the database containing recordings from the camera attached to the old hardware device. For multi-camera devices such as video encoders, you must decide what to do for each video channel on the new hardware device.

The table in the left side of the wizard page lists available video channels on the new hardware device. For a regular single-camera hardware device, there will only be one video channel. For video encoders, there will typically be several video channels.

1. For each video channel, use the table's **Inherit** column to select which camera from the old hardware device should be inherited by the new hardware device.

2. Then decide what to do with camera databases. You have three options:

   - **Inherit existing database(s):** The cameras you selected to be inherited by the new hardware device will inherit camera names, recordings databases as well as any archives from the old hardware device. Databases and archives (see "About archiving" on page 144) will be renamed to reflect the new hardware device's MAC address and video channels. The rights (see "Configure user and group rights" on page 180) of users with access to the inherited cameras are automatically updated so they can view both old and new recordings. Users will basically not notice the hardware device replacement since camera names will remain the same.

- **Delete the existing database(s):** The databases of the cameras you selected to be inherited by the new hardware device will be deleted. New databases will be created for future recordings, but it will not be possible to view recordings from before the hardware replacement.
- **Leave the existing database(s):** The databases of the cameras you selected to be inherited by the new hardware device will not be deleted. New databases will be created for future recordings, but even though the old databases still exist on the XProtect Professional server it will not be possible to view recordings from before the hardware replacement. Should you later want to delete the old databases, deletion must take place manually.

3. If the new hardware device has fewer video channels than the old hardware device, it will not be possible for the new hardware device to inherit all cameras from the old hardware device. When that is the case, you will be asked what to do with the databases of cameras that could not be inherited by the new hardware device. You have two options:
   - **Delete the databases for the cameras that are not inherited:** The databases of the cameras that could not be inherited by the new hardware devices will be deleted. It will not be possible to view recordings from before the hardware replacement. New databases will of course be created for future recordings by the new hardware devices.
   - **Leave the databases for the cameras that are not inherited:** The databases of the cameras that could not be inherited by the new hardware devices will not be deleted. Even though the old databases still exist on the XProtect Professional server it will not be possible to view recordings from before the hardware replacement. Should you later want to delete the old databases, deletion must take place manually. New databases will of course be created for future recordings by the new hardware devices.
4. Click **Finish**.

   When ready, restart (see "Start and stop services" on page 185) the Recording Server service. The hardware replacement will not be evident in clients until you restart the Recording Server service.

About dedicated input/output devices

You can add a number of dedicated input/output (I/O) hardware devices to XProtect Professional (see Add hardware devices (see "The Add Hardware Devices wizard" on page 45)). For information about which I/O hardware devices are supported, see the release notes.

When you add I/O hardware devices, input on them can be used for generating events in XProtect Professional, and events in XProtect Professional can be used for activating output on the I/O hardware devices. This means that you can use I/O hardware devices in your events-based system setup in the same way as a camera.

With certain I/O hardware devices it is necessary for the surveillance system to regularly check the state of the hardware devices' input ports to detect whether input has been received. Such state checking at regular intervals is called **polling**. The interval between state checks, called a **polling frequency**, is specified as part of the general ports & polling properties (see "Ports and polling" on page 134). For such I/O hardware devices, the polling frequency should be set to the lowest possible value (one tenth of a second between state checks). For information about which I/O hardware devices require polling, see the release notes.

Configure hardware devices

Once you have added hardware devices (see "The Add Hardware Devices wizard" on page 45), you can specify/edit device-specific properties, such as the IP address, which video channels to use, which COM ports to use for controlling attached PTZ (Pan/Tilt/Zoom) cameras, whether to use 360° lens technology, etc.

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Hardware Devices**, right-click the required hardware device, and select Properties.
2. Specify Name & Video channels, Network, Device type and license (see "Network, device type, and license" on page 76), PTZ device (on page 77), and 360° Lens (see "Fisheye" on page 114) properties as required.
3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Delete hardware devices

IMPORTANT: If you delete a hardware device you will not only delete all cameras , speakers and microphones attached to the hardware device. You will also delete any recordings from cameras on the hardware device.

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Hardware Devices**, right-click the hardware device you want to delete, and select **Delete Hardware device**.
2. Confirm that you want to delete the hardware device and all its recordings.
3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.
4. Restart (see "Start and stop services" on page 185) the Recording Server service.

If deleting a hardware device is not the right thing to do, consider disabling the individual cameras , speakers or microphones connected to the hardware device:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Hardware Devices**, and expand the hardware device in question.
2. Right-click the camera or microphone or speaker that you want to disable, and select **Disable**.
3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.
4. Restart (see "Start and stop services" on page 185) the Recording Server service.

Replace hardware devices

If required, you can replace a hardware device—which you have previously added to and configured on your surveillance system—with a new one. This can typically be relevant if you replace a physical camera on your network.

- Open the Replace Hardware Device wizard (see "About the Replace Hardware Device wizard" on page 72), which helps you through the entire replacement process on the surveillance system server, including:
  - Detecting the new hardware device
  - Specifying license for the new hardware device
  - Deciding what to do with existing recordings from the old hardware device

Hardware properties

Properties in this window:

Hardware name and video channels 76
Network, device type, and license 76
PTZ device 77

Hardware name and video channels

When you configure hardware devices (on page 75), specify the following properties:

Name	Description
Hardware name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Video channel # enabled	Enable/disable each of the selected hardware device's video channels. Many hardware devices only have a single video channel, in which case only one channel will be listed. Other hardware devices—typically video encoder devices—have several video channels.

If some of the channels are unavailable, this is because you are not licensed to use all of a video encoder device's channels. Example: You have a video encoder device with four channels, but your license for the device only allows you to use two of them. In that case, you can only have two channels enabled at a time; the two other channels will be disabled. Note that you are free to select which two channels you want to enable. Contact your Milestone vendor if you need to change your number of licenses.

Network, device type, and license

When you configure hardware devices (on page 75), specify the following properties:

Name	Description
Address	IP address or host name of the hardware device.

Name	Description
HTTP Port	Port to use for HTTP communication with the hardware device. Default is port 80. To use the default port, select Use default HTTP port.
FTP port	• Port to use for FTP communication with the hardware device. Default port is port 21.To use the default port, select U**se default FTP port**.
User name	Only required when **Server requires login** is selected. Specify the user name required for using the SMTP server.
User name	User name for the hardware device's administrator account. Many organizations use the hardware device manufacturer's default user names for their hardware devices. If that is the case in your organization, select <default> (do not type a manufacturer's default user name as this can be a source of error; trust that XProtect Professional will know the manufacturer's default user name). Other typical user names, such as admin or root are also selectable from the list. If you want a user name which is not on the list, simply type a new user name. **Tip:** User names you enter will subsequently be added to the list, so you can easily select them later.
Password	Password for the hardware device's administrator account, a.k.a. the root password.
Hardware type	Read-only field displaying the type of video device driver used for communication with the hardware device.
Serial number (MAC address)	Read-only field displaying the serial number of device. The serial number is usually identical to the 12-character hexadecimal MAC address of the hardware device (example: 0123456789AF).
License information	The current license status for the hardware.
Replace Hardware Device	Opens a wizard (see "About the Replace Hardware Device wizard" on page 72), with which you—if required—can replace the selected hardware device with another one. This can typically be relevant if you replace a physical camera on your network. The wizard helps you take all relevant issues into account: for example, deciding what to do with recordings from cameras attached to the old hardware device, etc.

PTZ device

The PTZ Device tab is only available if you configure (see "Configure hardware devices" on page 75) video encoder hardware devices on which the use of PTZ (Pan/Tilt/Zoom) cameras is possible:

Name	Description
Connected cameras have Pan/tilt/Zoom capabilities	Select check box if any of the cameras attached to the video encoder device is a PTZ camera.

Name	Description
PTZ type on COM#	If a PTZ camera is controlled through the COM port (a.k.a. serial port) in question, select the required option. Options are device-specific, depending on which PTZ protocols are used by the device in question. If no PTZ cameras are controlled through the COM port in question, select None. Some of the options concern absolute and relative positioning. What is that? Absolute positioning is when the PTZ camera is controlled based on a single fixed position, against which all other positions are measured. Relative positioning is when the PTZ camera is controlled relative to its current position.

The table in the lower half of the dialog contains a row for each video channel on the hardware device. First row from the top corresponds to video channel 1, second row from the top corresponds to video channel 2, etc.

Name	Description
Name	Name of the camera attached to the video channel in question.
Type	Select whether the camera on the selected camera channel is fixed or moveable: • **Fixed**: Camera is a regular camera mounted in a fixed position • **Moveable**: Camera is a PTZ camera
Port	Available only if **Moveable** is selected in the **Type** column. Select which COM port on the video encoder to use for controlling the PTZ camera.
Port Address	Available only if **Moveable** is selected in the **Type** column. Lets you specify port address of the camera. The port address will normally be 1. If using daisy chained PTZ cameras, the port address will identify each of them, and you should verify your settings with those recommended in the documentation for the camera.

Cameras and storage information

About video and recording configuration

Once you have added hardware devices and attached cameras, you can configure video and recording settings in three ways:

- **Wizard-driven:** Guided configuration which lets you specify video, recording and archiving settings for all your cameras. See Configure Video and Recording wizard and Adjust Motion Detection wizard.

- **General:** Specify video, recording and shared settings (such as dynamic archiving paths and whether audio should be recorded or not) for all your cameras.
  - In the Management Application navigation pane, expand Advanced Configuration, right-click Cameras and Storage Information, and select Properties.
- **Camera-specific:** Specify video, recording and camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for each individual camera.
  - In the Management Application navigation pane, expand Advanced Configuration, and expand Cameras and Storage Information, right-click the required camera, and select Properties.

About database resizing

In case recordings for a camera get bigger than expected, or the available drive space is suddenly reduced in another way, an advanced database resizing procedure will automatically take place:

If archives (see "About archiving" on page 144) are present on the same drive as the camera's database, the oldest archive for all cameras archived on that drive will be moved to another drive (moving archives is only possible if you use dynamic archiving (see "Dynamic path selection" on page 87), with which you can archive to several different drives) or—if moving is not possible—deleted.

If no archives are present on the drive containing the camera's database, the size of all camera databases on the drive will be reduced by deleting a percentage of their oldest recordings, temporarily limiting the size of all databases.

When the Recording Server service (see "About services" on page 184) is restarted upon such database resizing, the original database sizes will be used. You should therefore make sure that the drive size problem is solved.

Should the database resizing procedure take place, you will be informed on-screen in the Smart Client, in log files, and (if set up) through an e-mail and/or SMS notification.

About motion detection settings

Motion detection settings are linked to the Recording properties (see "Recording" on page 106) settings for the camera. Motion detection is enabled as default. Disabling it will improve CPU and RAM performance of your XProtect Professional system, but will—depending on your system settings—also affect your motion detection, event and alarm management. In the following two tables, You can see the differences between enabling (table 1) and disabling (table 2) built-in motion detection for a camera.

Enabled motion detection

Recording properties setting	Recordings	Motion-based events	Non-motion based events	Sequences
Always	Yes	Yes	Yes	Yes
Never	No	Yes	Yes	No
Built-in Motion Detection	Yes	Yes	Yes	Yes

Recording properties setting	Recordings	Motion-based events	Non-motion based events	Sequences
Built-in Motion Detection & Event or Event only	Yes	Yes	Yes	Yes

Disabled motion detection

Camera's recording settings	Recordings	Motion-based events	Non-motion based events	Sequences
Always	Yes	No	Yes	No
Never	No	No	Yes	No
Built-in Motion Detection	No	No	Yes	No
Built-in Motion Detection & Event or Event only	Yes (depending on settings)	No	Yes (depending on settings)	No

About motion detection and PTZ cameras

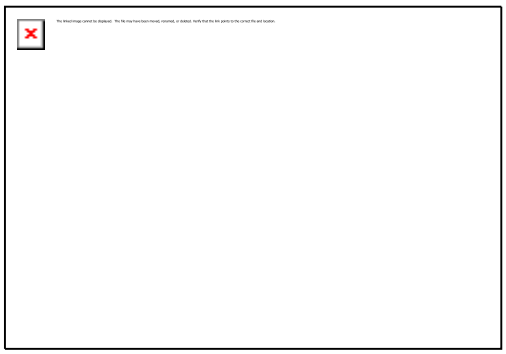
Motion detection generally works the same way for PTZ (Pan/Tilt/Zoom) cameras as it does for regular cameras. However:

- It is not possible to configure motion detection separately for each of a PTZ camera's preset positions.
- In order to activate unwanted recordings, notifications, etc., motion detection is automatically disabled while a PTZ camera moves between two preset positions. After a number of seconds, the so-called transition time, specified as part of the PTZ camera's PTZ patrolling properties (see "PTZ patrolling" on page 118), motion detection is automatically enabled again.

Configure camera-specific schedules

If you base your schedule profile—or parts of it—on events within periods of time, remember to select **Start event** and **Stop event** from the lists below the calendar section.

Tip: If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.



The fact that a camera transfers video to XProtect Professional does not necessarily mean that video from the camera is recorded. Recording is configured separately; see Configure video and recording (see "About video and recording configuration" on page 78).

For each camera, you can create schedule profiles based on:

Online periods

- Periods of time (example: Mondays from 08.30 until 17.45), shown in pink:
- Events within periods of time (example: from Event A occurs until Event B occurs Mondays from 08.30 until 17.45), shown in yellow:

  The two options can be combined , but they cannot overlap in time.

Speedup

- Periods of time (example: Mondays from 08.30 until 17.45), shown in olive green:

E-mail notification

- Periods of time (example: Mondays from 08.30 until 17.45), shown in blue:

SMS notification

- Periods of time (example: Mondays from 08.30 until 17.45), shown in green:

PTZ patrolling

- Periods of time (example: Mondays from 08.30 until 17.45), shown in red:
- If use of one patrolling profile is followed immediately by use of another, run your mouse pointer over the red bar to see which patrolling profile applies when.

XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of

customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

1. In the **Schedule Profiles** list, select **Add new...**.
2. In the **Add Profile** dialog, enter a name for the profile. Names must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
3. In the top right corner of the dialog, select **Set camera to start/stop on time** (to base subsequent settings on periods of time) or **Set camera to start/stop on event** (to base subsequent settings on events within periods of time).

   Tip: You can combine the two, so you may return to this step in order to toggle between the two options.
4. In the calendar section, place your mouse pointer at a required start point, then hold down the left mouse button, drag the mouse pointer and release at the required end point.
   - You specify each day separately.
   - You specify time in increments of five minutes. XProtect Professional helps you by showing the time over which your mouse pointer is positioned.

If you base your schedule profile—or parts of it—on events within periods of time, remember to select **Start event** and **Stop event** from the lists below the calendar section.

- **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
- To delete an unwanted part of a schedule profile, right-click it and select **Delete**.
- To quickly fill or clear an entire day, double-click the name of the day.
- As an alternative to dragging inside the calendar section, use the **Start time**, **End time** and **Day** fields, then the **Change Period** or **Set Period** button as required. When using the **Start time** and **End time** fields, remember that time is specified in increments of five minutes. You cannot specify a period shorter than five minutes, and you can only use times like 12:00, 12.05, 12:10, 12:15, etc. If you specify a time outside of the five-minute intervals, such as 12:13, you will get an error message.

Configure when cameras should do what

Use the scheduling feature to configure when:

- Cameras should be online (that is transfer video to XProtect Professional)
- Cameras should use speedup (that is use a higher than normal frame rate)
- You want to receive any e-mail and/or SMS notifications regarding cameras
- PTZ cameras should patrol, and according to which patrolling profile

- Archiving should take place

See Configure general scheduling and archiving (on page 150) and Configure camera-specific schedules (on page 80).

Configure motion detection

Do the following:

1. In the Management Application navigation pane, expand **Advanced Configuration**, expand **Cameras and Storage Information**, right-click the required camera, and select **Properties**.
2. In the **Camera Properties** window, select the **Recording Properties** tab, and select the relevant settings (see "About motion detection settings" on page 79).
3. Select the **Motion Detection** tab.

   If there are any areas that should be excluded from motion detection (for example if the camera covers an area where a tree is swaying in the wind), you can exclude that area (see "Exclude regions" on page 67) by selecting it with your mouse.
4. Fill in the relevant properties (see "Motion detection & exclude regions" on page 111).

   There are some differences in motion-detection behavior for PTZ cameras (see "About motion detection and PTZ cameras" on page 80).
5. Click OK.

Disable or delete cameras

All cameras are by default enabled. This means that video from the cameras can be transferred to XProtect Professional provided that the cameras are scheduled to be online (see "Online period" on page 156).

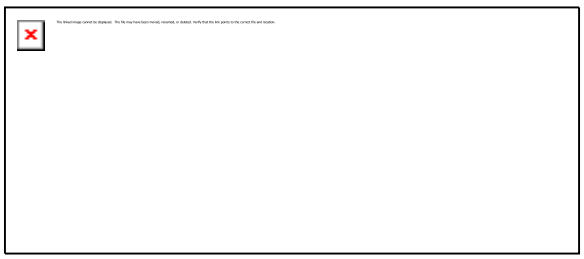
To **disable** a camera:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Cameras and Storage Information**, double-click the camera you want to disable, and clear the **Enabled** box.
2. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

To **delete** a camera, you have to delete the hardware device (see "Delete hardware devices" on page 75). If you delete the hardware device, you also delete any attached microphones and speakers. If you do not want this, consider disabling the camera instead.

Move PTZ type 1 and 3 to required positions

For PTZ types 1 and 3, you can move the PTZ camera to required positions in several different ways:



1. Click the required position in the camera preview (if supported by the camera).
2. Use the sliders located near the camera preview to move the PTZ camera along each of its axes: the X-axis (for panning left/right), the Y-axis (for tilting up/down), and the Z-axis (for zooming in and out; to zoom in, move the slider towards **Tele;** to zoom out, move the slider towards **Wide**).
3. Use the navigation buttons:

Moves the PTZ camera up and to the left

Moves the PTZ camera up

Moves the PTZ camera up and to the right

Moves the PTZ camera to the left

Moves the PTZ camera to its home position (that is default position)

Moves the PTZ camera to the right

Moves the PTZ camera down and to the left

Moves the PTZ camera down

Moves the PTZ camera down and to the right

Zooms out (one zoom level per click)

Zooms in (one zoom level per click)

Recording and storage properties

Properties in this window:

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Recording and archiving paths

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

All properties on a white background are editable, properties on a light blue background cannot be edited. Note that all of the properties can also be specified individually for each camera.

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

Name	Description
Shortcut	Users of the Smart Client can take advantage of keyboard shortcuts, some of which let the users toggle between viewing different cameras. Such shortcuts include numbers which are used to identify each camera. Shortcut numbers must be unique for each camera. A camera shortcut number must not contain any letters or special characters, and must not be longer than eight digits. Examples of correct camera shortcut numbers: 3, 12345678. Examples of incorrect camera shortcut numbers: Cam#3, 123456789. More information about using the keyboard shortcuts is available in the separate documentation for the Smart Client.
Recording Path	Path to the folder in which the camera's database should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can only specify a path to a folder on a **local** drive. You cannot specify a path to a network drive. If you use a network drive, it is not be possible to save recordings if the network drive becomes unavailable. If you change the recording path, and you have existing recordings at the old location, you are asked whether you want to move the recordings to the new location (recommended), leave them at the old location, or delete them. **Tip:** If you have several cameras, and several local drives are available, you can improve performance by distributing individual cameras' databases across several drives.
Archiving Path	Only editable if not using dynamic paths for archiving (see "About archiving" on page 144). Path to the folder in which the camera's archived recordings should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can specify a path to a local or network drive. If you change the archiving path, and there are existing archived recordings at the old location, you will be asked whether you want to move the archived recordings to the new location (recommended), leave them at the old location, or delete them. Note that if you move archived recordings, XProtect Professional will also archive what is currently in the camera database. In case you wonder why the camera database is empty just after you have moved archived recordings, this is the reason.
Retention Time	Total amount of time for which you want to keep recordings from the camera (that is recordings in the camera's database as well as any archived recordings). Default is 30 days. Note that the retention time covers the **total** amount of time you want to keep recordings for. In earlier XProtect Professional versions, time limits were specified separately for the database and archives.

Name	Description
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
Set all template values on selected cameras	Apply all values from the template to selected cameras.

Dynamic path selection

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. In the case of Dynamic Path Selection, it is because the properties are shared by all cameras.

With dynamic archiving (see "About archiving" on page 144) paths, you specify a number of different archiving paths, usually across several drives. If the path containing the XProtect Professional database is on one of the drives you have selected for archiving, XProtect Professional will always try to archive to that drive first. If not, XProtect Professional automatically archives to the archiving drive with the most available space at any time, provided there is not a camera database using that drive. Which drive has the most available space may change during the archiving process, and archiving may therefore happen to several archiving drives during the same process. This fact will have no impact on how users find and view archived recordings.

Dynamic archiving paths are general for all your cameras; you cannot configure dynamic archiving paths for individual cameras.

All properties on a white background are editable, properties on a light blue background cannot be edited.

Name	Description
Enable dynamic path selection archives	Enables the use of dynamic path selection, allowing you to select which paths you want to use. The list of selectable paths initially represents all drives on the server, both local and mapped drives. You can add further paths with the **New path** feature below the list.
Use	Select particular paths for use as dynamic archiving paths. You can also select a previously manually added path for removal (see description of **Remove** button in the following).
Drive	Letter representing the drive in question, for example C:.
Path	Path to where you save the files, for example C:\ or \\OurServer\OurFolder\OurSubfolder\.
Drive Size	Total size of the drive.
Free Space	Amount of unused space left on the drive.

Name	Description
New path	Specify a new path, and add it to the list using the Add button. Paths must be reachable by the surveillance system server, and you must specify the path using the UNC (Universal Naming Convention) format, example: \\server\volume\directory\. When the new path is added, you can select it for use as a dynamic archiving path.
Add	Add the path specified in the **New path** field to the list.
Remove	Remove a selected path—which has previously been manually added—from the list. You cannot remove any of the initially listed paths, not even when they are selected.

Video recording

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

In XProtect Professional, the term **recording** means **saving video and, if applicable, audio from a camera in the camera's database on the surveillance system server**. Video/audio is often saved only when there is a reason to do so, for example as long as motion is detected, when an event occurs and until another event occurs, or within a certain period of time.

All properties on a white background are editable, properties on a light blue background cannot be edited. Note that all of the Video Recording properties can also be specified individually for each camera (see "Recording" on page 106).

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

Name	Description
Record on	Lets you select under which conditions video from the camera should be recorded: • **Always:** Record whenever the camera is enabled (see "General" on page 101) and scheduled to be online (see "Online period" on page 156) (the latter allows for time-based recording). • **Never**: Never record. Live video will be displayed, but—since no video is kept in the database—users will not be able to play back video from the camera. • **Motion Detection**: Select this to record video in which motion (see "Motion detection & exclude regions" on page 111) is detected. Unless post-recording (see the following) is used, recording will stop immediately after the last motion is detected. • **Event**: Select this to record video when an event occurs and until another event occurs. Use of recording on event requires that events have been defined, and that you select start and stop events. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields. • **Motion Detection & Event**: Select this to record video in which motion is detected, or when an event occurs and until another event occurs. Remember to select start and stop events in the neighboring columns.
Start Event	Select required start event. Recording will begin when the start event occurs (or earlier if using pre-recording; see the following).
Stop Event	Select required stop event. Recording will end when the stop event occurs (or later if using post-recording; see the following).
Pre-recording	You can store recordings from periods preceding detected motion and/or start events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column. **How does pre- and post-recording work?** XProtect Professional receives video in a continuous stream from the camera whenever the camera is enabled and scheduled to be online. This is what lets you view live video, but it also means that XProtect Professional can easily store received video for a number of seconds in its memory (a.k.a. buffering). If it turns out that the buffered video is needed for pre- or post-recording, it is automatically appended to the recording. If not, it is simply discarded.

Name	Description
Seconds [of pre-recording]	Specify the number of seconds for which you want to record video from before recording start conditions (that is motion or start event) are met. Usually, only some seconds of pre-recording is required, but you can specify up to 65535 seconds of pre-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long pre-recording time, you can potentially run into a scenario where your pre-recording time spans scheduled or unscheduled archiving (see "About archiving" on page 144) times. That can be problematic since pre-recording does not work well during archiving.
Post-recording	You can store recordings from periods following detected motion and/or stop events. Select check box to enable this feature. Specify the required number of seconds in the neighboring column.
Seconds [of post-recording]	Specify the number of seconds for which you want to record video from after recording stop conditions (that is motion or stop event) are met. Usually, only some seconds of post-recording is required, but you can specify up to 65535 seconds of post-recording, corresponding to 18 hours, 12 minutes and 15 seconds. However, if specifying a very long post-recording time, you can potentially run into a scenario where your post-recording time spans scheduled or unscheduled archiving times. That can be problematic since post-recording does not work well during archiving.
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
Set all template values on selected cameras	Apply all values from the template to selected cameras.

Properties in this window:

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If the camera uses the MJPEG video format

With MJPEG, you can define frame rates for regular as well as speedup modes. If the camera offers dual stream, you can also enable this:

Regular frame rate mode:

Name	Description
Frame Rate	Required average frame rate for video from the camera. Select number of frames, then select the time unit interval (second, minute or hour).
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.

Speedup frame rate mode:

Name	Description
Enable speedup frame rate	The speedup feature lets you use a higher than normal frame rate if motion is detected and/or an event occurs. When you enable speedup, further columns for specifying speedup details become available.
Frame Rate	Speedup frame rate for viewing video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode. If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
On motion	Select this check box to use the speedup frame rates when motion is detected. The camera will return to the normal frame rates two seconds after the last motion is detected.

Name	Description
On event	Select this check box to use the speedup frame rates when an event occurs and until another event occurs. Use of speedup on event requires that events have been defined, and that you select start and stop events in the neighboring lists. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
Start Event	Select required start event. The camera will begin using the speedup frame rates when the start event occurs.
Stop Event	Select required stop event. The camera will return to the normal frame rates when the stop event occurs.

Tip: Speedup does not necessarily have to be based on motion- or events, you can also use scheduling (see "Speedup" on page 157) to configure speedup based on particular periods of time. If you prefer such time-based speedup, you should still enable the use of speedup by selecting the **Enable speedup** check box.

Dual stream:

This feature is only available on cameras supporting dual stream.

Name	Description
Enable dedicated live stream	This additional stream feature lets you use the alternative stream of the camera. It enables two independent streams to the recording server—a stream for live viewing and another stream for recording purposes, with different resolution, encoding, and frame rate.
Stream	Select the type of the live stream. Stream settings for viewing live video and for recording video may very well be different in order to get the best result.
Resolution	Select the resolution of the camera.
FPS	Select the camera's live frame rate per second (FPS)

Why are there three different places where I can configure frame rates for video? The first, Live frame rate, is for the regular recording stream. The second, Live frame rate, is for when speeding up recordings in connection with motion detection or similar. And the third, FPS, is for the additional stream used for live viewing.

If the camera uses the MPEG video format

With MPEG, you can define frame rate and other settings:

Name	Description
Frame rate per second	Frame rate for viewing live and recorded video from the camera. Select number of frames per second.

Name	Description
Record keyframes only	Keyframes stored at specified intervals record the entire view of the camera, whereas the following frames record only pixels that change. This helps greatly reducing the size of MPEG files. Select the check box if you only want to record keyframes. Note that you can specify exceptions if motion is detected or events occur (see the following).
Record all frames on motion	Allows you to make exceptions if you have selected to record keyframes only. Select this check box to record all frames when motion is detected. Two seconds after the last motion **is detected**, the camera will return to recording keyframes only**.**
Record all frames on event	Allows you to make exceptions if you have selected to record keyframes only. Select this check box to record all frames when an event occurs and until another event occurs. Use of this feature requires that events have been defined, and that you select start and stop events in the neighboring lists. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
Start Event	**Use when recording on Event or Motion Detection & Event.** Select required start event. The camera will begin recording all frames when the start event occurs.
Stop Event	Select required stop event. The camera will again only recording keyframes when the stop event occurs.

Dual stream:

This feature is only available on cameras supporting dual stream.

Name	Description
Enable dedicated live stream	This additional stream feature lets you use the alternative stream of the camera. It enables two independent streams to the recording server—a stream for live viewing and another stream for recording purposes, with different resolution, encoding, and frame rate.
Stream	Select the type of the live stream. Stream settings for viewing live video and for recording video may very well be different in order to get the best result.
Resolution	Select the resolution of the camera.
FPS	Select the camera's live frame rate per second (FPS)

Manual recording

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. In the case of Manual recording, it is because the properties are shared by all cameras.

When manual recording is enabled, Smart Client users with the necessary rights (see "Configure user and group rights" on page 180) can manually start recording if they see something of interest while viewing live video from a camera which is not already recording.

If enabled, manual recording can take place even if recording for individual cameras (see "Recording" on page 106) is set to **Never** or **Conditionally**.

When started from the Smart Client, such user-driven recording will always take place for a fixed time, for example for five minutes.

Name	Description
Enable manual recording	Select check box to enable manual recording and specify further details.
Default duration of manual recording	Period of time (in seconds) during which user-driven recording will take place. Default duration is 300 seconds, corresponding to five minutes.
Maximum duration of manual recording	Maximum allowed period of time for user-driven recording. This maximum is not relevant in connection with manual recording started from the Smart Client, since such manual recording will always take place for a fixed time. In some installations it is, however, also possible to combine manual recording with third-party applications if integrating these with XProtect Professional through an API or similar, and in such cases specifying a maximum duration may be relevant. If you are simply using manual recording in connection with the Smart Client, disregard this property.

Frame rate - MJPEG

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

All properties on a white background are editable, properties on a light blue background cannot be edited. Note that all of the Frame Rate - MJPEG properties can also be specified individually for each camera (see "Recording" on page 106) using MJPEG.

Properties in this window:

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Template and common properties

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
Set all template values on selected cameras	Apply all values from the template to selected cameras.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

Regular frame rate properties

Name	Description
Frame Rate	Required average frame rate for video from the camera. Select number of frames, then select the time unit interval (second, minute or hour).
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
Time Unit	Select required unit for live and recording frame rates (per second, minute, or hour). Note that you can only select time bases that let you speed up frame rates. Example: If you have specified 15 frames per **second** in normal mode, you cannot specify 16 frames per **minute** or **hour** in speedup mode.

Name	Description
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.

Speedup frame rate properties

Name	Description
Enable Speedup	The speedup feature lets you use a higher than normal frame rate if motion is detected and/or an event occurs. When you enable speedup, further columns for specifying speedup details become available.
Frame Rate	Speedup frame rate for viewing video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode. If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
Time Unit	Select required unit for live and recording frame rates (per second, minute, or hour). Note that you can only select time bases that let you speed up frame rates. Example: If you have specified 15 frames per **second** in normal mode, you cannot specify 16 frames per **minute** or **hour** in speedup mode.

Name	Description
Speedup On	• **Motion Detection**: Select this to speed up when motion (see "Motion detection & exclude regions" on page 111) is detected. Normal frame rates will be resumed immediately after the last motion **is detected.** • **Event:** Select this to speed up when an event occurs and until another event occurs. Use of speedup on event requires that events have been defined, and that you select start and stop events in the neighboring columns. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields. • **Motion Detection & Event:** Select this to speed up when motion is detected, or when an event occurs and until another event occurs. Remember to select start and stop events in the neighboring columns.
Schedule Only	Select this to speed up according to the camera's speedup schedule (see "Speedup" on page 157) only.
Start Event	Select required start event. The camera will begin using the speedup frame rates when the start event occurs.
Stop Event	Select required stop event. The camera will return to the normal frame rates when the stop event occurs.
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.

Frame Rate - MPEG

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

All properties on a white background are editable, properties on a light blue background cannot be edited. Note that all of the Frame Rate - MPEG properties can also be specified individually for each camera (see "Recording" on page 106) using MPEG.

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.

Name	Description
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Dual Stream	Allows you to check if dual streaming is enabled on the camera(s). Note that the information is read-only. For cameras that support dual streaming, this can be enabled/disabled as part of individual cameras' Video (on page 102) properties.
Live FPS	Select the camera's live frame rate per second (FPS).
Record Keyframe Only	Keyframes stored at specified intervals record the entire view of the camera, whereas the following frames record only pixels that change; this helps greatly reduce the size of MPEG files. Select the check box if you only want to record keyframes.
Record All Frames on	Allows you to make exceptions if you have selected to record keyframes only. • **Motion Detection**: Select this to record all frames when motion is detected. Two seconds after the last motion (see "Motion detection & exclude regions" on page 111) is detected, the camera will return to recording keyframes only**.** • **Event**: Select this to record all frames when an event occurs and until another event occurs. Requires that events have been defined, and that you select start and stop events in the neighboring columns. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields. • **Motion Detection & Event**: Select this to record all frames when motion is detected, or when an event occurs and until another event occurs. Remember to select start and stop events in the neighboring columns. • **Schedule only**: Select this to record all frames according to the camera's speedup schedule (see "Speedup" on page 157) only.
Start Event	**Use when recording on Event or Motion Detection & Event.** Select required start event. The camera will begin recording all frames when the start event occurs.
Stop Event	Select required stop event. The camera will again only recording keyframes when the stop event occurs.

Name	Description
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
Set all template values on selected cameras	Apply all values from the template to selected cameras.

Audio recording

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, you can determine whether audio should be recorded or not. Your choice applies for all cameras on your XProtect Professional system.

Name	Description
Always	Always record audio on all applicable cameras.
Never	Never record audio on any cameras. Note that even though audio is never recorded, it is still be possible to listen to live audio in the Smart Client.

If you record audio, it is important that you note the following:

- Audio recording affects video storage capacity: Audio is recorded to the associated camera's database. Therefore, it is important to bear in mind that the database is likely to become full earlier if you record audio and video than if you only record video. The fact that the database becomes full is not in itself a problem since XProtect Professional automatically archives (see "About archiving" on page 144) data if the database becomes full. However, you may need additional archiving space if you record audio.
    - Example: If you use MPEG4, each one-second video GOP (Group Of Pictures) will be stored in one record in the database. Each second of audio will also be stored in one record in the database. This reduces the database's video storage capacity to half its capacity, because half of the database's records is used for storing audio. Consequently, the database runs full sooner, and automatic archiving takes place more often than if you were only recording video.
    - Example: If you use MJPEG, audio is stored in one record for every JPEG for as long as the audio block size does not exceed the time between the JPEGs. In extreme cases, this reduces the database's video storage capacity to half its capacity, because half of the database's records is used for storing audio. If you use very high frame rates, which means less time between each JPEG, a smaller portion of the database is used for storing audio records, and consequently a larger portion is available for storing video. The result is that the database runs full sooner, and automatic archiving takes place more often than if you were only recording video.

Above examples are simplified. The exact available video storage capacity also depends on GOP/JPEG and audio kilobyte size.

Audio selection

When you configure video and recording (see "About video and recording configuration" on page 78), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

With a default microphone and/or speaker selected for a camera, audio from the microphone and/or speaker will automatically be used when video from the camera is viewed. Note that all of the properties can also be specified individually for each camera.

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Default Microphone	Select required default microphone. **Tip:** Note that you can select microphones or speakers attached to another hardware device than the selected camera.
Default Speaker	Select required default speaker.
Camera	Click the **Open** button to configure detailed and/or camera-specific settings (such as event notification, PTZ preset positions, and fisheye view areas) for the selected camera.
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
Set all template values on selected cameras	Apply all values from the template to selected cameras.

Storage information

The storage information lets you view how much storage space you have on your XProtect Professional system—and, not least, how much of it is free:

Name	Description
Drive	Letter representing the drive in question, for example C:.
Path	Path to where you save the files, for example C:\ or \\OurServer\OurFolder\OurSubfolder\.
Usage	What the storage area is used for, for example recording or archiving.
Drive Size	Total size of the drive.
Video Data	Amount of video data on the drive.
Other Data	Amount of other data on the drive.
Free Space	Amount of unused space left on the drive.

Tip: To quickly view disk space usage in a pie chart format, select the line representing the drive you are interested in.

Camera properties

Properties in this window:

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Recording and archiving paths 107
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Output 111
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General

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, properties include:

Name	Description
Enabled	Cameras are by default enabled, meaning that provided they are scheduled to be online (see "Online period" on page 156), they are able to transfer video to XProtect Professional. If required, you can disable an individual camera, in which case no video/audio will be transferred from the camera source to XProtect Professional.
Camera Name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Camera shortcut number	Users of the Smart Client can take advantage of keyboard shortcuts, some of which let the users toggle between viewing different cameras. Such shortcuts include numbers which are used to identify each camera. Shortcut numbers must be unique for each camera. A camera shortcut number must not contain any letters or special characters, and must not be longer than eight digits. Examples of correct camera shortcut numbers: 3, 12345678. Examples of incorrect camera shortcut numbers: Cam#3, 123456789. More information about using the keyboard shortcuts is available in the separate documentation for the Smart Client.

These properties are to a large extent camera-specific. Since such properties vary from camera to camera, descriptions in the following are for guidance only. If the selected camera is accessible, a live preview is displayed. Click the **Camera Settings...** button to open a separate window with properties for the selected camera.

The video properties typically let you control bandwidth, brightness, compression, contrast, resolution, rotation, etc. by overwriting existing values of selecting new ones. When you adjust video settings, you can—for most cameras—preview the effect of your settings in an image below the fields.

Video settings may feature an **Include Date and Time** setting. If set to **Yes**, date and time from the camera will be included in video. Note, however, that cameras are separate units which may have separate timing devices, power supplies, etc. Camera time and XProtect Professional system time may therefore not correspond fully, and this may occasionally lead to confusion. As all frames are time-stamped by XProtect Professional upon reception, and exact date and time information for each image is already known, it is recommended that the setting is set to **No**.

Tip: For consistent time synchronization, you may—if supported by the camera—automatically synchronize camera and system time through a time server.

Video

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, properties include:

If the camera uses MJPEG video format

With MJPEG, you can define frame rates for regular as well as speedup modes. If the camera offers dual stream, you can also enable this:

Regular frame rate mode:

Name	Description
Frame Rate	Required average frame rate for video from the camera. Select number of frames, then select the time unit interval (second, minute or hour).
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.

Speedup frame rate mode:

Name	Description
Enable speedup frame rate	The speedup feature lets you use a higher than normal frame rate if motion is detected and/or an event occurs. When you enable speedup, further columns for specifying speedup details become available.
Frame Rate	Speedup frame rate for viewing video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
Live Frame Rate	Required average frame rate for live video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode. If the camera supports dual stream and dual stream is enabled, the **Live Frame Rate** column will be read-only with the value **Dual streaming—**which cannot be altered.
Recording Frame Rate	Required average frame rate for recorded video from the camera. Select number of frames, then select the time unit interval (second, minute or hour). The frame rate must be higher than the frame rate specified under normal mode.
On motion	Select this check box to use the speedup frame rates when motion is detected. The camera will return to the normal frame rates two seconds after the last motion is detected.

Name	Description
On event	Select this check box to use the speedup frame rates when an event occurs and until another event occurs. Use of speedup on event requires that events have been defined, and that you select start and stop events in the neighboring lists. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
Start Event	Select required start event. The camera will begin using the speedup frame rates when the start event occurs.
Stop Event	Select required stop event. The camera will return to the normal frame rates when the stop event occurs.

Tip: Speedup does not necessarily have to be based on motion- or events, you can also use scheduling (see "Speedup" on page 157) to configure speedup based on particular periods of time. If you prefer such time-based speedup, you should still enable the use of speedup by selecting the **Enable speedup** check box.

Dual stream:

This feature is only available on cameras supporting dual stream.

Name	Description
Enable dedicated live stream	This additional stream feature lets you use the alternative stream of the camera. It enables two independent streams to the recording server—a stream for live viewing and another stream for recording purposes, with different resolution, encoding, and frame rate.
Stream	Select the type of the live stream. Stream settings for viewing live video and for recording video may very well be different in order to get the best result.
Resolution	Select the resolution of the camera.
FPS	Select the camera's live frame rate per second (FPS)

Why are there three different places where I can configure frame rates for video? The first, Live frame rate, is for the regular recording stream. The second, Live frame rate, is for when speeding up recordings in connection with motion detection or similar. And the third, FPS, is for the additional stream used for live viewing.

If the camera uses MPEG video format

With MPEG, you can define frame rate and other settings:

Name	Description
Frame rate per second	Frame rate for viewing live and recorded video from the camera. Select number of frames per second.

Name	Description
Record keyframes only	Keyframes stored at specified intervals record the entire view of the camera, whereas the following frames record only pixels that change. This helps greatly reducing the size of MPEG files. Select the check box if you only want to record keyframes. Note that you can specify exceptions if motion is detected or events occur (see the following).
Record all frames on motion	Allows you to make exceptions if you have selected to record keyframes only. Select this check box to record all frames when motion is detected. Two seconds after the last motion **is detected**, the camera will return to recording keyframes only**.**
Record all frames on event	Allows you to make exceptions if you have selected to record keyframes only. Select this check box to record all frames when an event occurs and until another event occurs. Use of this feature requires that events have been defined, and that you select start and stop events in the neighboring lists. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
Start Event	**Use when recording on Event or Motion Detection & Event.** Select required start event. The camera will begin recording all frames when the start event occurs.
Stop Event	Select required stop event. The camera will again only recording keyframes when the stop event occurs.

Dual stream:

This feature is only available on cameras supporting dual stream.

Name	Description
Enable dedicated live stream	This additional stream feature lets you use the alternative stream of the camera. It enables two independent streams to the recording server—a stream for live viewing and another stream for recording purposes, with different resolution, encoding, and frame rate.
Stream	Select the type of the live stream. Stream settings for viewing live video and for recording video may very well be different in order to get the best result.
Resolution	Select the resolution of the camera.
FPS	Select the camera's live frame rate per second (FPS)

Audio

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, properties include the possibility of selecting a default microphone and/or speaker for the camera.

With a default microphone and/or speaker selected for a camera, audio from the microphone and/or speaker will automatically be used when video from the camera is viewed.

If a microphone and/or a speaker is attached to the same hardware device as the camera, that microphone and/or speaker will be the camera's default microphone and/or speaker if you do not select otherwise.

Name	Description
Default Microphone	Select required default microphone. **Tip:** Note that you can select microphones or speakers attached to another hardware device than the selected camera.
Default Speaker	Select required default speaker.

The ability to select a default microphone and/or speaker for the camera requires that at least one microphone and/or speaker has been attached to a hardware device on the surveillance system.

Recording

In XProtect Professional, the term **recording** means **saving video and, if applicable, audio from a camera in the camera's database on the surveillance system server**. Video/audio is often saved only when there is a reason to do so, for example as long as motion is detected, when an event occurs and until another event occurs, or within a certain period of time.

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, recording properties include:

Name	Description
Always	Record whenever the camera is enabled (see "General" on page 101) and scheduled to be online (see "Online period" on page 156) (the latter allows for time-based recording).
Never	Never record. Live video will be displayed, but—since no video is kept in the database—users will not be able to play back video from the camera.
Conditionally	Record when certain conditions are met. When you select this option, specify required conditions (see the following) which enables you to store recordings from periods preceding and following detected motion and/or specified events. Example: If you have defined that video should be stored when a door is opened, being able to see what happened immediately prior to the door being opened may also be important. Say you have specified that video should be stored conditionally on event, with a start event called **Door Opened** and a stop event called **Door Closed**. With three seconds of pre-recording, video will be recorded from three seconds before **Door Opened** occurs and until **Door Closed** occurs
Built-in motion detection	Select this check box to record video in which motion (see "Motion detection & exclude regions" on page 111) is detected. Unless post-recording (see the following) is used, recording will stop immediately after the last motion is detected.

Name	Description
On event	Select this check box to record video when an event occurs and until another event occurs. Use of recording on event requires that events have been defined, and that you select start and stop events in the neighboring lists. **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
Start Event	Select required start event. Recording will begin when the start event occurs (or earlier if using pre-recording; see the following).
Stop Event	Select required stop event. Recording will end when the stop event occurs (or later if using post-recording; see the following).
Enable pre-recording	Available only when the option **Conditional** is selected. Specify the number of seconds for which you want to record video from before recording start conditions (that is motion or start event) are met.
Enable post-recording	Available only when the option **Conditional** is selected. Specify the number of seconds for which you want to record video after recording stop conditions (that is motion end or stop event) are met.

How does pre- and post-recording work? XProtect Professional receives video in a continuous stream from the camera whenever the camera is enabled and scheduled to be online. This is what lets you view live video, but it also means that XProtect Professional can easily store received video for a number of seconds in its memory (a.k.a. buffering). If it turns out that the buffered video is needed for pre- or post-recording, it is automatically appended to the recording. If not, it is simply discarded.

Note that manual recording (on page 93) may be enabled. With manual recording, Smart Client users with the necessary rights (see "Configure user and group rights" on page 180) can manually start recording if they see something of interest while viewing live video from a camera which is not already recording. If enabled, manual recording can take place even if recording for individual cameras is set to **Never** or **Conditionally**.

Recording and archiving paths

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, properties include:

Name	Description
Recording Path	Path to the folder in which the camera's database should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can only specify a path to a folder on a **local** drive. You cannot specify a path to a network drive. If you use a network drive, it is not be possible to save recordings if the network drive becomes unavailable. If you change the recording path, and you have existing recordings at the old location, you are asked whether you want to move the recordings to the new location (recommended), leave them at the old location, or delete them. **Tip:** If you have several cameras, and several local drives are available, you can improve performance by distributing individual cameras' databases across several drives.
Delete Database	Click button to delete all recordings in the database for the camera. Archived recordings will not be affected. **IMPORTANT:** Use with caution. All recordings in the database for the camera will be permanently deleted. As a security measure, you will be asked to confirm the deletion.
Archiving Path	Only editable if not using dynamic paths for archiving (see "About archiving" on page 144). Path to the folder in which the camera's archived recordings should be stored. Default is C:\MediaDatabase. To browse for another folder, click the browse icon next to the required cell. You can specify a path to a local or network drive. If you change the archiving path, and there are existing archived recordings at the old location, you will be asked whether you want to move the archived recordings to the new location (recommended), leave them at the old location, or delete them. Note that if you move archived recordings, XProtect Professional will also archive what is currently in the camera database. In case you wonder why the camera database is empty just after you have moved archived recordings, this is the reason.
Delete Archives	Click button to delete all archived recordings for the camera. Recordings in the camera's regular database will not be affected. The ability to delete is available regardless of whether you use a single archiving path or dynamic archiving paths. **MPORTANT:** Use with caution. All archived recordings for the camera will be permanently deleted. As a security measure, you will be asked to confirm the deletion.

Name	Description
Retention Time	Total amount of time for which you want to keep recordings from the camera (that is recordings in the camera's database as well as any archived recordings). Default is 30 days. Note that the retention time covers the **total** amount of time you want to keep recordings for. In earlier XProtect Professional versions, time limits were specified separately for the database and archives.
Database Repair Action	Select which action to take if the database becomes corrupted: • **Repair, scan, delete if fails**: Default action. If the database becomes corrupted, two different repair methods will be attempted: a fast repair and a thorough repair. If both repair methods fail, the contents of the database will be deleted. • **Repair, delete if fails**: If the database becomes corrupted, a fast repair will be attempted. If the fast repair fails, the contents of the database will be deleted. • **Repair, archive if fails**: If the database becomes corrupted, a fast repair will be attempted. If the fast repair fails, the contents of the database will be archived. • **Delete (no repair)**: If the database becomes corrupted, the contents of the database will be deleted. • **Archive (no repair)**: If the database becomes corrupted, the contents of the database will be archived. If you choose an action to repair a corrupt database, this corrupt database is closed while it is repaired. Instead, a new database is created to allow recordings to continue. **Why archive a corrupt database?** Provided the corrupt database has been archived, it can often be repaired by the Smart Client. So when you open the corrupt database in the Smart Client, the Smart Client will repair it automatically if at all possible. **Tip:** There are several things you can do to prevent that your databases become corrupt in the first place. See Protect recording databases from corruption (see "About protecting recording databases from corruption" on page 211).
Configure Dynamic Paths	With dynamic archiving paths, you specify a number of different archiving paths, usually across several drives. If the drive containing the camera's database is among the path you have selected for dynamic archiving, XProtect Professional will always try to archive to that path first. If not, XProtect Professional automatically archives to the archiving drive with the most available space at any time, provided there is not a camera database using that drive. See also Dynamic path selection (on page 87).

Event notification

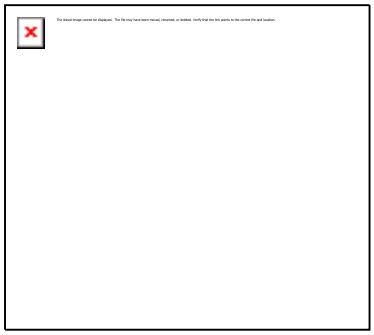
When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, properties include event notification:

About event notifications

Event notification lets you inform Smart Client users that an event has occurred on the XProtect Professional system. Event notification can be valuable for client users, as they will be able to quickly detect that an event has occurred, even though their focus was perhaps on something else the moment the event occurred.

Tip: Even though event notification is configured separately for each camera, you can select between all events on your XProtect Professional system, regardless whether events are manual, generic, or originate on another hardware device than the camera itself.

In the Smart Client, event notification is given by a yellow indicator which lights up when a relevant event has taken place. An optional sound on event notification can furthermore be configured in the Smart Client itself.



In the clients, three differently colored indicators are available for each camera:

- The yellow event indicator. When event notification is used for a camera, the yellow indicator will light up when a relevant event has occurred.
- A red motion indicator; lights up when motion has been detected.
- An optional green video indicator; lights up when video is received from the camera.

In the Smart Client, all three indicators are in effect optional since the blue bar in which the indicators are displayed can be turned off in the Smart Client. If Smart Client users in your organization are going to rely on event notification, make sure they do not switch the blue bars off.

How to select required events

1. In the **Available events** list, select the required event. It is only possible to select one event at a time.

   Tip: If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.

2. Click the **>>** button to copy the selected event to the **Selected Events** list.
3. Repeat for each required event.

If you later want to remove an event from the **Selected Events** list, simply select the event in question, and click the **<<** button.

Output

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, you can also associate a camera with particular hardware output (see "Add a hardware output" on page 128), for example the sounding of a siren or the switching on of lights.

Associated output can then be activated automatically when motion is detected in video from the camera, or manually when Smart Client users with the necessary rights (see "Configure user and group rights" on page 180) view live video from the camera.

1. In the **Available output** list, select the required output. It is only possible to select one output at a time.

   Tip: If you have not yet defined any suitable output, you can quickly do it: Use the **Configure Output** button, located below the other fields.

   Tip: Even though output is configured separately for each camera, you can select between all output on your XProtect Professional system, regardless whether output originates on another hardware device than the camera itself.

2. Click the **>>** button to copy the selected output to the:

   - **On manual activation** list, in which case the output will be available for manual activation in the Smart Client.

     - and/or -

   - **On motion detected** list, in which case the output will be activated when motion is detected in video from the camera.

   If required, the same output can appear on both lists.

3. Repeat for each required output.

If you later want to remove an output from the one of the lists, select the output in question, and click the **<<** button.

Motion detection & exclude regions

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, adjusting motion detection is important because it may determine when video from the camera is recorded, when e-mail notifications are generated, when hardware output (such as lights or sirens) is activated, etc. Time spent on finding the best possible motion detection settings for each camera may help you later avoid unnecessary recordings, notifications, etc. Depending on the physical location of the camera, it may be a very good idea to test motion detection under different physical conditions (day/night, windy/calm weather, etc.).

Before you configure motion detection for a camera, you should configure the camera's video properties (see "General" on page 101), such as compression, resolution, etc.

Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices

for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Name	Description
Enable	Lets you enable or disable (see "About motion detection settings" on page 79) the built-in motion detection.
Show grid	Lets you toggle the grid on and off. Toggling the grid off may provide a less obscured view of the preview image; selection of areas which should be excluded from motion detection takes place the same way as when the grid is visible. When on, the preview image will be divided into small sections by a grid. To define areas which should be excluded from motion detection, drag the mouse over the areas in the preview image while pressing the mouse button down. Left mouse button selects a grid section; right mouse button clears a grid section. Selected areas are highlighted in blue.
Include All	Lets you quickly select all grid sections in the preview image. This can be useful if you want to exclude motion detection in most areas of the image, in which case you can simply clear the few sections in which you do not want to exclude motion detection.
Exclude All	Lets you quickly clear all grid sections in the preview image.
Sensitivity	Determines how much each pixel must change before it is regarded as motion. With a high sensitivity, very little change in a pixel is required before it is regarded as motion. Areas in which motion is detected are highlighted in green in the preview image. Select a slider position in which only detections you consider motion are highlighted. The more you drag the slider to the left, the more of the preview image becomes highlighted. This is because with a high sensitivity even the slightest change in a pixel will be regarded as motion. As an alternative to using the slider, you may specify a value between 0 and 256 in the field next to the slider to control the sensitivity setting.
Motion	Adjust the **Motion** slider so that motion detection is only triggered by the required level of motion. The selected motion level is indicated by the black vertical line in the **Level** bar above the sliders. The black vertical line serves as a threshold. When motion is above (to the right of) the selected level, the bar changes color from green to red, indicating a positive motion detection. Alternatively, specify a value between 0 and 10000 in the field on the left to control the motion setting. The more you drag the slider to the left, the more positive motion detections you see because less change will be needed to trigger a positive motion detection. The number of positive motion detections may also affect the amount of video you record, the amount of notifications you receive, etc.
Keyframe Only	If you want motion detection to take place only on keyframes of the video stream to reduce the system resources used on motion detection, select **Keyframe only**.

Name	Description
Detection interval	Specify how often motion detection analysis is carried out on video from the camera. The default is every 240 milliseconds (close to once a quarter of a second). The interval is applied regardless of your cameras' frame rate settings. Adjusting this setting can help lower the amount of system resources used on motion detection.
Detection resolution	Specify whether the full image or a selected percentage of the image should be analyzed. For example, by specifying 25%, every fourth pixel is analyzed instead of all pixels, reducing the system resources used but also offering less accurate motion detection.

Privacy masking

Ask yourself whether there are any areas of the camera image that must be masked from viewing. For example, if the camera points in a way so that it catches the window of a private building, the privacy of the residents must be respected. In that case, you can mask areas of the image by configuring the settings below.

Name	Description
Enable	Enable the **Privacy Masking** feature.
Show grid	Toggle the grid on and off. Toggling the grid off may provide a less obscured view of the preview image; selection of areas which should be excluded from privacy masking takes place the same way as when the grid is visible. When on, the preview image will be divided into small sections by a grid. To define areas which should be excluded from privacy masking, drag the mouse over the areas in the preview image while pressing the mouse button down. Left mouse button selects a grid section; right mouse button clears a grid section. Selected areas are highlighted in red.
Show privacy mask	Toggle the red area indicating privacy masking on and off. Toggling the red area off may provide a less obscured view of the preview image.
Clear	Clear the privacy masking.

360° lens

360° lens technology allows you to view 360° panoramic video through an advanced lens. If a camera is going to use 360° lens technology, you must enable the technology and, in some cases, enter a special license key.

Name	Description
Enable 360° lens	Select check box to enable use of the 360° lens technology and to be able to specify further properties.

Name	Description
Enable panomorph support	Select to enable panomorph support. Panomorph is an advanced technology can provide high resolution in zones of interest, while at the same time using fewer pixels than conventional fisheye solutions. In the list, also select whether the camera is located in the ceiling, on a wall or on ground level.
Immervision Enables® panomorph RPL number	When enabling the panomorph support functionality, you must also select a Registered Panomorph Lens (RPL) number from the **ImmerVision Enables® panomorph RPL number** list. This is to ensure identification and correct configuration of the lens used with the camera in question. The RPL number is usually found on the lens itself or on the box it came in. If you, at some point, want to add additional types of lenses, go to **File** and select **Import new lens types.** Locate the .xml file that contains information about the lens type and press **OK.** For details of ImmerVison, panomorph lenses, and RPLs, see http://www.immervision.com/en/home/index.php **(**http://www.immervision.com/en/home/index.php**).**
Enable fisheye support	Select to enable fisheye support. Fisheye technology uses a wide-angle lens to capture a hemispherical image, which can then be de-warped through configured fisheye settings (see "Fisheye" on page 114) for the camera in question.
License key	If required, enter your special fisheye license key and click OK, after which it will be possible to configure fisheye settings for camera(s) attached to the hardware device.

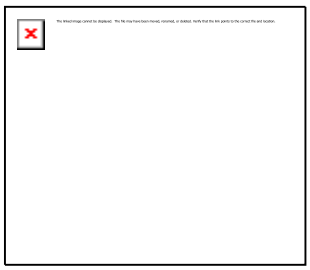
Do I need the special fisheye license key, and where do I get it? Contact your XProtect Professional vendor for further information.

Fisheye

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, fisheye properties may be available. Fisheye is a technology that allows viewing of 360-degree panoramic video through an advanced lens.

You will not see the fisheye properties until certain conditions are met: The camera must be either a dedicated fisheye camera or be equipped with a special fisheye lens. A special fisheye license key is also required; you enter the key when you configure the hardware device (see "Configure hardware devices" on page 75) to which the fisheye camera is attached.

You configure the camera's fisheye functionality by adjusting its fisheye view field, indicated by a green circle in the fisheye view, until the circle encloses the actual image area of the fisheye lens. Your settings are then used by the fisheye technology for converting the circular fisheye view into a flattened rectangular view.



Name	Description
Ceiling mount	If the camera is mounted on a ceiling, you can adjust properties to reflect this by selecting the check box.
Resolution	Resolution values are automatically displayed above the fisheye image. When using fisheye, resolution will automatically be set to the highest possible value.
X radius	Controls the horizontal (X) radius of the green circle. Move the slider to the left for a narrower circle, or to the right for a wider circle. Alternatively, specify a value between 0 and 800 in the field next to the slider. 0 corresponds to the slider's leftmost position, 800 corresponds to the slider's rightmost position.
Milestone Recording Server service	A vital part of the surveillance system. Video streams are only transferred to XProtect Professional while the Recording Server service is running.
X center	Controls the horizontal (X) position of the green circle. Move the slider to the left or right as required. Alternatively, specify a value between 0 and 800 in the field next to the slider.
Y center	Controls the vertical (Y) position of the green circle. Move the slider to the left in order to move the circle up, or to the right in order to move the circle down. Alternatively, specify a value between 0 and 800 in the field next to the slider.
Enable preview	Toggle between viewing the circular fisheye view and the flattened rectangular view resulting from your settings. When you preview the flattened view, the following navigation buttons become available for moving around within the flattened view.
Set as Home	Use after navigating to a suitable viewpoint using the navigation buttons. Sets the current viewpoint as home position (that is default position), so that when client users viewing the camera click their clients' **Home** button, their view of the camera changes to that position.

Button	Description
	Moves the flattened view up

Name	Description
	Moves the flattened view up and to the left
	Moves the flattened view up and to the right
	Moves the flattened view to the left
	Moves the flattened view to its home position (that is default position)
	Moves the flattened view to the right
	Moves the flattened view down and to the left
	Moves the flattened view down
	Moves the flattened view down and to the right
	Zooms out (one zoom level per click)
	Zooms in (one zoom level per click)

PTZ preset positions

PTZ-related properties are only available when you are dealing with a PTZ (Pan/Tilt/Zoom) camera. PTZ preset positions can be used for making the PTZ camera automatically go to a particular position when particular events occur, and when setting up PTZ patrolling profiles. Preset positions also become selectable in clients, allowing users with required rights (see "Configure user and group rights" on page 180) to move the PTZ camera between preset positions.

Names of preset positions must contain only the characters A-Z, a-z and the digits 0-9. If you import preset positions from cameras (see the following), verify that their names do not contain other characters. If they do, change the preset position names before you import them.

Restart services (see "Start and stop services" on page 185) after having made changes to PTZ settings.

Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Name	Description
PTZ type	Your configuration options depend on the type of PTZ camera in question: • Type 1 (stored on server): You define preset positions by moving the camera using the controls (see "Move PTZ type 1 and 3 to required positions" on page 84) in the upper half of the window, then storing each required position on the XProtect Professional server. You can define up to 260 preset positions this way. • Type 2 (imported from camera): You import preset positions which have previously been defined and stored on the PTZ camera itself through the camera's own configuration interface. The number of allowed preset positions depends on the PTZ camera and driver used. • Type 3 (stored on camera): You define preset positions by moving the camera with the controls (see "Move PTZ type 1 and 3 to required positions" on page 84) in the upper half of the window, then storing each required position in the camera's own memory. You can define up to 260 preset positions this way. If preset positions have already been defined for the camera, you can simply import them for use with XProtect Professional.
Import / Refresh	Only available when you have selected PTZ type 2 or 3. Lets you import already defined preset positions from the camera's memory for use with XProtect Professional. If you have already imported preset positions this way, and preset positions have since then been added or changed on the camera, you can use this button to refresh the imported preset positions.
Add New	Only available when you have selected PTZ type 1. When you have move the camera to a required position using the controls in the upper half of the window, type a name for the position in the blank field, then click the button to add the position to the list of defined preset positions. Remember that names of preset positions must contain only the characters A-Z, a-z and the digits 0-9.
Set New Position	Only available when you have selected PTZ type 1 or 3. Lets you change an already defined preset position. In the list, select the preset position you want to change. Then move the camera to the new required position using the controls in the upper half of the window. Then click the button to overwrite the old position with the new one.

Name	Description
Delete	Only available when you have selected PTZ type 1 or 3. Lets you delete an already defined preset. In the list, select the preset position you want to delete, then click the button. Before you delete a preset position, make sure it is not used in PTZ patrolling or PTZ on event. Since the preset positions are stored on the camera, you can bring a deleted preset position back into XProtect Professional by clicking the **Import / refresh** button. If you bring back a preset position this way, and the preset position is to be used in PTZ patrolling or PTZ on event, you must manually configure PTZ patrolling and/or PTZ on event to use the preset position again.
Test	Lets you try out a preset position. In the list, select the preset position you want to test, then click the button to view the camera move to the selected position.
PTZ control wheel	Lets you move a preset position selected in the list up and down respectively. The selected preset position is moved one step per click. By moving preset positions up or down, you can control the sequence in which preset positions are presented in clients.

PTZ patrolling

PTZ-related properties are only available when you are dealing with a PTZ (Pan/Tilt/Zoom) camera. PTZ patrolling is the continuous movement of a PTZ camera between a number of preset positions (see "PTZ preset positions" on page 116). To use patrolling, you should normally have specified at least two preset positions for the PTZ camera in question.

To configure PTZ patrolling, you basically select a patrolling profile in the **Patrolling profiles** list, then specify required properties to define the exact behavior of the patrolling profile.

Tip: Although it is technically not patrolling, specifying a patrolling profile with only one preset position is possible. A patrolling profile with only one preset position can, when combined with scheduling, be useful in two cases: For moving a PTZ camera to a specific position at a specific time, and for moving a PTZ camera to a specific position upon manual control of the PTZ camera.

Restart services (see "Start and stop services" on page 185) after having made changes to PTZ settings. When you have defined your patrolling profiles, also remember to schedule (see "PTZ patrolling" on page 157) the use of patrolling profiles. Bear in mind that patrolling can be overridden if users (with the required rights (see "Configure user and group rights" on page 180)) manually operate PTZ cameras.

Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Patrolling profiles

A PTZ camera may patrol according to several different patrolling profiles. For example, a PTZ camera in a supermarket may patrol according to one patrolling profile during opening hours, and according to another patrolling profile when the supermarket is closed. The **Patrolling profiles** list lets you select which patrolling profile to configure.

- Add New: Lets you add a new patrolling profile to the list. When you add a new patrolling profile, you can either give it a unique name, or reuse an existing name from another PTZ camera with PTZ patrolling.

  Using several identically named patrolling profiles can be advantageous when you later configure scheduling. Example: If you have configured patrolling profiles identically named Night Patrolling on 25 different cameras, you can schedule the use of Night Patrolling on all 25 cameras in one go, even though Night Patrolling covers individual preset positions on each of the 25 cameras.

- Delete: Lets you delete an existing patrolling profile. Note that the selected patrolling profile will be removed from the list without further warning.

There are already some patrolling profiles listed, why? Names of patrolling profile defined for other cameras can be reused. This allows you to use a single patrolling profile name across several PTZ cameras, and this can make scheduling (see "PTZ patrolling" on page 157) of PTZ patrolling much easier. Despite the fact that several PTZ cameras share a patrolling profile name, the movement between preset positions is of course individual for each camera.

Preset positions to use in a patrolling profile

Having selected a patrolling profile in the **Patrolling profiles** list, you can specify which of the PTZ camera's preset positions should be used for the selected patrolling scheme:

1. In the **Preset Positions** list, select the preset positions you want to use. A preset position can be used more than once in a patrol scheme, for example if the preset position covers an especially important location.

   Tip: By pressing the CTRL button on your keyboard while selecting from the **Preset Positions** list, you can select several or all of list's preset positions in one go.

2. Click the button to copy the selected preset positions to the **Patrolling list**.

3. The camera will move between preset positions in the sequence they appear in the **Patrolling list**, starting at the preset position listed first. If you want to change the sequence of preset positions in the **Preset Positions** list, select a preset position, and use the or buttons to move the selected preset position up or down in the list. The selected preset position is moved one step per click.

If you later want to remove a preset position from the Patrolling list, select the preset position in question, and click the button.

Wait and transition timing for a patrolling profile

ame	Description
Wait time (sec.)	Lets you specify the number of seconds for which the PTZ camera should stay at each preset position before it moves on to the next preset position. Default is 10 seconds. The wait time applies to all presets in the patrolling profile, that is the PTZ camera will stay at each preset position for the same number of seconds.
Transition time (sec.)	Transition time (sec.): Lets you specify the number of seconds required for the PTZ camera to move from one preset position to another. Default is five seconds. During this transition time, motion detection is automatically disabled, as irrelevant motion is otherwise likely to be detected while the camera moves between the preset positions. After the specified number of seconds, motion detection is automatically enabled again. The transition time applies to all presets in the patrolling profile. It is thus important that the camera is able to reach between any of the patrolling profile's preset positions within the number of seconds you specify. If not, false motion is likely to be detected. Bear in mind that it takes longer for the PTZ camera to move between positions that are located physically far apart (for example from an extreme left position to an extreme right position) than between positions that are located physically close together.

Tip: Note that wait time and transition time settings are tied to the selected patrolling profile. This allows you the flexibility of having different wait time and transition time settings for different patrolling profiles on the same camera.

PTZ scanning

PTZ scanning (continuous panning) is supported on a few PTZ cameras only.

- **PTZ scanning:** Only available if your camera supports PTZ scanning. Lets you enable PTZ scanning and select a PTZ scanning speed from the list below the check box.

Note that PTZ scanning only works for PTZ type 1 cameras (where preset positions are configured and stored on the XProtect Professional server). If the camera is a PTZ type 2 camera, and you import preset positions which have previously been defined and stored on the PTZ camera itself through the camera's own configuration interface, PTZ scanning will stop working. For more information about PTZ types, see PTZ preset positions (on page 116).

Pause PTZ patrolling

PTZ patrolling is automatically paused when the camera is operated manually as well as if PTZ on Event (on page 121) is used. PTZ patrolling can also be paused if motion is detected.

Tip: Note that pause settings are tied to the selected patrolling profile. This allows you the flexibility of having different pause settings for different patrolling profiles on the same camera.

Pause patrolling if motion is detected

To pause PTZ patrolling when motion is detected, so that the PTZ camera will remain at the position where motion was detected for a specified period of time, do the following:

1. Select the **Pause patrolling if motion is detected** check box.
2. Select whether the PTZ camera should resume patrolling:
   - After a certain number of seconds has passed since first detection of motion, regardless whether further motion is detected

     - or -
   - After a certain number of seconds has passed without further detection of motion
3. Specify the required number of seconds for the selected option (default is ten and five seconds respectively).

   Unless transition time (see the previous information under **Wait and Transition Timing ...**) is set to zero, motion detection is automatically disabled while the camera moves between preset positions, as irrelevant motion is otherwise likely to be detected while the camera moves between the preset positions.

Resume PTZ patrolling

PTZ patrolling is automatically paused when the camera is operated manually as well as if PTZ on Event is used. You can specify how many seconds should pass before the regular patrolling is resumed after a manual or event-based interruption. Default is 30 seconds.

Users of the Smart Client are—in addition to manual control—able to stop a selected PTZ camera's patrolling entirely. This takes place through a context menu in the Smart Client view. For Smart Client users, the number of seconds specified in the **Patrolling settings** section therefore only applies when users manually control a PTZ camera; not when users stop a PTZ camera's patrolling entirely. When Smart Client users stop a PTZ camera's patrolling entirely, the camera's patrolling will resume only when the Smart Client user selects to resume it.

PTZ on event

PTZ-related properties are only available when you are dealing with a PTZ (Pan/Tilt/Zoom) camera. When a PTZ camera supports preset positions (see "PTZ preset positions" on page 116), it is possible to make the PTZ camera automatically go to a particular preset position when a particular event occurs.

When associating events with preset positions on a PTZ camera, you can select between **all** events defined on your XProtect Professional system; you are not limited to selecting events defined on a particular hardware device.

1. In the **Events** list in the left side of the window, select the required event.

   Tip: If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
2. In the **PTZ Preset Position** list in the right side of the window, select the required preset position.

   For this purpose, you can only use an event once per PTZ camera. However, different events can be used for making the PTZ camera go to the same preset position. Example:
   - Event 1 makes the PTZ camera go to preset position A
   - Event 2 makes the PTZ camera go to preset position B

- Event 3 makes the PTZ camera go to preset position A

If later you want to end the association between a particular event and a particular preset position, clear the field containing the event.

After you have made the PTZ setting changes, restart services (see "Start and stop services" on page 185).

Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Audio

About recording audio

If you record audio, it is important that you note the following:

- Only audio from microphones is recorded. Only incoming audio, that is audio recorded by microphones attached to hardware devices, is recorded. Outgoing audio, that is what operators say when they talk through speakers attached to hardware devices, is not recorded.
- Audio recording affects video storage capacity. Audio is recorded to the associated camera's database. Therefore, it is important to bear in mind that the database is likely to become full earlier if you record audio and video than if you only record video. The fact that the database becomes full is not in itself a problem since XProtect Professional automatically archives (see "About archiving" on page 144) data if the database becomes full. However, you may need additional archiving space if you record audio.
  - Example: If you use MPEG4, each one-second video GOP (Group Of Pictures) will be stored in one record in the database. Each second of audio will also be stored in one record in the database. This reduces the database's video storage capacity to half its capacity, because half of the database's records is used for storing audio. Consequently, the database runs full sooner, and automatic archiving takes place more often than if you were only recording video.
  - Example: If you use MJPEG, audio is stored in one record for every JPEG for as long as the audio block size does not exceed the time between the JPEGs. In extreme cases, this reduces the database's video storage capacity to half its capacity, because half of the database's records is used for storing audio. If you use very high frame rates, which means less time between each JPEG, a smaller portion of the database is used for storing audio records, and consequently a larger portion is available for storing video. The result is that the database runs full sooner, and automatic archiving takes place more often than if you were only recording video.

The above examples are simplified. The exact available video storage capacity also depends on GOP/JPEG and audio kilobyte size.

Speakers

About speakers

Speakers are attached to devices, and therefore also typically physically located next to cameras. They can typically transmit information to people near a camera. Operators, with the necessary rights, can talk through such speakers using their Smart Clients (provided the computer running the Smart Client has a microphone attached).

Example: An elevator is stuck. Through a camera mounted in the elevator, Smart Client operators can see that there is an elderly lady in the elevator. A microphone attached to the camera records that the lady says: “I am afraid; please help me out!” Through a speaker attached to the camera, operators can tell the lady that: “Help is on its way; you should be out in less than fifteen minutes.”

Show or hide microphone and/or speaker

If you have added more microphone and/or speaker to your XProtect Professional system than you need, you can hide the ones you do not need by right-clicking the relevant microphone and/or speaker and select **Hide**. If you need the hidden microphone again, you can right-click the overall microphone and/or speaker icon and select **Show Hidden Items**.

Speaker properties

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, you can determine when audio should be recorded or not. Your choice applies for all cameras on your XProtect Professional system.

Name	Description
Enabled	Speakers are by default enabled, meaning that they are able to transfer audio to XProtect Professional. If required, you can disable an individual speaker, in which case no audio will be transferred from the speaker to XProtect Professional.
Speaker name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

Microphones

About microphones

Microphones are attached to hardware devices, and therefore typically physically located next to cameras. They can typically record what people near a camera are saying. Operators, with the necessary rights, can then listen to these recordings through their Smart Clients (provided the computer running the Smart Client has speakers attached).

When you manage microphones in XProtect Professional, you can always manage the microphones attached to cameras; **not** microphones attached to Smart Client operators' computers.

If you have added more microphones and speakers to your XProtect Professional system than you need, you can hide the ones you do not need by right-clicking the relevant microphone and/or speaker and select **Hide**. If you need the hidden microphone again, you can right-click the overall microphone and/or speaker icon and select **Show Hidden Items**.

Configure microphones or speakers

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Hardware Devices**, and expand the hardware device to which the relevant microphones or speakers is attached.
2. Right-click the required microphones or speakers, and select **Properties**.
3. Specify properties (see "Speaker properties" on page 123) as required.

Configuration of microphones or speakers in XProtect Professional is very basic. Settings such as volume, etc. are controlled on the microphones or speakers units themselves.

Show or hide microphone and/or speaker

If you have added more microphone and/or speaker to your XProtect Professional system than you need, you can hide the ones you do not need by right-clicking the relevant microphone and/or speaker and select **Hide**. If you need the hidden microphone again, you can right-click the overall microphone and/or speaker icon and select **Show Hidden Items**.

Microphone properties

When you configure video and recording (see "About video and recording configuration" on page 78) for specific cameras, you can determine when audio should be recorded or not. Your choice applies for all cameras on your XProtect Professional system.

Microphone properties

Enabled	Microphones/speaker are by default enabled, meaning that they are able to transfer audio to XProtect Professional. If required, you can disable an individual microphone/speaker, in which case no audio will be transferred from the microphone/speaker to XProtect Professional.
Microphone/speaker name	The name as it appears in the Management Application as well as in clients. You can overwrite the existing name with a new one. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

On some hardware devices, audio can also be enabled/disabled on the hardware device itself, typically through the hardware device's own configuration web page. If audio on a hardware device does not work after enabling it in the Management Application, you should verify whether the problem may be due to audio being disabled on the hardware device itself.

Recording settings

Name	Description
Always	Always record audio on all applicable cameras.
Follow video	Record audio only when video is recorded.
Never	Never record audio on any cameras. Note that even though audio is never recorded, it is still be possible to listen to live audio in the Smart Client.

Events and output

About input and output

Hardware input, such as door sensors, can be attached to input ports on hardware devices. Input from such external hardware input units can be used for generating events in XProtect Professional.

Hardware output units can be attached to output ports on many hardware devices, allowing you to activate lights, sirens, and more from XProtect Professional. Such hardware output can be activated automatically by events, or manually from clients.

Before you specify use of hardware input and hardware output units on a hardware device, verify that sensor operation is recognized by the hardware device. Most hardware devices are capable of showing this in their configuration interfaces, or via CGI script commands. Also check the XProtect Professional release notes to verify that input and output controlled operations are supported for the hardware device and firmware used.

You do not have to configure hardware input units separately, any hardware input units connected to hardware devices are automatically detected when you add the hardware devices to XProtect Professional. The same goes for hardware output, but hardware output does require some simple configuration in XProtect Professional.

If you want to **configure hardware output** and **automatically trigger output when events occur**, so that, for example, lights are switched on when a door is opened or when motion is detected in video, see Add a hardware output (on page 128) and Configure hardware output on event (on page 131).

About events and output

Events and output of various types can be used for automatically triggering actions in XProtect Professional. Examples of actions: starting or stopping recording on cameras, switching to a particular video frame rate, triggering e-mail and/or SMS notifications, making PTZ cameras move to specific preset positions, etc. Events can also be used for activating hardware output.

You can also configure events and output to generate alarms (see "About alarms" on page 193).

Events can be divided in to:

- **Internal events (system-related):** for example, motion, server responding/not responding, archiving problems, lack of disk space, etc.

- **External events (integrated):** for example, MIP plug-in events.

Overview of events and output

Types of events:

Name	Description
Analytics events:	Analytics events can be used as alarms and integrated seamlessly with the Alarms feature (see "About alarms" on page 193). Analytics events (see "Overview of events and output" on page 126) are typically data received from external third-party video content analysis (VCA) (see "VCA" on page 223) providers. An example of a VCA-based system could be an access control system.
Hardware input events:	Hardware input, such as door sensors, can be attached to input ports on hardware devices. Input from such external hardware input units can be used for generating events in XProtect Professional. Events based on input from hardware input units attached to hardware devices are called hardware input events. Some hardware devices have their own capabilities for detecting motion, for detecting moving and/or static objects, etc. (configured in the hardware devices' own software; typically by accessing a browser-based configuration interface on the hardware device's IP address). When this is the case, XProtect Professional considers such detections as input from the hardware, and you can use such detections as input events as well. Lastly, hardware input events can be based on XProtect Professional detecting motion in video from a camera, based on motion detection settings in XProtect Professional. This type of hardware input events is also called system motion detection events or VMD (Video Motion Detection) events. In earlier XProtect Professional versions, VMD events were an event type of their own; now they are simply considered a type of hardware input event.
Hardware output:	Hardware output units can be attached to output ports on many hardware devices, allowing you to activate lights, sirens, and more from XProtect Professional. Such hardware output can be activated automatically by events, or manually from clients.

Name	Description
Manual events:	Events may be generated manually by the users selecting them in their clients. These events are called manual events. Manual events can be of the type **Global events** or **Timer events:** Global events apply to all hardware whereas timer events are separate events, triggered by the hardware input event, manual event or generic event under which they are defined. Timer events occur a specified number of seconds or minutes after the event, under which they are defined, has occurred. Timer events may be used for a wide variety of purposes, typically for stopping previously triggered actions. **Example:** A camera starts recording based on a hardware input event, for example when a door is opened; a timer event stops the recording after 15 seconds.
Generic events:	Input may also be received in the form of TCP or UDP data packages, which can be analyzed by XProtect Professional, and—if they match specified criteria—used to generate events. Such events are called generic events.
Output control on event:	Hardware output can be activated automatically when events occur. For example, when a door is opened (hardware input event), lights are switched on (hardware output). When configuring the output control, you can select between all output and events defined in XProtect Professional. You are not limited to selecting output or events defined on particular hardware devices. You can use a single event for activating more than one output.

Before you configure events of any type, **configure general event handling**, such as which ports XProtect Professional should use for event data. Normally, you can just use the default values, but it is a good idea to verify that your organization is not already using the ports for other purposes. See Configure general event handling (on page 131).

Before you specify use of hardware input and hardware output units on a hardware device, verify that sensor operation is recognized by the hardware device. Most hardware devices are capable of showing this in their configuration interfaces, or via CGI script commands. Also check the XProtect Professional release notes to verify that input and output controlled operations are supported for the hardware device and firmware used.

You do not have to configure hardware input units separately, any hardware input units connected to hardware devices are automatically detected when you add the hardware devices to XProtect Professional. The same goes for hardware output, but hardware output does require some simple configuration in XProtect Professional.

If you want to **configure hardware output** and **automatically trigger output when events occur**, so that, for example, lights are switched on when a door is opened or when motion is detected in video, see Add a hardware output (on page 128) and Configure hardware output on event (on page 131).

When you are ready to **configure events**, see Add a hardware input event (on page 128), Add a generic event (on page 130), and Add a manual event (on page 129). If you want to use timer events with your other events, see Add a timer event (on page 130).

Add an analytics event

To add an analytics event, do the following:

1. In the Management Application's navigation pane, expand **Events and Output**, right-click **Analytics Events** and select **Create New**.
2. Specify required properties (see "Analytics event" on page 134).
3. Click **OK**.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Add a hardware input event

With hardware input events, you can turn input received from input units attached to hardware devices into events in XProtect Professional.

Before you specify input for a hardware device, verify that sensor operation is recognized by the hardware device. Most hardware devices are capable of showing this in their configuration interfaces, or via CGI script commands. Also check the release notes to verify that input-controlled operation is supported for the hardware device and firmware used.

To add and/or configure a hardware input event, do the following:

1. In the Management Application navigation pane, expand **Advanced Configuration,** then expand **Events and Output.** Right-click **Hardware Input Events** and select **Enable New Input Event**.
2. In the **Hardware Input Event Properties** window's list of hardware devices, expand the required hardware device to see a list of pre-defined hardware input.
3. Select the required types of input to use them as events. The types of input often vary from camera to camera. If motion detection (see "Motion detection & exclude regions" on page 111) is enabled in XProtect Professional for the camera in question, note the input type **System Motion Detection**, which lets you turn detected motion in the camera's video stream into an event. In earlier XProtect Professional versions, this was known as a VMD event.

   Note that some types of input are mutually exclusive. When you select one type of input, you may therefore note that other types of input become unavailable for selection.
4. For each selected type of input, select required properties (see "Hardware input event" on page 136). When ready, click **OK**, or click the **Add button** to add a timer event (on page 130) to the event you have just created.
5. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Add a hardware output

With hardware output, you can add external output units, such as lights, sirens, door openers, etc., to your XProtect Professional system. Once added, output can be activated automatically by events or detected motion, or manually by client users.

Before you specify output, verify that sensor operation is recognized by the hardware device with which you are going to use the output. Most hardware devices are capable of showing this in their configuration interfaces, or via CGI script commands. Also check the release notes to verify that output-controlled operation is supported for the hardware device and firmware used.

To add a hardware output event, do the following:

1. In the Management Application navigation pane, expand **Advanced Configuration,** then expand **Events and Output.** Right-click **Hardware Output** and select **Add New Output**.
2. In the **Hardware Output Properties** window's list of hardware devices, select the required hardware device, and click the **Add** button below the list.
3. Specify required properties (see "Hardware input event" on page 136).
4. Click **OK**.
5. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

For information about how to configure automatic activation of hardware output when events occur, see Configure hardware output on event (on page 131). You configure output for manual activation in clients as well as for automatic activation on detected motion individually for each camera (see "Output" on page 111).

Add a manual event

With manual events, your users with required rights (see "Configure user and group rights" on page 180) can trigger events manually from their clients. Manual events can be global (shared by all cameras) or tied to a particular camera (only available when the camera is selected). You can use manual events for a wide variety of purposes, for example:

- As start and stop events for use when scheduling cameras' online periods (see "Online period" on page 156). For example, you can make a camera start or stop transferring video to the surveillance system based on a manual event.
- As start and stop events for controlling other camera settings. For example, you can make a camera use a higher frame rate based on a manual event or you can use a manual event for triggering PTZ on event (on page 121).
- For triggering output. Particular output can be associated (see "Configure hardware output on event" on page 131) with manual events.
- For triggering event-based e-mail and/or SMS notifications.
- In combinations. For example, a manual event could make a camera start transferring video to the surveillance system while an output is triggered and an e-mail notification is sent to relevant people.

To add a manual event, do the following:

1. In the Management Application navigation pane, expand **Advanced Configuration,** then expand **Events and Output.** Right-click **Manual Events** and select **Add New Manual Event**
2. In the list in the left side of the **Manual Event Properties**, select global or a camera as required.

3. Click the **add** button and specify required properties (see "Hardware input event" on page 136). When ready, click **OK**, or click the **Add** button again to add a timer event (on page 130) to the event you have just created.

4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Add a generic event

XProtect Professional can analyze received TCP and/or UDP data packages, and automatically trigger events when specified criteria are met. This way, you can easily integrate your XProtect Professional surveillance system with a very wide range of external sources, for example access control systems and alarm systems and more. Events based on the analysis of received TCP and/or UDP packets are called generic events.

1. In the Management Application navigation pane, expand **Advanced Configuration**, then expand **Events and Output**. Right-click **Generic Events** and select **Add New Generic Event**.

2. In the Generic Event Properties window, click the **Add** button, and specify required properties (see "Generic event" on page 139). When ready, click **OK**, or click the **Add** button to add a timer event to the event you have just created.

3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Generate alarms based on analytics events

Generating alarms based on analytics events is normally a three-step process:

1. Enable the analytics events feature and set up its security. A list of allowed addresses can be used to control who can send event data to the system and on which port the server listens.

2. Create the analytics event, possibly with a description of the event, and test it.

3. Use the analytics event as the source of an alarm definition (see "Alarms definition" on page 196).

As indicated, to use VCA-based events (see "VCA" on page 223), most often a third-party VCA tool is required for supplying data to XProtect Professional. Which VCA tool to use is entirely up to you, as long as the data supplied by the tool adheres to the applied formatting rules described in the Milestone Analytics Events Developers Manual. Contact Milestone for more details.

Add a timer event

Timer events are separate events, triggered by the type of event under which they are defined. Timer events occur a specified number of seconds or minutes after the event under which they are defined has occurred. Timer events may be used for a wide variety of purposes, typically for stopping previously triggered actions. Examples:

- A camera starts recording based on a hardware input event, for example when a door is opened; a timer event stops the recording after 15 seconds

- Lights are switched on and a camera starts recording based on a manual event; a timer event stops the recording after one minute, and another timer event switches the lights off after two minutes

To add a timer event, select any event you have previously configured, click the **Add** button, and specify required properties (see "Timer event" on page 139). XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Tip: You can add as many timer events as required under an event. This way, you can, for example, make one timer event trigger something 10 seconds after the main event, another timer event trigger something else 30 seconds after the main event, and a third timer event trigger something else 2 minutes after the main event.

Configure hardware output on event

Once you have added hardware output (see "Add a hardware output" on page 128), such as lights, sirens, door openers, etc., you can associate the hardware output with events. This way, particular hardware output can be activated automatically when events occur. Example: When a door is opened (hardware input event), lights are switched on (hardware output).

When making the associations, you can select between **all** output and events defined on your XProtect Professional server; you are not limited to selecting output or events defined on particular hardware devices.

1. In the Management Application's navigation pane, expand **Advanced Configuration,** then expand **Events and Output.** Right-click **Output Control on Event** and select **Properties**.
2. Fill in the relevant properties (see "Output control on event (Events and Output-specific properties)" on page 143).
3. Click **OK**.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

You can use a single event for activating more than one output.

You cannot delete associations, but you can change your selections or select **None** in both columns as required.

Tip: If you have not yet defined any suitable event or output, you can quickly do it: Use the **Configure events** list and/or **Configure Output...** button, located below the list of associations.

Configure general event handling

Before configuring events of any type, configure general event handling, such as which ports XProtect Professional should use for event data. Normally, you can just use the default values, but it is a good idea to verify that your organization is not already using the ports for other purposes.

1. In the Management Application's navigation pane, expand **Advanced Configuration**, right-click **Events and Output**, and select **Properties.**

2. Specify required properties (see "Ports and polling" on page 134). XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Test a generic event

If you have added a generic event, a quick and easy way to test your generic event is to first set up an event notification and then use Telnet to send a small amount of data which will trigger the generic event and in turn the event notification.

For this example, we have created a generic event called **Video**. Our generic event specifies that if the term **video** appears in a received TCP data package, the generic event should be triggered. Your generic event may be different, but you can still use the principles outlined in the following:

1. In the Management Application navigation pane, expand **Advanced Configurations**, then expand **Cameras and Storage Information**, right-click a camera to which you have access in the Smart Client, and select **Properties**.

2. Select **Event Notification** and select the required generic event. XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

   Make sure that your generic event is the **only** event appearing in the **Selected Events** list while you are performing the test, otherwise you cannot be sure that it is your generic event which triggers the event notification. Once you are done testing, you can move any temporarily removed events back to the **Selected Events** list.

3. Save your configuration changes by clicking the **Save Configuration** button in the Management Application toolbar.

4. Make sure the Recording Server service is running. Also make sure that the camera for which you just configured the event notification is displayed in your Smart Client, and that you have camera title bars enabled in your Smart Client so that you can see the yellow event indicator.

5. In Windows' **Start** menu, select **Run...**, and type the following in the **Open** field:

   - If you are performing the test on the XProtect Professional server itself:

     telnet localhost 1234

   - **If you are performing the test from a remote computer:** Substitute **localhost** with the IP address of the XProtect Professional server. Example: If the IP address of the XProtect Professional server is 123.123.123.123, type:

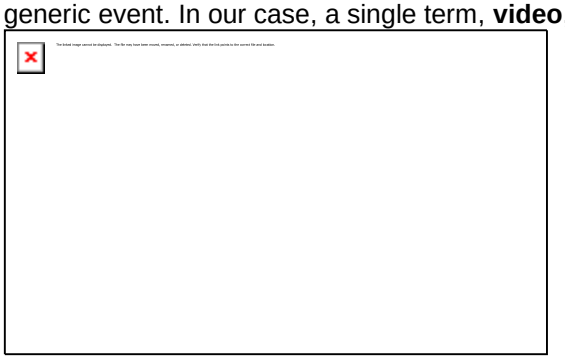
     ```
     telnet 123.123.123.123 1234
     ```

   This will open a **Telnet** window.

   In the above examples, the number **1234** indicates the port on which the XProtect Professional server listens for generic events. Port 1234 is the default port for this purpose, but it is possible

to change this by specifying another port number as part of the general event handling configuration (see "Configure general event handling" on page 131). If the alert and generic event port number has been changed on your system, type your system's alert and generic event port number instead of **1234**.

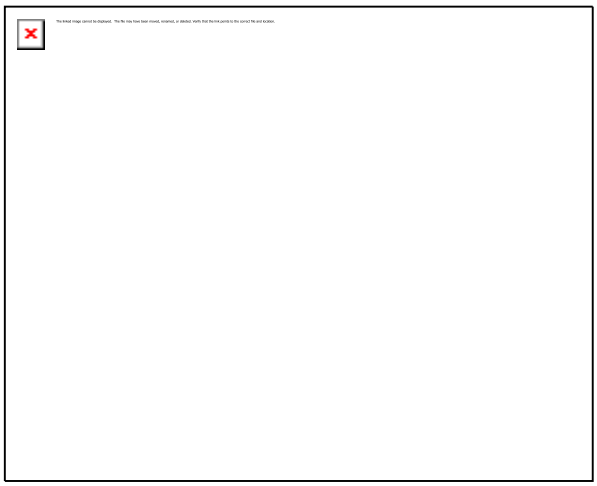
6. In the **Telnet** window, type the terms (so-called **event substring**) required to trigger your generic event. In our case, a single term, **video**, is required:



While you type in the Telnet window, you may experience so-called echo. This is the server repeating some or all of the characters it receives. It will not have any impact as long as you are sure you type the required characters.

7. Close the **Telnet** window. It is important that you close the window, since your input is not sent to the surveillance system until you close the window.

8. Go to your Smart Client. If the yellow event indicator lights up for the required camera, your generic event works as intended.:



What is Telnet? Telnet is a terminal emulation program used on TCP/IP networks. With Telnet, you can connect to a server from a computer on the network, and execute commands through Telnet as if you were entering them directly on the server. Windows includes a client for use with Telnet.

General event properties

Ports and polling

The **General Event Properties** window lets you specify network settings to be used in connection with event handling.

Name	Description
Alert and generic event port	Specify port number to use for handling events , including generic events. Default port is port 1234.
SMTP event port	Specify port number to use for sending event information from hardware devices to XProtect Professional via SMTP. Default port is port 25.
FTP event port	Port to use for FTP communication with the hardware device. Default port is port 21.
Polling interval [1/10] second	For a small number of hardware devices, primarily dedicated input/output devices (see "About dedicated input/output devices" on page 74), it is necessary for XProtect Professional to regularly check the state of the hardware devices' input ports in order to detect input. Such state checking at regular intervals is called polling. You can specify (in tenths of a second) the interval between state checks. Default value is 10 tenths of a second (that is one second). For dedicated input/output devices, it is highly recommended that the polling frequency is set to the lowest possible value (one tenth of a second between state checks). For information about which hardware devices require polling, see the release note.

Events and output properties

Properties in this window:

Analytics event 134
Hardware input event 136
Hardware output 138
Manual event 138
Timer event 139
Generic event 139
Output control on event (Events and Output-specific properties) 143

Analytics event

When you configure analytics events (see "Add an analytics event" on page 128), specify the following:

Name	Description
Name	Type a name for the event.
Description	Enter a description (optional).
Test Event	Test the validity of the event by clicking this button (optional). **Tip:** You can carry out this test at any step of the analytics event creation/editing process and as many times as you wish.

When you click **Test Event**, a window opens which goes through a number of conditions that must be met for analytics events to work. The window consists of two tabs: **Tasks** and **Errors**.

The **Tasks** tab lists the conditions that are tested and mark them failed: or success: The **Errors** tab shows a list of errors corresponding to any failed conditions.

Remember to save any changes made during the test.

When done, check the presence of your test event in the Smart Client's **Alarm list**. Sort by type **Test Alarm** to make your test event appear at the top of the **Alarm list**. See the Smart Client documentation for more details.

Conditions	Description	Error messages and solutions
Changes saved	If the event is new, is it saved? Or if there are changes to the event name, are these changes saved?	**Save changes before testing analytics event.** Solution/Explanation: Save changes.
Analytics Events enabled	Is the Analytics Event feature enabled?	**Analytics events have not been enabled.** Solution/Explanation: Enable the Analytics Events feature.
Address allowed	Is the IP address/host name of the machine sending the event(s) allowed (listed on the analytics events address list)?	**The local host name must be added as allowed address for the Analytics Event service.** Solution/Explanation: Add your machine to the analytics events address list (of allowed IP addresses/host names). **Error resolving the local host name.** Solution/Explanation: The IP address/host name of the machine cannot be found or is invalid.
Analytics event used in alarm definition	Is the analytics event used actively in any alarm definitions?	**Analytics event is not used in any alarm definition.** Solution/Explanation: Use the analytics event in an alarm definition.
Send analytics event	Did sending a test event to the Event Server succeed?	See table below.

Error messages and solutions for the condition **Send analytics event**:

Error messages	Solution/Explanation
Event Server not found.	Unable to find the Event Server service on the list of registered services.
Error connecting to Event Server.	Unable to connect to the Event Server service on the defined port (most likely due to network problems, the Event Server service being stopped or similar).
Error sending analytics event.	Connection to the Event Server service established but event cannot be sent (most likely due to network problems, for example time out).
Error receiving response from Event Server.	Event sent to Event Server but no reply received (most likely due to network problems or port being busy (see the Event Server log, typically located at ProgramData\Milestone\XProtect Event Server\logs\—can be opened in Microsoft Notepad or similar tool)).
Analytics event unknown by Event Server.	The Event Server service does not know the event most likely due to the event—or changes to the event—not having been saved.
Invalid analytics event received by Event Server.	Event format is somehow incorrect.
Sender unauthorized by Event Server.	Most likely your machine is not on the list of allowed IP addresses/host names.
Internal error in Event Server.	An Event Server error. Open the Event Server log in Microsoft Notepad or similar tool. The log is typically located at ProgramData\Milestone\XProtect Event Server\logs\
Invalid response received from Event Server.	Response is invalid. Possibly due to port being busy or network problems Open the Event Server log in Microsoft Notepad or similar tool. The log is typically located at ProgramData\Milestone\XProtect Event Server\logs\
Unknown response from Event Server.	Response is valid but not understood. Possibly due to port being busy or network problems. Open the Event Server log in Microsoft Notepad or similar tool. The log is typically located at ProgramData\Milestone\XProtect Event Server\logs\
Unexpected error.	Please contact your system provider Milestone Support (support@milestonesys.com) for help.

Hardware input event

When you add hardware input events (see "Add a hardware input event" on page 128), some properties depend on the selected type of input:

Name	Description
Enable	Select check box to use selected type of input as an event in XProtect Professional, and specify further properties.

Name	Description
Event name	Specify a name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]** Some cameras only support event names of a certain length and/or with a certain structure. Refer to the camera's documentation for exact details.
Images from camera	Only relevant if using pre- and post-alarm images, a feature available for selected cameras only; it enables sending of images from immediately before an event took place from the camera to the surveillance system via e-mail. Pre- and post-alarm images should not be confused the pre- and post-recording feature (see "Recording" on page 106) particular to XProtect Professional. Lets you select which camera you want to receive pre- and/or post-alarm images from.
Number of pre-alarm images	Only relevant if using pre-alarm images, a feature available for selected cameras only. Specify required number of pre-alarm images. Allowed number may differ from camera to camera; allowed range is displayed to the right of the field.
Frames per second	Only relevant if using pre-alarm images, a feature available for selected cameras only. Specify required frame rate. Used in combination with the Number of pre-alarm images field, this field indirectly allows you to control how long before the event you want to receive pre-alarm images from.
Send e-mail if this event occurs	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select if XProtect Professional should automatically send an e-mail when the event occurs. Recipients are defined as part of the e-mail notification configuration. When using e-mail notifications, also bear in mind individual cameras' scheduling (see "E-mail notification" on page 157).
Attach image from camera	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select to include an image—recorded at the time the event is triggered—in the e-mail notification, then select the required camera in the list next to the check box.
Send SMS if this event occurs	Only available if SMS notification (see "Configure SMS notifications" on page 169) is enabled. Select if XProtect Professional should automatically send an SMS when the event occurs. Recipients are defined as part of the SMS notification configuration. When using SMS notifications, also bear in mind individual cameras' scheduling (see "SMS notification" on page 157).
Delete	Delete a selected event.
Add	When a specific hardware input event is selected, clicking Add will add a timer event (on page 130) to the selected hardware input event.

Hardware output

When you add hardware output (see "Add a hardware output" on page 128), specify the following properties:

Name	Description
Output name	Specify a name. If you are going to make the hardware output available for manual activation in clients, this is the name that client users will see. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]** Some cameras only support event names of a certain length and/or with a certain structure. Refer to the camera's documentation for exact details.
Output connected to	Select which of the hardware device's output ports the output is connected to. Many hardware devices only have a single output port; in that case simply select **Output 1**.
Keep output for	Lets you specify the amount of time for which the output should be applied. Specify the required amount of time in either 1/10 seconds or seconds. Some hardware devices are only able to apply output for a relatively short time, for example for up to five seconds. Refer to the documentation for the hardware device in question for exact information.

Tip: To verify that your hardware output works, click the **Test Output** button.

Manual event

When you add manual events (see "Add a manual event" on page 129), specify the following properties:

Name	Description
[List of defined global events and cameras]	Contains a Global node and a list of all defined cameras. You can configure as many manual events as required, no matter whether they are global or camera-specific. A + sign next to the Global node indicates that one or more global manual events have already been configured. A + sign next to a camera indicates that one or more manual events have already been configured for that camera.
Event name	Specify a name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]** Some cameras only support event names of a certain length and/or with a certain structure. Refer to the camera's documentation for exact details.

Name	Description
Send e-mail if this event occurs	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select if XProtect Professional should automatically send an e-mail when the event occurs. Recipients are defined as part of the e-mail notification configuration. When using e-mail notifications, also bear in mind individual cameras' scheduling (see "E-mail notification" on page 157).
Attach image from camera	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select to include an image—recorded at the time the event is triggered—in the e-mail notification, then select the required camera in the list next to the check box.
Send SMS if this event occurs	Only available if SMS notification (see "Configure SMS notifications" on page 169) is enabled. Select if XProtect Professional should automatically send an SMS when the event occurs. Recipients are defined as part of the SMS notification configuration. When using SMS notifications, also bear in mind individual cameras' scheduling (see "SMS notification" on page 157).
Delete	Delete a selected event.
Add	Add a new event. When **Global** or a specific camera is selected, clicking **Add** will add a new manual event. When a specific manual event is selected, clicking **Add** will add a timer event (on page 130) to the selected manual event.

Timer event

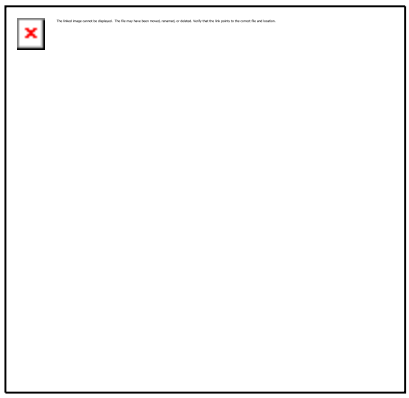
When you add timer events (see "Add a timer event" on page 130), specify the following properties:

Name	Description
Timer event name	Specify a name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]** Some cameras only support event names of a certain length and/or with a certain structure. Refer to the camera's documentation for exact details.
Timer event occurs after	Specify the amount of time that should pass between the main event occurring and the timer event (in seconds or minutes).

Generic event

When you add generic events (see "Test a generic event" on page 132), specify the following properties:

Name	Description
Event name	Specify a name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]** Some cameras only support event names of a certain length and/or with a certain structure. Refer to the camera's documentation for exact details.
Event port	Read-only field displaying the port number on which XProtect Professional listens for generic events (default is port 1234). The port number can be changed as part of the general event handling configuration (see "Configure general event handling" on page 131).
Event substring	Lets you specify the individual items for which XProtect Professional should look out for when analyzing data packages. Specify one or more terms, then click the Add button to add the specified term(s) to the Event message expression field, the content of which will be used for the actual analysis. Examples: • **Single term:** User001 (when added to the Event message expression field, the term will appear as "User001") • **Several terms as one item:** User001 Door053 Sunday (when added to the Event message expression field, the terms will appear as " User001 Door053 Sunday") When you add several terms as one item (appearing as, for example, " User001 Door053 Sunday" in the Event message expression field), everything between the quotation marks must appear together in the package, in the specified sequence, in order to match your criterion. If the terms must appear in the package, but not necessarily in any exact sequence, add the terms one by one (that is so they will appear as "User001" "Door053" "Sunday" in the Event message expression field). **Tip:** It is OK for TCP and UDP packages used for generic events to contain special characters, such as @, #, +, 敷~, etc. within the text string to be analyzed.

Name	Description
Event message expression	Displays the string which will be used for the actual package analysis. The field is not directly editable. However, you can position the cursor inside the field in order to determine where a new item should be included when you click the Add button or one of the parenthesis or operator buttons described in the following. Likewise, you can position the cursor inside the field in order to determine where an item should be removed when clicking the Remove button: The item immediately to the left of the cursor will be removed when you click the Remove button. • **(:** Lets you add a start parenthesis character to the Event message expression field. Parentheses can be used to ensure that related terms are processed together as a logical unit; in other words, they can be used to force a certain processing order in the analysis. Example: If using ("User001" OR "Door053") AND "Sunday", the two terms inside the parenthesis will be processed first, then the result will be combined with the last part of the string. In other words, XProtect Professional will first look for any packages containing either of the terms User001 or Door053, then it will take the results and run through them in order to see which packages also contain the term Sunday. • **):** Lets you add an end parenthesis character to the Event message expression field. • **AND:** Lets you add an AND operator to the Event message expression field. With an AND operator, you specify that the terms on both sides of the AND operator must be present. Example: If using User001 AND Door053 AND Sunday, the term User001 as well as the term Door053 as well as the term Sunday must be present in order for the criterion to be met. It is not enough for only one or two of the terms to be present. As a rule of thumb, the more terms you combine with AND, the fewer results you will retrieve:  Combinations with AND yields few results (indicated in red) • **OR:** Lets you add an OR operator to the Event message expression field. With an OR operator, you specify that either one or another term must be present. Example: If using User001 OR Door053 OR Sunday, the term User001 or the term Door053 or the term Sunday must be present in order for the criterion to be met. The criterion is satisfied even if only one of the terms is present. As a rule of thumb, the more terms you combine with OR, the more results you will retrieve:

Name	Description
Event priority	The same data package may be analyzed for different events. The ability to assign a priority to each event lets you manage which event should be triggered if a received package matches the criteria for several events. The priority must be specified as a number between 0 (lowest priority) and 1000 (highest priority). When XProtect Professional receives a TCP and/or UDP package, analysis of the packet will start with analysis for the event with the highest priority. This way, when a package matches the criteria for several events, only the event with the highest priority will be triggered. If a package matches the criteria for several events with an identical priority, for example two events with a priority of 999, all events with the priority in question will be triggered.
Event protocol	Select which protocol XProtect Professional should listen for in order to detect the event: • **Any:** Listen for, and analyze, packages using TCP as well as UDP protocol. • **TCP:** Listen for, and analyze, packages using TCP protocol only. • **UDP:** Listen for, and analyze, packages using UDP protocol only.
Event rule type	Select how particular XProtect Professional should be when analyzing received data packages: • **Search:** In order for the event to occur, the received package must contain the message specified in the Event message expression field, but may also have more content. Example: If you have specified that the received package should contain the terms "User001" and "Door053", the event will be triggered if the received package contains the terms "User001" and "Door053" and "Sunday" since your two required terms are contained in the received package. • **Match:** In order for the event to occur, the received package must contain exactly the message specified in the Event message expression field, and nothing else.
Send e-mail if this event occurs	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select if XProtect Professional should automatically send an e-mail when the event occurs. Recipients are defined as part of the e-mail notification configuration. When using e-mail notifications, also bear in mind individual cameras' scheduling (see "E-mail notification" on page 157).
Attach image from camera	Only available if e-mail notification (see "Configure e-mail notifications" on page 166) is enabled. Select to include an image—recorded at the time the event is triggered—in the e-mail notification, then select the required camera in the list next to the check box.

Name	Description
Send SMS if this event occurs	Only available if SMS notification (see "Configure SMS notifications" on page 169) is enabled. Select if XProtect Professional should automatically send an SMS when the event occurs. Recipients are defined as part of the SMS notification configuration. When using SMS notifications, also bear in mind individual cameras' scheduling (see "SMS notification" on page 157).
Delete	Delete a selected event.
Add	Add a new event. When the **Generic Events** node is selected, clicking **Add** will add a new generic event. When a specific generic event is selected, clicking **Add** will add a timer event (on page 130) to the selected generic event.

Output control on event (Events and Output-specific properties)

When you add output controls on events (see "Configure hardware output on event" on page 131), specify the following properties:

Name	Description
Event	Select the required event.
Output	Select the required output event.

Scheduling and archiving

About scheduling

The scheduling feature lets you specify:

- When you want to archive (see "About archiving" on page 144)
- That some cameras transfer video to XProtect Professional at all times
- That some cameras transfer video only within specific periods of time or when specific events occur
- When you want to receive notifications from the system

You can set up general scheduling properties for all your cameras or individual properties per camera. You can set up when:

- One or more cameras should be online (that is transfer video to XProtect Professional)

- One of more cameras should use speedup (that is use a higher than normal frame rate)
- You want to receive any e-mail and/or SMS notifications regarding one or more cameras.
- Archiving takes place.
- PTZ cameras should patrol, and according to which patrolling profile

About archiving

Archiving is an integrated and automated feature in XProtect Professional with which recordings are moved to free up space for new recordings. By default, recordings are stored in the XProtect Professional database for each camera. The database for each camera is capable of containing a maximum of 600,000 records or 40 GB. XProtect Professional automatically archives (see "About archiving" on page 144) recordings if a camera's database becomes full. Consequently, having sufficient archiving space is important.

You do not have to do anything to enable archiving. It runs in the background and is automatically enabled and carried out from the moment XProtect Professional is installed. The most recent recordings are saved on a local storage in order to prevent network-related problems in the saving process.

The default settings for XProtect Professional is to perform archiving once a day, or if your database becomes full. You can change the settings (see "Archiving" on page 155) for when and how often archiving takes place in the Management Application. You can also schedule archiving (see "About archiving schedules" on page 150) up to 24 times a day, with a minimum of one hour between each one. This way, you can proactively archive recordings, so databases will never become full. Basically, the more you expect to record, the more often you should archive.

You can also change the retention time, which is the total amount of time you want to keep recordings from a camera (recordings in the camera's database as well as any archived recordings) under the properties of the individual camera.

XProtect Professional automatically archives recordings if a camera's database becomes full. You only specify **one** time limit (the retention time) as part of the general Recording and Archiving paths (on page 85) properties. Note that retention time will determine when archiving takes place. Retention time is the **total** amount of time for which you want to keep recordings from a camera (that is recordings in the camera's database **as well as** any archived recordings).

Backup of archives

Creating backups based on the content of camera databases is not recommended as it may cause sharing violations or other malfunctions. Instead, create backups based on the content of archives. If you have not specified separate archiving locations for separate cameras, you could back up the default local archiving directory, **Archives**.

Important: When you schedule a backup, make sure the backup job does not overlap with any scheduled archiving times.

If archiving fails

Under rare circumstances, archiving may fail, for example due to network problems. However, in XProtect Professional this does not pose a threat. XProtect Professional creates a new database and continues archiving in this new database. You can work with—and view—both this new database and the old one like any other databases.

About archiving locations

The default archiving folder (see "Configure default file paths" on page 213) (C:\MediaDatabase) is located on the XProtect Professional server. You can change the default archiving folder to any other location locally, or select a location on a network drive to use as the default archiving folder. In the archiving folder, separate subfolders for storing archives for each camera are automatically created. These subfolders are named after the MAC address of the hardware device to which the camera is connected.

Because you can keep archives spanning many days of recordings and archiving may take place several times per day, further subfolders, named with the archiving date and time, are also automatically created.

The subfolders are named according to the following structure:

```
...\Archives\CameraMACAddress_VideoEncoderChannel\DateAndTime
```

If the video encoder does not have several channels, the video encoder channel will always be _1 (example: 00408c51e181_1).

Example: an archiving at 23.15 on 31st December 2012 for a camera with the MAC address 00408c51e181 attached to channel 2 would be stored:

```
C:\MediaDatabase\Archives\00408c51e181_2\2012-12-31-23-15
```

Before configuring archiving (see "About archiving" on page 144) locations, consider whether you want to use static or dynamic archiving paths:

- **Static** archiving paths mean that for a particular camera, archiving will take place to a particular location, and to that location only. Static archiving paths are in principle individual for each camera, but they do not have to be unique: several cameras can easily use the same path if required.

  You can configure static archiving paths for individual cameras, or as part of the general Recording and archiving paths properties.

  - **Individual cameras:** In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Cameras and Storage Information**, double-click the required camera, select **Recording & Archiving Paths**, and specify required properties (see "Recording and archiving paths" on page 107).
  - **General Recording and Archiving Paths:** In the Management Application 's navigation pane, expand **Advanced Configuration**, double-click **Cameras and Storage Information**, and specify required properties (see "Recording and archiving paths" on page 85).

  Tip: If several cameras should use the same path, use the general Recording & Archiving Paths properties. There you get a template feature which lets you specify shared archiving locations in just a few clicks.

- **Dynamic** archiving paths allow greater flexibility, and are highly recommended. With dynamic archiving paths, you specify a number of different archiving paths, usually across several drives. If the path containing the camera database to be archived is on one of the drives you have selected for dynamic archiving, XProtect Professional will always try to archive to that drive first. If not, XProtect Professional automatically archives to the archiving drive with the most available space at any time, provided there is not a camera database using that drive. This fact will have no impact on how users find and view archived recordings.

Dynamic archiving paths are general for all your cameras; you cannot configure dynamic archiving paths for individual cameras.

To configure archiving paths: In the Management Application's navigation pane, expand **Advanced Configuration**, double-click **Cameras and Storage Information**, select **Dynamic Path Selection - Archives**, and specify required properties (see "Dynamic path selection" on page 87).

If you configure your cameras through the Configure video and recording wizard (see "The Configure Video and Recording wizard" on page 57), the wizard also lets you configure archiving paths.

About archiving to other locations

When you archive to other locations than the default archiving directory, XProtect Professional will first temporarily store the archive in the local default archiving directory, then immediately move the archive to the archiving location you have specified.

Archiving directly to a network drive can mean that archiving time varies depending on the available bandwidth on the network. First storing the archive locally, then moving it speeds up the archiving procedure, and reduces delays in case of network problems.

If you archive to a network drive, the regular camera database can only be stored on a local drive attached directly to the XProtect Professional server.

About dynamic archive paths

With dynamic archiving paths, you specify a number of different archiving paths, usually across several drives. Using dynamic paths is recommended and is the default setting when you configure cameras through the Configure video & recording wizard (see "About video and recording configuration" on page 78).

If the path containing the camera's database is on one of the drives you have selected for dynamic archiving, XProtect Professional will always try to archive to that drive first. If not, XProtect Professional automatically archives to the archiving drive with the most available space at any time, provided a camera database is not using that drive.

The drive that has the most available space may change during the archiving process, and archiving may therefore happen to several archiving drives during the same process. This will have no impact on how users find and view archived recordings.

Dynamic archiving paths are general for all your cameras; you cannot configure dynamic archiving paths for individual cameras.

When deciding which drives to use for dynamic archiving, consider the pros and cons in the following examples (in which we assume that the default archiving path (see "Configure default file paths" on page 213) is on drive C:—drive letters are examples only, different drive letters may of course be used in your organization):

- **Camera records to drive C: and archives to drive C:**

  If the path containing the camera's database is on one of the drives you have selected for dynamic archiving, XProtect Professional will always try to archive to that drive first. Archiving will take place quickly, but may also fill up the drive with data fairly quickly.

- **Camera records to drive C: and archives to drive D:**

  Recordings and archives are on separate drives. Archiving takes place less quickly. XProtect Professional will first temporarily store the archive in the local default archiving directory on C:,

then immediately move the archive to the archiving location on D:. Therefore, sufficient space to accommodate the temporary archive is required on C:.

- **Camera 1 records to drive C: and archives to drive D: while Camera 2 records to drive D: and archives to drive C:**

  Avoid this. One camera's archiving may take up space required for another camera's recordings. In the above example, Camera 1's archiving to D: may result in no recording space for camera 2 on D:. The rule is: "Do not cross recording and archiving drives."•

If you use several surveillance servers in a master/slave setup, each surveillance server must archive to its own mapped location in order for archiving to work. If you attempt to archive to the same mapped location for all the servers, archiving will fail.

If you use several surveillance servers in a master/slave setup, each surveillance server must archive to its own mapped location in order for archiving to work. If you attempt to archive to the same mapped location for all the servers, archiving will fail.

About archiving audio

If an audio source (for example, a microphone) is enabled on a hardware device, audio recordings are archived together with video recordings from the camera attached to the hardware device. If the hardware device is a video encoder with several channels, audio is archived with the camera on channel 1.

When an audio source is enabled, audio is recorded to the associated camera's database. This will affect the database's capacity for storing video. You may, therefore, want to use scheduled archiving more frequently if recording audio and video than if only recording video.

Storage capacity required for archiving

The storage capacity required for archiving depends entirely on the amount of recordings you plan to keep, and on how long you want to keep them (retention time). Some organizations want to keep archived recordings from a large number of cameras for several months or years. Other organizations may only want to archive recordings from one or two cameras, and they may want to keep their archives for much shorter periods of time.

You should always first consider the storage capacity of the **local** drive containing the default archiving directory to which archived recordings are always moved, even though they may immediately after be moved to an archiving location on another drive. Basically, the capacity of the local drive should be at least twice the size required for storing the databases of all cameras.

When you archive, XProtect Professional automatically checks that space required for the data to be archived plus 1 GB of free disk space per camera is available at the archiving location. If not, the archive location's oldest data from the camera in question will be deleted until there is sufficient free space for the new data to be archived.

When you estimate storage capacity required for archiving, consider your organization's needs, then plan for worst case rather than best case scenarios.

You cannot archive to external drives, only to local drives on the XProtect Professional server.

Tip: The Storage Calculator, found in the Support section of the Milestone website, can help you determine the storage capacity required for your surveillance system.

Automatic response if running out of disk space

If XProtect Professional runs of disk space while archiving, you can set up an automatic response. Two scenarios can occur, depending on whether the camera database drive is different from, or identical to, the archiving drive:

Different drives: Automatic archiving if database drive runs out of disk space

In case the XProtect Professional server is running out of disk space, and the archiving drive is **different from** the camera database drive, and archiving has not taken place within the last hour, archiving will automatically begin in an attempt to free up disk space. This will happen regardless of any archiving schedules. The server is considered to be running out of disk space if:

- there is less than 10% disk space left, and the available disk space goes below 30 GB plus 1.5 GB per camera
- the available disk space goes below 150 MB plus 20 MB per camera (example: with ten cameras, the server would be running out of disk space if the remaining available disk space went below 350 MB (150 MB plus 20 MB for each of the ten cameras))

The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 10% disk space left.

On the archiving drive, XProtect Professional automatically checks that the space required for data from a camera to be archived plus 1 GB of free disk space per camera is available. If not, the archive drive's oldest data from the camera in question will be deleted until there is sufficient free space for the new data to be archived.

IMPORTANT: You will lose the archive data being deleted.

Same drive: Automatic moving or deletion of archives if drive runs out of disk space

If the XProtect Professional server is running out of disk space, and the archiving drive is identical to the camera database drive, XProtect Professional will automatically do the following in an attempt to free up disk space:

1. First, the program will attempt to move archives (moving archives is only possible if you use dynamic archiving, with which you can archive to several different drives). This will happen if:
   - there is less than 15% disk space left, and the available disk space goes below 40 GB plus 2 GB per camera

     - or -
   - the available disk space goes below 225 MB plus 30 MB per camera (example: with ten cameras, the server would be running out of disk space if the remaining available disk space went below 525 MB (225 MB plus 30 MB for each of the ten cameras))

   The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 15% disk space left.
2. If moving archives is not possible, XProtect Professional will attempt to delete the oldest archives. This will happen if:
   - there is less than 10% disk space left, and the available disk space goes below 30 GB plus 1.5 GB per camera

- or -

- the available disk space goes below 150 MB plus 20 MB per camera (example: with ten cameras, the server would be running out of disk space if the remaining available disk space went below 350 MB (150 MB plus 20 MB for each of the ten cameras))

The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 10% disk space left.

IMPORTANT: You will lose data from the archives being deleted.

3. Ultimately, if there are no archives to delete, XProtect Professional will attempt to resize camera databases by deleting their oldest recordings. This will happen if:

   - there is less than 5% disk space left, and the available disk space goes below 20 GB plus 1 GB per camera

   - or -

   - the available disk space goes below 75 MB plus 10 MB per camera (example: with ten cameras, the server would be running out of disk space if the remaining available disk space went below 175 MB (75 MB plus 10 MB for each of the ten cameras))

   The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 5% disk space left.

   IMPORTANT: You will lose the data deleted as part of the database resizing process.

   When the recording server is restarted upon such database resizing, the original database sizes will be used. You should therefore make sure the drive size problem is solved, or adjust camera database sizes to reflect the altered drive size.

Tip: Should the database resizing procedure take place, you will be informed on-screen in the Smart Client, in log files, and (if set up) through an e-mail and/or SMS notification.

1. First, XProtect Professional will attempt to delete archives. This will happen if:

- there is less than per camera

  - or -

- the available disk space goes below 150 MB plus 20 MB per camera

  The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 10% disk space left.

  IMPORTANT: You will lose data from the archives being deleted.

1. Ultimately, if there are no archives to delete, XProtect Professional will attempt to resize camera databases. This will happen if:

- there is less than 5% disk space left, and the available disk space goes below 20 GB plus 1 GB per camera

  - or -

- the available disk space goes below 75 MB plus 10 MB per camera (example: with ten cameras, the server would be running out of disk space if the remaining available disk space went below 175 MB (75 MB plus 10 MB for each of the ten cameras))

The difference ensures that very large disks will not necessarily be considered to be running out of disk space just because they have less than 5% disk space left.

IMPORTANT: You will lose the data deleted as part of the database resizing process.

When the recording server is restarted upon such database resizing, the original database sizes will be used. You should therefore make sure the drive size problem is solved, or adjust camera database sizes to reflect the altered drive size.

Tip: Should the database resizing procedure take place, you will be informed on-screen in the Smart Client, in log files, and (if set up) through an e-mail notification.

About archiving schedules

There are two ways in which to configure archiving schedules:

- While you configure your cameras through the Configure Video and Recording wizard (see "The Configure Video and Recording wizard" on page 57), in which case you configure your archiving schedule on the wizard's **Drive selection** page.
- As part of the general Scheduling and Archiving properties: In the Management Application's navigation pane, expand **Advanced Configuration**, right-click **Scheduling and Archiving**, select **Properties**, select **Archiving** in the dialog, and specify required properties.

View archived recordings

You can view archived recordings via the Smart Client. Use, for example, all of the Smart Client's advanced features (video browsing, and export) for archived recordings.

Stored archives

For archived recordings stored on a local or network drive, you use the Smart Client playback features to find and view the relevant recordings, just like you would with recordings stored in a camera's regular database.

Exported archives

For exported archives, for example archives stored on a CD, you use the Smart Client. See the Smart Client documentation for more information.

Configure general scheduling and archiving

Do the following:

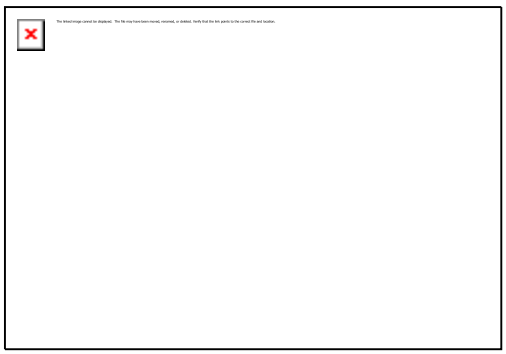
1. In the Management Application navigation pane, expand **Advanced Configuration**, right-click **Scheduling and Archiving**, and select **Properties**.
2. Specify properties as required for Scheduling all cameras (on page 153), Scheduling options (on page 154), and Archiving.
3. XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

When archiving, disable any virus scanning (see "Virus scanning information" on page 25) of camera databases and archiving locations.

Configure camera-specific schedules

If you base your schedule profile—or parts of it—on events within periods of time, remember to select **Start event** and **Stop event** from the lists below the calendar section.

Tip: If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.



The fact that a camera transfers video to XProtect Professional does not necessarily mean that video from the camera is recorded. Recording is configured separately; see Configure video and recording (see "About video and recording configuration" on page 78).

For each camera, you can create schedule profiles based on:

Online periods

- Periods of time (example: Mondays from 08.30 until 17.45), shown in pink:
- Events within periods of time (example: from Event A occurs until Event B occurs Mondays from 08.30 until 17.45), shown in yellow:

  The two options can be combined , but they cannot overlap in time.

Speedup

- Periods of time (example: Mondays from 08.30 until 17.45), shown in olive green:

E-mail notification

- Periods of time (example: Mondays from 08.30 until 17.45), shown in blue:

SMS notification

- Periods of time (example: Mondays from 08.30 until 17.45), shown in green:

PTZ patrolling

- Periods of time (example: Mondays from 08.30 until 17.45), shown in red:

- If use of one patrolling profile is followed immediately by use of another, run your mouse pointer over the red bar to see which patrolling profile applies when.

XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

1. In the **Schedule Profiles** list, select **Add new...**.
2. In the **Add Profile** dialog, enter a name for the profile. Names must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
3. In the top right corner of the dialog, select **Set camera to start/stop on time** (to base subsequent settings on periods of time) or **Set camera to start/stop on event** (to base subsequent settings on events within periods of time).

   Tip: You can combine the two, so you may return to this step in order to toggle between the two options.
4. In the calendar section, place your mouse pointer at a required start point, then hold down the left mouse button, drag the mouse pointer and release at the required end point.
   - You specify each day separately.
   - You specify time in increments of five minutes. XProtect Professional helps you by showing the time over which your mouse pointer is positioned.

If you base your schedule profile—or parts of it—on events within periods of time, remember to select **Start event** and **Stop event** from the lists below the calendar section.

- **Tip:** If you have not yet defined any suitable events, you can quickly do it: Use the **Configure events** list, located below the other fields.
- To delete an unwanted part of a schedule profile, right-click it and select **Delete**.
- To quickly fill or clear an entire day, double-click the name of the day.
- As an alternative to dragging inside the calendar section, use the **Start time**, **End time** and **Day** fields, then the **Change Period** or **Set Period** button as required. When using the **Start time** and **End time** fields, remember that time is specified in increments of five minutes. You cannot specify a period shorter than five minutes, and you can only use times like 12:00, 12.05, 12:10, 12:15, etc. If you specify a time outside of the five-minute intervals, such as 12:13, you will get an error message.

General scheduling properties

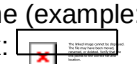
Properties in this window:

Scheduling all cameras 153
Scheduling options 154
Archiving 155

Scheduling all cameras

When you configure general scheduling and archiving (see "Configure general scheduling and archiving" on page 150), you can specify certain properties for many cameras in one go. Either in order to speed up things, or because the properties in question are shared by all cameras rather than being specific to individual cameras.

All properties on a white background are editable, properties on a light blue background cannot be edited. Note that the properties **Online Period**, **Speedup**, **E-mail Notification**, **SMS Notification**, and **PTZ Patrolling** can also be specified individually for each camera.

Name	Description
Template	The template can help you configure similar properties quickly. Say you have 20 cameras and you want to change the recording path, archiving path, and retention time for all of them. Instead of having to enter the same three pieces of information 20 times, you can simply enter them once in the template, and then apply the template to the 20 cameras with only two clicks.
Apply Template	Select which cameras you want to apply the template for. You then use one of the two **Set** buttons to actually apply the template. **Tip:** To select all cameras in the list, click the **Select All** button.
Camera	The name as it appears in the Management Application as well as in clients.
Online	Select the required profile (for example **Always on**) for the online schedule (see "Configure camera-specific schedules" on page 80) for the camera(s) in question. You specify a camera's online periods by creating schedule profiles based on: • Periods of time (example: Mondays from 08.30 until 17.45), shown in pink:  • Events within periods of time (example: from Event A occurs until Event B occurs Mondays from 08.30 until 17.45), shown in yellow: The two options can be combined ; but they cannot overlap in time.

Name	Description
E-mail	Select the required profile for the e-mail notification schedule (see "E-mail notification" on page 157) for the camera(s) in question. You specify a camera's e-mail notification periods by creating schedule profiles based on periods of time (example: Mondays from 08.30 until 17.45), shown in blue:
SMS	Select the required profile for the SMS notification schedule (see "SMS notification" on page 157) for the camera(s) in question. You specify a camera's SMS notification periods by creating schedule profiles based on periods of time (example: Mondays from 08.30 until 17.45), shown in green:
PTZ Patrolling	Only available for PTZ (Pan/Tilt/Zoom) cameras with patrolling, the continuous movement of a PTZ camera between a number of preset positions. Lets you select the required profile for the PTZ patrolling schedule (see "PTZ patrolling" on page 157) for the camera(s) in question. You specify a camera's patrolling schedule based on patrolling profiles within particular periods of time (example: Mondays from 08.30 until 17.45), shown in red:
Select All	Click button to select all cameras in the **Apply Template** column.
Clear All	Click button to clear all selections in the **Apply Template** column.
Set selected template value on selected cameras	Apply only a selected value from the template to selected cameras. **Tip:** To select more than one value press CTRL while selecting.
New schedule profile	Create a new schedule profile of any type by clicking the **Create...** button.

Scheduling options

When you configure general scheduling and archiving (see "Configure general scheduling and archiving" on page 150), you can specify certain properties for many cameras in one go. In the case of Scheduling Options, it is because the properties are shared by all cameras.

Name	Description
Start cameras on client requests	Cameras may be offline, for example because they have reached the end of an online recording schedule (see "Online period" on page 156), in which case client users will not be able to view live video from the cameras. However, if you select **Start cameras on client requests**, client users will be able to view live video from the camera outside online schedule—but without recording (technically: force the camera to be online outside its online schedule). You must select **Enable recording when started on client request** (see the following), if you want recording to take place.

Name	Description
Enable recording when started on client request	Enable recording on the camera when **Start cameras on client requests** (see the previous) is also selected. If a user does not have access to manual recording (see "Camera access" on page 182), selecting **Enable recording when started on client request**, will **not** enable the user to do manual recording.
Schedule profile for new cameras	Select which online schedule profile to use as default for cameras you subsequently add to your XProtect Professional system. Note that your selection only applies for the online schedule, not for any other schedules. Default selection is **Always on**, meaning that new cameras will always be online, that is transferring video to the XProtect Professional server for live viewing and further processing.
Maximum delay between reconnect attempts	Control the aggressiveness of reconnection attempts. If XProtect Professional loses the connection to a camera, it will by default attempt to re-establish the connection after ten seconds. In some environments, for example if using vehicle-mounted cameras through wireless connections, camera connections may frequently be lost, and you may want to change the aggressiveness of such reconnection attempts.

You can view live and even record video from a camera outside its online recording schedule. To do this, you select the **Start cameras on client requests** and, if needed, the **Enable recording when started on client request** options in the following when setting up your scheduling properties for the camera in question.

Archiving

XProtect Professional automatically archives (see "About archiving" on page 144) recordings if a camera's database becomes full (in earlier versions, this was an option configured individually for each camera).

Name	Description
Archiving Times	Specify when you want XProtect Professional to automatically move recordings to your archiving path(s). You can specify up to 24 archiving times per day, with minimum one hour between each one. Select the hour, minute and second values and click the **up** and **down** buttons to increase or decrease values, or simply overwrite the selected value, and then click **Add**. The more you expect to record, the more often you should archive.
Send e-mail on archiving failure	If selected, XProtect Professional will automatically send an e-mail to selected recipients if archiving fails. This requires that the e-mail notification (on page 157) feature is enabled. Recipients are defined as part of the e-mail notification properties.
Send SMS on archiving failure	If selected, XProtect Professional will automatically send an SMS (mobile phone text message) to selected recipients if archiving fails. This requires that the SMS notification (on page 157) feature is enabled. Recipients are defined as part of the SMS notification properties (see "SMS properties" on page 169).

Camera-specific scheduling properties

Properties in this window:

Online period 156
Speedup 157
E-mail notification 157
SMS notification 157
PTZ patrolling 157

Online period

When you configure scheduling (see "Configure camera-specific schedules" on page 80) for specific cameras, your **Online Period** settings are probably the most important, since they determine when each camera should transfer video to XProtect Professional.

By default, cameras added to XProtect Professional will automatically be online, and you will only need to modify the online period settings if you require cameras to be online only at specific times or events. Note, however, that this default may be changed as part of the general scheduling options (see "Scheduling options" on page 154), in which case subsequently added cameras will not automatically be online.

The fact that a camera transfers video to XProtect Professional does not necessarily mean that video from the camera is recorded. Recording is configured separately; see Configure video and recording (see "About video and recording configuration" on page 78).

Name	Description
Online	Select the required profile (for example **Always on**) for the online schedule (see "Configure camera-specific schedules" on page 80) for the camera(s) in question. You specify a camera's online periods by creating schedule profiles based on: • Periods of time (example: Mondays from 08.30 until 17.45), shown in pink: • Events within periods of time (example: from Event A occurs until Event B occurs Mondays from 08.30 until 17.45), shown in yellow: The two options can be combined ; but they cannot overlap in time.

Is it possible to view live and even record video from a camera outside its online recording schedule? Yes, you select the Start cameras on client requests (see "Scheduling options" on page 154) and, if needed, the Enable recording when started on client request **(see "Scheduling options" on page 154)** options when setting up your scheduling properties for the camera in question.

Speedup

Speedup may also take place based on events, but that is configured elsewhere: See Frame rate - MJPEG (General recording and storage properties) (see "Frame rate - MJPEG" on page 94) and Video (Camera-specific properties) (see "Video" on page 102).

Name	Description
Speedup	For specific MJPEG cameras, specify speedup periods. Before you can define this type of schedule, speedup must be enabled (see "Frame rate - MJPEG" on page 94). You specify a camera's speedup periods by creating schedule profiles based on periods of time (example: Mondays from 08.30 until 17.45), shown in olive green:

E-mail notification

When you configure scheduling (see "Configure camera-specific schedules" on page 80) for specific cameras, you can specify e-mail notification (see "Configure e-mail notifications" on page 166) periods. Before you can define this type of schedule, e-mail notification must be enabled (see "E-mail properties" on page 167).

Name	Description
E-mail	Select the required profile for the e-mail notification schedule (see "E-mail notification" on page 157) for the camera(s) in question. You specify a camera's e-mail notification periods by creating schedule profiles based on periods of time (example: Mondays from 08.30 until 17.45), shown in blue:

SMS notification

When you configure scheduling (see "Configure camera-specific schedules" on page 80) for specific cameras, you can specify SMS notification (see "Configure SMS notifications" on page 169) periods. Before you can define this type of schedule, SMS notification must be enabled (see "SMS properties" on page 169).

Name	Description
SMS	Select the required profile for the SMS notification schedule (see "SMS notification" on page 157) for the camera(s) in question. You specify a camera's SMS notification periods by creating schedule profiles based on periods of time (example: Mondays from 08.30 until 17.45), shown in green:

PTZ patrolling

When you configure scheduling (see "Configure camera-specific schedules" on page 80) for PTZ (Pan/Tilt/Zoom) cameras capable of patrolling (see "PTZ patrolling" on page 118), you can specify

which patrolling profiles to use at specific times. Before you can define this type of schedule, patrolling must be configured for the cameras in question.

Name	Description
PTZ Patrolling	Only available for PTZ (Pan/Tilt/Zoom) cameras with patrolling, the continuous movement of a PTZ camera between a number of preset positions. Lets you select the required profile for the PTZ patrolling schedule (see "PTZ patrolling" on page 157) for the camera(s) in question. You specify a camera's patrolling schedule based on patrolling profiles within particular periods of time (example: Mondays from 08.30 until 17.45), shown in red:

Use of one patrolling profile may be followed immediately by use of another (example: use the Daytime patrolling profile Mondays from 08.30 until 17.45, then the Evening patrolling profile Mondays from 17.45 until 23.00). Use of two patrolling profiles cannot overlap.

Unlike other types of scheduling, there are no ready-made **Always on** and **Always off** schedule profiles for PTZ patrolling. You can create any number of customized schedule profiles for each camera. When you create a customized schedule profile (see "Configure camera-specific schedules" on page 80) for one camera, you can reuse it with other cameras if required.

Matrix

About Matrix video sharing

The Matrix feature allows distributed viewing of live video from any camera to any Matrix recipient on a network operating with XProtect Professional. A computer on which Matrix-triggered video can be viewed is known as a Matrix recipient. In order to become a Matrix recipient, the computer must have the multi-purpose Smart Client installed.

For more information about Matrix recipients refer to the Smart Client User's Manual, available on the XProtect Professional software DVD as well as from www.milestonesys.com. Also, once installed, the Smart Client has its own built-in help system.

There are two ways in which Matrix-triggered video can appear on a Matrix recipient:

- **Manual triggering**: Another user wants to share important video, and sends it from a Smart Client—or from a custom-made web page—to the required Matrix recipient.
- **Automatic triggering**: Video is sent to the required Matrix recipient automatically when a predefined event occurs; for example when a door sensor detects that a door is opened, or when the surveillance system detects motion in the video from a camera.

About Matrix recipients

A computer on which Matrix-triggered video can be viewed is known as a Matrix recipient. In order to become a Matrix recipient, the computer must have the multi-purpose Smart Client installed.

For more information about Matrix recipients refer to the Smart Client User's Manual, available on the XProtect Professional software DVD as well as from www.milestonesys.com. Also, once installed, the Smart Client has its own built-in help system.

There are two ways in which Matrix-triggered video can appear on a Matrix recipient:

- **Manual triggering**: Another user wants to share important video, and sends it from a Smart Client—or from a custom-made web page—to the required Matrix recipient.
- **Automatic triggering**: Video is sent to the required Matrix recipient automatically when a predefined event occurs, for example when a door sensor detects that a door is opened, or when the surveillance system detects motion in the video from a camera.

Configure Matrix

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click **Matrix** and select **Properties**.
2. Enable the use of Matrix by selecting the **Enable Matrix** check box.
3. Specify required properties (see "Matrix recipients" on page 159), or, for automatically triggered video sharing, select **Matrix Event Control** and configure Matrix Event Control properties (see "Matrix event control" on page 161).When ready, click **OK.**
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Configure Matrix for video sharing

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click **Matrix** and select **Properties**.
2. Enable the use of Matrix by selecting the **Enable Matrix** check box.
3. Specify required properties (see "Matrix recipients" on page 159), or, for automatically triggered video sharing, select **Matrix Event Control** and configure Matrix Event Control properties (see "Matrix event control" on page 161).When ready, click **OK.**
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Matrix properties

Properties in this window:

Matrix recipients 159
Matrix event control 161

Matrix recipients

The **Matrix Recipients** tab is used for enabling Matrix functionality and for defining on which computers to display Matrix-triggered live video. A computer on which Matrix-triggered video can be displayed is known as a Matrix recipient. Being able to view Matrix-triggered video requires that a Smart Client is installed on the user's computer.

Name	Description
Enable Matrix	Select check box to enable Matrix functionality.
[List of Defined Matrix recipients]	Lists any already defined Matrix recipients, that is computers on which Matrix-triggered video can be displayed. To change the properties of an already defined Matrix recipient, select the required Matrix recipient, make the changes in the fields below the list, then click the Update button. To remove a Matrix recipient from the list, select the unwanted Matrix recipient, then click the **Delete** button.
Delete	Available only when you have selected a Matrix recipient in the list. Clicking the **Delete** button will remove the selected Matrix recipient. You will be prompted to confirm the removal.
Name	Name for the Matrix recipient. Used when adding a new Matrix recipient or editing the properties of an existing one. The name will appear in various day-to-day usage situations; it is therefore a good idea to use a descriptive and unambiguous name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Address	IP address of the Matrix recipient, used when adding a new Matrix recipient or editing the properties of an existing one.
Port	Specify the port number to be used when sending commands to the Matrix recipient. Used when adding a new Matrix recipient or editing the properties of an existing one. The Matrix recipient will listen for commands on this port. By default, port 12345 is used; you can of course specify another port number.
Password	Specify the password to be used when communicating with the Matrix recipient. Used when adding a new Matrix recipient or editing the properties of an existing one
Matrix recipient is a Smart Client	Select if the Matrix recipient in question is a Smart Client. Matrix-triggered live video may also be displayed in usersSmart Clients. If a Smart Client is used, distribution of the Matrix -triggered live video takes place slightly differently.
Clear	Removes any content in the **Name**, **Address,** and **Password** fields.
Update	Updates the properties of the selected Matrix recipient with the changes made during editing. Available only if you have edited the properties of an existing Matrix recipient.
Add	Adds the new Matrix recipient to the list. Available only if you have added properties of a new Matrix recipient in the **Name**, **Address**, **Port**, **Password**, and possibly Smart Client fields.

Matrix event control

The **Matrix Event Control** tab is used for configuring the automatic sending of live video based on predefined events. You can define exactly which events and cameras to use on a per- Matrix recipient basis.

The **Matrix Event Control** tab displays the list of Matrix recipients defined on the **Matrix Recipients** tab.

Right-clicking a Matrix recipient brings up a list of devices with belonging events. When you select an event, it will initially be highlighted by a red exclamation mark, indicating that there is additional configuration to be done. Right-clicking an event brings up a list of options for the selected event:

Name	Description
Delete [selected event]	Deletes selected event on selected device.
Connect	Connects to the camera (actual camera is specified after selecting action to be taken).
Disconnect, then connect	Disconnect any existing connections, then connect again. With this option the live video will appear in the Matrix recipient on a first-in-first-out basis. Each time a new event occurs, video from the latest event is displayed prominently in a specific position on the Matrix recipient, while at the same time video from the older events is shifted to less prominent positions and eventually ”pushed out” of the Matrix recipient in order to make space for the latest event's video. With the **Connect** option, you may experience that if video triggered by one event on a camera is already shown on the Matrix recipient, videos triggered by another event on the same camera will not be displayed prominently as coming from the latest event – simply because the Matrix recipient is already showing video from the camera in a less prominent position. By selecting **Disconnect, then connect** you can avoid this issue, and ensure that video from the latest event is always displayed prominently.
Disconnect	Disconnects any existing connection. Use if a particular event should cause video to stop being displayed in the Matrix recipient, even if they are not yet old enough to be “pushed out” of the Matrix recipient.

If you selected Connect, another red exclamation mark will indicate that there is still some configuration to be done. Right-clicking an action to select which camera to apply the action on.

In this example, we have specified that when motion is detected on Camera b, the selected Matrix recipient should connect to Camera b:

Logs

About logs

XProtect Professional can generate various logs.

Log types

Name	Description
Management Application log files	These files log activity in the Management Application. A new log file is created for each day the Management Application is used. You cannot disable this type of logging. Management Application log files are named according to the structure AdminYYYYMMDD.log, for example Admin20091231.log.
Recording Server service log files	These files log Recording Server service (see "About services" on page 184) activity. A new log file is created for each day the service is used. You cannot disable this type of logging. Recording Server service log files are named according to the structure RecordingServerYYYYMMDD.log, for example RecordingServer20091231.log.
Image Server service log files	These files log activity on the Image Server service (see "About services" on page 184). A new log file is created for each day the service is used. You cannot disable this type of logging. Image Server service log files are named according to the structure ISLog_YYYYMMDD.log, for example ISLog_20091231.log.
Image Import service log files	These files log activity regarding the Image Import service, when this service is used for fetching pre-alarm images, and storing the fetched images in camera databases. Pre-alarm images is a feature available for selected cameras only. It enables sending of images from immediately before an event took place from the camera to the surveillance system via e-mail. A new log file is created for each day the service is used. You cannot disable this type of logging. Image Import service log files are named according to the structure ImageImportLog_YYYMMDD.log, for example ImageImportLog20091231.log.

Name	Description
Event log files	These files log information about registered events. A new log file is created for each day on which events occur. You cannot disable this type of logging. Event log files should be viewed using the Smart Client (use the **Playback** tab's **Alerts** section).
Audit log files	These files log Smart Client user activity provided audit logging is enabled. A new log file is created for each day with audit logging enabled and client user activity. Audit log files are named according to the structure is_auditYYYMMDD.log, for example is_audit20091231.log. The _is prefix is due to the fact that the audit log files are generated by the Image Server service.

Log locations

All log files are by default placed in the appropriate **All Users** folder for the operating system you are using. By default, they are stored there for seven days. Note, however, that log file locations as well as the number of days to store the logs can be changed as part of the logging configuration.

Log structures

Most log files generated by XProtect Professional use a shared structure complying with the W3C Extended Log File Format. Each log file consists of a header and a number of log lines:

- The header outlines the information contained in the log lines.
- The log lines consist of two main parts: the log information itself as well as an encrypted part. The encrypted part makes it possible, through decryption and comparison, to assert that a log file has not been tampered with.

Log integrity checks

All log files, except Management Application log files, are subjected to an integrity check once every 24 hours. The integrity check is performed by the XProtect Professional Log Check service.

The result of the integrity check is automatically written to a file named according to the structure LogCheck_YYYYMMDD.log, for example LogCheck_20091231.log. Like the log files themselves, the log check files are by default placed in the appropriate **All Users** folder for the operating system you are using.

Any inconsistencies will be reported in the form of error messages written in the log check file. Possible error messages (other, non-error, messages may also appear in the log check file):

Name	Description
Log integrity information was not found. Log integrity can't be guaranteed.	The log file could not be checked for integrity.

Name	Description
Log information does not match integrity information. Log integrity can't be guaranteed.	The log file exists, but does not contain the expected information. Thus, log integrity cannot be guaranteed.
[Log file name] not found	The log file was not present.
[Log file name] is empty	The log file was present, but empty.
Last line changed/removed in [log file name]	The last line of the log file did not match validation criteria.
Encrypted data missing in [log file name] near line [#]	The encrypted part of the log line in question was not present.
Inconsistency found in [log file name] near line [#]	The log line does not match the encrypted part.
Inconsistency found in [log file name] at beginning of log file	The log file header is not correct. This situation is most likely to occur if a user has attempted to delete the beginning of a log file.

Configure system, event and audit logging

XProtect Professional can to generate various logs. To configure logging, do the following:

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click **Logs** and select **Properties**.
2. Specify required properties (see "Log properties" on page 164) for:
   - General system logs (Management Application log, Recording Server service log, Image Server service log, Image Import service log)
   - The event log
   - The audit log

   Note that only audit logging can be disabled/enabled by administrators; all other logs are compulsory. XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.
3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Log properties

XProtect Professional can generate various types of logs. When you configure logs, you can define the following:

Logs (Management Application log, Recording Server service log, Image Server service log, and Image Import service log)

Name	Description
Path	These log files are by default placed in the appropriate **All Users** folder for the operating system you are using. To specify another location for your log files, type the path to the required folder in the **Path** field, or click the browse button next to the field to browse to the required folder.
Days to log	A new log file is created each day the Management Application and/or the services are used. A log file older than the number of days specified in the field is automatically deleted. By default, the log file will be stored for seven days. To specify another number of days (max. 9999), simply overwrite the value in the field. The current day's activity is always logged, even with a value of 0 in the field. Therefore, if you specify 0, you will log current day's activity; if you specify 1, you will keep one day plus the current day's activity, and so on.

Event Log

Name	Description
Path	These log files are by default placed in the appropriate **All Users** folder for the operating system you are using. To specify another location for your log files, type the path to the required folder in the **Path** field, or click the browse button next to the field to browse to the required folder.
Days to log	A new log file is created for each day on which events occur. A log file older than the number of days specified in the field is automatically deleted. By default, the log file will be stored for seven days. To specify another number of days (max. 9999), simply overwrite the value in the field. The current day's activity is always logged, even with a value of 0 in the field. Therefore, if you specify 0, you will log current day's activity; if you specify 1, you will keep one day plus the current day's activity, and so on.

Audit Log

Name	Description
Enable audit logging	Audit logging is the only type of XProtect Professional logging which is not compulsory. Select/clear the check box to enable/disable audit logging.
Path	These log files are by default placed in the appropriate **All Users** folder for the operating system you are using. To specify another location for your log files, type the path to the required folder in the **Path** field, or click the browse button next to the field to browse to the required folder.

Name	Description
Days to log	A new log file is created for each day with audit logging enabled and client user activity. A log file older than the number of days specified in the field is automatically deleted. By default, the log file will be stored for seven days. To specify another number of days (max. 9999), simply overwrite the value in the field. The current day's activity is always logged (provided audit logging is enabled and there is user activity). Therefore, if you specify 1, you will keep one day plus the current day's activity. Note that if you specify 0 (zero), audit log files will be kept indefinitely (disk space permitting).
Minimum logging interval	Minimum number of seconds between logged events. Specifying a high number of seconds between logged events may help reduce the size of the audit log. Default is 60 seconds.
In sequence timespan	Number of seconds to pass for viewed images to be considered to be within the same sequence. Specifying a high number of seconds may help limit the number of viewed sequences logged, and thus reduce the size of the audit log. Default is ten seconds.

E-mail

About e-mail

With e-mail notifications, you can instantly get notified when your surveillance system requires attention. XProtect Professional can automatically send e-mail notifications to one or more recipients when:

- Motion (see "Motion detection & exclude regions" on page 111) is detected
- Events occur. You can select individually for each event whether you want to receive an e-mail notification or not.
- Archiving (see "About archiving" on page 144) fails (if e-mail notification has been selected as part of the archiving properties)

Configure e-mail notifications

Do the following:

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click **E-mail** and select **Properties**.
2. Specify required properties (see "E-mail properties" on page 167), including the important information about which SMTP mail server to use. XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for

each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

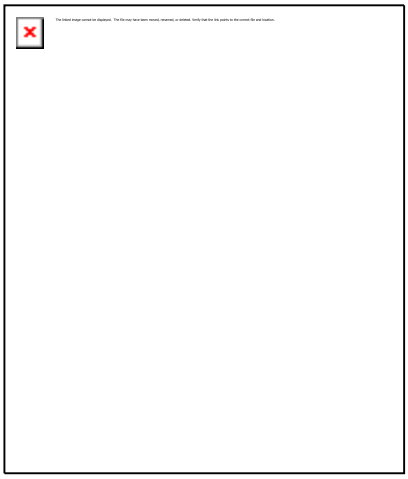
Tip: You can test your e-mail notification configuration by clicking the **Test** button. This will send a test e-mail to the specified recipients.

3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

When you configure e-mail alerts, also consider the e-mail notification schedules (see "E-mail notification" on page 157) configured for each camera.

E-mail properties

With e-mail notifications (see "Configure e-mail notifications" on page 166), you and your colleagues can instantly get notified when your surveillance system requires attention.

Name	Description
Recipient(s)	Specify the e-mail addresses to which e-mail notifications should be sent. If specifying more than one e-mail address, separate the e-mail addresses with semicolons (example: aa@aa.aa; bb@bb.bb; cc@cc.cc).
Test	Sends a test e-mail to the specified recipients. If **Include Image** is selected, the test e-mail will have a still test JPEG image attached.
Subject text	Enter required subject text for e-mail notifications.
Message text	Enter required message text for e-mail notifications. Note that camera information as well as date and time information is automatically included in e-mail notifications.
Include Image	Select check box to include still images in e-mail notifications. When selected, a still JPEG image from the time the triggering event occurred will be attached to each e-mail notification.  Example of e-mail including a still image

Name	Description
Do not send e-mail on camera failures	If selected, e-mail notifications will not be sent if XProtect Professional loses contact with a camera. Otherwise, automatic e-mail notifications will be sent in such cases, regardless of any scheduled e-mail notification periods **(see "**E-mail notification**" on page 157).**
Time between motion- and database-related e-mails per camera	Minimum time (in minutes) to pass between the sending of each e-mail notification per camera. This interval only applies for e-mail notification generated by detected motion or database-related events; e-mail notification generated by other types of events will still be sent out whenever the events occur. Examples: If specifying **5**, a minimum of five minutes will pass between the sending of each motion- or database-related e-mail notification per camera, even if motion or database events are detected in between. If specifying **0**, e-mail notifications will be sent each time motion or database events are detected, potentially resulting in a very large number of e-mail notifications being sent. If using the value **0,** you should therefore consider cameras' motion detection (see "Motion detection & exclude regions" on page 111) sensitivity settings.
Sender e-mail address	Enter the e-mail address you wish to appear as the sender of the e-mail notification.
Outgoing mail (SMTP) server name	Type the name of the SMTP (Simple Mail Transfer Protocol) server which will be used for sending the e-mail notifications. Compared with other mail transfer methods, SMTP has the advantage that you will avoid automatically triggered warnings from your e-mail client. Such warnings may otherwise inform you that your e-mail client is trying to automatically send e-mail messages on your behalf. TLS (Transport Layer Security) and it s predecessor SSL (Secure Socket Layer) is not supported; if the sender belongs on a server that requires TLS or SSL, e-mail notifications will not work properly. Also, you may be required to disable any e-mail scanners that could prevent the application sending the e-mail notifications.
Server requires login	Select check box if a user name and password is required to use the SMTP server.
User name	Only required when **Server requires login** is selected. Specify the user name required for using the SMTP server.
Password	Only required when **Server requires login** is selected. Specify the password required for using the SMTP server.

SMS

About SMS

With SMS notifications, you can instantly get notified on your mobile device when your surveillance system requires attention. XProtect Professional can automatically send SMS notifications when:

- Motion (see "Motion detection & exclude regions" on page 111) is detected
- Events occur. You can select individually for each event whether you want to receive an SMS notification or not.
- Archiving (see "About archiving" on page 144) fails (if an SMS notification has been selected as part of the archiving properties)

Use of the SMS notification feature requires that an external Siemens TC-35 GSM modem has been attached to a serial port (a.k.a. COM port) on the XProtect Professional server. Siemens TC-35 is a dual-band EGSM900/GSM1800 modem. Verify that the modem is compatible with mobile phone networks where you are going to use it with XProtect Professional.

Configure SMS notifications

To configure SMS notifications, do the following:

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click **SMS** and select **Properties**.
2. Enable the use of SMS by selecting the **Enable SMS** check box.
3. Specify required properties (see "SMS properties" on page 169).

   Tip: You can test your SMS notification configuration by clicking the **Test** button; this will send a test SMS to the specified recipient. Note that you must stop the Recording Server service (see "Start and stop services" on page 185) while you perform the test (remember to start the service again afterwards).
4. XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.
5. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

When you configure SMS alerts, also consider the SMS notification schedules (see "SMS notification" on page 157) configured for each camera.

SMS properties

With SMS notifications (see "Configure SMS notifications" on page 169), you can instantly get notified when your surveillance system requires attention.

Name	Description
Enable SMS	Enables the use of SMS notifications, allowing you to specify further properties.
GSM modem connected to	Select port connecting the XProtect Professional server to the GSM modem.
SIM card PIN code	Specify PIN code for the SIM card inserted in the GSM modem.
SIM card PUK code	Specify PUK code (that is unlocking code) for the SIM card inserted in the GSM modem.
SMS central phone number	Specify the number of the SMS central to which the GSM modem should connect in order to send SMS notifications.
Recipient phone number	Specify the number of the mobile telephone to which SMS alerts should be sent. It is only possible to send SMS notifications to a single telephone number.
Message	Specify required message text for the SMS notification. Message text must be no longer that 160 characters, and must only contain the following characters: a-z, A-Z, 0-9 as well as commas (,) and full stops (.). Note that camera information as well as date and time information is automatically included in SMS notifications. **Tip:** While you write, the counter below the **Message** field indicates how many characters you have left to use.
Time between motion- and database-related SMSs per camera	Minimum time (in minutes) to pass between the sending of each SMS notification per camera. This interval only applies for SMS notification generated by detected motion or database-related events; SMS notification generated by other types of events will still be sent out whenever the events occur. Examples: If specifying 5, a minimum of five minutes will pass between the sending of each motion- or database-related SMS notification per camera, even if motion or database events are detected in between. If specifying 0, SMS notifications will be sent each time motion or database events are detected, potentially resulting in a very large number of SMS notifications being sent. If using the value 0, you should therefore consider cameras' motion detection (see "Motion detection & exclude regions" on page 111) sensitivity settings.
Test	Lets you test your SMS notification configuration by sending a test SMS to the specified recipient. Note that you must stop the Recording Server service (see "Start and stop services" on page 185) while you perform the test (remember to start the service again afterwards).
Do not send SMS on camera failures	If selected, SMS notifications will not be sent if XProtect Professional loses contact with a camera. Otherwise, automatic SMS notifications will be sent in such cases, regardless of any scheduled SMS notification periods (see "SMS notification" on page 157).

Central

About XProtect Central

The **XProtect Central Settings** lets you specify the login settings required for an XProtect Central server to access the surveillance system in order to retrieve status information and alarms. If you are a user of the Milestone Integration Platform, this is also the dialog that lets you specify the login settings for the Milestone Integration Platform to access the surveillance system.

Enable XProtect Central

1. In the Management Application's Navigation pane, expand **Advanced Configuration**, right-click Central and then select **Properties**.
2. Enable the use of Central connections by selecting the **Enable MilestoneXProtect Central** check box.
3. Specify required properties (see "Central properties" on page 171).
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Central properties

Name	Description
Enable Milestone XProtect Central connections	Enables the use of Central connections, allowing you to specify further properties.
Login Name	Type the name used for the connection between the XProtect Professional and XProtect Central servers or the Milestone Integration Platform. The name must match the name specified on the XProtect Central server or in the Milestone Integration Platform.
Password	Type the password used for the connection between XProtect Professional and XProtect Central servers or the Milestone Integration Platform. The password must match the password specified on the XProtect Central server or in the Milestone Integration Platform.
Port	Type the port number to which the XProtect Central server or the Milestone Integration Platform should connect when accessing the XProtect Professional server. The port number must match the port number specified on the XProtect Central server or in the Milestone Integration Platform. Default port is 1237.

Server access

About server access

You can configure clients' access to the XProtect Professional server in two ways:

- **Wizard-driven:** Guided configuration which lets you specify how clients access the server and which users can use clients. See Configure User Access wizard (on page 69).

  When you use the wizard, all users that you add have access to all cameras, including new cameras added at a later stage. If this is not acceptable, specify access settings, users and user rights separately; see the following.

- **Through advanced configuration:** In previous versions of XProtect Professional, this was known as Image Server administration, since technically it is the Image Server service (see "About services" on page 184) which handles clients' access to the surveillance system.

About registered services

Registered services displays the services installed to and running on your XProtect Professional system. It displays the following information about the individual services:

Name	Description
Enabled	Indicates if the relevant service is enabled
Name	The name of the service
Description	A description of the service
Addresses	The inside and outside addresses used by the service

You can change the inside and outside addresses for a service. To do this, you click the **Edit** button and then enter the relevant inside and/or outside addresses. Note that not all services can be edited. You can delete a service registration from the system by clicking the **Delete** button. You are prompted for confirmation before the service is deleted.

Configure server access

1. In the Management Application's navigation pane, expand **Advanced Configuration,** right-click **Server Access** and select **Properties**.

2. Specify required properties for Server Access (on page 173), Local IP Ranges (on page 174), and Language Support & XML Encoding (see "Language support and XML encoding" on page 174). XProtect Professional comes with two simple schedule profiles, **Always on** and **Always off,** which cannot be edited or deleted. If these do not meet your needs, you can create any number of customized schedule profiles for each camera. When you create a customized schedule profile for one camera, you can reuse it with other cameras if required.

3. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

When you use this option, you configure client users separately from clients' access. See Add individual users (see "Add basic users" on page 178), Add user groups (on page 179), and Configure user and group rights (on page 180).

Server access properties

Properties in this window:

Server access 173
Local IP ranges 174
Language support and XML encoding 174

Server access

When you configure server access (on page 172) (that is clients' access to the XProtect Professional server), specify the following:

Name	Description
Server name	Name of the XProtect Professional server as it will appear in clients. Client users with rights to configure their clients will see the name of the server when they create views in their clients.
Local port	Port number to use for communication between clients and the surveillance server. The default port number is 80; you can change the port number if port 80 is used for other purposes in your organization.
Enable internet access	Select the check box if the server should be accessible from the internet through a router or firewall. If you select this option, also specify the public (“outside”) IP address and port number in the following fields. When using public access, the router or firewall used must be configured so requests sent to the public IP address and port are forwarded to the local (“inside”) IP address and port of the XProtect Professional server.
Internet address	Lets you specify a public IP address or hostname for use when the XProtect Professional server should be available from the internet.
Internet port	Specify a port number for use when the XProtect Professional should be available from the Internet. The default port number is 80. You can change the port number if needed.

Name	Description
Max. number of clients	You can limit the number of clients allowed to connect at the same time. Depending on your XProtect Professional configuration and the performance of the hardware and network used, limiting the number of simultaneously connected clients may help reduce server load. If more than the allowed number of simultaneously connected clients attempt to log in, only the allowed number of clients will be allowed access. Any clients in excess of the allowed number will receive an error message when attempting to log in. By default, a maximum of ten simultaneously connected clients are allowed. To specify a different maximum number, simply overwrite the value. **Tip:** To allow an unlimited number of simultaneously connected access clients, type **0** (zero) in the **Max. number of clients** field. A four-minute session timeout period applies for client sessions on XProtect Professional. In many cases, client users may not notice this at all. However, the session timeout period will be very evident if you set the **Max. number of clients** value to **1**. When that is the case, and the single allowed client user logs out, four minutes must pass before it will be possible to log in again.

Local IP ranges

You can specify IP address ranges which XProtect Professional should recognize as coming from a local network. This can be relevant if different subnets are used across you local network.

1. Click the **Add** button.
2. In the **Start Address** column, specify the first IP address in the required range.
3. In the **End Address** column, specify the last IP address in the required range.

   Tip: If required, an IP address range may include only one IP address (example: 192.168.10.1-192.168.10.1).
4. Repeat if other local IP address ranges are required.

Language support and XML encoding

You can select the language/character set that should be used by the XProtect Professional server and clients.

Name	Description
Character encoding/Language	Select required language/character set. Example: If the surveillance server runs a Japanese version of Windows, select Japanese. Provided access clients also use a Japanese version of Windows, this will ensure that the correct language and character encoding is used in clients' communication with the server.

Master/Slave

About master and slave

You can create a master/slave setup of XProtect Professional servers. A master/slave setup will allow remote users to transparently connect to more than one server at the same time. When remote users connect to the master server, they will instantly get access to the slave servers as well.

Configure master and slave servers

Configuring a master/slave setup

In the Management Application 's Navigation pane, expand **Advanced Configuration**, right-click **Master/Slave** and select **Properties**.

1. Select the **Enable as master server** check box.
2. Click **Add** to add a slave server.
3. Specify slave server properties. When ready, click **OK.**
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Adding a slave server

To add a slave server, expand **Advanced Configuration** in the Management Application , right-click **Master/Slave** and select **Add New Slave Server**, then specify slave server properties. Slave servers can also be added from the **Master/Slave Properties** window by clicking **Add.**

Tip: Instead of specifying a host name when adding a slave server, you may specify the IP address of the slave server. Simply type the IP address in the **Address** field when adding the slave server. Remember that if on a local network, the **local** IP address of the slave server must be used.

Before you start using your master/slave setup, remember to verify that:

- Required users have be defined on the master server as well as on each of the slave servers.

- Public Access (see "Configure server access" on page 172) has been enabled on all involved servers, and ports mapped accordingly in the routers or firewalls used, if the slave servers are to be accessed from the internet.

When using a master/slave setup, remote users and their rights **must be defined in the Management Application** 's **Users** section on the master server as well as on each of the slave servers. Only cameras to which a remote user has been given access will be visible to the user, regardless of whether the cameras are connected to the master server or to one of the slave servers. If they are to be accessed from the internet, **Public Access** must be enabled on all involved servers, and ports must be mapped accordingly in the routers and/or firewalls used.

Frequently asked questions about using master/slave

How many master servers can I use in a master/slave setup? An unlimited number of servers per SLC (Software License Code, specified during installation (see "Install your surveillance server software" on page 27)) can be designated as master servers. If required—for example if your organization is very large and spread over many geographical locations, or in case your organization wants to create a redundancy solution—this allows you to use several master servers in a master/slave setup.

How many slave servers can I use in a master/slave setup? Up to four servers can be defined as slave servers under a designated master server using the same Software License Code.

How do I switch around which server is master and which server is slave? If you want a slave server to become a master server, simply clear **Enable as master server** on the original master server and click **OK**. In the Management Application's navigation pane right-click the slave server which you want to become master server, and select **Properties**. Then select **Enable as master server.** Next click **Add** to add slave servers to the new master server.

How do I ensure that I am actually connected to my slaves? You can verify the connection to your slaves by clicking Update Status and let the system report the number of connected slaves back to you.

Event Server installation in a master/slave setup

If you are planning to run a master/slave setup, it is important that you run **Typical** installation on the master server and **Custom** installation, where you deselect installing the Event Server service, on the slave server(s). This is because there can only be one event server service in a master/slave setup. If more than one Event Server service is installed, the master server will have problems accessing cameras on slave servers.

However, if you have an Event Server installed on the master server and no Event Server installed on slave servers, you can create alarms that are triggered when events occur on the slave.

If you cannot see an event from the slave server when you are creating an alarm and entering the source in the Management Application, this could be because you need to be a user on the slave server with administrator access before you can see the events on the slave server.

A locally defined Windows user created on the Windows server will not be recognized on the slave server, and an event from the slave server will not be available for creating alarms. If you are a domain user, you be added to both the master server and the slave server with administrator access. This will allow you to see the events on the slave server and create alarms.

If you are set up as a basic user on both the master server and slave server, with administrator rights on both, you will be able to see events on the slave server and create alarms when you log in to the master server with this user ID.

By default, the Management Application will not prompt you for a login, but will log you in with the Windows user ID with which you have logged in to Windows. If you want to log in to the Management Application as a basic user, you must therefore do the following: Start the Management Application and go to **File** > **Logout**. This will open a login dialog where you can use your basic user ID to log in.

Master/slave properties

If you have several XProtect Professional servers, you can create a master/slave setup. A master/slave setup will allow users to connect—in a transparent way—to more than one server simultaneously. When users connect to the master server, they will instantly get access to the slave servers as well.

Master server properties

Name	Description
Enable as master server	Select to enable as master server.
Timeout	Set timeout of slave update. See Update Status on Slaves in the following.
Add	Lets you add slave servers. Select **Master Server** in the list and click the **Add** button.

Slave server properties

Name	Description
Address	IP address of the slave server.
Port	Port number of the slave server.
Delete	Remove a slave server from the list of slave servers. Select the slave server in the list and click the **Delete** button.

When selecting **Master Server**, the **Delete** button is disabled and the **Add** button is enabled—provided that **Enable as master server** is selected—allowing you to add slave servers to the master server but preventing you from deleting the master server.

Update status on slaves

In the **Master Settings Summary** and **Slave Settings Summary** table area, it is possible to verify/update added slaves by clicking **Update Status**. A status dialog will run and subsequently inform you of the status of your slave server(s).

Users

About users

The term **users** primarily refers to users who connect to the surveillance system through their clients. You can configure such users in two ways:

- As **basic users**, authenticated by a user name/password combination.
- As **Windows users**, authenticated based on their Windows login

You can add both types of users through the Configure User Access wizard (on page 69) or individually (see Add basic users (on page 178) and Add Windows users (on page 178)).

By grouping users, you can specify rights (see "Configure user and group rights" on page 180) for all users within a group in one go. If you have many users performing similar tasks, this can save you significant amounts of work. User groups are logical groups created and used for practical purposes in the Management Application only. They are not in any way connected with user groups from central directory services. If you want to use groups, make sure you add groups (see "Add user groups" on page 179) before you add users: You cannot add existing users to groups.

Finally, the Administrators group is also listed under Users. This is a default Windows user group for administration purpose which automatically has access to the Management Application.

Add basic users

When you add a basic user, you create a dedicated surveillance system user account with basic user name and password authentication for the individual user. Note that if you add a user as a Windows user, this will provide better security.

If you want to include users in groups, make sure you add required groups (see "Add user groups" on page 179) before you add users: You cannot add existing users to groups.

You can add basic users in two ways: One is through the Configure User Access wizard (on page 69), the other is described here:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, right-click **Users**, and select **Add New Basic User**.
2. Specify a user name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

   Then specify a password, and repeat it to be sure you have specified it correctly.
3. Click **OK**.
4. Specify General Access (on page 181) and Camera Access (on page 182) properties. These properties will determine the rights of the user.
5. Click **OK**.
6. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Add Windows users

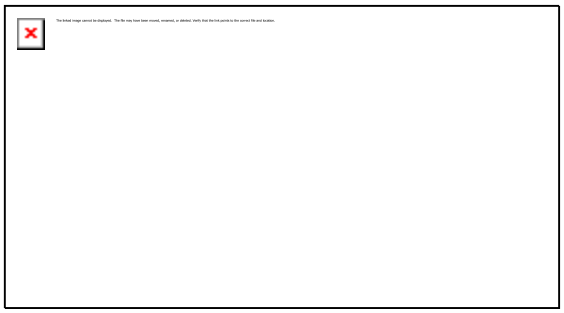
When you add Windows users, you import users defined locally on the server and authenticate them based on their Windows login. This generally provides better security than the basic user concept, and is the recommended method.

If you want to include users in groups, make sure you add required groups (see "Add user groups" on page 179) before you add users: You cannot add existing users to groups.

You can add Windows users in two ways: One is through the Configure User Access wizard (on page 69), the other is described here:

The users you want to add must have been defined as local PC users on the server. Simple file sharing must be disabled on the server. To disable simple file sharing, right-click Windows' **Start** button and select **Explore**. In the window that opens, select the **Tools** menu, then select **Folder Options...**, then the **View** tab. Scroll to the bottom of the tab's **Advanced Settings** list, and make sure that the **Use simple files sharing** check box is cleared. When ready, click **OK** and close the window.

1. In the Management Application's navigation pane, expand **Advanced Configuration**, right-click **Users**, and select **Add New Windows User**. This will open the S**elect Users or Groups** dialog.

   Note that you can only make selections from the local computer, even if you click the Locations... button.

2. In the **Enter the object names to select** box, type the required user name(s), then use the **Check Names** feature to verify it. If you type several user names, separate each name with a semicolon. Example: **Brian; Hannah; Karen; Wayne.**

3. When done, click **OK:**

4. Specify General Access (on page 181) and Camera Access (on page 182) properties. These properties will determine the rights of the user.

5. Click **OK**.

6. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Users who have been added from a **local database** logging in with a client should not specify any server name, PC name, or IP address as part of the user name. Example of a correctly specified user name: USER001. Example of an incorrectly specified user name: PC001/USER001. The user should of course still specify a password and any required server information.

Add user groups

User groups are logical groups created and used for practical purposes in the Management Application only. They are not in any way connected with user groups from central directory services such as, for example, Active Directory®.

By grouping users, you can specify rights (see "Configure user and group rights" on page 180) for all users within a group in one go. If you have many users performing similar tasks, this can save you significant amounts of work.

Make sure you add groups before you add users: You cannot add existing users to groups.

1. In the Management Application's navigation pane, expand **Advanced Configuration**, **right-click Users**, and select **Add New User Group**.
2. Specify a name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
3. Click **OK**.
4. Specify General access (on page 181) and Camera access (on page 182) properties. These properties will determine the rights of the group's future members.
5. Click **OK**.
6. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.
7. Now you can add users to the group: In the navigation pane, right-click the group you just created, and Add basic users **(on page 178) or** Add Windows users (on page 178) as required.

Configure user and group rights

User/group rights are configured during the process of adding users/groups, see Add basic Users (on page 178), Add Windows users (on page 178) and Add user groups (on page 179). Note that you can also add basic and Windows users through the Configure User Access wizard (on page 69). However, when using the wizard all users you add will have access all to cameras, including any new cameras added at a later stage.

If you at a later stage want to edit the rights of a user or group:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, expand **Users**, right-click the required user or group, and select **Properties**.
2. Edit General Access (on page 181) and Camera Access (on page 182) properties. These properties will determine the rights of the user/group.
3. Click **OK**.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

User properties

Properties in this window:

User information 181
Group information 181
General access 181
Camera access 182
Alarm Access (Properties) 183

User information

Name	Description
User name	Only editable if the selected user is of the type basic user. Edit the user name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**
Password	Only editable if the selected user is of the type basic user. Edit the password. Remember to repeat the password to be sure you have specified it correctly.
User type	Non-editable field, displaying whether the selected user is of the type basic user or Windows user group.

Group information

Name	Description
Group name	Edit the group name. Names must be unique, and must not contain any of these special characters: **< > & ' " \ / : * ? | [ ]**

General access

When you add or edit basic users (see "Add basic users" on page 178), Windows users (see "Add Windows users" on page 178) or groups (see "Add user groups" on page 179), specify general access settings:

Name	Description
Live	Ability to access the **Live** tab in the Smart Client.
Playback	Ability to access the **Playback** tab in the Smart Client.
Setup	Ability to access setup mode in the Smart Client. **Tip:** By clearing the **Live**, **Playback** and **Setup** check boxes you can effectively disable the user's/group's ability to use the Smart Client. You can use this as a temporary alternative to deleting the user/group, for example while a user is on vacation.
Edit shared views	Ability to create and edit views in shared groups in the Smart Client. Views placed in shared groups can be accessed by every user. If a user/group does not have this right, shared groups will be protected, indicated by a padlock icon in the Smart Client.

Name	Description
Edit private views	Ability to create and edit views in private groups in the Smart Client. Views placed in private groups can only be accessed by the user who created them. If a user/group does not have this right, private groups will be protected, indicated by a padlock icon in the Smart Client. Denying users the right to create their own views may make sense in some cases; for example in order to limit bandwidth use. For more information about shared and private views, see the separate Smart Client documentation.
Administrator Access	Ability to access and work with the Management Application. Selected and non-editable for Administrators. Cleared and selectable for all other users.

Camera access

When you add or edit basic users (see "Add basic users" on page 178), Windows users (see "Add Windows users" on page 178) or groups (see "Add user groups" on page 179), you can specify camera access settings.

In the list of cameras, select the camera(s) you want to work with. Note the last item in the list, **Rights for new cameras when added to the system**, with which you can allow the user/group access to any future cameras.

Tip: If the same features should be accessible for several cameras, you can select multiple cameras by pressing SHIFT or CTRL on your keyboard while selecting.

For the selected camera(s), in the **Access** check box, specify if the user/group should have access to live viewing and playback at all. If so, specify if they should have access to **both** live viewing and playback and—if this is the case—which sub-features should be available when working with the selected camera(s).

The sub-features are listed in two columns in the lower part of the window: the left column lists features related to live viewing, the right column lists features related to playback.

The **Camera access settings** check boxes work like a hierarchy of rights. If the **Access** check box is cleared, everything else is cleared and disabled. If the **Access** check box is selected, but, for example, the **Live** check box is cleared, everything under the **Live** check box is cleared and disabled.

Depending on the selected column, the following default features for live or playback from the selected camera(s) will give you the ability to:

Live	Features
PTZ	Use navigation features for PTZ (Pan/Tilt/Zoom) cameras. A user/group will only be able to use this right if the user has access to one or more PTZ cameras.
PTZ preset positions	Use navigation features for moving a PTZ camera to particular preset positions. A user/group will only be able to use this right if having access to one or more PTZ cameras with defined preset positions.

Live	Features
Output	Activate output (lights, sirens, door openers, etc.) related to the selected camera(s).
Events	Use manually triggered events related to the selected camera(s). This feature is available in the XProtect Smart Client only.
Incoming audio	Listen to incoming audio from microphones related to the selected camera(s). This feature is available in the Smart Client only.
Outgoing audio	Talk to audiences through speakers related to the selected camera(s). This feature is available in the XProtect Smart Client only.
Manual recording	Manually start recording for a fixed time (defined (see "Manual recording" on page 93) by the surveillance system administrator).
Playback	**Features**
AVI/JPEG export	Export evidence as movie clips in AVI format and as still images in JPEG format.
Database export	Export evidence in database format. This feature is available in the Smart Client only.
Sequences	Use the **Sequences** feature when playing back video from the selected camera.
Smart search	Use the smart search feature, with which users can search for motion in one or more selected areas of images from the selected camera. This feature is available in XProtect Smart Client only.
Recorded audio	Listen to recorded audio from microphones related to the selected camera(s).

You cannot select a feature, if the selected camera does not support the relevant feature. For example, PTZ-related rights are only available if the relevant camera is a PTZ camera. Some features depend on the user's/group's General Access (on page 181) properties.

Square-filled check boxes can appear in the lower part of the window if you have selected several cameras and a feature applies for some but not all of the cameras. Example: For camera A, you have selected that use of the Events is allowed, for camera B, you have not allowed this. If you select both camera A and camera B in the list, the Events check box in the lower part of the window will be square-filled. Another example: Camera C is a PTZ camera for which you have allowed the PTZ preset positions feature whereas camera D is not a PTZ camera. If you select both camera C and camera D in the list, the PTZ preset positions check box will be square-filled.

Alarm Access (Properties)

When you add or edit basic users (see "Add basic users" on page 178), Windows users (see "Add Windows users" on page 178) or groups (see "Add user groups" on page 179), specify their Smart Client alarm access rights:

Name	Description
View	Allows users of the Smart Client to: • View alarms • Print alarms reports.

•

Services

About services

The following services are all automatically installed on the XProtect Professional server if you run a **Typical** installation. By default, services run transparently in the background on the XProtect Professional server. If you need to, you can start and stop services separately from the Management Application, see Start and stop services (on page 185).

Service	Description
Milestone Recording Server service	A vital part of the surveillance system. Video streams are only transferred to XProtect Professional while the Recording Server service is running.
Milestone Image Server service	Provides access to the surveillance system for users logging in with a Smart Client. Note: If the Image Server service is configured in Windows Services to log in with another account than the Local System account, for example as a domain user, Smart Clients on other computers than the surveillance server itself will not be able to log in to the server using the server's host name. Instead, those users must enter the server's IP address.
Milestone Image Import service	Used for fetching pre- and post-alarm images, and storing the fetched images in camera databases. Pre- and post-alarm images is a feature available for selected cameras only; it enables sending of images from immediately before and after an event took place from the camera to the surveillance system via e-mail. Pre- and post-alarm images should not be confused with the XProtect Professional pre- and post-recording feature (see "Recording" on page 106).
Milestone Log Check service	Performs integrity checks on XProtect Professional log files. For more information, see Overview of Logs.
Milestone Event Server service	Manages all alarms and map-related communication. It stores events, image files and map configurations, and makes status information about the surveillance system available.

Service	Description
Milestone Mobile service	Manages the communication between the Recording Server and mobile devices (such as smartphones and tablets) and between the Recording Server and web browsers.

If you run a Custom installation, you can choose not to install the Mobile server and/or the Event Server. If you do so, the Mobile service and/or the Event Server service will not be seen in your Services overview.

Start and stop services

On an XProtect Professional server, several services (see "About services" on page 184) by default run in the background. If you need to, you can start and stop each service separately:

1. In the Management Application's Navigation pane, expand **Advanced Configuration** and select **Services**. This will display the status of each service.
2. You can now stop each service by clicking the **Stop** button. When a service is stopped, the button changes to **Start**, allowing you to start the service again when required.

   Tip: Occasionally, you may want to stop a service and start it again immediately after. The **Restart** button allows you to do just that with a single click.

Servers

Mobile Server

About Mobile server

A Mobile server handles log-ins when a user wants to log into his/her XProtect video management setup via the XProtect Mobile client (see "About XProtect Mobile client" on page 17) from a mobile device or from XProtect Web Client (see "About XProtect Web Client" on page 18).

Upon correct login, the Mobile server distributes video streams from relevant recording servers to XProtect Mobile client. This offers an extremely secure setup, where recording servers are never connected to the Internet. When a Mobile server receives video streams from recording servers, it also handles the complex conversion of codecs and formats allowing streaming of video on the mobile device.

Important: Before you begin the installation of the Mobile server, make sure you are logged in with an account that has administrator rights. Installation will not be successful if you use a standard user account.

About Video push

Video push is feature in your Mobile client that allows you to use your mobile device's camera, for example, to collect evidence when you investigate an alarm or event. You do this by sending a video stream from your mobile device to your XProtect video management system. In the Mobile server settings, you can set up how many users should be able to use the Video push feature in the video management system.

About saving configuration changes in XProtect Enterprise 8.0 and streamlined XProtect software versions

The following applies to XProtect Enterprise 8.0, XProtect Professional 8.0, XProtect Express 1.0, XProtect Essential 2.0 and XProtect Go 2.0 software versions only.

If you are logged into the XProtect Mobile client and are watching one or more cameras views while at the same time changing configuration in the Management Application, the live video from the camera may freeze in the XProtect Mobile client if you click **Save Configuration and Restart Surveillance Services** in the Management Application**.**

To avoid this scenario, you must restart the Milestone XProtect Mobile service manually. See the Windows Help for information about how to do this. If you are using newer versions of XProtect, the Milestone XProtect Mobile service is restarted with the other services and no user action is required.

Add/edit a Mobile server

1. Do one of the following:
   - To add a new server, right-click **Mobile Servers.** From the menu that appears, select **Create New**.
   - To edit a Mobile server, select the wanted server.
2. Fill in/edit the needed properties.
3. In the lower right corner, click **Apply**.
4. In the top toolbar, click **File** > **Save**.

IMPORTANT: If you edit settings for **Login method, All cameras view** and **Outputs and events**, while you are connected to the XProtect Mobile client, you must restart the XProtect Mobile client for the new settings to take effect.

Delete a Mobile server

1. From the navigation pane, expand **Servers** > **Mobile Servers** in order to see existing servers.
2. Right-click the unwanted server and select **Delete**.
3. Click **Yes**.

Rename a Mobile server

1. From the navigation pane, expand **Servers** > **Mobile Servers** in order to see existing servers.
2. Select the required Mobile server.
3. On the **Info** tab, which opens once the Mobile server is selected, change the name of the server by typing in the **Server name** and **Description** fields.
4. In the lower right corner, click **Apply**.
5. In the toolbar, click **File** > **Save**.

Add a Video push channel

To add a Video push channel (see "About Video push" on page 185), do the following:

1. On the **Video Push** tab, select the **Video push** checkbox.
2. Add a video push channel by changing the number of channels from 0 (default) to the number of video push channels needed. Once added, video push channels appear in the **Channels mapping**.
3. Click **File** > **Save**.
4. Add the Mobile server as a hardware device (see "Add a Video push channel as a hardware device" on page 187) to the video management system by specifying the IP address of the Mobile server (the Mobile server must be added manually and will not be detected in automatic hardware searches). Once finished, click **Apply**.
5. On the **Video Push** tab, click **Find Cameras**. If successful, the newly added Video push hardware device appears in this list and is ready to use.
6. Click **Apply**.
7. **Click File > Save.**

Add a Video push channel as a hardware device

If you add a Video push channel, you must add the Video push driver to your Management Application/Management Client. To do so:

1. Open the **Add New Hardware Wizard** in your Management Application/Management Client.
2. Choose the **Manual** option. The Video push driver will not be detected in automatic hardware searches.
3. Specify hardware information settings and select the hardware driver manually.
4. Once finished, your Video push driver is ready and can be used in your XProtect Mobile client.

Add hardware devices settings

Specify the following settings when you add a Video Push driver in the **Add Hardware Devices** wizard:

Name	Description
Use:	Select if the Video push driver should added to the XProtect video management system.
Address:	Type in the XProtect Mobile server network address.

Name	Description
Port:	Type in the port number for your Video push driver. The default port is 80. Important: You must set the same port number as you set when you specify your Video push settings (see "Video push" on page 190). If these values are not identical, your Video push driver will not be able to work.
User name:	Select any user name from the drop down list.
Password:	Type in the password for the Video push driver. The password for your Video push driver is **Milestone** (this cannot be changed).
Hardware Driver:	Select the **Video Push Driver**.
Verified:	Select if the Video push driver runs on a secured HTTPS connection.

Mobile server settings

Properties in this window:

Info 188
Server status 189
Video push 190
Export 190

Info

Fill in and specify general settings for the Mobile server:

Name	Description
Server name:	Name of the Mobile server.
Description:	Description of the Mobile server.
Mobile server:	Choose between all Mobile servers currently installed to the specific XProtect® video management system. Only XProtect Mobile servers that are up and running are shown in the list.
Connection type:	Possible methods are: **HTTP only**, **HTTP and HTTPS** or **HTTPS Only**.
Client timeout (HTTP)	Default time frame (30 sec.) for how often the Mobile server client must indicate to the Mobile server server that it is up and running. Milestone recommends that you do not increase the time frame.
Login method:	Select how you want to log in to the Mobile server server should take place. Possible methods are: **Automatic, Windows Only** or **Basic Only.**

Name	Description
All cameras view:	Enable/disable viewing of **All Cameras** view. This view contains all cameras on a recording server (user rights permitting).
Output and events:	Enable/disable output and events.
Keyframes only	Enable/disable video stream to stream key frames only. Enabling key frames only reduces bandwidth usage.
Enabled:	Enable/disable logging of XProtect Mobile client' actions in a separate log file.
Log file location:	Path to where log files are saved.
Keep logs for:	Number of days to keep logs for (default 3 days).
CPU usage:	Default level of CPU usage which will trigger a warning in the log.
Internal bandwidth:	Default internal bandwidth usage which will trigger a warning in the log.
External bandwidth:	Default external bandwidth usage which will trigger a warning in the log.
Check every:	Default time frame (30 sec.) for checking warning levels.

Note that every time you change a setting in the Mobile server settings, you must click the **Apply** button followed by the **Save** button.

Server status

See the status details for your Mobile server. The details are read-only:

Name	Description
Server active since:	Shows how long the Mobile server has been running since it was last stopped.
CPU usage:	Shows current CPU usage on the Mobile server.
Internal bandwidth:	Shows the current bandwidth in use between the Mobile server and the relevant recording server.
External bandwidth:	Shows the current bandwidth in use between the mobile device and Mobile server.
User Name column:	Shows user name(s) of the Mobile server user(s) connected to the Mobile server.
State column:	Shows the current relation between the Mobile server and the XProtect Mobile client user in question. Is the user connected (a state preliminary to servers exchanging keys and encrypting credentials) or is he/she actually logged in? Possible states are: Connected and Logged In XProtect.
Bandwidth Usage column:	Shows the level of bandwidth used by the Mobile server client user in question.

Name	Description
Live Streams column:	Shows the number of live video streams currently open for the XProtect Mobile client user in question.
Playback Streams column:	Shows the number of playback video streams currently open for the Mobile server client user in question.

Note that every time you change a setting in the Mobile server settings, you must click the **Apply** button followed by the **Save** button.

Video push

If you enable Video push, specify the following settings:

Name	Description
Video push	Enable Video push on the Mobile server.
Number of channels	Specify the number of enabled Video push channels in your XProtect Professional system.
Channel column	Shows the channel number for the relevant channel. Non-editable.
Port	Port number for the relevant Video push channel.
MAC	MAC address for the relevant Video push channel.
User Name	Enter the user name associated with the relevant channel.
Camera Name	Shows the name of the camera if the cameras has been identified.

Once you have completed all necessary steps (see "Add a Video push channel" on page 187), click **Find Cameras** to search for the relevant camera.

Note that every time you change a setting in the Mobile server settings, you must click the **Apply** button followed by the **Save** button.

Export

Specify the settings for exported recordings:

Name	Description
Export	Enable export in clients.
Export to:	Specify the location to which recordings should be exported.
Delete exported recordings older than:	Enter the number of days to pass before recordings are deleted.
Limit size of exports folder to:	Enter a number to set a maximum limit for the folder to which the recordings are exported.
Include timestamps:	Add timestamps to exported video.

In the columns, see the following details for every individual exported recording:

Name column	Name of the exported recording.

State column	State of the exported recording.
Camera column	The camera that provided the exported recording.
Timestamp column	The point of time when the exported recording took place.
Duration column	The length of the exported recording.
User column	The name of the user who provided the exported recording.
MB column	The size of the exported recording.

Note that every time you change a setting in the Mobile server settings, you must click the **Apply** button followed by the **Save** button.

Mobile Server Manager

About Mobile Server Manager

The Mobile Server Manager is a tray-controlled feature connected to Mobile server.

Right-clicking the Mobile Server Manager icon in the system tray opens a menu from which Mobile server functionality can be easily accessed. You can:

- Open XProtect Web Client (see "Access XProtect Web Client" on page 18)
- Start, stop and restart the Mobile service (see "Start, stop and restart Mobile service" on page 193)
- Fill in or change surveillance server credentials (see "Fill in/edit surveillance server credentials" on page 193)
- Show/edit port numbers (on page 193)
- Edit certificate (on page 192)
- Open today's log file (see "Access logs and exports" on page 192)
- Open log folder (see "Access logs and exports" on page 192)
- Open export folder (see "Access logs and exports" on page 192)
- Show Mobile server status (see "About show status" on page 191)
- Access the XProtect Mobile Help website where you find manuals, FAQS and product demonstration videos.

About show status

If you right-click the Mobile Server Manager and select **Show Status...** (or double-click the Mobile Server Manager icon), a window opens, showing the status of the Mobile server. You can see the following:

Name	Description
Server running since:	Time and date of the time when the Mobile server was last started.
Connected users:	Number of users currently connected to the Mobile server.
CPU usage:	How many % of the CPU is currently being used by the Mobile server.
CPU usage history:	A graph detailing the history of CPU usage by the Mobile server.

Access logs and exports

The Mobile Server Manager lets you quickly access the log file of the day, open the folder to which logs files are saved, and open the folder to which exports are saved. To open any one of these, right-click the Mobile Server Manager and select **Open Today's Log File**, **Open Log Folder** or **Open Export Folder** respectively**.**

Important: If you uninstall XProtect Mobile from your system, its log files are not deleted. Administrators with proper rights can access these log files at a later timer, or decide to delete them if they are not needed any longer. The default location of the log files is in the ProgramData folder. If you change the default location of log files, existing logs are not copied to the new location nor are they deleted.

Edit certificate

If you want to use a secure HTTPS protocol to establish connection between your mobile device or the XProtect Web Client and the Mobile server, you must have a valid certificate for the device or web browser to accept it without warning. The certificate confirms that the certificate holder is authorized to establish the connection.

When you install the Mobile server, you generate a self-signed certificate if you run a **Typical** installation. If you run a **Custom** installation, you get the choice between generating a self-signed certificate or loading a file containing a certificate issued by another trusted site. If you, at a later point, want change the certificate you use, you can do this from the Mobile Server Manager.

1. Right-click the Mobile Server Manager and select **Edit Certificate...**
2. Choose whether you want to either:

- Generate a self-signed certificate or
- Load a certificate file.

Generate a self-signed certificate

1. Choose the **Generate a self-signed certificate** option and click **OK**.
2. Wait for a few seconds while the system installs the certificate.
3. Once finished, a window opens and informs you that the certificate was installed successfully. The Mobile service is restarted for the changes to take effect.

Locate a certificate file

1. Choose the **Load a certificate file** option.
2. Fill in the path for the certificate file or click the ... box to open a window where you can browse for the file.
3. Fill in the password connected to the certificate file.
4. When finished, click **OK**.

Note that HTTPS is not supported on Windows XP and Windows 2003 operating systems and works on Windows Vista or newer Windows OS only.

Fill in/edit surveillance server credentials

1. Right-click the Mobile Server Manager and select **Surveillance Server Credentials...**
2. Fill in the **Server URL**
3. Select what user you want to log in as:

- Local system administrator (no credentials needed) or
- A specified user account (credentials needed)

1. If you have chosen a specified user account, fill in **User Name** and **Password**.
2. When finished, click **OK**.

Show/edit port numbers

1. Right-click the Mobile Server Manager and select **Show/Edit Port Numbers...**
2. To edit the port numbers, fill in the relevant port number. You can indicate a standard port number (for HTTP connections) and/or a secured port number (for HTTPS connections).
3. When finished, click **OK**.

Start, stop and restart Mobile service

If needed, you can start, stop and restart the Mobile service from the Mobile Server Manager. To perform any of these tasks, right-click the Mobile Server Manager and select **Start Mobile service**, **Stop Mobile service** or **Restart Mobile service** respectively**.**

Alarms

About alarms

The Alarms feature is a Milestone Integration Platform (MIP) (see "About MIP plug-ins" on page 200) based feature using functionality handled by the Event server. It provides central overview and control of alarms in any number of XProtect Professional installations throughout your organization.

You can configure alarms to be generated based on either:

- **Internal events (system-related):** for example, motion, server responding/not responding, archiving problems, lack of disk space, etc.
- **External events (integrated):** for example, MIP plug-in events.

In addition, the Alarms feature deals with general alarms settings and alarm logging.

Configuring alarms

Alarm configuration includes among other things:

- Dynamic setup of alarm handling (see "Add an alarm" on page 196) based on users access rights
- Central overview of all components: servers, cameras, and external units
- Setup of central logging of all incoming alarms and system information
- Handling of plug-ins, allowing customized integration of other systems, for example external access control or VCA-based systems.

Viewing alarms

The following can play a role with regards to alarms and who can view/control/manage them and to what degree**.** This is because alarms are controlled by the visibility of the object causing the alarm.

Source/device visibility: if the device causing the alarm is not set to be visible to the user, the user will not be able to see the alarm in the alarm list in the Smart Client. See Configure User Access wizard (on page 69).

Right to trigger manually defined events: if manually defined events (see "Add a manual event" on page 129) are available in your XProtect Professional system, these can determine if the user can trigger selected manually defined events in the Smart Client. See Configure User Access wizard (on page 69).

External plug-ins: if any external plug-ins are set up in your system, these might control user's rights to handle alarms.

General access rights: can determine whether the user is allowed to (only) view or also to manage alarms. See Configure User Access wizard (on page 69).

Time profiles for alarms

Alarms can also be based on time profiles (for alarms) (see "Add a time profile (for Alarms)" on page 195). Alarm's time profiles are periods of time used when creating alarm definitions. You can, for example, create a time profile for alarms covering the period from 2.30 PM till 3.30 PM on Mondays, and then use the time profile to make sure that certain alarm definitions are only enabled within this period.

Frequently asked questions: XProtect Central and alarms

Does Alarms cover the same functionality as XProtect Central? Yes, to a large extent, since configuration of former XProtect Central functionality is now included in the Alarms feature. XProtect Central was an independent product consisting of two parts: a dedicated server and a number of dedicated clients. Alarms, on the other hand, is an integrated part of XProtect Professional. This

means that much configuration needed in XProtect Central has become redundant with the introduction of alarms. Client-wise the Alarms feature uses the XProtect Smart Client.

However, the features Alarms, Time Profiles (for Alarms) and General Settings, must still be configured in the Management Application and are very similar to XProtect Central.

Can I reuse old alarm and map definitions from XProtect Central? No, you will have to redefine your alarms and maps definitions in the Alarms feature.

Does the Alarms feature cover the same functionality as XProtect Analytics Generic VA? Yes, to a large extent, since what was before a plug-in to XProtect Analytics is now an integrated part of the Alarms feature and covers the same functionality. See also **'Does Alarms cover the same functionality as XProtect Central?'** FAQ earlier.

Tip: You can even use manual events for triggering alarms and, if required, the same event can be used to trigger several different alarms.

About alarms in the Smart Client

To ease overview, delegation and handling of alarms, these will appear in the Smart Client alarm list where it is possible to view and manage these (reassign, change status, comment, and similar). They can, if relevant, be integrated with map functionality. The Alarms feature is a powerful monitoring tool, providing instant overview of alarms and possible technical problems.

IMPORTANT: It is only possible to view alarms based on the Alarms feature in Smart Client 6.0 if you run Smart Client 6.0 in a 32-bit version—not in a 64-bit version.

Add a time profile (for Alarms)

Time Profiles are periods of time used for the Alarms (see "About alarms" on page 193) feature only.

Tip: For all other time scheduling and profiling purposes, use the general scheduler of XProtect Professional.

You can, for example, create a time profile covering the period from 2.30 PM till 3.30 PM on Mondays, and then use the time profile to make sure that a certain alarm definition is only enabled within this period.

They can be based on one or more single periods of time, on one or more recurring periods of time, or a combination of single and recurring times. Many users will be familiar with the concepts of single and recurring time periods from calendar applications, such as the one in Microsoft Outlook.

Time profiles always apply in the **XProtect Professional server's** local time.

To add a time profile (for an alarm (see "Add an alarm" on page 196)), do the following:

1. In the Management Application's navigation pane, expand **Alarms**, right-click **Time Profiles**, and select **Create New**.

   Tip: The small month overview in the top right corner of the **Time Profile Properties** window can help you get a quick overview of the time periods covered by the time profile, as dates containing specified times are highlighted in bold.

2. In the calendar, select the **Day View, Week View, or Month View** tab, then right-click inside the calendar and select either **Add Single Time...** or **Add Recurring Time...**.

3. If you select **Add Single Time...**, specify **Start time** and **End time**. If the time is to cover whole days, select the **All-day event** box.

—or—
If you select **Add Recurring Time...**, specify time range, recurrence pattern, and range of recurrence.

Tip: If you select a time period by dragging in the calendar before right-clicking, the selected period will automatically be used in the dialog that appears when you select **Add Single Time...** or **Add Recurring Time...**.

4. Click **OK**.
5. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Tip: When you edit an existing time profile, remember that a time profile may contain more than one time period, and that time periods may be recurring. If you want your time profile to contain additional periods of time, add more single times or recurring times.

Add an alarm

For a detailed overview of Alarms and how the feature works, see About alarms (on page 193).

To add/configure an alarm, do the following:

1. In the Management Application's navigation pane, expand **Alarms**, right-click **Alarm Definition** and select **Create New**.
2. Specify required properties (see "Alarms definition" on page 196).
3. Click **OK**.
4. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

Configure analytics events in alarms

Analytics events (see "Overview of events and output" on page 126) are typically data received from external third-party video content analysis (VCA) (see "VCA" on page 223) providers. An example of a VCA-based system could be an access control system.

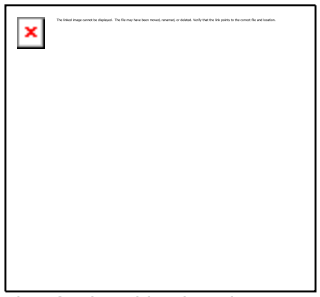
Alarms properties

Properties in this window:

Alarms definition 196
Alarm data settings 198
Sound settings 199
Time profile 200

Alarms definition

When you configure Alarm definitions (see "Add an alarm" on page 196), specify the following:

Name	Description
Enable	Enables the Alarms feature.
Name	Enter a name. The alarm's name will appear whenever the alarm is listed. **Tip:** Alarm names do not have to be unique, but using unique and descriptive alarm names are advantageous in many situations.
Description	Enter a description (optional).
Triggering event	This list offers both system-related events and plug-ins. You can select the event message which should be used when the alarm is triggered:  List of selectable triggering events; the highlighted one is created and customized using analytics events.
Sources	Select which cameras and/or other devices, including plug-in defined sources (VCA, MIP, etc) (see "About alarms" on page 193), the event should originate from in order to trigger the alarm. Your options depend upon which type of event you have selected.
Time profile	If you select **Time profile**, you must select when the alarm should be enabled for triggering. If you have not defined alarm time profiles (see "Add a time profile (for Alarms)" on page 195), you will only be able to select **Always**. If you have defined one or more time profiles, they will be selectable from this list.
Event based	If you select **Event based,** you must select which events should start and stop the alarm. Events available for selection are hardware events defined on cameras, video servers and input. Also global/manual event definitions (see "Add a manual event" on page 129) can be used. Note that when selecting **Event based** it is not possible to define alarms based on outputs—only on inputs.
Time Limit	Select the time-limit within which the operator must respond to the alarm.
Events triggered	Select the event to be triggered if the operator does not react withing the time limit specified in **Time limit**. This could be, for example, sending an email, SMS or similar.

Name	Description
Related cameras	Select (a maximum of 15) cameras for inclusion in the alarm definition even though they are not themselves triggering the alarm. This can be relevant, for example, if you have selected an external event message (such as a door being opened) as the source of your alarm. By defining one or more cameras near the door, you could attach the cameras' recordings of the incident to the alarm.
Related map	Select a map to tie to the alarm definition. The selected map will automatically be shown in the Smart Client whenever the alarm is listed. This might help you to quicker identify the physical location of the alarm.
Initial alarm owner	Select a default user responsible for the alarm. You can only select from users allowed to view **all** cameras and/or other devices selected as source(s) for the event causing the alarm.
Initial alarm priority	Select a priority (**High**, **Medium** or **Low)** for the alarm. Priorities can be used for sorting purposes and workflow control in the Smart Client.
Initial alarm category	Select a category to which the alarm should initially be assigned. This could be, for example, **Building01**, **Burglary**, **ElevatorEast** or similar, depending on which categories have been defined.
Event triggered by alarm	Define an event to be triggered by the alarm in the Smart Client (if needed).
Auto-close alarm	Select if the alarm should automatically be closed upon a particular event. This is possible for alarms triggered by some (but not all) events.

See also Alarm data settings (on page 198) and Alarm sound settings (see "Sound settings" on page 199) for further information on how to configure alarm settings.

Alarm data settings

When you configure alarm data settings, specify the following:

Alarm Data Levels **tab,** Priorities

Name	Description
Level	Add new priorities with level numbers of your choosing or use/edit the default priority levels (numbers **1**, **2** or **3)**. These priority levels are used to configure the **Initial alarm priority** setting (see "Alarms definition" on page 196).
Name	Type a name for the entity. You can create as many as you like.
Sound	Select the sound to be associated with the alarm. Use one if the default sounds or add more in Sound Settings (on page 199).

Alarm Data Levels tab, States

Level	In addition to the default state levels (numbers **1**, **4**, **9** and **11,** which can not be edited or reused), add new states with level numbers of your choosing. These state levels are only visible in the Smart Client's **Alarm List**.
Name	Type a name for the entity. You can create as many as you like.

Alarm Data Levels tab, Categories

Level	Add new categories with level numbers of your choosing. These category levels are used to configure the **Initial alarm category** setting (see "Alarms definition" on page 196).
Name	Type a name for the entity. You can create as many as you like.

Alarm List Configuration tab

In **Available columns,** use **>** to select which columns should be available in the Smart Client's **Alarm List**. Use **<** to clear selection. When done, **Selected columns** should contain the items to be included.

Reasons for Closing tab**Enable**	Select to enable that all alarms must be assigned a reason for closing before they can be closed.
Reason	Add reasons for closing that the user can choose between when closing alarms. Examples could be "**Solved-Trespasser**" or "**False Alarm**". You can create as many as you like.

Sound settings

When you configure Sound Settings, specify the following:

Name	Description
Sounds	Select the sound to be associated with the alarm. The list of sounds contain a number of default Windows sounds. These cannot be edited. However, you can add new sounds of the file type .wav, but only if these are encoded in Pulse Code Modulation (PCM). Although the default sounds are standard Windows sound-files, local Windows settings might cause these to sound different on different machines. Some users might also have deleted one or more of these sound-files and will therefore be unable to play them. To ensure an identical sound all over, you should import and use your own .wav files encoded in PCM.
Add	Lets you add sounds. Browse to the sound to upload one or several .wav files.
Remove	Remove a selected sound from the list of manually added sounds. Default sounds cannot be removed.

Name	Description
Test	Lets you test the sound. In the list, select the sound. The sound will be played once.

Time profile

When you configure Time profiles (see "Add a time profile (for Alarms)" on page 195), specify the following:

Name	Description
Name	Type a name for the time profile.
Description	Enter a description (optional).
Add Single Time	Right-click the calendar and select **Add Single Time**. Specify **Start time** and **End time**. If the time covers whole days, select **All-day event**.
Add Recurring Time	Right-click the calendar and select **Add Recurring Time**. Specify the time range, recurrence pattern, and range of recurrence.
Edit Time	Right-click the calendar and select **Edit Time**. Specify **Start time** and **End time**. If the time covers whole days, select **All-day event**. When you edit an existing time profile, remember that a time profile may contain more than one time period, and that time periods may be recurring. If you want your time profile to contain additional periods of time, add more single times or recurring times.

MIP plug-ins

About MIP plug-ins

If you install MIP (Milestone Integration Partner) plug-ins to your XProtect Professional, the plug-ins can be found in the Management Application's navigation pane, expand **Advanced Configuration**, under **MIP Plug-ins**.

You can assign MIP-related user rights to users and user groups. You do this from the Management Application's navigation pane, expand **Advanced Configuration**, expand **Users**, right-click the wanted user and select **Properties**. Under the **Alarm Management** tab, a tab allowing access to MIP settings for the selected user is located.

You can also use online activation (see "About activating licenses" on page 36) in connection with licensing schemes of MIP-related plug-ins.

Backup and restore configuration

About backup and restore of configurations

We recommend that you make regular backups of your XProtect Professional configuration (cameras, schedules, views, etc.) as a disaster recovery measure. While it is rare to lose your configuration, it can happen under unfortunate circumstances. Luckily, it takes only a minute to back up your existing configuration.

Back up system configuration

The backup described here is a backup of your entire surveillance system setup (including, among other things, log files, event and Matrix configuration, restore points, view groups, and Management Application, and Smart Client configuration). Alternatively, you can export your configuration as a backup (see "Export and import management application configuration" on page 205), which is limited to the the Management Application configuration.

The following describes how to back up your configuration in XProtect Professional 7.0.

If you need information about how to back up a configuration from an earlier version of XProtect Professional—a typical need when upgrading—see Upgrade from a previous version (on page 29).

In the following, we assume that you have not changed the XProtect Professional default configuration path (see "Configure default file paths" on page 213), which is **C:\Documents and Settings\All Users\Application Data\Milestone\Milestone Surveillance** on servers running Windows® XP or Windows Server 2003, and **C:\Program Data\Milestone\Milestone Surveillance** on servers running all other supported operating systems. If you have changed the default configuration path, you must take your changes into consideration when using the method described in the following.

To back up:

1. If XProtect Professional is used on a server running Windows XP or Windows Server 2003, make a copy of the folder **C:\Documents and Settings\All Users\Application Data\Milestone\Milestone Surveillance** and all of its content.

   If XProtect Professional is used on a server running any other supported operating system, make a copy of the folder **C:\Program Data\Milestone\Milestone Surveillance** and all of its content.

2. Open the folder **C:\Program Files\Milestone\Milestone Surveillance\devices**, and verify if the file **devices.ini** exists. If the file exists, make a copy of it. The file will exist if you have configured video properties (see "General" on page 101) for certain types of cameras; for such cameras, changes to the properties are stored in the file rather than on the camera itself.

3. Store the copies away from the XProtect Professional server, so that they will not be affected if the server is damaged, stolen or otherwise affected.

   Remember that a backup is a snapshot of your XProtect Professional system configuration at the time of backing up. If you later change your configuration, your backup will not reflect the most recent changes. Therefore, back up your system configuration regularly.

Tip: When you back up your configuration as described, the backup will include restore points (see "Restore system configuration from a restore point" on page 207). This allows you to not only restore the backed-up configuration, but also to revert to an earlier point in that configuration if required.

Restore system configuration

1. If XProtect Professional is used on a server running Windows XP or Windows Server 2003, copy the content of the backed-up **Milestone Surveillance** folder into **C:\Documents and Settings\All Users\Application Data\Milestone\Milestone Surveillance**.

   If XProtect Professional is used on a server running any other supported operating system, copy the content of the backed-up **Milestone Surveillance** folder into **C:\Program Data\Milestone\Milestone Surveillance.**

2. If you backed up the file **devices.ini**, copy the file into **C:\Program Files\Milestone\Milestone Surveillance\devices.**

Back up and restore Alarms configuration

It is important that you regularly back up your XProtect Professional Alarms configurations. You do this by backing up the event server, which handles your alarm and map configuration, and also the Microsoft® SQL Server Express database, which stores your alarm data. This enables you to restore your alarm and map configuration in a possible disaster recovery scenario.

Tip: Backing up also has the added benefit that it flushes the SQL Server Express database's transaction log.

When you back up and restore Alarms configuration, you must do it in the following order.

Prerequisites

- **You must have administrator rights on the SQL Server Express database** when you backup or restore your alarm configuration database on the SQL Server Express. Once you are done backing up or restoring, you only need to be a database owner of the SQL Server Express database.
- **Microsoft® SQL Server Management Studio Express**, a tool you can download for free from www.microsoft.com/downloads (see http://www.microsoft.com/downloads/ - http://www.microsoft.com/downloads/). Among its many features for managing SQL Server Express databases are some easy-to-use backup and restoration features. Download and install the tool on your existing surveillance system server and on a possible future surveillance system server (you will need it for backup as well as restoration).

Step 1: Stopping the Event Server service

Stop the event server service to prevent configuration changes from being made:

1. On your surveillance system server, click **Start** > **Control Panel** > **Administrative Tools** > **Services**.

2. Right-click the Event Server, click **Stop**.

This is important since any changes made to alarm configurations—between the time you create a backup and the time you restore it—will be lost. If changes are made after the backup, you will have to make a new backup.

Note that alarms will not be generated while the Event Server service is stopped; it is thus important to remember to start the service again once you have finished backing up the SQL database.

Step 2: Backing up alarms data in SQL Server Express database

1. Open Microsoft SQL Server Management Studio Express from Windows' **Start** menu by selecting **All Programs** > **Microsoft SQL Server 2008 > SQL Server Management Studio Express**.

   Tip: If you do not have **SQL Server Management Studio Express**, it can be downloaded for free from www.microsoft.com/downloads (see http://www.microsoft.com/downloads/ - http://www.microsoft.com/downloads/).

   When you open the tool, you are prompted to connect to a server. Specify the name of the required SQL Server and connect with admin user credentials.

   Tip: You do not have to type the name of the SQL server: If you click inside the **Server name** field and select **<Browse for more...>**, you can select the required SQL Server from a list instead.

2. Once connected, you will see a tree structure in the **Object Explorer** in the left part of the window. Expand the SQL Server item, then the **Databases** item, which contains your entire alarm configuration.

3. Right-click the **VIDEOOSDB** database, and select **Tasks** > **Back Up...**

4. On the **Back Up Database** dialog's **General** page, do the following:

   - Under **Source**: Verify that the selected database is **VIDEOOSDB** and that the backup type is **Full**.

   - Under **Destination**: A destination path for the backup is automatically suggested. Verify that the path is satisfactory. If not, remove the suggested path, and add another path of your choice.

5. On the **Back Up Database** dialog's **Options** page, under **Reliability**, select **Verify backup when finished** and **Perform checksum** before writing to media.

6. Click **OK** to begin the backup. When backup is finished, you will see a confirmation.

7. Exit Microsoft SQL Server Management Studio Express.

No VIDEOOSDB database? VIDEOOSDB is the default name of the database containing the system configuration. If you can find the database, but it is not called **VIDEOOSDB**, it could be because you gave the database another name during the installation. In the following, we will assume that the database uses the default name.

Step 3: Reinstalling XProtect Professional (if needed) (see "Install your surveillance server software" on page 27).

Step 4: Restoring alarms data in SQL Server Express database

Luckily, most users never need to restore their backed-up alarm data, but if you ever need to, do the following:

1. In the Windows Start menu, open Microsoft SQL Server Management Studio Express.

   Tip: If you do not have **SQL Server Management Studio Express**, it can be downloaded for free from www.microsoft.com/downloads (see http://www.microsoft.com/downloads/ - http://www.microsoft.com/downloads/).

2. Connect to a server. Specify the name of the required SQL Server, and connect using the user account the database was created with.

   Tip: You do not have to type the name of the SQL server: If you click inside the **Server name** field and select **<Browse for more...>**, you can select the required SQL Server from a list instead.

3. In the **Object Explorer** on the left, expand **SQL Server** < **Databases**, right-click the **VIDEOOSDB** database, and then select **Tasks** > **Restore** > Database...

   VIDEOOSDB is the default name of the database containing the system configuration. If you can find the database, but it is not called **VIDEOOSDB**, it could be because you gave the database another name during installation. In the following, we will assume that the database uses the default name.

4. In the **Restore Database** dialog, on the **General** page, under **Source for restore,** select **From device** and click <Browse for more...>, to the right of the field. In the Specify Backup dialog, make sure that **File** is selected in the **Backup media** list**.** Click **Add.**

5. In the **Locate Backup File** dialog, locate and select your backup file **VIDEOOSDB.bak**. Then click **OK.** The path to your backup file is now listed in the **Specify Backup** dialog.

6. Back on the **Restore Database** dialog's **General** page, your backup is now listed under **Select the backup sets to restore**. Make sure you select the backup by selecting the check box in the **Restore** column.

7. Now go to the **Restore Database** dialog's **Options** page, and select **Overwrite the existing database**. Leave the other options as they are, and then click **OK** to begin the restoration. When the restore is finished, you will see a confirmation.

   Tip: If you get an error message telling you that the database is in use, try exiting Microsoft SQL Server Management Studio Express completely, then repeat steps 1-9.

8. Exit Microsoft SQL Server Management Studio Express.

Step 5: Restarting the Event Server service

During the restore process, the Event Server service was stopped to prevent configuration changes being made until you were done. Remember to start the service again:

1. On your surveillance system server, click **Start** > **Control Panel** > **Administrative Tools** > **Services**.

2. Right-click the Event Server, click **Start**.

What is the SQL Server Express transaction log and why does it need to be flushed?

Each time a change in the XProtect Professional alarm data occurs, the SQL Server will log the change in its transaction log. The transaction log is essentially a security feature that makes it possible to roll back and undo changes to the SQL Server Express database. The SQL Server by default stores its transaction log indefinitely, and therefore the transaction log will over time build up more and more entries.

The SQL Server's transaction log is by default located on the system drive, and if the transaction log just grows and grows, it may in the end prevent Windows from running properly. Flushing the SQL Server's transaction log from time to time is therefore a good idea; flushing it does not in itself make the transaction log file smaller, but it prevents it from growing out of control. XProtect Professional does not, however, automatically flush the SQL Server's transaction log at specific intervals. This is because users have different needs. Some want to be able to undo changes for a very long time, others do not care; what would suit one organization's needs could be problematic for others.

You can do several things on the SQL Server itself to keep the size of the transaction log down, including truncating and/or shrinking the transaction log (for numerous articles on this topic, go to support.microsoft.com (see http://support.microsoft.com - http://support.microsoft.com) and search for SQL Server transaction log). However, backing up the XProtect Professional database is generally a better option since it flushes the SQL Server's transaction log and gives you the security of being able to restore your XProtect Professional alarm data in case something unexpected happens.

Export and import management application configuration

You can export the current configuration of your XProtect Professional Management Application, either as a safety measure in order to have a backup file of your configuration, or as a clone allowing you to use a similar Management Application configuration elsewhere. You can subsequently import previously exported Management Application configurations.

Export Management Application configuration as backup

With this option, all relevant XProtect Professional Management Application configuration files will be combined into one single .xml file, which can then be saved at a location specified by you. Note that if there are unsaved changes to your configuration, they will automatically be saved when you export the configuration.

1. In the Management Application's **File** menu, select **Export Configuration - Backup**.
2. Browse to the location at which you want to store the exported configuration, specify a suitable file name, and click **Save**.

If you intend to set up an identical version of your surveillance system elsewhere, **do not** export your configuration as **backup**, since this may lead to the same device information being used twice, in which case clients may get the following error message: **Application is not able to start because two (or more) cameras are using the same name or ID.** Instead, export your configuration as a **clone**. When you export as a clone, the export takes into account the fact that you will not use the

exact same physical cameras, etc. even though your new system may otherwise be identical to your existing one.

What is the difference between this Management Application configuration backup and the system configuration backup done from the Milestone Surveillance folder? Those are two different things. The backup described here is limited to a backup of the Management Application configuration. The type of system configuration backup done from the Milestone Surveillance folder is a backup of your entire surveillance system setup (including, among other things, log files, event configuration, restore points, view groups, and Management Application, and Smart Client configuration).

When you install the new version of XProtect Professional, it inherits the configuration from your previous version.

We recommend that you make regular backups of your server configuration as a disaster recovery measure. You should also do this when you upgrade your server. While it is rare that you lose your configuration (cameras, schedules, views, etc), it **can** happen under unfortunate circumstances. Fortunately, it takes only a minute to back up your existing configuration.

Export Management Application configuration as clone

With this option, all relevant XProtect Professional Management Application configuration files will be collected, and GUIDs (Globally Unique IDentifiers; unique 128-bit numbers used for identifying individual system components, such as cameras) will be marked for later replacement.

Why are GUIDs marked for replacement? GUIDs are marked for later replacement because they refer to specific components (cameras, etc.). Even though you wish to use the cloned configuration for setting up a new similar system using similar types of cameras, the new system will not use the exact same physical cameras as the cloned system. When the cloned configuration is later used in a new system, the GUIDs will therefore be replaced with GUIDs representing the specific components of the new system.

After GUIDs have been marked for replacement, the configuration files will be combined into one single .xml file, which can then be saved at a location specified by you. Note that if there are unsaved changes to your configuration, they will automatically be saved when you export the configuration.

1. In the Management Application's **File** menu, select **Export Configuration - Clone**.
2. Browse to the location at which you want to store the exported configuration, specify a suitable file name, and click **Save**.

Import previously exported Management Application configuration

The same import method is used regardless of whether the XProtect Professional Management Application configuration was exported as a backup or a clone.

1. In the Management Application's **File** menu, select **Import Configuration**.
2. Browse to the location from which you want to import the configuration, select the required configuration file, and click **Open**.
3. Only relevant if the system into which you import the configuration contains devices (cameras, etc.) which are not present in the imported configuration: You will be asked whether you want to delete or keep recordings from affected devices. If keeping the recordings, note that they will not be accessible until you add the affected devices to XProtect Professional again. Select the required option, and click **OK**.

4. In the Management Application's navigation pane, expand **Advanced Configuration,** and select **Services**.

5. For the Recording Server and Image Server services respectively, click the **Restart** button. When the two services are restarted, the imported Management Application configuration is applied.

Import changes to configuration

It is possible to imported changes to a configuration. This can be relevant if installing many similar XProtect Professional systems, for example in a chain of shops where the same types of server, hardware devices, and cameras are used in each shop. In such cases, you can use an existing configuration—typically a cloned configuration (see "Export and import management application configuration" on page 205)—as a template for the other installations. However, since the shops' installations are not exactly the same (the hardware devices and cameras are of the same type, but they are not physically the same, and therefore they have different MAC addresses), there needs to be an easy way of importing changes to the template configuration.

This is why XProtect Professional lets you import changes about hardware devices and cameras as comma-separated values (CSV) from a file (see "CSV file format and requirements" on page 53):

1. From the menu bar, select **File** > **Import Changes to Configuration...**

2. Select **Online verification** if the new hardware devices and cameras listed in your CSV file are connected to the server and you want to verify that they can be reached.

3. Then point to the CSV file, and click the **Import Configuration from File** button.

Restore system configuration from a restore point

Restore points allow you to return to a previous configuration state. Each time a configuration change is applied in the Management Application—either by clicking **OK** in a properties dialog or by clicking the **Apply** button in a summary pane—a new restore point is created.

All restore points in the current and previous five sessions are stored and can be selected again. A new session begins each time the Management Application is started as well as each time you save the whole configuration, for example by clicking the **Save Configuration** button in the Management Application's toolbar. For sessions older than the last five sessions, only the latest restore point of each session is stored. With the **Number of old sessions to keep** field you can control how many old sessions are kept.

When selecting to restore a configuration from a restore point, the configuration from the selected restore point will be applied and used once the services are restarted (see Start and stop services (on page 185)).

If you have added new cameras or other devices to XProtect Professional after the restore point was created, they will be missing if you load the restore point. This is due to the fact that they were not in the system when the restore point was created. In such cases, you will be notified and must decide what to do with recordings from the affected devices.

1. From the Management Application's **File** menu, select **Load Configuration from Restore Point...**

2. In the left part of the **Restore Points** dialog, select the required restore point.

Tip: When you select a restore point, you will in the right part of the dialog see information about the configuration state at the selected point in time. This can help you select the best possible restore point.

3. Click the **Load Restore Point** button.
4. If you are sure that you want to overwrite the current configuration with the one from the selected restore point, click **OK**.
5. Only relevant if the current configuration contains cameras or other devices which were not present in the selected restore point: You will be asked whether you want to delete or keep recordings from affected devices. If keeping the recordings, note that they will not be accessible until you add the affected devices to XProtect Professional again. Select the required option, and click **OK**.
6. Click **OK** in the Restore Points dialog.
7. In the Management Application's navigation pane, expand **Advanced Configuration**, and select **Services**.
8. For the Recording Server and Image Server services respectively, click the **Restart** button. When the two services are restarted, the configuration from the selected restore point is applied.

Common tasks

About handling daylight saving time

Daylight saving time (DST, also known as summer time) is the practice of advancing clocks in order for evenings to have more daylight and mornings to have less. Typically, clocks are moved forward one hour during the spring season and adjusted backward during the fall season. Note that use of DST varies between countries/regions.

When working with a surveillance system, which is inherently time-sensitive, it is important to know how the system handles DST.

Spring: Switch from Standard Time to DST

The change from standard time to DST is not much of an issue since you jump one hour forward. Typically, the clock jumps forward from 02:00 standard time to 03:00 DST, and the day thereby has 23 hours. In that case, there is no data between 02:00 and 03:00 in the morning since that hour, for that day, did not exist.

Fall: Switch from DST to Standard Time

When you switch from DST to standard time in the fall, you jump one hour back. Typically, the clock jumps backward from 02:00 DST to 01:00 standard time, repeating that hour, and the day thereby has 25 hours. In that case, you will reach 01:59:59, then immediately revert back to 01:00:00. If the system did not react, it would essentially re-record that hour, so the first instance of, for example, 01:30 would be overwritten by the second instance of 01:30.

Because of this, XProtect Professional will forcefully archive the current video in the event that the system time changes by more than five minutes. The first instance of the 01:00 hour will not be viewable directly from clients. However, the data is recorded and safe, and it can be browsed using the Smart Client application by opening the archived database directly.

Improve stability with 3 GB virtual memory

Microsoft Windows 32-bit operating systems can address 4 GB of virtual memory. The operating system kernel reserves 2 GB for itself, and each individual running process is allowed to address another 2 GB. This is a default setting in Windows, and for the vast majority of XProtect Professional installations it works fine.

As from XProtect Professional 6.5, the main components of the server—the Recording Server service and the Image Server service—have been compiled with the LARGEADDRESSAWARE flag. This means you can optimize the memory usage of the XProtect Professional Recording Server and Image Server services by configuring your 32-bit Windows operating system so that it restricts the kernel to 1GB of memory, leaving 3GB of address space for processes compiled with the LARGEADDRESSAWARE flag.

This should improve the stability of especially the Recording Server service by allowing it to exceed the previous 2 GB virtual memory limit, making it possible for it to use up to 3 GB of memory. The change in Windows configuration is known as 3 GB switching.

When is 3 GB switching relevant?

For very large XProtect Professional installations and/or for installations with many megapixel cameras it can be relevant to change Windows settings so that only 1 GB of virtual memory is reserved for the operating system kernel, leaving 3 GB for running processes.

If you use the Windows default setting, with only 2 GB virtual memory reserved for running processes, the Recording Server service in very large installations of XProtect Professional may:

- Behave erratically when it gets close to the 2 GB virtual memory limit. Symptoms can include database corruption, and client-server or camera-server communication errors.
- Become unstable and crash if it exceeds the 2 GB virtual memory limit. During such crashes, the code managing the surveillance system databases is not closed properly, and databases will become corrupt. In case of a crash, Windows will normally restart the Recording Server service. However, when the Recording Server service is restarted, one of its first tasks will be to repair the databases. The database repair process can in some cases take several hours, depending on the amount of data in the corrupted databases.

If you experience problems, and you run XProtect Professional 6.5 or newer, making Windows use 3 GB for running processes is likely to solve the problems. If you have not experienced problems, but you run XProtect Professional 6.5 or newer and your XProtect Professional installation is very large and/or features many megapixel cameras, 3 GB switching can help prevent the problems from occurring.

The way to configure 32-bit Windows to be LARGEADDRESSAWARE depends on your type of Windows operating system. In the following, you will see two methods outlining Microsoft's recommended procedure for increasing the per-process memory limit to 3 GB. Use the first method if running Windows XP Professional or Windows Server 2003. Use the second method if running Windows 2008 Server, Windows Vista Business, Windows Vista Enterprise or Windows Vista Ultimate.

What to do: If running Windows XP Professional or Windows Server 2003

The following technique can be used to add the 3 GB switch to the boot.ini file.

1. From a command prompt, enter the following to add the 3 GB switch to the end of the first line of the operating system section in the boot.ini file (requires administrative privileges):

   ```
   BOOTCFG /RAW "/3GB" /A /ID 1
   ```

   Where:

   - **/RAW** specifies the operating system options for the boot entry. The previous operating system options will be modified.
   - **"/3GB"** specifies the 3 GB switch.
   - **/A** specifies that the operating system options entered with the /RAW switch will be appended to the existing operating system options.
   - **/ID** specifies the boot entry ID in the OS Load Options section of the boot.ini file to add the operating system options to. The boot entry ID number can be obtained by performing the command **BOOTCFG /QUERY** (this displays the contents of the boot.ini file) at the command prompt.

2. Reboot after editing the boot.ini file for the changes to take effect.

Remove the 3 GB Switch

Remove the 3 GB switch

If you want to undo the 3 GB switch, follow this procedure:

1. Select **Start** > **Control Panel**, and double-click the **System** icon.
2. Select the **Advanced** tab, and click the **Settings** button in the **Startup and Recovery** section.
3. Click the **Edit** button in the **System Startup** section. The boot.ini file will launch in an editor.
4. Remove the **"/3GB"** from the end of the appropriate boot entry line under the [operating systems] section. Save and close the file.
5. Click **OK** in the **Startup and Recovery** section.
6. Reboot after editing the boot.ini file for the changes to take effect.

What to do: If running Windows 2008 Server or Windows Vista

1. Select **Start** > **All Programs** > **Accessories**, right-click **Command Prompt**, and select **Run as administrator**, then click **Continue**.
2. Enter the following command to add the 3 GB switch to the current operating system boot entry:

   ```
   BCDEDIT /SET INCREASEUSERVA 3072
   ```

   Where:

   - **USERVA** specifies an alternate amount of user-mode virtual address space for operating systems.
   - **3072** Specifies 3 GB (3072 MB).
3. Reboot after editing for the changes to take effect.

Remove the /3GB switch

1. Select **Start** > **All Programs** > **Accessories**, right-click **Command Prompt**, and select **Run as administrator**, then click **Continue**.
2. Enter the following command to remove the 3 GB switch from the current operating system boot entry:

   ```
   BCDEDIT /DELETEVALUE INCREASEUSERVA
   ```
3. Reboot after editing for the changes to take effect.

About protecting recording databases from corruption

In the Management Application, you can select which action to take if a camera database becomes corrupted. The actions include several database repair options. While being able to select such actions is highly valuable, it is of course even better to take steps to ensure that your camera databases do not become corrupted.

Power outages: use a UPS

The single most common reason for corrupt databases is the recording server being shut down abruptly, without files being saved and without the operating system being closed down properly. This may happen due to power outages, due to somebody accidentally pulling out the server's power cable, or similar.

The best way of protecting your recording servers from being shut down abruptly is to equip each of your recording servers with a UPS (Uninterruptible Power Supply).

The UPS works as a battery-driven secondary power source, providing the necessary power for saving open files and safely powering down your system in the event of power irregularities. UPSs vary in sophistication, but many UPSs include software for automatically saving open files, for alerting system administrators, etc.

Selecting the right type of UPS for your organization's environment is an individual process. When assessing your needs, however, do bear in mind the amount of runtime you will require the UPS to be able to provide if the power fails; saving open files and shutting down an operating system properly may take several minutes.

Windows Task Manager: Be careful when ending processes

When working in Windows Task Manager, be careful not to end any processes which affect the surveillance system. If you end an application or system service by clicking **End Process** in the Windows Task Manager, the process will not be given the chance to save its state or data before it is terminated. This may lead to corrupt camera databases.

Windows Task Manager will typically display a warning if you attempt to end a process. Unless you are absolutely sure that ending the process will not affect the surveillance system, click **No** when the warning message asks you if you really want to terminate the process.

Hard disk failure: Protect your drives

About viewing version and license information

Knowing the exact version of your XProtect Professional system may be relevant if you require support, or want to upgrade your system. It may also be relevant for you to know your license information and what contact details Milestone has registered about your organization.

If you have purchased a Software Upgrade Plan (SUP), information about the expiration date of the SUP may also be important you to know.

To view such information, select **About...** in the Management Application **Help** menu.

If you need to update any of your information, click the link provided at the bottom to log on to the Milestone website from which you can update your information.

Apply/save configuration changes

Whenever you make changes in your XProtect Professional configuration, you will be asked to apply them.

- If you made the changes in one of the Management Application dialogs, you apply them by clicking **OK**.

- If you made the changes in one of the Management Application summary tables, click **Apply.**

Applying a configuration change means that the change is stored by XProtect Professional in a restore point (see "Restore system configuration from a restore point" on page 207) (so that you can return to a working configuration if something goes wrong), but applying a configuration change does not mean that the changes will take immediate effect on the surveillance system.

To store your configuration change in the configuration file:

1. In the Management Application toolbar click the **Save Configuration** button.
2. For your configuration changes to have immediate effect, on the Management Application toolbar, click **Save Changes and Restart Surveillance Services**.

   If you do not restart immediately, your configuration changes will take effect the next time you restart XProtect Professional services (see "About services" on page 184).

   IMPORTANT: While services are restarted, you cannot view or record video. Restarting services typically only takes a few seconds, but in order to minimize disruption you may want to restart services at a time when you do not expect important incidents. Users connected to XProtect Professional through clients will typically remain logged in during the services restart, but they will experience a short video outage.

Configure default file paths

XProtect Professional uses a number of default file paths:

File paths	Description
Default recording path for new cameras	All new cameras you add will by default use this path for storing recordings. If required, you can change individual cameras' recording paths as part of their individual configuration (see "Recording and archiving paths" on page 107), but you can also change the default recording path so all new cameras you add will use a path of your choice.
Default archiving path for new cameras	All new cameras you add will by default use this path for archiving (see "About archiving" on page 144). If required, you can change individual cameras' archiving paths as part of their individual configuration, but you can also change the default recording path so all new cameras you add will use a path of your choice. Note that camera-specific archiving paths are not relevant if using dynamic path selection (on page 87) for archiving.
Configuration path	The path by default used for storing your XProtect Professional system configuration.

To change any of the default file paths:

1. If you want to change the configuration path, stop (see "Start and stop services" on page 185) all services. This step is not necessary if you want to change the default recording or archiving path.
2. On the Management Application menu bar, select **Application Settings** > **Default File Paths...**

3. You can now overwrite the necessary paths. Alternatively, click the browse button next to the field and browse to the location.

   For the default recording path, you can only specify a path to a folder on a **local** drive. If you are using a network drive, you cannot save recordings if the network drive becomes unavailable.

   If you change the default recording or archiving paths and there are existing recordings at the old locations, you must select whether you want to move the recordings to the new locations (recommended), leave them at the old locations, or delete them.

4. Click **OK**.

5. Save your configuration changes by clicking the **Save Configuration** button on the Management Application toolbar.

6. Restart (see "Start and stop services" on page 185) all services.

Monitor storage space usage

To view how much storage space you have on your XProtect Professional system—and not least how much of it is free—do the following:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, and select **Cameras and Storage Information**.

2. View the **Storage Usage Summary** for information about, which drives are available, what drives are used for, the size of each drive, as well as how much video data, other data, and free space there is in each drive.

View video from cameras in Management Application

You can view live video from single cameras directly in the Management Application:

1. In the Management Application's navigation pane, expand **Advanced Configuration**, and expand **Cameras and Storage Information**.

2. Select the required camera to view live video from that camera. Above the live video, you will find a summary of the most important properties for the selected camera. Below the live video, you will find information about the camera's resolution and average image file size. For cameras using MPEG or H.264, you will also see the bit rate in Mbit/second.

   IMPORTANT: Viewing of live video in the Management Application may under certain circumstances affect any simultaneous recording from the camera in question. Especially three scenarios are important to consider:

   1) Some cameras supporting multistreaming may halve their frame rate or respond with other negative effects when a second stream is opened.

   2) If a camera delivers live video in a very high quality, de-coding of images may increase the load on the Recording Server service, which may in turn affect ongoing recordings negatively.

   3) Cameras that do not support multiple simultaneous video streams cannot connect to the surveillance server and the Management Application at the same time. Therefore, we

recommended stopping (see "Start and stop services" on page 185) the Recording Server service when configuring such devices for motion detection and PTZ. See also View video from cameras in Management Application (on page 214).

Glossary of terms

Symbols & Numeric

360 degrees panomorph support

Cameras with 360 degrees panomorph support offer—as the name indicates—360 degree coverage and can survey an entire area without blind spots or distorted images.

A

Administrator

1) System administrator. 2) In previous versions of XProtect Professional: the main application used by XProtect Professional administrators for configuring the surveillance system server. Now called the Management Application.

Analytics Events

Analytics events are typically data received from an external third-party video content analysis (VCA) provider. An example of a VCA-based system is an access control system. Analytics events can be integrated seamlessly with the **Alarms** feature.

API

Application Program Interface—set of tools and building blocks for creating or customizing software applications.

Aspect ratio

The height/width relationship of an image.

ATM

Automatic teller machine—machine that dispenses money when a personal coded card is used.

AVI

A popular file format for video. Files in this format carry the .avi file extension.

B

Browser

A software application for finding and displaying web pages.

C

Carousel

A feature for displaying video from several cameras, one after the other, in a single camera position. The required cameras and the intervals between changes are specified by the XProtect Professional administrator. The carousel feature is available, if configured, in the Smart Client.

Central

A product available as an add-on to XProtect Professional. XProtect Central provides a complete overview of status and alarms from any number of XProtect Professional servers, regardless of location.

Codec

A technology for compressing and decompressing audio and video data, for example, in an exported AVI file. MPEG and Indeo are examples of frequently used codecs.

CSV

Comma-separated values data format that stores tabular data, where the lines represent rows in a table and commas define the columns, in a simple file. For example, data about cameras may appear as comma-separated values in a .csv file, which can then be imported into XProtect Professional. A simple but effective method if setting up several similar systems.

D

Device

In XProtect Professional : a camera, video encoder, input device, or output device connected to a recording server.

DirectX

A Windows extension providing advanced multimedia capabilities.

DNS

Domain Name System—system allowing translation between alphabetic host names (for example, mycomputer) or domain names (for example, www.mydomain.com) and numeric IP addresses (for example, 192.168.212.2). Many people find alphabetic names easier to remember than numeric IP addresses.

Driver

A program used for controlling/communicating with a device.

DST

Daylight saving time; temporarily advancing of clocks during the summer so that afternoons have more daylight and mornings have less.

Dual stream

Some cameras support two independent streams (which can be sent to the recording server): one for live viewing and another for playback purposes. Each stream has its own resolution, encoding, and frame rate.

DVR

Digital video recorder—device that records video in a digital format to a hard disk drive embedded in the DVR itself.

E

Event Server

A server that stores and handles incoming alarm data and events from all XProtect Professional servers. The Event Server enables powerful monitoring and provides an instant overview of alarms and possible technical problems within your systems.

F

Fisheye

A type of lens that allows the creation and viewing of 360-degree images.

FPS

Frames per second—measurement indicating the amount of information contained in a motion video. Each frame represents a still image, but when frames are displayed in succession, the illusion of motion is created. The higher the FPS, the smoother the motion appears. Note, however, that a high FPS may also lead to a large file size when video is saved.

Frame rate

A measurement indicating the amount of information contained in motion video—typically measured in FPS.

FTP

File Transfer Protocol—standard for exchanging files across the internet. FTP uses the TCP/IP standards for data transfer and is often used for uploading or downloading files to and from servers.

G

Generic events

XProtect Professional can receive and analyze input in the form of TCP or UDP data packages which, if they match specified criteria, can be used to generate events. Such events are called generic events.

GOP

Group of pictures; individual frames grouped together, forming a video-motion sequence.

Grace period

When you install XProtect Professional, configure the system and add recording servers and cameras, XProtect Professional runs on temporary licenses. These need to be activated before a certain period ends. This is the grace period.

GSM

Global System for Mobile communications—a standard for mobile telephony.

GUID

Globally unique identifier—unique 128-bit number used to identify components on a Windows system.

H

H.264

A standard for compressing and decompressing video data (a codec). H.264 is a relatively recent codec; it compresses video more effectively than older codecs, and it provides more flexibility for use in a variety of network environments.

Hardware device

Technically speaking, cameras are not added to XProtect Professional, rather to hardware devices. This is because hardware devices have their own IP addresses or host names. Being IP-based, XProtect Professional primarily identifies units based on their IP addresses or host names. Even though each hardware device has its own IP address or host name, several cameras, microphones, and so on, can be attached to a single hardware device and share the same IP address or host name. This is typically the case with cameras attached to video encoder devices. Each camera, microphone, and so on, can be configured individually, even when several of them are attached to a single hardware device.

Host

A computer connected to a TCP/IP network. A host has its own IP address, but may—depending on network configuration—also have a **host name to make it easily identifiable.**

Hotspot

Particular position for viewing enlarged and/or high quality video in the Smart Client.

HTTP

HyperText Transfer Protocol—standard for exchanging files across the internet. HTTP is the standard used for formatting and transmission of data on the World Wide Web.

I

I/O

Input/Output; refers to the communication between a computer and a person. Inputs are the signals or data received by the system and outputs are the signals or data sent from it.

I-frame

Short name for intra-frame; used in the MPEG standard for digital video compression. An I-frame is a single frame stored at specified intervals. The I-frame records the entire view of the camera, whereas the frames that follow (P-frames) record only the pixels that change. This helps greatly reduce the size of MPEG files. An I-frame is similar to a keyframe.

Image Server

A service that handles access to XProtect Professional for remote users logging in with Smart Client The Image Server service does not require separate hardware; it runs in the background on the XProtect Professional server. The Image Server service is not

configured separately as it is configured through XProtect Professional 's Management Application.

IP

Internet Protocol—protocol (or standard) specifying the format and addressing scheme used for sending data packets across networks. IP is often combined with another protocol, TCP. The combination, known as TCP/IP, allows data packets to be sent back and forth between two points on a network for longer periods of time and is used when connecting computers and other devices on the internet.

IP address

Internet Protocol address; the identifier for a computer or device on a network. It is used by the TCP/IP protocol for routing data traffic to the intended destination. An IP address consists of four numbers, each between 0 and 256, separated by periods (example: 192.168.212.2).

IPIX

A technology that allows the creation and viewing of 360-degree panomorph (fisheye) images.

J

JPEG

(Also JPG) Joint Photographic Experts Group—widely used lossy compression technique for images.

K

Keyframe

Used in the MPEG standard for digital video compression, a keyframe is a single frame stored at specified intervals. The keyframe records the entire view of the camera, whereas the frames between the keyframes record only the pixels that change. This helps greatly reduce the size of MPEG files.

M

MAC address

Media Access Control address—12-character hexadecimal number uniquely identifying each device on a network.

Manual events

You can generate an event manually from the client. These events are called manual events.

Master/Slave

A setup of servers where one server (the master server) is of higher importance than the remaining servers (the slave servers). With a master/slave setup in XProtect Professional, it is possible to combine several XProtect Professional servers and extend the number of cameras you can use beyond the maximum allowed number of cameras for a single server. In such a setup, clients will still have a single point of contact: they connect to the master server but also get access, transparently, to cameras and recordings on the slave servers.

Matrix

A feature enabling the control of live camera views on remote computers for distributed viewing. Once configured, Matrix-triggered live video can be viewed in the Smart Client.

Matrix recipient

A computer equipped with Smart Client software and therefore capable of displaying Matrix-triggered live video.

MJPEG

Motion JPEG—compressed video format where each frame is a separately compressed JPEG image. The method used is quite similar to the I-frame method used for MPEG, but no interframe prediction is used. This allows for somewhat easier editing, and makes

compression independent of the amount of motion.

Monitor

1) A computer screen. 2) An application used in previous versions of XProtect Professional for recording and displaying video. The Monitor application has been discontinued.

MPEG

Compression standards and file formats for digital video developed by the Moving Pictures Experts Group. MPEG standards use so-called lossy compression as they store only the changes between frames, removing often considerable amounts of redundant information. Keyframes stored at specified intervals record the entire view of the camera, whereas the frames that follow record only pixels that change. This helps greatly reduce the size of MPEG files.

N

NTLM

In a Windows network, NT LAN Manager is a network authentication protocol.

P

Panomorph

A type of lens that allows the creation and viewing of 360-degree images.

P-frame

Predictive frame—the MPEG standard for digital video compression uses P-frames together with I-frames. An I-frame, also known as a keyframe, is a single frame stored at specified intervals. The I-frame records the entire view of the camera, whereas the frames that follow (the P-frames) record only the pixels that change. This helps greatly reduce the size of MPEG files.

PIN

Personal identification number (or personal identity number)—number used to identify and authenticate users.

Ping

A computer network administration utility used to determine whether an IP address is available, by sending a small amount of data to see if it responds. The word ping was chosen because it mirrors the sound of a sonar. You send the ping command using a Windows command prompt.

Polling

Regularly checking the state of something, for example, whether input has been received on a particular input port of a device. The defined interval between such state checks is often called a polling frequency.

Port

Logical endpoint for data traffic. Networks use different ports for different types of data traffic. Therefore it is sometimes, but not always, necessary to specify which port to use for particular data communication. Most ports are used automatically based on the types of data included in the communication. On TCP/IP networks, port numbers range from 0 to 65536, but only ports 0 to 1024 are reserved for particular purposes. For example, port 80 is used for HTTP traffic, which is used when viewing web pages.

POS

(Also PoS) Point of sale; the physical place where a sale is made, for example, at the cash register.

Post-recording

The ability to store recordings from periods following motion and/or specified events. Based on incoming video being buffered on the XProtect Professional server in case it is going to be needed for a motion- or event-triggered recording. Using post-recording can

be highly advantageous: if, for example, you have defined that video should be recorded while a gate is open, being able to see what happens immediately after the gate is closed may also be important.

Pre-alarm

Pre-alarm images is a feature available for selected cameras only; it enables the sending of images from immediately before an event took place from the camera to XProtect Professional via e-mail.

Pre-buffer

See the description of Pre-recording.

Pre-recording

The ability to store recordings from periods preceding detected motion and/or specified events. Based on incoming video being buffered on the XProtect Professional server in case it is going to be needed for a motion- or event-triggered recording. Using pre-recording can be highly advantageous: if, for example, you have defined that video should be recorded when a door is opened, being able to see what happened immediately prior to the door being opened may also be important.

Privacy masking

The ability to define if and how selected areas of a camera's view should be masked before distribution. For example, if an XProtect Professional camera films a street, you can mask certain areas of a building (for example, windows and doors) with privacy masking in order to protect residents' privacy.

PTZ

Pan/Tilt/Zoom—highly movable and flexible type of camera.

PUK

Personal Unblocking Key or PIN Unlock Key—number used as an extra security measure for SIM cards.

R

Recording

On IP video surveillance systems, recording means **saving video and, if applicable, audio from a camera in the cameraâ€™s database on the surveillance system**. In many IP surveillance systems, all the video/audio received from cameras is not necessarily saved. Saving of video and audio in a cameraâ€™s database is in many cases started only when there is a reason to do so, for example, when motion is detected, when an event occurs, or when a specific period of time begins. Recording is then stopped after a specified amount of time, for example, when motion is no longer detected, when an event occurs, or when a time period ends. The term **recording** originates from the analog video era, when images were taped only when the record button was pressed.

Recording Server service

Windows service (without any user interface) used by XProtect Professional for recording and displaying video. Video is only transferred to the surveillance system while the Recording Server service is running.

Restore point

Restore points allow you to return to a previous configuration state. When a configuration change is applied in XProtect Professional, a restore point is created. If something goes wrong in your configuration, you can browse through restore points, and return to a suitable one.

S

SCS

A file extension (.scs) for a script type targeted at controlling clients.

SDK

Software Development Kit—programming package enabling software developers to

create applications for use with a specific platform.

SIM

Subscriber identity module—circuit stored on a small card inserted into a mobile phone or computer, or other mobile device. The SIM card is used to identify and authenticate the user.

SLC

Software license code—product registration code required for using the XProtect Professional software. If you do not have system administration responsibilities, you do not have to deal with SLCs. System administrators use SLCs when installing and registering the software.

SMS

Short Message Service or Systems Management Server; 1) Short Message Service, a system for sending text messages to mobile phones. 2) Systems Management Server, a Microsoft tool which lets system administrators build up databases of hardware and software on local networks. The databases can then—among other things—be used for distributing and installing software applications over local networks.

SMTP

Simple Mail Transfer Protocol—standard for sending e-mail messages between mail servers.

Subnet

A part of a network. Dividing a network into subnets can be advantageous for management and security reasons, and may in some cases also help improve performance. On TCP/IP-based networks, a subnet is basically a part of a network on which all devices share the same prefix in their IP addresses, for example 123.123.123.xxx, where the first three numbers (123.123.123) are the shared prefix. Network administrators use subnet masks to divide networks into subnets.

T

TCP

Transmission Control Protocol—protocol (or standard) used for sending data packets across networks. TCP is often combined with another protocol, IP (Internet Protocol). The combination, known as TCP/IP, allows data packets to be sent back and forth between two points on a network for longer periods of time, and is used when connecting computers and other devices on the internet.

TCP/IP

Transmission Control Protocol/Internet Protocol—combination of protocols (or standards) used when connecting computers and other devices on networks, including the internet.

Telnet

Terminal emulation program used on TCP/IP networks. With Telnet, you can connect to a server from a computer on the network and execute commands through Telnet as if you were entering them directly on the server. Windows includes a client for use with Telnet.

Transact

An add-on to XProtect Professional. XProtect Transact can help you prevent loss and shrinkage through video evidence combined with time-linked POS or ATM transaction data.

U

UDP

User Datagram Protocol—connectionless protocol for sending data packets across networks. Primarily used for broadcasting messages. UDP is a fairly simple protocol, with less error recovery features than, for example, the TCP protocol.

UPS

A UPS (Uninterruptible Power Supply) works as a battery-driven secondary power source, providing the necessary power for saving open files and safely powering down your system in the event of power irregularities. UPSs vary in sophistication, but many UPSs include software for automatically saving open files, for alerting system administrators, etc.

URL

Uniform Resource Locator; an address of a resource on the World Wide Web. The first part of a URL specifies which protocol (or data communication standard) to use when accessing the resource, whereas the second part of the URL specifies the domain or IP address at which the resource is located. For example, www.milestonesys.com.

V

VCA

Video content analysis (VCA) is a system that detects various types of previously specified behavior, both of humans and vehicles. A VCA-based system provides third-party video content analysis, spanning from face recognition, over advanced motion detection, to complex behavioral analysis. VCA systems and their output can seamlessly be integrated with the **Alarms** feature and used for, for example, triggering alarms. Here, the events resulting from VCA systems are called analytics events.

Third-party VCA tools are developed by independent partners delivering solutions based on an a Milestone open platform. These solutions can impact performance on XProtect Professional.

Video encoder

A device, typically a standalone device, that can stream video from a number of connected client cameras. Video encoders contain image digitizers, making it possible to connect analog cameras to a network.

Video server

Another name for a video encoder.

View

In XProtect Professional, a collection of video from one or more cameras, presented together in the Smart Client. A view may include other content, such as HTML pages and static images, in addition to video from cameras.

VMD

Video motion detection; way of defining activity in a scene by analyzing image data and the differences in a series of images.

W

Wizard

A utility to help perform a particular task quickly, while also ensuring coverage of all relevant parameters. For example, the **Adjust Motion Detection** wizard quickly helps you configure motion detection on each of XProtect Professional 's cameras without the risk of forgetting to set any key parameters.

X

XProtect Smart Client

An advanced client application for letting remote users access XProtect Professional in order to view live images, play back recorded images, activate output, print and export evidence, and so on (access to features depend on individual user rights). Some of the features include live and playback video, digital zoom, and timeline browsing. The Smart Client should always be downloaded from XProtect Professional and installed locally on remote users' computers.

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milestone

Campus
Network Diagram

Classroom Bldg

110v

SECURITY
SWITCH

62.5 micron multimode fiber at distances up to 220 meters
50 micron multimode fiber at distances up to 550 meters

Agricultural Bldg

110v

SECURITY
SWITCH

62.5 micron multimode fiber at distances up to 220 meters
50 micron multimode fiber at distances up to 550 meters

Animal Science Bldg

110v

SECURITY
SWITCH

62.5 micron multimode fiber at distances up to 220 meters
50 micron multimode fiber at distances up to 550 meters

Annex Bldg

110v

SECURITY
SWITCH

62.5 micron multimode fiber at distances up to 220 meters
50 micron multimode fiber at distances up to 550 meters

Equine Bldg

110v

SECURITY
SWITCH

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Campus

Network
Diagram

SEC-NETWORK

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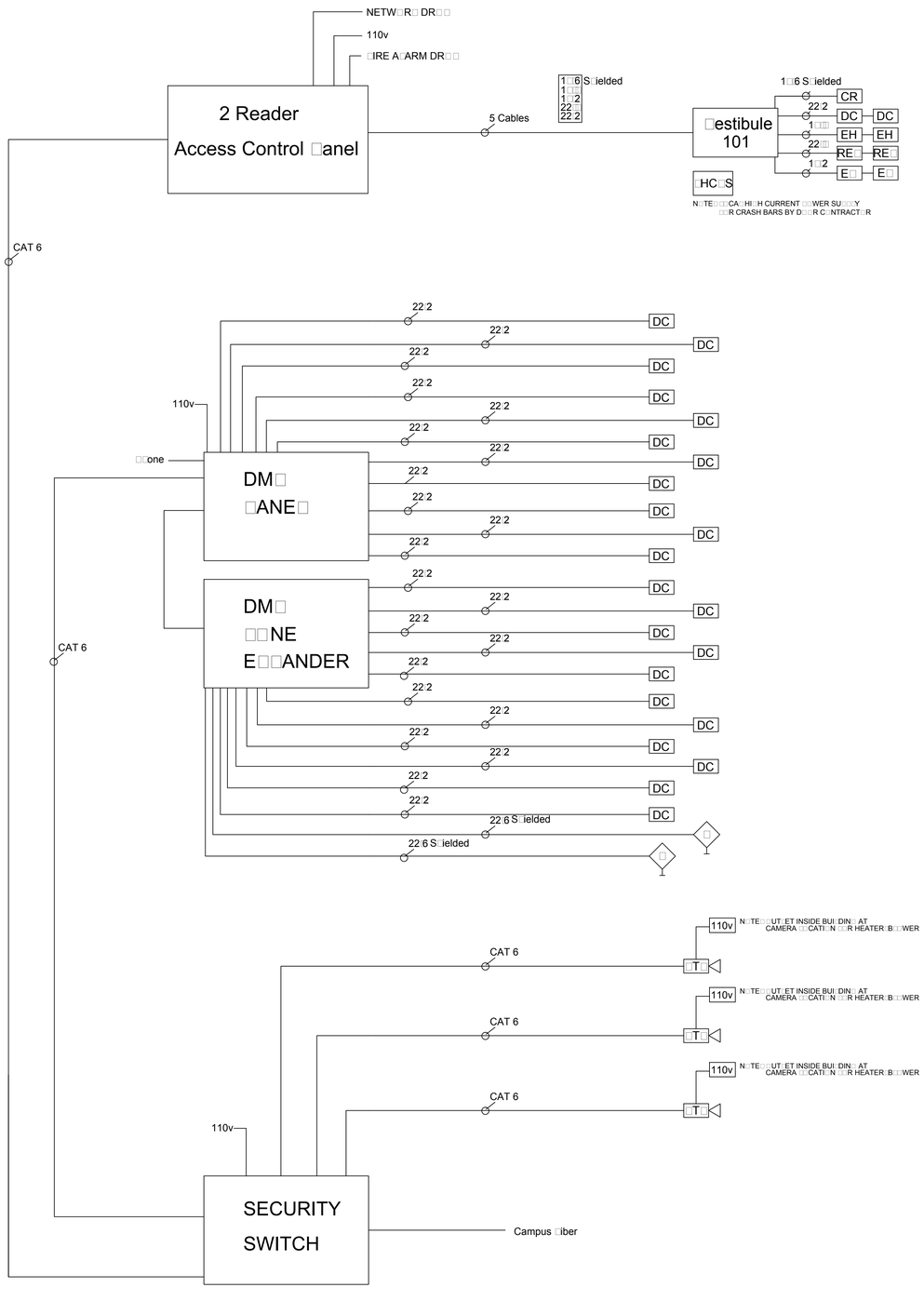

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Agricultural Bldg.

One-Line Diagram

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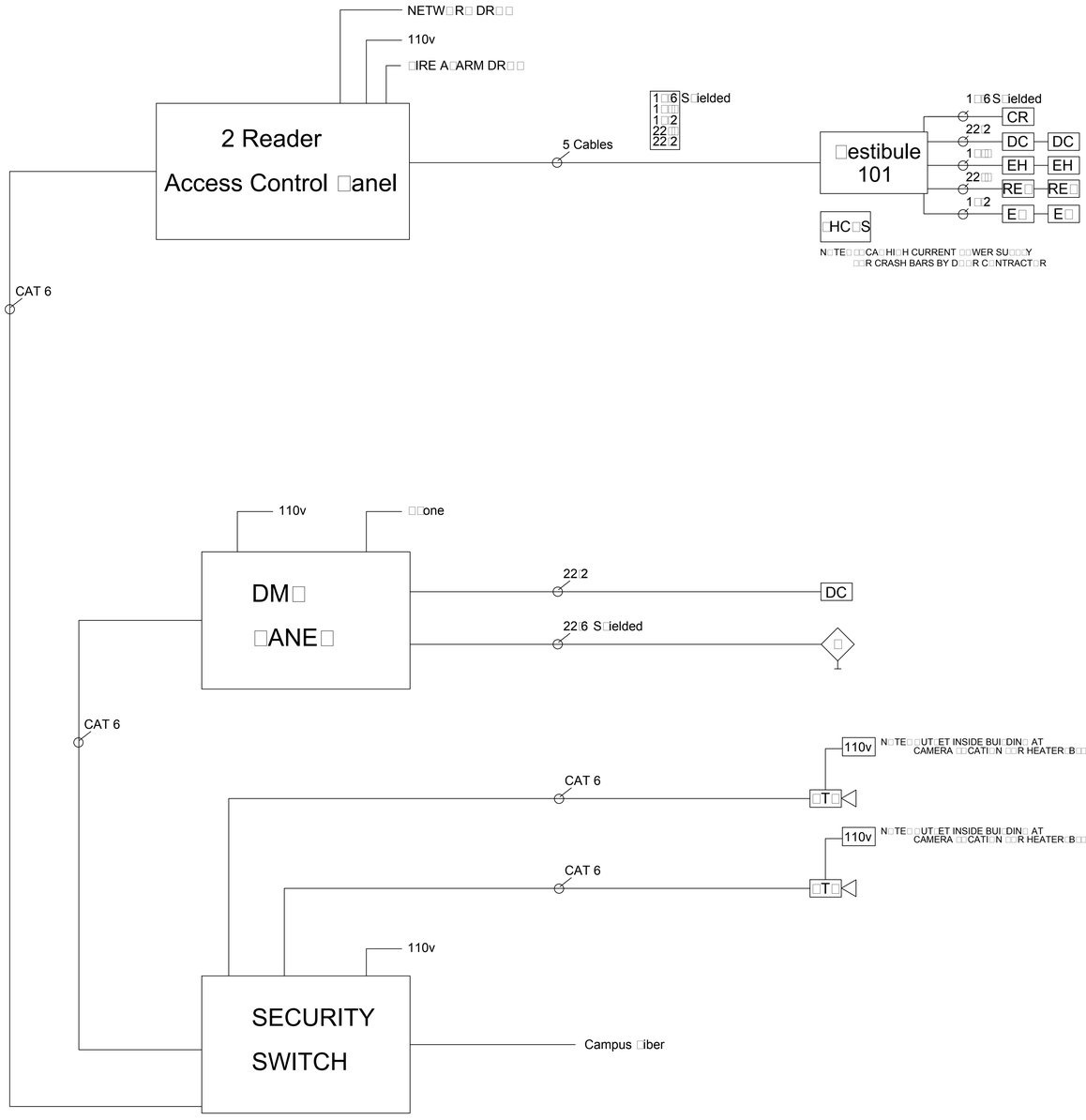

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Animal Science Bldg.

One-Line Diagram

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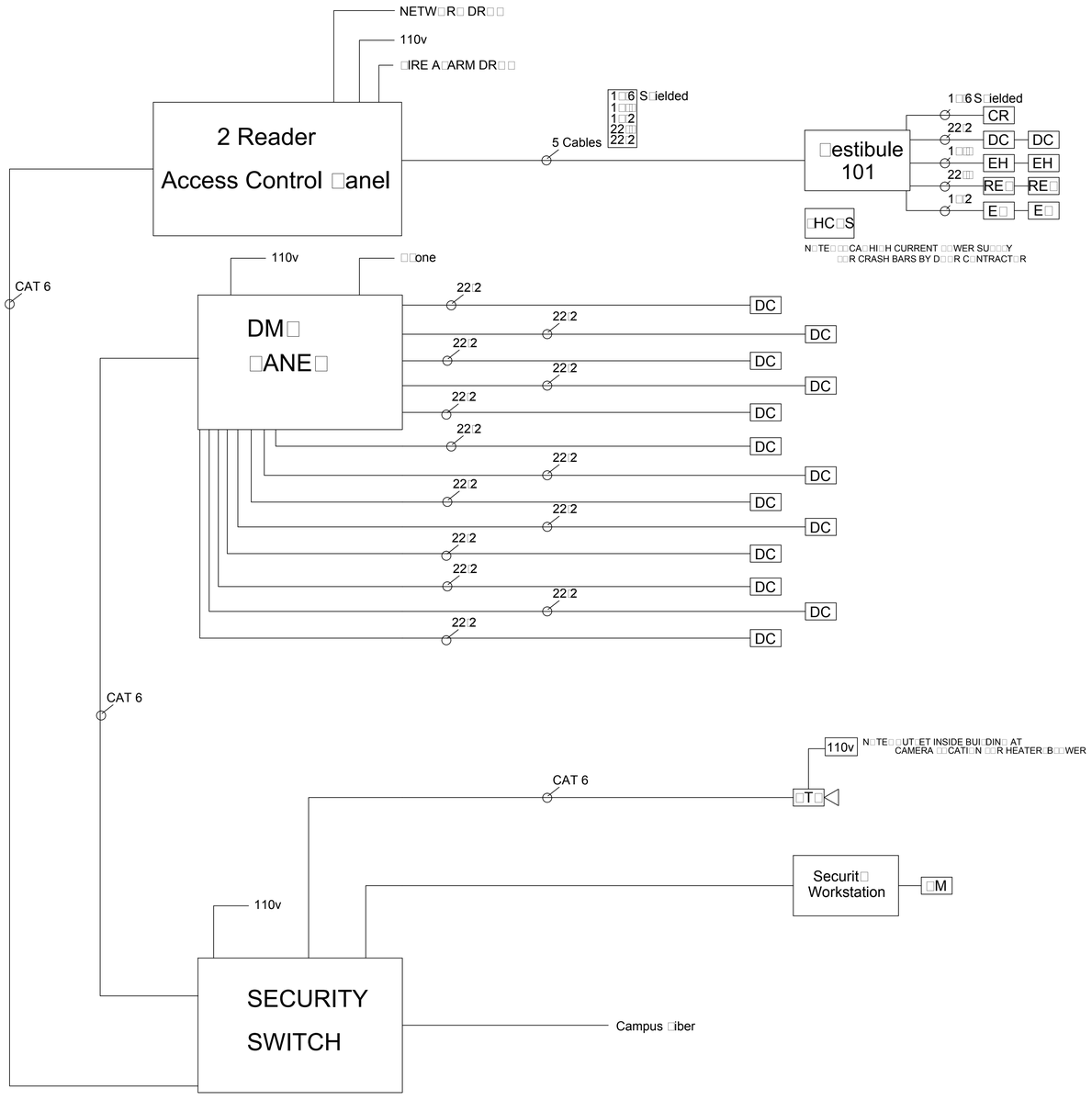

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Annex
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One-Line
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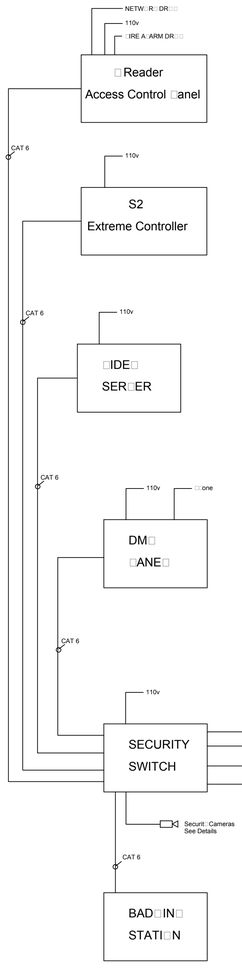
Campus
Inter□Building Connections

Classroom Bldg



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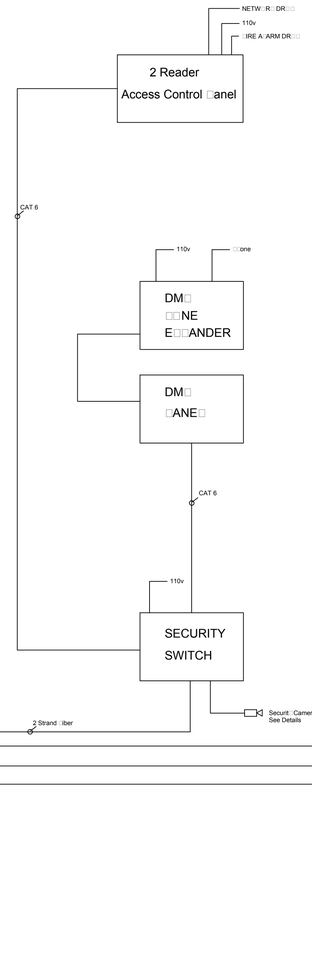
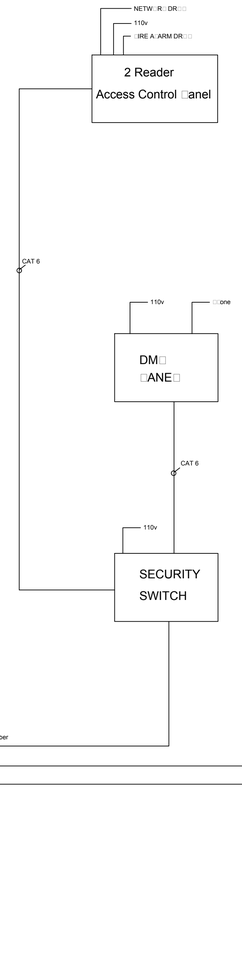


Animal Science Bldg



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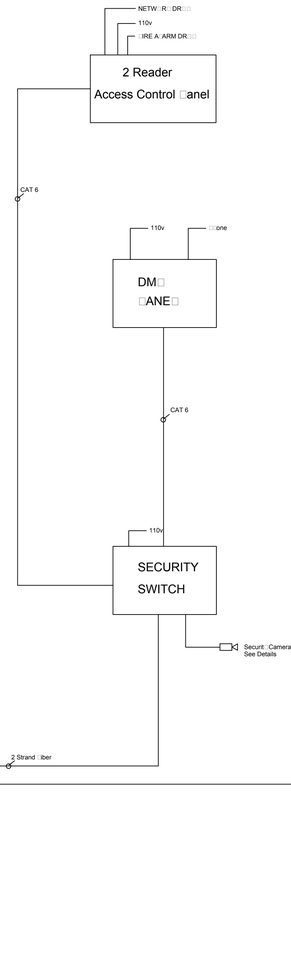

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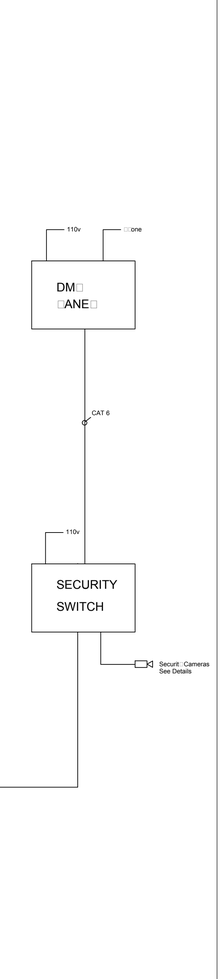

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One-Line Diagram

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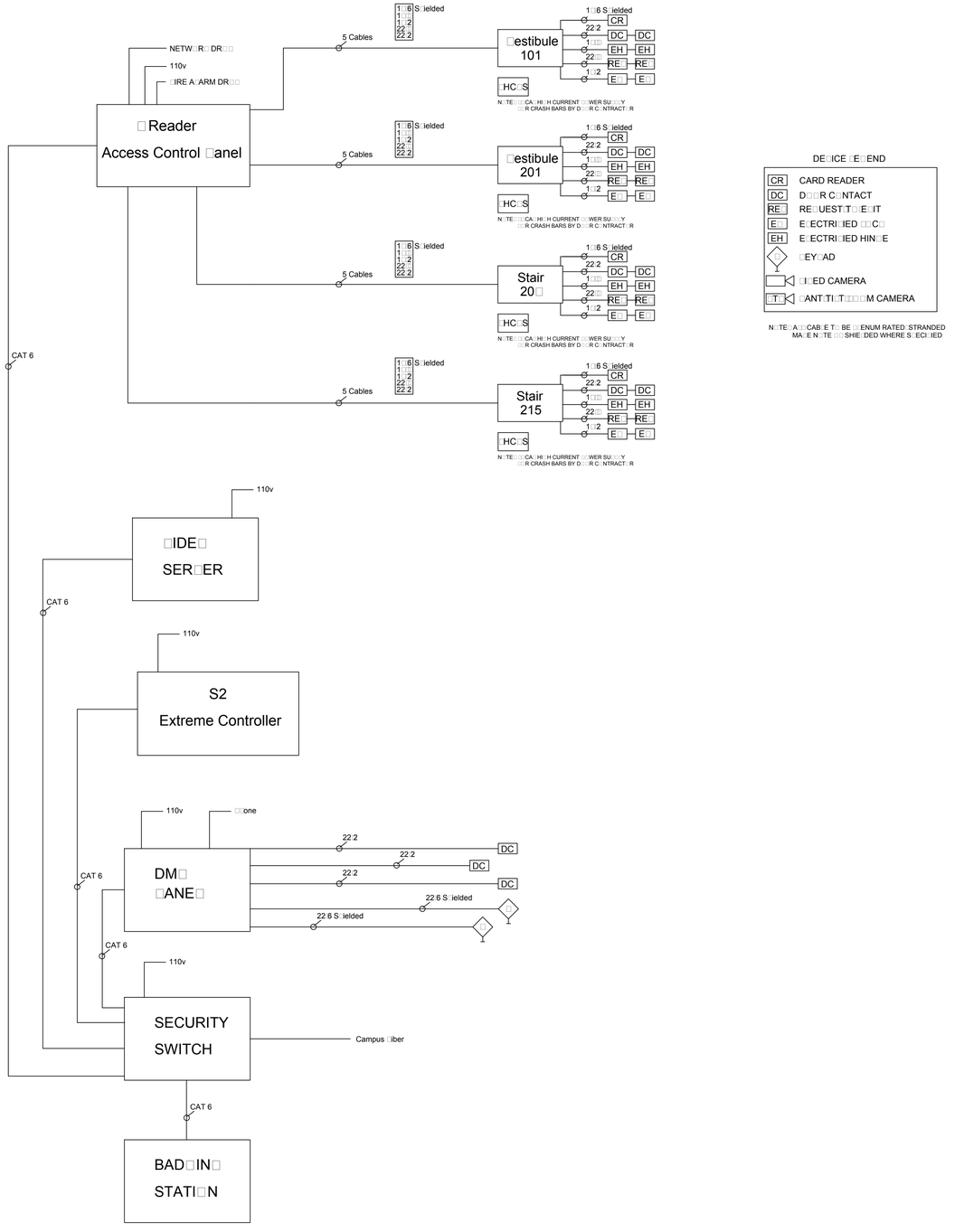

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Classroom Bldg.

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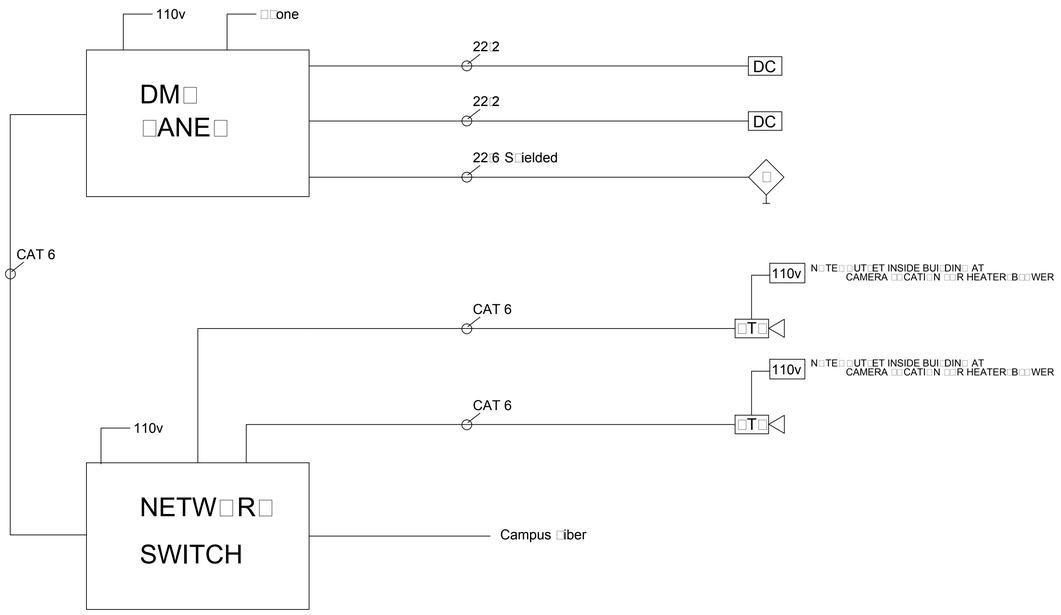

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Equine
Bldg.

One-Line
Diagram

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S2 SECURITY®

Integrated security for an IP-connected world®

S2 NetBox®

S2 ENTERPRISE®

User Guide

For S2 NetBox® and S2 Enterprise®
Version 4.4

July 2013

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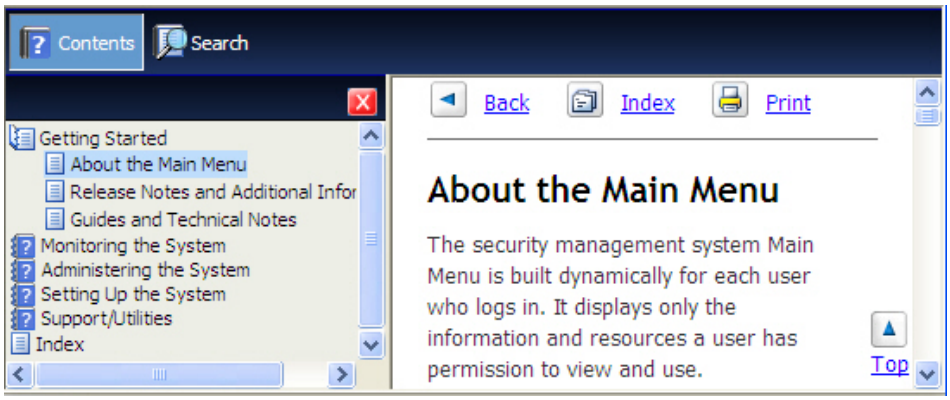
Introduction

This guide is intended for users of the S2 security management system. It provides a printable version of the online help available for common monitoring and administration tasks.

Note: Check the S2 Security web site (**www.s2sys.com**) for updated specifications, lists of supported devices, and software updates.

Getting Help

As you use the system, you can click the **Help** icon in the header bar to open the help window shown below. The topic displayed in the right pane provides assistance with the page you are currently viewing.



To use help:

- Click the **Contents** and **Search** buttons above the navigation pane on the left to switch between the table of contents and the search feature.
- Click the close button to hide the navigation pane. To show it again, click the **Contents** or **Search** button.
- In the table of contents, click a book to show or hide its list of topics. Click a topic title to display that topic in the right pane.
- When viewing a topic, click **Back** to return to the previous topic, click **Index** to display the help Index, and click **Print** to print the current help topic.
- To use the search feature, enter the word you want to find and then either click **Go** or press **ENTER**. To search for a phrase, enter it in quotation marks.

  Note: If the **Highlight search results** check box is selected when you perform a search, all instances of the word or phrase you entered will be highlighted in the search results.

Monitoring Doors, Cameras, and System Resources

The Monitor menu contains options for monitoring camera views, entering duty log messages, accessing all live monitoring options, granting passback grace, unlocking portals, and selecting different partitions to monitor.

Choose this:	To do this:
Cameras	Monitor individual cameras.
Camera Views	Monitor up to four camera views simultaneously in a quad view.
Duty Log Entry	Enter duty log comments into the Activity Log.
Live Monitoring	See Live Monitoring Options.
Portal Status	Unlock portals and view their status.
Passback Grace	Grace cardholders from anti-passback violations.
Select Partition	Select a different partition to monitor, in a multi-partition system.

Monitoring Cameras

Select **Monitor : Cameras**.

On this page you can select any camera defined in the system to monitor a live camera view.

Note: For information on monitoring NetVR cameras, see the "NetVR User Guide."

To monitor a live camera view:

1. Select a camera from the Cameras menu.
2. From the **Camera Preset** drop-down list, select the preset position you want to view. (The list automatically shows the selected camera's presets.)
3. Use the controls described in the following table to review recorded video, aim the camera, move it to its home position, zoom in and out, and adjust the speed of camera movement.

Note: If the camera does not have these capabilities, or if the home, tilt, pan and zoom URLs have not been set up, these controls will not appear. If the video management system (VMS) does not support variable speed PTZ, the camera speed drop-down will not appear. In addition, the VMS and other factors determine whether the PTZ buttons toggle rather than operate with one click to move one step.

Control:	Use to:
	Display VCR controls you can use to review recorded video. This control will appear only for video management system (VMS) cameras.
	Display PTZ (pan, tilt, zoom) controls.
	Move the camera to its preset home position.
	Move the camera one step in the direction of the arrow. **Note**: If the camera is connected to a ViconNet, a single click starts the camera movement and a second click is required to stop the camera movement. If the camera moves too quickly for accurate positioning, select a lower speed number from the camera speed drop-down, described below
	Zoom in.
	Zoom out.
	Select the speed of camera movement: 1 is slowest, 10 is fastest.

Monitoring Multi-Camera Views

Select **Monitor : Camera Views**.

On this page you can monitor a quad view, which displays up to four camera views simultaneously.

Note: For information on monitoring NetVR multi-camera views, see the "NetVR User Guide."

To monitor a multi-camera (quad) view:

1. Select a camera view from the Camera Views menu.
2. When the quad view appears on the page, click the pane displaying the camera view you want to monitor. A border appears around the pane to indicate that it is selected.
3. Click this control to display the **Camera Preset** drop-down list and select the preset position you want to view. (The list automatically shows the selected camera's presets.)

4. Use the controls described in the previous section, Monitoring Cameras, to view recorded video, aim the camera, move it to its home position, zoom in and out, and adjust the speed of camera movement.

Adding Duty Log Messages to the Activity Log

Select **Monitor : Duty Log Entry**.

To add a duty log message to the Activity Log, you can type the message into a text box or select a preset message, if any have been configured.

To add a duty log message to the Activity Log:

1. Type your message into the **Enter duty log message** text box.
2. Alternatively, if the **Use Duty Log Response** drop-down list appears on the page, select a preset message from the list.
3. Click **Save**.

Notes: To view a duty log message for an entry in the Activity Log, click the clipboard icon that appears at the end of the entry.

When you double-click an Activity Log entry, a dialog box appears in which you can append a duty log entry to that entry.

Live Monitoring Options

The **Monitor: Live Monitoring** menu contains options for viewing system activities and floorplans, and for initiating live monitoring sessions.

Choose this:	To do this:
Activity Log	View recent entries in the log of system activity.
Floorplans	View the state of alarms and other system resources on a floorplan.
Home Page	View a full system summary (available in selected versions of the security management system).
Monitoring Desktop	Use a familiar fixed display to view system information.
Widget Desktop	Use a custom real-time display to view system information.

Monitoring the Activity Log

Select **Monitor : Live Monitoring : Activity Log**.

Note: You can also view the Activity Log on the Monitoring Desktop, in the Activity Log widget on the Widget Desktop, and in the Activity Log Widget on the Home page.

When you first open the Activity Log page, it displays 301 of the most recent entries in the log of system activity. If you remain on the page, additional entries appear in the list, until up to 1,000 of the most recent entries are displayed.

If an administrator or monitor has added a duty log message to an entry, you can click the clipboard icon ( ) to view the message. If there is recorded video associated with an entry, you can click the camera icon ( ) to view the recording.

Filtering Activity Log Data

When monitoring system activity in the Activity Log, you can filter the current list of log entries to focus on specific information. There are two types of filters you can apply:

- **Text filters**: In an Activity Log tab (displayed on the Monitoring Desktop) or an Activity Log widget (displayed on the Monitoring Desktop, Home page, or Widget Desktop), you can apply a text filter to view only entries from the original list that contain a specific text string.

  Note: Text filters are not available in the full page view of the Activity Log.

- **Category filters**: In an Activity Log tab or widget, and also in the full page view of the Activity Log, you can apply a category filter to view only entries from the original list that belong to a particular category.

You can also combine a text filter with a category filter. For example, suppose that after applying the text filter “Jean Gauthier,” you apply the category filter **Access Denied** to the results. The new results will show only denied access requests for the cardholder Jean Gauthier.

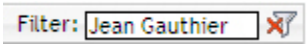
Note: If filters were not enabled when an Activity Log widget was created, that instance of the widget will not have text and category filtering capabilities.

Your filtered results will include only entries currently defined for the view of the Activity Log you are monitoring. For example, in an Activity Log widget that is configured to display only "Access denied" entries, applying the **Access Granted** category filter will return no results.

Applying Text Filters

To apply a text filter, you type text into the **Filter** box that appears in the upper right corner of the Activity Log tab or widget. The results will include only entries from the original list containing text matching your entry. Text filtering is not case-sensitive; you can enter either uppercase or lowercase characters.

For example, to see only entries containing the name "Jean Gauthier," apply the filter shown below.



Filtering begins as you start to type. The filtered data will be displayed in the Activity Log until you click the **Clear Filters** icon, enter a different text filter, or ending the current monitoring session.

Applying Category Filters

To apply a category filter, you select an entry from the **Category** drop-down list in the upper right corner of the Activity Log page, tab, or widget. The results will include only entries from the original list that belong to the selected category. The following categories are available:

- **All** (default): Select when you want to remove the currently applied category filter without applying a new one, and without removing the current text filter if one is applied. (Clicking the **Clear Filters** icon clears all category and text filters.)
- **Access Control**: Select to view only access control related entries, such as Access Denied, Access Granted, Forced Open, Relocked, Timed Unlock Expired, and Unlock entries.
- **Alarms and Events**: Select to view only alarm and event related entries, such as Alarm Acknowledged, Alarm Actions Cleared, Alarm Adopted, Alarm Panel Armed, Event Actions Cleared, Event Triggered, and Tamper Alarm entries.
- **Threat Levels**: Select to view only threat level related entries, such as Threat Level Set, Threat Level Set (ALM), and Threat Level Set (API) entries.
- **System Administration**: Select to view only system administration related entries, such as FTP Backup Complete, FTP Backup Failed, Log Archive Failed, Logged In, Logged Out, and System Backup Successful entries.
- **Devices**: Select to view only device related activity, such as Battery Failed, Blade Not Responding, Intrusion Panel Alarm, NAS Backup Complete, and Secondary System Restored events.
- **Network Nodes**: Select to view only Network Node related entries, such as Coproc Not Responding, NN Connected, NN Startup, and NN Timeout, entries.
- **Access Granted**: Select to view only entries for granted access requests.
- **Access Denied**: Select to view only entries for denied access requests.

Once you have applied a category filter, the filtered data will be displayed in the Activity Log until you click the **Clear Filters** icon, select a different filter, or end the current monitoring session.

Navigating to a Person Record from the Activity Log

If you have the right to view a cardholder's person record, clicking that person's name within an Activity Log entry opens a window in which his or her person record is displayed. Any rights you have to view and edit information in a particular person record will apply when you access the record from the Activity Log.

About Activity Log Messages

The messages are color coded.

- **Red** indicates a process failure or access control issue.
- **Green** indicates a successful process.
- The color currently selected for **Trace person log color** on the Network Controller page indicates valid or invalid access attempts in the current partition by individuals whose activity is being traced.
- **Black** is used for all other messages.

Descriptions of the message text and variables included in Activity Log messages follow.

Times

Each Activity Log message begins with the *controller time*—the time when the event was communicated to the Network Controller. Depending on how your system is configured, the controller time might be followed (in square brackets) by the time when the event actually occurred on the node.

Names

Specific names entered into the system during setup and configuration will be used in log entries in place of variables such as: <username>, <portalname>, <nodename>, <eventname>, <elevatorname>, <alarmpanel>, and <threatlevel>. This is a strong reason for assigning names that are descriptive. The log will be much easier to understand.

Numbers

Specific numbers will be used in log entries in place of <ipaddress>, <slotnumber>, and <rev>.

Reset Types

Specific <reset_type> messages for the **Network Node Ident** log entry include:

- **Power on reset** - The node reset on power up.
- **Watchdog timer reset** - This occurs when the system takes too long to process an operation involving a node. It should restart and continue processing. If the problem persists, contact your system administrator.
- **Normal reset** - Physical reset by pushing the node reset button on the node blade.
- **Network loss** - No reset has occurred. The node lost network connectivity but has now reconnected.

Reason Codes

Specific [<reasoncode>] messages for "Access denied" log entries include:

- **[BIT MISMATCH]** - The data format of this credential does not match any data format configured in the system. Clicking this message code opens the Card Decoder window.
- **[DISABLED]** (or **[CLEAR]**, **[DAMAGED]**, **[FORGOTTEN]**, **[LOST]**, **[NOT RETURNED]**, **[NOT VALIDATED]**, **[RETURNED]**, **[STOLEN]**, or **[SUSPENDED]**) - This credential has been disabled.
- **[EXPIRED]** - This credential has expired.
- **[HOLIDAY]** - A defined holiday does not allow access for this person at this time.
- **[LOCATION]** - This person's access level or the current threat level does not allow the use of this reader.
- **[MISSING (DISABLED)]** – This credential was reported as missing and is disabled.
- **[NO PIN]** - No PIN was entered within the PIN entry timeout period set on the Network Controller page.
- **[NOT IN NODE]** - The node has no record of this credential and was unable to load it in time. The name of the person who owns the credential is displayed.
- **[PIN]** - The PIN entered is incorrect.
- **[PASSBACK VIOLATION]** - This credential was presented to enter a region where the cardholder is already known to be. (This is a subset of tailgate violations.)
- **[TAILGATE VIOLATION]** - This credential was presented in a region where the cardholder is known NOT to be.

- **[TEMPORARY (EXPIRED)]** – This credential was issued as a temporary credential and has expired.
- **[TIME]** - Time specs do not allow access for this person at this time.
- **[THREAT LEVEL]** - This person's access level does not allow access under the current threat level.
- **[UNKNOWN]** - The data format of this credential is valid, but there is no record of the credential anywhere in the system. Clicking this message opens the Card Decoder window.
- **[WRONG DAY]** - Time specs or holiday definitions do not allow access for this person on this day.

Note: "Access denied" log entries for remote-lockset portals may incorrectly report the [TIME] reason code rather than the [WRONG DAY] REASON CODE. This is because remote locksets do not distinguish between a rejection based on the wrong time of day and a rejection based on the wrong day of the week.

There are two [<reasoncode>] messages for "Access granted" log entries:

- **[DURESS]** - A cardholder presented his or her card and then entered a duress PIN (his or her assigned PIN, with the last digit incremented by 1) into the keypad. This resulted in an apparently normal access that was actually a duress access.
- [PASSBACK] - A cardholder presented credentials that were used previously in this reader group. However, on the person record, the person's **Regional anti-passback privileges** are set to **Exempt** or Soft Always, so the person was allowed access and the access was logged.

Monitoring Floorplans

Select **Monitor : Live Monitoring : Floorplans**.

On this page you can:

- View any floorplan that is configured in the system.
- See the locations of system resources such as portals, online remote locksets, cameras, inputs, outputs, and temperature sensors.
- Use a floorplan link to switch to a different floorplan.
- Display temperature graphs for each temperature point.
- Perform momentary unlocks of portals and online remote locksets and scheduled unlocks of portals.
- Perform scheduled disarming of inputs.
- Perform scheduled activations and deactivations of outputs.
- Display thumbnail images from cameras.

- View the current status of an alarm.

Note: Viewing and configuring floorplans requires a browser plug-in Macromedia Flash Player 9.0 or later.

To monitor floorplans:

1. Select from the **Floorplan** drop-down the floor you want to monitor.
2. Click the icon for any system resource on the floorplan to display its type and name in the **Type** and **Name** text boxes.

   Note: Selected icons are slightly dimmed on the floorplan.

3. Right-click anywhere on the floorplan to display the Flash Player menu. You can use the options on this menu.
4. Hold down the left mouse button over the icon for a resource to display a menu of the actions you can perform:
   - The menu for a portal lets you perform a momentary unlock or schedule an extended unlock.
   - The menu for an online remote lockset lets you perform a momentary unlock..
   - The menu for a camera lets you select a thumbnail image.
   - The menu for an alarm lets you view its current status.
   - The menu for a floorplan link lets you view its current status and/or display that floorplan.
   - The menu for an input lets you perform a scheduled disarming of the input.
   - The menu for an output lets you perform a scheduled activation or deactivation of the output.
   - The menu for a temperature sensor lets you select a temperature graph.

   Note: Whenever there is a valid entry at a portal, the cardholder's name appears below the icon for that portal. Whenever an event is triggered, the icon for that alarm turns red.

5. You can click on an input icon or an output icon and select **Schedule Action**.
6. You can click on a camera icon and select a thumbnail image.
7. You can click on a temperature icon and select a temperature graph.
8. Alarm icons turn red if that event is triggered.

Using the Home Page

Select **Monitor : Live Monitoring : Home Page**.

The Home page, which is available in selected versions of the security application, provides a layout for viewing full system information using an Activity Log, Auto-Monitor, Video Stream, and User Tasks widget for direct access to these functions. You can click the button provided to make this your start page.

Note: Opening the Home page automatically hides the Table of Contents. To display it again, click Show TOC in the header bar.

On the Home page, you can:

- Use the **Activity Log** widget to view recent entries in the log of system activity.
- Use the **Auto-Monitor** widget to view issues that might require attention.

  This widget displays notifications of all currently active events of the following types: Unacknowledged Events, Node Communication Loss, Door Forced Open, and Door Held Open. It also displays all Access Denied events that have occurred within the last hour. Pointing to a notification displays an informational tooltip showing more detail about each event.
- Use the **Video Stream** widget to monitor a camera view.

  The first camera in your system's Camera Menu order will appear by default in this widget. If there are no camera definitions in the system, the Video Stream widget will not display a camera view.
- Use the **User Tasks** widget for direct access to common features (based on your login permissions).

  Clicking the icon for a task takes you directly to the page for performing the task. For example, if you have Administrator access, clicking the **People Locator** takes you to a page where you can run searches to find people in the system.

Using the Monitoring Desktop

Select **Monitor : Live Monitoring : Monitoring Desktop**.

The Monitoring Desktop provides a fixed layout for viewing dynamic system information. It has separate tabbed pages for monitoring various system functions, such as events, camera views, and floorplans.

To use a fixed display to monitor all system activities:

1. In the upper left pane, click either the Events or Activity Log tab, depending on the type of system information you want to view in that pane.

Note: The **Events** tab displays all currently active system events. Events can be sorted on the **Date/Time**, **Priority**, **Name**, or **Commands** column.

2. In the lower left pane, click the Activity Log, Cameras, Camera Views, Camera Monitor, Floorplans, or Events tab, depending on the type of information you want to view in that pane.
3. Use the windows on the right side of the desktop to view the current threat level, unlock portals, view cameras, and view a recent history of cardholders who have presented their credentials to readers in the system.

Note: Two links appear in the upper right corner of the Monitoring Desktop. You can use the **tearoff** link to open the Monitoring Desktop in a separate window, so you can continue to use it as you work with other pages in the application. If you have a Generation 1 Dedicated Micros DVR integration, you can use the **setup video** link to determine whether the version of Java available in your browser will work with the DVR, and to update Java if necessary.

Activity Log Tab

The Activity Log tab displays recent entries in the log of system activity. For more information, see Monitoring the Activity Log.

Cameras Tab

You can select any camera defined in the system to monitor a live camera view. For more information, see Monitoring Cameras.

Camera Views Tab

You can monitor a multi-camera (quad) view, which displays up to four camera views simultaneously. For more information, see Monitoring Multi-Camera Views.

Camera Monitor Tab

You can select the specific camera you want displayed on the Camera Monitor tab.

1. In the Cameras widget on the right side of the page, point to this icon above the camera you want to select:

   The icon changes to this button:

2. Click the button to bring the Camera Monitor tab forward and display the video stream or image from that camera.

You can use the controls described in the following table to review recorded video, aim the camera, move it to its home position, zoom in and out, and adjust the speed of camera movement.

Note: If the camera does not have these capabilities, or if the home, tilt, pan and zoom URLs have not been set up, these controls will not appear. If the video management system (VMS) does not support variable speed PTZ, the camera speed drop-down will not appear. In addition, the VMS and other factors determine whether the PTZ buttons toggle rather than operate with one click to move one step.:

Control:	Use to:
	Display VCR controls you can use to review recorded video. This control will appear only for video management system (VMS) cameras.
	Display PTZ (pan, tilt, zoom) controls.
	Move the camera to its preset home position.
	Move the camera one step in the direction of the arrow. **Note**: If the camera is connected to a ViconNet, a single click starts the camera movement and a second click is required to stop the camera movement. If the camera moves too quickly for accurate positioning, select a lower speed number from the camera speed drop-down, described below
	Zoom in.
	Zoom out.
	Select the speed of camera movement: 1 is slowest, 10 is fastest.

Floorplans Tab

You can use the Floorplans tab to monitor any floorplan configured in the system. For more information, see Monitoring Floorplans.

Note: Viewing and configuring floorplans requires a browser plug-in from Macromedia called Flash Player 9.0 or higher. Your operating system and browser will automatically determine which version of the plug-in to install.

Events Tab

The active events listed on this tab are sorted in priority order by default. To reverse the sort order, click the **Priority** column header. You can also click the **Date/Time** or **Name** column header to sort on those columns.

An event will appear in the list as long as its cause is still active and/or it requires acknowledgment.

To acknowledge and respond to events:

1. Select **Monitor : Monitoring Desktop**.
2. To investigate and acknowledge an event, you can:
   - If this icon appears in the Name column for an event, click it to view recorded video associated with the event.
   - Click Camera in the Commands column to view live video for an event.
   - Click Details in the Commands column to view the **Operator long message** entered in the event definition.
   - Click Acknowledge in the Commands column to acknowledge the event. Otherwise, it will remain active until all actions triggered by the event are concluded, or the **Maximum Duration** specified in the event definition elapses and the event auto-acknowledges.
   - Click Clear to clear all active actions triggered by the event. This button will appear for an event only if both **Allow Clear Actions** and **While Active?** are both selected in the event definition.

Using the Widget Desktop

Select **Monitor : Live Monitoring : Widget Desktop**.

The Widget Desktop provides a custom real-time display for monitoring the system. When you open the Widget Desktop, you see one or more windows, called *widgets*, arranged in the default layout for your system. Each widget has a special function, such as displaying system activity, unlocking portals, or delivering real-time web content from another system.

Note: Internet Explorer 7 or higher is required for optimal viewing of the Widget Desktop. Page display problems occur when the Widget Desktop is viewed in other browsers or other versions of Internet Explorer.

If the default Widget Desktop layout does not meet your needs, you can select a different layout if others are available. You can also customize a layout for the current monitoring session, by adding available widgets and selecting a different background. See the online help for details about available widgets.

Note: Changes you make to a layout are not saved across monitoring sessions. Once you close the Widget Desktop, the layout reverts to its original appearance. If you need a custom layout, and you do not have setup privileges in the active partition, see your security administrator for assistance. If you do have setup privileges in the active partition, you can switch to Compose mode, edit and save the current layout or any available layout, then switch back to monitoring mode. See Using the Widget Desktop in online help for more information.

You may also be able to change the individual widgets in a layout, depending on how it was set up. For example, you may be able to:

- Move, size, minimize, and close a widget.
- Change a widget's unique properties.
- Change the scope of the data displayed in a widget.

Note: If a grid is displayed on the desktop background, widgets will automatically align to the nearest intersection of lines in the grid whenever you move or resize them.

To display the default Widget Desktop layout:

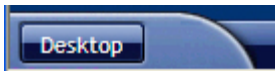
- Select **Monitor : Live Monitoring : Widget Desktop**. The default Widget Desktop layout appears automatically.

To select a different layout:

1. Select **Load Layout** from the Desktop menu in the lower left corner of the page.
2. In the Load Layout dialog box, select the layout you want, and then click **OK**.
3. To return to the default layout at any time, select **Default** from the Load Layout dialog box.

To add a widget to the selected layout:

- Click Desktop in the lower left corner of the page to display the Desktop menu.



- Select the widget you want to add.

To select a different partition to monitor:

1. Click the name of the current partition on the lower right edge of the page.
2. In the Switch Partition dialog box, select the partition you want to monitor.
3. Click **OK**.

   The partition you selected becomes the current partition until you select a different one.

To change the Widget Desktop background:

- Right-click anywhere on the background, select a number from the Background drop-down, and then click **OK**.

To make the Widget Desktop your start page:

- Select **Make This My Start Page** from the **Desktop** menu in the lower left corner of the page. The next time you log in to the system, your default Widget Desktop layout will be displayed automatically.

Note: Your default Widget Desktop layout is the one that is currently selected on the Login tab of your person record.

To get Help from the Widget Desktop:

- Click the information icon in the lower right corner of the page.

To switch to Compose mode:

1. If you have setup privileges in the active partition, click Compose Mode from the Desktop menu in the lower left corner of the page.

   To the right of the Desktop menu, you will now see the word “Compose” and property sheets for changing the Desktop menu, layout properties, and default widget properties for the selected layout:

2. Make any changes you want to the current layout, or any available layout, and then save the layout.
3. When you have finished, select **End Compose Mode** from the Desktop menu to return to monitoring mode, or select **Exit** from the menu to return to the Main Menu.

To exit the Widget Desktop:

- Select Exit from the Desktop menu in the lower left corner of the page to return to the main menu.

About the Alarm Workflow Widget

If the creator of a Widget Desktop layout has made the Alarm Workflow widget available, you can it to monitor and resolve alarms.

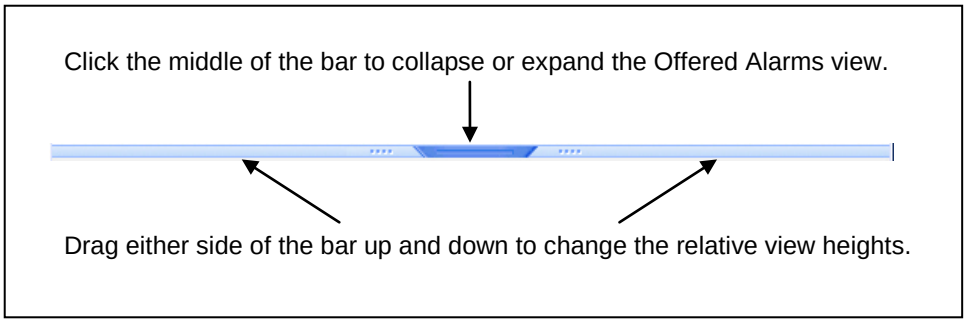
Depending on how the Alarm Workflow widget was configured for the current layout, it will show alarms from the current partition only, from selected partitions, or from all partitions.

There is an **Operator is present** check box in the upper left corner of the Alarm Workflow widget. You can select or clear this check box to indicate your current availability for handling alarms in the partitions you are viewing. Depending on how the alarm workflow feature was implemented for your system, alarms might behave differently when this check box is selected than when it is clear.

The Alarm Workflow widget includes two views for managing alarms. The **Offered Alarms** view includes alarms that are unowned or are owned by another operator. The **My Alarms** view includes alarms that are owned by you. The following information appears for each alarm:

- **Priority/Color**: The priority and color specified for alarms in the event definition. The column header will display either a **P** or a **C**, depending on whether the column is currently set to sort by priority or by color.
- **Date/Time**: The date and time the alarm was triggered.
- **Partition**: The partition in which the alarm occurred.
- **Name**: The name of the event.
- **Policy**: The event policy specified for alarms in the event definition. The event policy defines a set of states, alarm timers, and transition rules that will be used to move alarms through the system.
- **Owner** (Offered Alarms view only): The current owner of the alarm. For example, if the alarm has no owner, **<Unassigned>** appears in this column.
- **State**: The current state of the alarm. If there is a timer associated with the current alarm state, a progress bar indicates the number of seconds remaining before the timer expires. The progress bar is green for the first half of that time period and yellow for the remaining half.

The **Offered Alarms** and **My Alarms** views are separated by a splitter bar, shown in the following figure, which you can use to change the amount of vertical space each view occupies within the widget.



Note: By default, the alarms in each view are sorted by priority. To reverse the sort order, click the priority (**P**) column header. Arrows indicating the current sort order appear in the header. To sort the view on a different column, click that column header.

Changing the Alarm Workflow Widget Properties

If the creator of the Widget Desktop layout has made the Alarm Workflow widget configurable, you can change its common properties and its scope properties. You can also specify the following unique properties for the widget:

- **Priority sorting method**: Select the sorting method used to sort alarms on the **Priority/Color** column.
  - **Sort by priority**: With this setting, alarms are sorted according to their priority numbers.
  - **Sort by color**: With this setting, alarms are sorted according to their colors.
- **Update progress bar every**: Select the frequency (1, 2, 5, or 10 seconds) with which progress bars displayed in the **State** column.

Monitoring and Resolving Alarms

When the Alarm Workflow widget is available in a Widget Desktop layout, you can use it to monitor and resolve alarms. You can:

- Indicate your presence and availability for handling alarms
- Add a duty log entry for selected alarms
- Adopt selected alarms
- Clear actions for selected alarms
- Acknowledge selected alarms

To indicate your presence:

- To indicate that you are available to handle alarms, select the **Operator is present** check box in the upper left corner of the widget.

You can select or clear this check box to indicate your current availability for handling alarms in the partitions you are viewing. Depending on how the alarm workflow is configured for your system, alarms might behave differently when this check box is selected than when it is clear.

To add a duty log entry for selected alarms:

1. In the **Offered Alarms** or **My Alarms** view, select each alarm to which you want to add a duty log message.
2. Click the **Add Duty Log button**.

Tip: Right-clicking an alarm listed in the **My Alarms** view both selects it and displays a menu from which you can select **Add Duty Log**.

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3. In the Duty Log Entry dialog box, enter your duty log message and click **Save**.

   A duty log entry is added to the Activity Log for the selected alarms. Monitors will be able to click a clipboard icon in the entry to view your message.

To adopt selected alarms:

1. In the **Offered Alarms** view, select each alarm for which you want to take ownership.
2. On the **Ownership Options** drop-down list, select one of the following options:
   - **Adopt Alarm**: Moves the selected alarms to the My Alarms view.
   - **Adopt and Acknowledge**: Moves the selected alarms to the My Alarms view and acknowledges them. Note that acknowledging an alarm does not resolve it, unless the cause of the alarm is no longer active.
   - **Adopt and Clear Actions**: Moves the selected alarms to the My Alarms view and clears all active actions for the alarms.

Tip: Right-clicking an alarm listed in the Offered Alarms view both selects the alarm and displays a menu from which you can select any of the ownership options listed above.

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3. If you are prompted, click **Yes** to confirm that you want to perform all selected actions, or click **No** to cancel all actions.

Note: The **Allow Clear Actions** settings for an event will determine whether a Clear Actions request will have an effect on its associated actions.

To clear actions for selected alarms:

1. In the **My Alarms** view, select each alarm for which you want to clear active actions.
2. Click Clear Actions.

   Tip: Right-clicking an alarm listed in the **My Alarms** view both selects it and displays a menu from which you can select **Clear Actions**.

3. If you are prompted, click **Yes** to confirm that you want to perform all selected actions, or click **No** to cancel all actions.

   If you click **Yes**, all active actions are cleared for every selected alarm, regardless of the view in which it appears.

Note: The **Allow Clear Actions** settings for an event will determine whether a Clear Actions request will have an effect on its associated actions.

To acknowledge selected alarms:

1. In the **My Alarms** view, select each alarm you want to acknowledge.
2. Click **Acknowledge**.

   Tip: Right-clicking an alarm listed in the **My Alarms** view both selects it and displays a menu from which you can select **Acknowledge**.

3. If you are prompted, click **Yes** to confirm that you want to perform all selected actions, or click **No** to cancel all actions.

   If you click **Yes**, every selected alarm is acknowledged, regardless of the view in which it appears. Note that acknowledging an alarm does not resolve it, unless the underlying cause of the alarm is no longer active.

Granting Passback Grace to Cardholders

Select **Monitor : Passback Grace**.

On this page, system users with at least an Administration user role can grant passback grace to cardholders. When a cardholder is “graced,” the person's next card read is allowed, no violations are triggered, and the person is moved to the region specified by the Auto-passback Grace to Region setting on the Network Controller page. Thereafter, all anti-passback rules are in effect, as before.

Note: A system user with only a Monitor user role can also grace cardholders, if both of following settings are selected on the Network Controller page: **The monitoring role can grant passback grace** and **Show Region and Passback Grace info in the Roster and People reports**.

To grant passback grace to cardholders:

1. In the search form, select the region in which you want to search, and enter sufficient additional data to find the people you want to grace.
2. Click **Search**.

   A report containing the search results is displayed below the form. The report shows each person's name and current location.
3. To grace an individual cardholder, click the **Grace** button for that person. To grace all cardholders listed in the report, click the **Grace all shown** button.

Note: A **Grace pending** button appears for any cardholder who does not require passback grace—such as a person who was just added to the system and is still in the Uncontrolled Space region.

Unlocking Portals and Viewing Their Status

There are several ways to unlock portals and view their status:

- Under **Monitor : Portal Status**, or in the **Portal Status Widget**, you can:
  - View the current location and status of any portal or online remote lockset, and view the unlock schedule of any portal.
  - View the current threat level of any portal or online lockset whose location has a different threat level than the default location for that partition.
  - Momentarily unlock a portal or online remote lockset.
  - Switch a portal to a locked or unlocked state.
  - Disable or enable a portal.
  - Schedule an extended lock or unlock of a portal.
- Under **Administration : Schedule Action**, or under **Monitor : Live Monitoring : Floorplans**, you can:
  - Schedule an extended lock or unlock of a portal.
  - You can also schedule the disarming of an input or activation or deactivation of an output. See Scheduling Actions for Inputs and Outputs on page 25.

Note: For more information about using Floorplans, see Monitoring Floorplans on page 9.

To momentarily unlock a portal or online remote lockset:

1. Select Monitor : Portal Status.
2. In the **Portal** column, locate the portal or lockset you want to unlock.
3. Click **Momentarily Unlock Portal** in the **Action** column. The portal or lockset unlocks for the unlock time configured in the portal definition.

To switch a portal to a locked or unlocked state:

1. Select Monitor : Portal Status.
2. In the **Action** column, click **Lock Portal** for the portal you want to lock.

   The portal locks immediately. It will remain in a locked state until it is unlocked again – either manually via the **Unlock Portal** button or a double card read, or automatically when any new scheduled action for this portal becomes active or any portal group time spec change involving this portal occurs. Once the portal has been returned to automatic control by a time spec change, any suspended event action defined for the portal is resumed.
3. In the **Action** column, click **Unlock Portal** for the portal you want to unlock.

   The portal unlocks immediately. It will remain in an unlocked state until it is locked again – either manually via the **Lock Portal** button or a double card read, or automatically when any new scheduled action for this portal becomes active or any portal group time spec change involving this portal occurs. Once the portal has been returned to automatic control by a time spec change, any suspended event action defined for the portal is resumed.

Note: The **Lock Portal** and **Unlock Portal** buttons are also available in the Portal Status and Portal Unlock widgets.

To disable or enable a portal:

1. Select Monitor : Portal Status.
2. In the **Portal** column, locate the portal or lockset you want to unlock.
3. To disable the portal, click **Disable Portal** in the **Action** column. The portal is locked and temporarily removed from the system's control.
4. To enable the portal, click **Enable Portal** in the **Action** column. The portal is returned to the system's control.

To schedule an extended unlock of a portal:

1. Select Monitor : Portal Status.
2. In the **Portal** column, locate the portal you want to unlock.

3. Click **Edit Schedule** in the **Action** column to display a list of scheduled actions for the selected portal.
4. To add a scheduled action, click the add button .
5. In the **Scheduled Actions** dialog box, select **Lock** or **Unlock** from the **Action** drop-down list.
6. For the **Uses Time** setting:
   - Select **System Time** if you want the start and end times to be based on the Network Controller time zone.
   - Select **Local Site Time** if you want the start and end times to be based on the Network Node time zone.
7. To schedule the **Start Time**, select one of the following:
   - **Now**: The action will start at the current date and time (filled in by default).
   - **At**: (selected by default) The action will start at the date and time you enter.
   - **In**: The action will start once the number of specified hours and minutes have elapsed.
8. To schedule the **End Time**, select one of the following:
   - **At**: The action will end at the date and time you enter. Use the format shown for the start time.
   - **After**: The action will end once the number of specified hours and minutes past the action's start time have elapsed.
9. In the **Comment** box, enter any comments you want to appear in the list of scheduled actions for the portal.
10. When you have finished, click **OK** to close the dialog box.

    Example: Select **Unlock** and set the **Start Time** to **Now**. Set the **End Time** to **After** 1:30 (one hour and thirty minutes). Click **OK**. The portal will unlock immediately and stay unlocked for one hour and thirty minutes.
11. To remove a scheduled action, repeat step 2, select the action, click the delete button, and click OK.
12. To edit a scheduled action, repeat step 2, select the action, click the edit button , make any changes you want tin the dialog box, and click OK.

Note: If a threat level group is selected under Portal Policies in the portal's definition, threat level changes at the portal's location might override a scheduled unlock currently in effect for the portal.

To schedule an extended lock or unlock from the Schedule Action page:

1. Select **Administration : Schedule Action**.
2. Click the **Schedule** link for the portal for which you want to schedule an action. A **Scheduled Action** dialog box appears.
3. In the **Action** column, select **Lock** or **Unlock**.

Note: Do not unlock a portal by scheduling an action for its lock output. This could create an alarm condition, because the portal may be opened without a valid card read.

---

4. In the **Start Date/Time** column, select one of the following:
   - **Now**: (the default setting) The action will start at the current date and time.
   - **At**: The action will start at the date and time you specify.
   - **In**: The action will start once the number of specified hours and minutes have elapsed.
5. In the **End Date/Time** column, select one of the following:
   - **At**: The action will end at the date and time you enter. Use the format shown for the Start Date/Time.
   - **After**: The action will end once the number of specified hours and minutes past the action's start time have elapsed.
6. Under **Use**, select either **Local Site Time** or **System Time**.

   When you select **Local Site Time**, the time specs for the selected action will be based on the time zone set for the local Network Node. When you select **System Time**, the time specs will be based on the time zone set for the Network Controller.
7. Click **Save**.

Note: If a threat level group is selected under Portal Policies in the portal's definition, threat level changes at the portal's location might override a scheduled unlock currently in effect for the portal.

To schedule an extended lock or unlock from a floorplan:

1. Select **Monitor : Live Monitoring : Floorplans**.
2. Select a floorplan from the **Floorplan** drop-down menu.
3. Hold down the left mouse button on the icon for a portal and select **Schedule Action** from the popup menu. A **Scheduled Action** dialog box appears.

Note: Selecting **Momentarily Unlock** from the popup menu for a portal unlocks the portal for its configured unlock time.

---

4. In the **Action** column, select **Lock** or **Unlock** for a portal.

5. In the **Start Date/Time** column, select one of the following:
   - **Now**: (the default setting) The action will start at the current date and time.
   - **At**: The action will start at the date and time you specify.
   - **In**: The action will start once the number of specified hours and minutes have elapsed.
6. In the **End Date/Time** column, select one of the following:
   - **At**: The action will end at the date and time you enter. Use the format shown for the Start Date/Time.
   - **After**: The action will end once the number of specified hours and minutes past the action's start time have elapsed.
7. Click **Save**.

   For example, for an output, select **Disarmed** and leave the **Start Time** at **Now**. Set the **End Time** to **After** 1:30 (one hours and thirty minutes). Click **Save**. The output will be disarmed for one hour and thirty minutes, starting immediately.

Scheduling Actions for Inputs and Outputs

Under **Administration : Schedule Action**, or under **Monitor : Live Monitoring : Floorplans**, you can schedule the disarming of an input or activation or deactivation of an output.

To schedule an extended action from the Schedule Action page:

1. Select **Administration : Schedule Action**.
2. Click the **Schedule** link for the input or output for which you want to schedule an action. A **Scheduled Action** dialog box appears..
3. In the **Action** column, select **Disarmed** for an input, or **Activate** or **Deactivate** for an output.
4. In the **Start Date/Time** column, select one of the following:
   - **Now**: (the default setting) The action will start at the current date and time.
   - **At**: The action will start at the date and time you specify.
   - **In**: The action will start once the number of specified hours and minutes have elapsed.
5. In the **End Date/Time** column, select one of the following:
   - **At**: The action will end at the date and time you enter. Use the format shown for the Start Date/Time.
   - **After**: The action will end once the number of specified hours and minutes past the action's start time have elapsed.
6. Under **Use**, select either **Local Site Time** or **System Time**.

When you select **Local Site Time**, the time specs for the selected action will be based on the time zone set for the local Network Node. When you select **System Time**, the time specs will be based on the time zone set for the Network Controller.

7. Click **Save**.

   For example, for an output, select **Activate** and leave the **Start Time** at **Now**. Set the **End Time** to **After** 1:30 (one hours and thirty minutes). Click **Save**. The output will be activated for one hour and thirty minutes, starting immediately.

To schedule an extended action from a floorplan:

1. Select **Monitor : Live Monitoring : Floorplans**.
2. Select a floorplan from the **Floorplan** drop-down menu.
3. Hold down the left mouse button on the icon for an input or output, and select **Schedule Action** from the popup menu. A **Scheduled Action** dialog box appears.
4. In the **Action** column, select **Disarmed** for an input, or **Activate** or **Deactivate** for an output.
5. In the **Start Date/Time** column, select one of the following:
   - **Now**: (the default setting) The action will start at the current date and time.
   - **At**: The action will start at the date and time you specify.
   - **In**: The action will start once the number of specified hours and minutes have elapsed.
6. In the **End Date/Time** column, select one of the following:
   - **At**: The action will end at the date and time you enter. Use the format shown for the Start Date/Time.
   - **After**: The action will end once the number of specified hours and minutes past the action's start time have elapsed.
7. Click **Save**.

   For example, for an output, select **Disarmed** and leave the **Start Time** at **Now**. Set the **End Time** to **After** 1:30 (one hours and thirty minutes). Click **Save**. The output will be disarmed for one hour and thirty minutes, starting immediately.

Selecting Partitions

Select **Monitor : Select Partition**.

If your system is partitioned for monitoring multiple populations and/or resources separately, you can select a different partition to:

- Monitor the other partition's activity.

- Perform administrative functions within the other partition.
- Set up and configure resources within the other partition.

To select a different partition:

1. Select the partition in which you want to work.
2. Click **Save**.

Note: You will need an appropriate user role in a partition before you will see its resources and activity.

Managing People Data

You can use options on the **Administration : People** menu to enter and change information about system users.

Choose this:	To do this:
Add	Add a person to the system.
Change/delete	Edit or delete the information currently in the system for a person.

Adding People to the System

Select **Administration : People : Add**.

A person must first be added to the system before issuing a credential, assigning an access level, or printing a photo ID.

To add a person:

1. Fill in the fields at the top of the person record:
   - In the text boxes enter a **Last Name** and **First Name**. **Last Name** is a required entry.
   - The **Activation Date/Time** is a required entry. It defaults to today. Click the calendar icon to select a different activation date.
   - For this record to be temporary, you must enter an **Expiration Date/Time**. This person's record and any credentials issued to this person will expire on the expiration date and time entered.

   Note: Activation date can be more recent than Expiration date. This may happen when re-activating a person's record after it has previously expired. The most recent date takes precedence. This record will be active but we recommend that the old expiration date be deleted.

   - If your organization issues ID numbers, enter the person's ID number in the **ID#** text box.

   Note: Although the **ID#** is not required, supplying a unique Person ID for each person record allows the records to be reliably retrieved, modified, and deleted via the API.

2. Review the information on the person record tabs, and make any needed changes or additions. For information about each of the tabs, see About the Person Record on page 31.
3. Click **Save**.
4. To add another person, click the **Add Another Person** button.

Changing Personal Information

Select **Administration : People : Change/delete**.

On this page you can:

- Search for person records to view, edit, or delete.
- Add or change personal information including contact and vehicle information, access level, photo, and user role permissions.
- Delete or Undelete a person's record. Note that deleting a person's record does not remove it from the system, but rather deletes it from the active roster. When viewing a deleted record the **Delete** action button changes to **Undelete**.
- Use the **Add** link to add people to the system.

To search for an individual's record by scanning a credential:

1. Click the **Search by Credential Scan** button at the bottom of the page.
2. If an enrollment reader is not defined for your system, select a reader from the drop-down list and click **Go**.
3. Scan the credential.
4. If the 90 second timeout period expires before you are able to complete the scan, click **Go** to restart the timer.
5. (optional) Before the timeout period expires, click **Stop** to stop the timer, then click **Go** to restart it when you are ready.

   In the list of matching person records, click a name to open the person's record. If only one record has a matching hot stamp number, that record opens automatically.
6. Make any needed changes to the person record.

To search for an individual's record by entering search criteria:

1. Search for person records by using any of the available fields.
   - Fields marked with an asterisk will find complete exact matches only. For example, if you enter an **ID#** of 123 and the person's ID# is 1234, no matches will be found.
   - Fields not marked with an asterisk can find partial matches. For example, enter the first letter of the **Last Name** and click **Search**. A list of all people whose last names begin with that letter will be displayed.
   - Entries in multiple fields must match on all fields. For example, enter the first letter of the **Last Name**, a **Department** name, and click **Search**. A list of all people whose last names begin with that letter AND whose department name also matches will be displayed.
2. Use the **Expiration date before** and **Expiration date after** fields to find people whose person records have expiration dates before or after a specific date.

3. Use the **Partition** drop-down list to specify the partitions you want to search:
   - Select **<all>** to include records from all partitions to which you have access. This option will only appear if you have access to multiple partitions.
   - Select **<visible>** to include records located in other partitions that are visible within the current partition.
   - Select **<current>** to limit the search to records located in the current partition.
   - Select the name of a partition to limit the search to records located in that partition.
4. To include particular types of records in the search results, select the check box for any of the following records:
   - **Include deleted records**: Records that have been deleted from the system will be included. This check box is selected by default.
   - **Include expired records**: Records that have expired will be included.
   - **Include only records with non-unique person IDs**: Only records with non-unique person IDs will be included. This is useful for finding and fixing non-unique person IDs prior to enabling the **Enforce unique person IDs** option on the Network Controller page.
   - **Include only records that exceed max active credentials**: Records that exceed the maximum number of active credentials a person should have per partition (as set on the Network Controller page) will be included.
   - **Include only records for traced persons**: Only records for people whose activity is being traced will be included. The **Trace this person** check box is selected in the person record of such individuals.
5. Click the **Search** button.

   If the search returns a list of names, click on the name of the person whose record you want to view, edit, or delete. If only one record matches the search criteria, that record opens automatically.

Note: If the person record is located in another partition, you will first need to click the **Switch Partition to Edit User** button at the bottom of the record to navigate to the other partition. You are able to edit the record if you have sufficient access rights in that partition. After saving your changes, you can navigate back by clicking the **Switch Partition to Original** button.

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6. Make any needed changes on the full Personal Information page.
7. Click **Save**.

About the Person Record

Once you select the person whose information you want to change or delete, the person record on the **Administration : People : Change** page appears. The information you can change for the person is described below.

To make changes in the basic information section:

1. **Last Name** and **Activation Date/Time** fields are required entries. You can click on the calendar icon to display a calendar for selecting dates.
2. Enter an **Expiration Date/Time** if you want the person's access to expire automatically at a particular date and time.

Note: The activation date can be more recent than the expiration date. This might happen when re-activating a person's record after it has previously expired. The most recent date takes precedence. This record will be active but it is recommended that the old expiration date be deleted.

---

3. If your organization issues ID numbers this can be entered in the **ID# text** box.

Note: For information about who last modified a person record and when, see the read-only fields **Last Modified Date & Time** and **Last Modified User** at the bottom of this section.

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4. You can also modify information on the person record tabs, described in the following sections.

Note: Depending on how the person record is configured for your system, you may see fewer tabs than are described here. In addition, the User-defined tab may have been given a unique name and custom data fields.

Access Control Tab

On this tab you can issue or revoke or temporarily disable credentials and assign a PIN, regional anti-passback privileges, an extended unlock period, trace a person's usage, and access levels. For more details, see Changing a Person's Access on page 35.

Photo ID Tab

If your system is licensed for photo ID badging you will see a **Photo ID** tab**.** On this tab you can upload, save, and delete photo ID images and digital signatures, and create and print access badges. Each image file uploaded must have a unique name and must end with the extension .jpeg or .jpg. It must be no larger than 80 KB; or on an Extreme or Enterprise system, no larger than the current photo ID size limit option on the Network Controller page.

User-defined Tab

These twenty fields can be customized and used by your organization to contain any data that you need to capture about people in your system.

Contact Tab

This information is optional and is only for the reference of the security application user.

Other Contact Tab

This information is optional and is only for the reference of the security application user.

Vehicles Tab

This information is optional.

- The **License #** field is for the state issued license plate number.
- The **Tag #** field is for the company issued parking permit number.

The **Tag #** field can be used to search for a person record. If your organization does not issue parking tag numbers you can enter the license plate number in the **License #** field to search and determine who owns a particular vehicle.

Login Tab

An entry is made here only if the person is a user in the system.

1. Enter a **User Name**.
2. Have the user enter their password in both the **Password** and **Re-enter Password** fields.

   Note: If you have configured an LDAP server for single sign-on password authentication, check the **Login using directory services domain passwords** box. **DO NOT** enter passwords here.

3. Select from the **User Roles** drop-down the appropriate user role for this person.
4. Select a default Widget Desktop layout for this person from the **Default Widget Desktop** drop-down. This is the layout that will appear automatically when the person is logged in and opens the Widget Desktop.
5. Click **Save**.

There are four levels of user roles for security application users. From lowest to highest they are:

- **Master partition monitor**. Users with this role can use all available Monitor functions, within the **Master** (default) partition only.

- **Master partition administer**. Users with this role can use all available Monitor and Administration functions, within the **Master** (default) partition only.
- **Master partition setup**. Users with this role may use the functions of the Setup, Administration, and Monitor menus, within the **Master** (default) partition only.
- **Full system setup**. Users with this role may use all available functions of the Setup, Administration, and Monitor menus with all partitions.

In addition to the roles above, users with setup privileges can assign **Custom User Roles** created using the **Setup : Site Settings : User Roles** page.

The Main Menu is built dynamically for each user who logs in. It will show only those menus, cameras, access levels, elevators, floor plans, events, and personal information that the user has permission to view or use based upon their assigned user roles.

Partitions Tab

The Partitions tab appears in person records only if the system has multiple partitions.

- If the person record is visible in all other partitions, the tab displays a note to that effect. In this case, administrators in every other partition have limited access to the person record. This means they can search for the person record, open it, and assign or remove any of the access levels defined in their own partitions. They cannot edit any other information in the person record, such as the person's contact and login information.
- If the person record is visible in only certain partitions, those partitions are listed on the tab. To give administrators in these partitions limited access to the person record, you will need to grant them that access.

As an example of why you might want to grant administrators in other partitions limited access to a person record, suppose that Thomas, an employee working in the home office, is about to begin a three-month assignment in a remote office. As the administrator of the Home Office partition, you can give Megan, the Remote Office partition's administrator, limited access to Thomas's person record for that period. She will then be able to assign Thomas the access levels he will need to enter and navigate the remote facility. Once Thomas's temporary assignment is completed, Megan can remove her partition's access levels from Thomas's person record.

To grant and revoke limited access to a person record:

1. Run a search to locate the person record.
2. On the Personal Information page, click the **Partitions** tab.

   The Partition drop-down list includes all other partitions in which you have at least administrator privilege, or in which the **Make this partition name visible to all administrators in other partitions** check box is selected on the Network Controller page.

3. Select a partition whose administrators should be granted limited access to this person record.
4. Enter the date and time when the limited access should expire.

Note: Click the calendar icon to select the date. If you do not enter an expiration date, administrators in the selected partition will have permanent limited access to the person record.

---

5. Click **Save**.
6. To revoke a partition's limited access before it expires, click the **Delete** icon to the left of the entry, click **Yes** to confirm, and then click **Save**.

Note: When searching for the person record, administrators who have been granted limited access will need to select the partition where the record resides before running the search.

Recent Activity Tab

This Recent Activity tab provides a report of the last ten (10) system events generated by this particular user.

Issuing Credentials to Employees

Before a credential can be issued, the employee name and activation date must be entered into the system.

To issue a credential:

1. Select **Administration : People : Change/delete**. You can search for person records by using any of the available fields.
   - Fields marked with an asterisk will find complete exact matches only. For example, if you enter an **ID#** of 123 and the person's ID# is 1234, no matches will be found.
   - Fields not marked with an asterisk can find partial matches. For example, enter the first letter of the **Last Name** and click **Search**. A list of all people whose last names begin with that letter will be displayed.
   - Entries in multiple fields must match on all fields. For example, enter the first letter of the **Last Name** and a **Department** name, and then click **Search**. A list of all people whose last names begin with the letter you entered AND whose department name matches the one you entered, will be displayed.
2. On the **Access Control** tab, click the **Add New Credential** button.
3. In the **Credential Format** field, select from the drop-down list the credential type being issued.
4. Enter the Hot stamp number printed on the card in the **Hot Stamp #** field.

Note: If the **Hot Stamp and encoded numbers default identical** check box is selected (**Setup : Access Control : Card/Keypad Formats**), whenever you enroll a credential using a reader or manually enter a number in the **Hot Stamp #** field, the system populates both **Hot Stamp #** and **Encoded #** fields with the same value.

5. Click the **Read** button to display the **Issue Credential Using Reader** pop-up window.
6. Check the **Reader** drop-down to ensure that the enrollment reader you are using is selected, and then click the **Go** button.
7. Swipe or pass the credential by the reader.

   The electronically encoded number in the credential appears in the **Encoded #** field back in the application window.

Note: In the **Access Levels** section on the right side of the **Access Control** tab, be sure that this employee has appropriate access levels in the **Selected** list.

8. Click **Save**.

Changing a Person's Access

Select **Administration : People**, enter a name and click **Search**.

On the Access Control tab of the Personal Information page you can:

- Issue a new credential.
- Revoke a credential.
- Disable a credential.
- Assign access levels.

Each individual in the system is limited to a maximum of 32 access levels.

Note: If the **Hot Stamp and encoded numbers default identical** check box is selected (**Setup : Access Control : Card/Keypad Formats**), whenever you enroll a credential using a reader or manually enter a number in the **Hot Stamp #** field, the system populates both **Hot Stamp #** and **Encoded #** fields with the same value.

To issue a new credential using a reader:

1. Select **Administration : People**, enter a name and click **Search**
2. On the **Access Control** tab, click the **Add New Credential** button.
3. Enter the hot stamp number printed on the credential in the **Hot Stamp #** field.

4. From the **Credential Format** drop-down list, select the credential type being issued.
   - (optional) Select a different status for the credential from the **Status** drop-down list. See "To disable a credential" below for more information.
   - (optional) If credential profiles are enabled for the site, select a profile from the **Profile** drop-down list. The profile will determine the maximum days of non-use before the credential will expire.
   - (optional) To set an expiration date for the credential, click the **Expiration Date** calendar icon and select a date from the calendar that appears. Each night the controller will check for and delete expired credentials.

     To remove an expiration date from a credential, click the date and then press **DELETE**.
5. Click the **Read** button to read the credential.
6. In the **Issue Credential Using Reader** dialog box, check to make sure the enrollment reader you are using is selected in the drop-down, and then click **Go**.
7. Swipe or pass the credential by the reader and the electronically encoded number in the credential will appear in the **Encoded #** box.

Note: If auto-incrementing of encoded credential numbers is enabled for your system (under Misc. Information on the **Network Controller** page), the value that appears in the **Encoded #** field will be one number above the highest value for any encoded number in the database.

Note: If the person already has the maximum number of active credentials set for your system, you will see an error message. To add the new credential, you will need to either revoke or disable one of the person's currently active credentials.

---

8. Click **Save**.

To issue a new credential using keyboard entry:

1. Select **Administration : People**, enter a name and click **Search**.
2. On the **Access Control** tab, click the **Add New Credential** button.
3. Enter the hot stamp number printed on the credential in the **Hot Stamp #** field.
4. Enter the encoded credential number in the **Encoded #** field.
5. In the **Credential Format** field select from the drop-down list the credential type being issued.

- (optional) Select a different status for the credential from the **Status** drop-down list. See “To disable a credential” below for more information.
- (optional) If credential profiles are enabled for the site, select a profile from the **Profile** drop-down list. The profile will determine the maximum days of non-use before the credential will expire.
- (optional) To set an expiration date for the credential, click the **Expiration Date** calendar icon and select a date from the calendar that appears. Each night the controller will check for and delete expired credentials.

  To remove an expiration date from a credential, click the date and then press **DELETE**.

Notes: If auto-incrementing of encoded credential numbers is enabled for your system (under Misc. Information on the **Network Controller** page), the value that appears in the **Encoded #** field will be one number above the highest value for any encoded number in the database.

If the person already has the maximum number of active credentials set for your system, you will see an error message. To add the new credential, you will need to either revoke or disable one of the person's currently active credentials.

---

6. Click **Save**.

To issue a new credential for use with remote locksets:

1. Select **Administration : People**, enter a name and click **Search**.
2. On the **Access Control** tab, click the **Add New Credential** button.
3. Enter the hot stamp number printed on the credential in the **Hot Stamp #** field and enter the encoded credential number in the **Encoded #** field.

   – or –

   For a PIN-only credential, enter the 6-digit PIN into both the **Hot Stamp #** field and the **Encoded #** box.

Notes: If auto-incrementing of encoded credential numbers is enabled for your system (under Misc. Information on the **Network Controller** page), the value that appears in the **Encoded #** field will be one number above the highest value for any encoded number in the database.

If the person already has the maximum number of active credentials set for your system, you will see an error message. To add the new credential, you will need to either revoke or disable one of the person's currently active credentials.

---

4. Select the credential type being issued from the **Credential Format** drop-down list. For a PIN-only credential, select **Remote Lockset PIN Only**.

Note: The **Remote Lockset PIN Only** format is intended for remote locksets configured with card readers only. It can be assigned to a remote lockset configured with both a reader and keypad, however, if you assign a PIN to the user. The user will need to enter the PIN twice at the lockset to unlock it.

   - (optional) Select a different status for the credential from the **Status** drop-down list. See "To disable a credential" below for more information.
   - (optional) If credential profiles are enabled for the site, select a profile from the **Profile** drop-down list. The profile will determine the maximum days of non-use before the credential will expire.
   - (optional) To set an expiration date for the credential, click the **Expiration Date** calendar icon and select a date from the calendar that appears.

     Each night the controller will check for and delete expired credentials. To remove an expiration date from a credential, click the date and then press **DELETE**.

5. (optional) Select a type from the **Remote Lockset User Type** drop-down list. Once a credential has been assigned any remote lockset user type other than **Regular Access Card**, it will no longer be usable as an access card.

Note: Be sure to test any credential that will be used with remote lockset magnetic stripe readers before giving it to the user. Occasionally, a magnetic stripe reader will fail to read a credential that can be successfully read by other readers. When this happens, the user receives no beep or confirmation that the credential was not read, and no information about the access attempt is recorded.

---

6. Click **Save**.

To disable a credential:

1. Select **Administration : People**, enter a name and click **Search**.
2. In the table of credentials on the **Access Control** tab, locate the credential you want to disable.
3. On the **Status** drop-down list, change the **Active** setting to any of the following:
   - **Clear***
   - **Damaged***
   - **Disabled**
   - **Forgotten***
   - **Lost***

- **Not Returned***
- **Not Used**
- **Not Validated***
- **Returned***
- **Stolen***
- **Suspended***

Important: The nine settings followed by an asterisk (*) above might have been customized for your system. For any of these nine settings, an administrator might have used the **Credential Attributes** page to change its name and description and to specify that all credentials to which the setting is applied should remain functional. For this reason, the **Status** drop-down list might look different from the list above, and applying certain of these settings to a credential might not disable it.

4. Click **Save**.

   The credential will not function until its status is changed back to **Active**.

Note: You should consider disabling the credential of a person whose credential has been forgotten, lost, or stolen and to whom you are issuing a temporary credential. If the disabled credential is found, you can select it and change its status back to **Active**.

You can run a **Credential Audit** report to view existing credentials by their current status settings and by recent non-use.

To set or remove an activation date or expiration date for an access level:

1. In the table of access levels, double-click anywhere in the row for the access level you want to edit.
2. To set an activation date, click the calendar icon in the **Activation Date** column, select a date from the calendar that appears, and then press **ENTER**.
3. To set an expiration date, click the calendar icon in the **Expiration Date** column, select a date from the calendar that appears, and then press **ENTER**.
4. To remove an activation date or expiration date from the access level, double-click anywhere in its row, drag to select the date you want to remove, press **DELETE**, and then Press **ENTER**.
5. To have the system automatically remove the access level once it expires, select **Yes** from the **Auto-remove** drop-down list.

   Each night, the controller will check for and delete expired access levels.
6. Click **Save**.

Note: If the **Save** button is dimmed, press **ENTER** to make it available.

To exempt an individual from the credential non-use rule:

Note: To ensure that credentials are disabled if they are not used within a specified number of days from the date they were issued, the administrator can select this feature on the Network Controller page.

1. Click the **Access Control** tab.
2. Select the **Exempt from credential non-use rules** check box on his or her person record.

To assign, edit, and remove access levels:

1. In the **Access Levels** section of the **Access Control** tab, select each access level you want to assign from the **Available** box, then click the right arrow button to move it to the **Selected** table.

   Use **SHIFT-click** to select multiple access levels at once.
2. To set an expiration date for an access level, do all of the following:
   - Double-click anywhere in its row and select a date from the calendar that appears. Press **ENTER** twice, then click **Save**.
   - To remove an expiration date from an access level, double-click anywhere in its row, select the date in the text box and press **DELETE**. Press **ENTER** twice, then click **Save**.
   - To have the system automatically remove the access level once it expires, select **Yes** from the **Auto-remove** drop-down list.
   - Press **ENTER** to confirm the changes, or press **ESC** to cancel them.
3. (optional) If Otis Compass is enabled, do either or both of the following, and then click **Save**.
   - Select a floor from the **Default elevator stop (floor)** drop-down list.

     This setting determines the floor to which the user will be directed.
   - To enable flags that are sent directly to the elevator control system, select any or all of the following check boxes: **VIP**, **TD08**, **TD10**, **TD20**, **TD40**, and **TD80**.

     The effect of enabling these flags depends on the configuration of the elevator control system.
4. To remove an access level from the person record, select it and click the left arrow button to move it back to the **Available** list.
5. Click **Save**.

Note: Access levels are assigned to people, not to credentials (such as access cards). All credentials issued to a particular person will have the same

access levels as the person. Each person in the system is limited to a maximum of 32 access levels.

To assign regional anti-passback privileges:

Anti-passback privileges are assigned to people, not to credentials.

1. Click the **Access Control** tab.
2. In the lower left corner, select an entry from the **Regional anti-passback privileges** drop-down list to determine how this person's passback violations should be handled:
   - **(none)**: The person will have no special anti-passback privileges. Violations will be handled according to the Passback violations and Tailgate violations behaviors selected on the **Regions** page.
   - **Exempt**: The system will ignore violations.
   - **Soft Only**: The system will log each violation, but allow access.
   - **Hard Only**: The system will deny access in the case of a violation.

   These anti-passback privileges take precedence over the specified Tailgate and Passback violation behaviors selected on the **Regions** page.

   Note: Mercury panels support only the **(none)** and **Exempt** settings.

3. Click **Save**.

To trace a person's activity:

1. To trace this person's activity in the current partition, select the **Trace this person** check box.
2. Click **Save**.

Whenever this person makes a valid or invalid access attempt in the current partition, a message will appear in the Activity Log. The message text will be displayed in bold, and in the color selected for **Trace person log color** on the Network Controller page.

If an event is selected for **Trace person event** on the Network Controller page, the event will be triggered whenever this person makes a valid or invalid access attempt in the current partition. These event activations will be logged in the Activity Log and you can report on them by setting a Trace people filter for a custom history report.

To assign a PIN:

1. Click the **Access Control** tab.
2. Enter a four- to six-digit number in the **PIN** text box in the lower right corner of the tabbed page.

   Note: Most Wiegand keypads support four digit PINs. Bit-burst keypads support PINs of any length.

3. Alternatively, click this icon next to the text box to enter an automatically generated PIN containing the number of digits specified for **Auto-generated PIN digits** on the Network Controller page (**Setup : Site Settings : Network Controller**).
4. Click **Save**.

Note: If the security administrator has enabled the **Keypad timed unlock** feature for a portal that has a reader/keypad device, a cardholder is able to present his or her credential at the portal, and then enter his or her assigned PIN followed by the number sign (#) and the number of minutes (1-99) the portal should remain unlocked. For example, entering **#20** after the PIN will unlock the portal for 20 minutes.

To assign a Duress PIN:

1. After assigning a PIN, select the **Assign duress PIN** check box.
2. Click **Save**.

   The duress PIN is the cardholder's assigned PIN code, with the last digit increased by 1. For example, if the assigned PIN is **127643**, the duress PIN will be **127644**.

   If the cardholder's credentials are presented at a portal to which he or she has valid access, followed by the duress PIN, an Activity Log message will indicate that a duress entry has occurred. For any event whose trigger is a duress entry, the event actions will become active.

Note: To include information on duress accesses in a custom History report, administrators can select the system event **Duress access completed** on the Events tab when entering filter criteria for the report.

To assign an extended unlock period:

3. If this person requires extra time to get through a door (because of a disability, for example), select the **Use Extended Unlock** check box.

   Whenever this person accesses a portal, it will remain unlocked for the number of seconds specified by the Extended Unlock Time specified in the portal definition.
4. Click **Save**.

Handling Missing Credentials

Handling credentials that have been forgotten or temporarily lost can be a time-consuming and error-prone process. To address this problem, the system provides a workflow for quickly and accurately issuing, extending, and returning temporary credentials. This workflow is available in person records when the **Enable temporary credential workflow** check box is selected on the Network Controller page. If you have sufficient permissions, you can use it to:

- Issue a temporary credential.
- Extend the expiration period for a temporary credential (if your system's Temporary Credential policy allows extensions).
- Return a temporary credential and, optionally, reactivate missing credentials.
- Reactivate mussing credentials.

Note: Credential status settings applied during the temporary credentials workflow can be used to create a Credential Audit report showing the current state of missing and temporary credentials.

To issue a temporary credential:

1. After verifying the identity of the person reporting a lost or forgotten credential, locate and open his or her person record.
2. Select the **Access Control** tab.
3. Click **Issue Temporary Credential**. If an enrollment reader is not defined for your system, select a reader from the drop-down list and click **Go**.
4. Scan the temporary credential.

   If **Disable missing credentials** is selected in your system's Temporary Credential policy, all other credentials currently issued to the person become disabled. Attempting to use such a credential will result in an "Access denied" Activity Log entry with the reason code: Missing [DISABLED].
5. Click **Save**.

Note: A person can have only one active temporary credential at a time. Each time an additional temporary credential is issued to a person, the previously issued temporary credential is disabled and its status changes from Temporary to Temporary (Disabled).

To extend the expiration period for a temporary credential:

If **Allow expiration extension** is selected in your system's Temporary Credential policy, you are allowed to extend a temporary credential.

1. Click **Extend Temporary Credential**.
2. If an enrollment reader is not defined for your system, select a reader from the drop-down list and click **Go**.

3. Scan the temporary credential.
4. Click **Save**.

   The credential's new expiration period will be the same as if you had issued a new temporary credential. It will extend past the current date for the number of days specified in your system's Temporary Credential policy. Once the credential expires, its status will change from **Temporary** to Temporary (Expired).

To return temporary credential(s) and optionally reactivate missing credential(s):

1. Click **Return Temporary Credential(s)**.

   All temporary credentials currently issued to the person are removed from the system.

   If **Missing credentials must be read for reactivation** is not selected in your system's Temporary Credential policy, all of the person's missing credential are reactivated (their status changes to Active) and the workflow is complete.
2. If a read is required to reactivate missing credentials, a reactivation box appears. To reactivate the missing credentials immediately:
   - If an enrollment reader is not defined for your system, select a reader from the drop-down list and click **Go**.
   - Scan a missing credential. The credential's status changes from Missing to Active.
   - Scan each additional missing credentials when the dialog box reappears (once for each missing credential).

   – or –

   Click **Cancel** to close the dialog box and reactivate the missing credential at a later time, using the procedure below.
3. Click **Save**.

To reactivate missing credential(s):

You can reactivate a person's missing credentials only if no temporary credentials are currently issued to the person.

1. Click **Reactivate Missing Credential(s)**. A reactivation dialog box appears.
2. If an enrollment reader is not defined for your system, select a reader from the drop-down list and click **Go**.
3. Scan a missing credential. Its status changes from Missing to Active.

   Scan each additional missing credential when the dialog box reappears (once for each missing credential), or click **Cancel** if you want to reactivate additional credentials at a later time.
4. Click **Save**.

Handling Lost Credentials

Select **Administration : Lost Cards**.

If a credential is found and turned in, you can determine the identity of the cardholder.

To determine the identity of a cardholder:

1. In the **Hot stamp #** text box, enter the number on the credential and click the **Search** button.
2. If there is no number printed on the credential, click the **Use Reader** link to display a small reader window.
3. Select a reader from the **Reader** drop-down list and swipe the credential through that reader.

   The credential number fills the **Hot stamp #** text box.
4. Click the **Search** button.

Revoking Credentials

In the **Access Control** section of the **Personal Information** page you can issue a new credential, revoke a credential, temporarily disable a credential, and assign access levels for any person in the system.

Revoking a credential is not temporary. In this respect, it differs from disabling a credential. For a revoked credential to function again you will have to use the procedure for issuing a new credential.

To revoke a current credential:

1. Select **Administration : People : Change/delete**.
2. Enter a name and/or other search data and click **Search**.
3. On the **Access Control** tab locate the credential you want to revoke.
4. The credential **Hot Stamp #** and **Encoded #** fields will fill with the credential numbers.
5. Click the **Revoke Credential** icon for that credential.
6. Click **Yes** in the **Revoke Credential** confirmation dialog.

This credential is immediately removed from the system and will not function.

Changing a Password

Select **Support/Utilities : Change Password**.

Passwords are needed only by users who are allowed to log in to the system.

Note: You can configure an LDAP server for single sign-on password authentication. Passwords would then not be entered here. You CANNOT change an LDAP server password from this page.

To change a password:

1. Enter the **Current password**. Passwords are case sensitive.
2. Enter the **New password**.
3. Enter the new password again in the **Re-enter password** box.
4. Click **Save**.

   The new password takes effect immediately.

Notes: If the new password is identical to the current password, you will see an error message. The new password must be different from the current one.

If you re-enter the new password incorrectly you will see an error message. A new password must be entered precisely as it was first entered.

Valid Password Rules

Passwords cannot contain quotation marks (“ ‘) unless the rules have been customized to include special characters in the required password configuration.

Rules for passwords can be customized in **Setup : Site Settings : Network Controller**, specifying minimum password length and/or whether the password must contain a combination of letters, numbers, and special characters. More details about the customized password requirements are found in “Changing Your Password” in Help.

Tips for strong passwords:

- Passwords should be changed periodically.
- Do not use passwords that can be easily guessed, such as names of family members or birth dates.
- Passwords should contain at least one alpha and one numeric character, or a combination of letters, numbers, and special characters, if so specified.

Managing Email Distribution Groups

Select **Administration : People : Email Distribution Groups**.

On this page you can create, edit, and delete groups of people that can be used for email distribution.

To create an email distribution group:

1. Enter a descriptive **Name** for the distribution group, or click **add** and then enter the name.
2. Enter values in one or more of the available search fields.

   For information on entering search criteria, see Changing Personal Information on page 29.
3. Click **Search**.

   The names of the people matching your search criteria appear in the Results list.
4. For each person you want to include in the distribution list, select the name in the Results list and click the right-arrow button [>] to move it to the Selected list.

   Note: In the Results list, the name of anyone whose email address is derived from a Short Message Service (SMS) address is followed by "[SMS]".
5. To remove a person from the Selected list, select the name and click the left-arrow button [<] to move it back to the Results list.
6. Click **Save** when the Selected list includes the set of people you want in the distribution group.

Note: Because email distribution lists refer to their members' person records, a member whose email address changes will continue to receive email distributed by the group.

Creating and Printing Photo IDs

Multiple hardware and software products have been integrated to provide image capture and photo ID printing features from within this security application. Install the software and drivers from the CD provided and refer to the printable "Photo ID Badging Install and Setup Guide" from its link in Help.

Note: Photo ID printing features work with Internet Explorer only. Other browsers do not support the ActiveX controls required for these features.

On the photo ID tab you can:

- Capture ID photos and save them to the personal information record.
- Print a photo ID badge.
- Request printing of a photo ID badge.
- Print photo ID badges from the request queue.
- Capture and save digital signatures.

To capture ID photos and save to a person's record:

Note: Make sure that the Logitech QuickCam settings are set to an image size of no more than 640x480, and that **Face Tracking** is set to **Follow Me**. This will ensure that the image size remains under the maximum 30K.

1. Select **Administration : People**.
2. Add a new person to the system or search for an existing person.
3. Click the **Photo ID** tab.
4. Select from the **Badge** drop-down the badge design you want to use.
5. Click the **Photo ID** button and the **Photo IDs** pop-up window appears.

   Note: If the photo ID image window does not appear, turn off the pop-up blocker or add the Network Controller site to the allowed site list.

6. In the **Photo ID** window, click **Capture Image**, and the **Select Image Source** window appears.
7. Select **Microsoft WDM Image Capture (Win32)** and click **OK**. The **Capture** window and the Logitech QuickCam application bar appear.
8. Ensure that the person is properly within the picture frame and click the capture button .

   Note: The software will perform “face-finding” and crop the image. This helps to ensure that the photo ID is less than the maximum allowed 30K.

9. If the picture is acceptable click **OK**. If not, click the continue button and recapture the photo.
10. The **Capture** window closes and the **Photo IDs** window redisplays with the image placed in the badge design. Confirm that the person's image is correctly captured and click **Save Image**.
11. The captured image appears on the **Personal Information** page. Click the **Close** button in the **Photo IDs** window.
12. Scroll to the bottom of the **Personal Information** page and click **Save**.

Note: On the Personal information page, you can right-click on the image and select **Save Picture as**. You can then save this image separately as a jpg or bmp file.

To print a photo ID badge at your workstation:

The photo ID printer must be connected to your workstation with a USB cable. See the manufacturer documentation for guidance on hardware setup.

The printer's Windows driver listed above must be installed on your workstation. See the manufacturer documentation for guidance on software and driver installation.

1. On the Personal Information page, click the **Photo ID** tab.
2. From the drop-down in the **Badge** box, select the layout you want to use.
3. Click **Photo ID**. A small photo ID window appears.
4. In the photo ID window, click **Print Photo ID**. The **Print** dialog box appears.
5. From the **Name** drop-down list, select the photo ID printer, and click **OK**. Retrieve the badge from the printer tray.
6. In the photo ID window, click **Close**.
7. On the **Personal Information** page, be sure to click **Save**. This saves the captured image and selected badge design with the person's record.

Note: If you do not have a badge printer attached to your computer you can queue the print request for printing later at a computer that has an attached badge printer.

To request printing of a photo ID badge:

1. On the Personal Information page, click the **Photo ID** tab.
2. Place a check in the **Request Photo ID** checkbox.
3. Click **Save**.
4. Select **Administration : Reports : People : Request Photo ID Report** and verify that this report lists your request.

Note: Any badge printing requests in the queue can be printed as described in the following procedure.

To print requested photo ID badges:

The printer must be connected to your workstation with a USB cable. See the manufacturer documentation for guidance on hardware setup.

The printer's Windows driver listed above must be installed on your workstation. See the manufacturer documentation for guidance on software and driver installation.

1. Select **Administration : Reports : People : Request Photo ID Report**. This report lists all currently outstanding photo ID print requests.
2. Click the printer icon in the **Action** column (the rightmost column) for the badge you want to print. A small photo ID window appears.
3. In the photo ID window, click **Print Photo ID**. The **Print** dialog box appears.
4. From the **Name** drop-down list, select the photo ID printer, and click **OK**. Retrieve the badge from the printer tray.
5. In the photo ID window, click **Close**.

Deleting Photo ID Layouts

Select **Administration : Utilities : Badge Layout Delete**.

With this page you can delete badge layouts that have been uploaded to the controller.

To delete a badge layout:

1. Select the check box to the right of each of the badge layouts you want to delete,
2. Click **Delete File(s)**.

Uploading Photo ID Layouts

Select **Administration : Utilities : Photo ID Layout Upload**.

With this page you can upload badge layouts to the controller for use in creating and printing badges.

Photo ID layouts must first be created using EPI Designer. EPI Designer is part of the EPI Builder SDK from ImageWare® Systems, Inc. For details regarding security system data that can be used in photo ID layouts, see "System Data for Photo ID Layouts" in Help.

To upload a photo ID layout:

1. Click the **Browse** button to browse to the location of your photo ID layout files.
2. In the Browse dialog box select the photo ID layout file you want to upload and click **Open**.

   Note: Photo ID layout files must end with the .dgn extension and can be no larger than 600K.

3. Click **Save**.

Creating Reports from System Data

The **Administration : Reports** menu provides a variety of system information reports.

Choose this:	To do this:
Configuration	Crete reports on the current configuration of system resources.
History	Create reports on system activity history.
People	Create reports on access information pertaining to people.

Configuration Reports

Select **Administration : Reports : Configuration**.

As Built

To run an As Built report, select a node from the Network Node drop-down and click Run report. A new browser window will open and display an image of each application blade in the node and the specific resources configured for that blade. You can print this report.

Cameras Report

The Cameras report displays all camera configuration information.

Camera Presets Report

The Camera Presets report displays configured presets for each camera in the system. These presets must be set at each camera web site.

Elevators Report

The Elevators report displays elevator configuration information including Node, Reader, and Floor to output mappings.

Floor Groups Report

The Floor Groups report displays all configured floor groups for use in elevator control.

Holidays Report

The Holidays report displays holiday specification information.

Portals Report

The Portals report displays portal definition information.

Portal Groups Report

The Portal Groups report displays all portal groups, the portals included in each, and the assigned threat level group.

Reader Groups Report

The Reader Groups report displays defined groups of readers.

Remote Locksets Report

The Remote Locksets report displays the following information for each remote lockset: name, IP address, synchronization status, serial number, last completed update time, firmware version, battery voltage, assigned Remote Lockset profile, and number of stored cardholders.

Clicking the Name link for a lockset takes you to the configuration page for the associated node. Clicking the Status link for a lockset takes you to the associated pending/transferred data summary report.

Resources Report

Displays all configured system resources including readers, inputs, outputs, elevators, and temperature points.

Threat Levels Report

The Threat Levels report displays all configured threat levels including the description and color assignment.

Threat Level Groups Report

The Threat Level Groups report displays all configured threat level groups and the threat levels assigned to them.

History Reports

Reports on the **Administration : Reports : History** menu let you retrieve data from archives when the requested report data is no longer active on the controller. In version 3.2 and above the controller maintains an active database of over 100,000 Activity Log records. Older data is kept in archive files both on the controller and on network attached storage devices. You can set up an FTP site or network attached storage (NAS) for this data.

Choose this:	To do this:
Access History Report	See reports tracing access attempts.
Audit Trail Report	See report of changes to the database over specified period of time.
CSV Export Report	Exports events from the Activity Log as a comma-separated values (CSV) file.
Custom Report	Create and run a custom report.
Duty Log Report	Run a report showing duty log comments.
General Event History	See reports on specific events from the Activity Log.
Portal Access Count	See reports on the number of portal accesses for an individual.

Access History Report

Select **Administration : Reports : History : Access History**.

On this page you can create reports to trace system access requests. The default Access History report searches the security database and archive files and returns information on every access request received by the system.

Before running the report, you can set search parameters to limit the results to particular people, event types, time periods, and portals. You can also limit the number of records the report will return.

To create an access history report:

1. Select **Administration : Reports : History : Access History**.
2. To return only requests from anyone with a particular last name, enter that name in the **Person** field.
3. To return only valid or invalid requests, select **Valid accesses** or **Rejected accesses**, respectively.
4. To return only requests received during a specific period of time, select one of the following:
   - **Today** to return only requests received today.
   - **Yesterday** to return only requests received yesterday.

- **Month(s)** to return only requests received from the first day of the month you select on the **From** drop-down list through the last day of the month you select on the **To** drop-down list.
- **Custom Period** to return only requests received from the date you enter in the **From** field through the date you enter in the **Thru** field.

5. To return only requests received at a particular portal, select the portal name from the **At (portal name)** drop-down list.
6. To return no more than a certain number of requests, enter that number in the **Maximum Records** field.
7. Click **Search**.

   The results are displayed in a table. For each access request, the table shows the date and time the request was received on the Controller and on the node, the person who made the request, the location where the request was received, and a description of the event type, such as "Access granted" or "Access denied (Unknown)".
8. Click any column header to sort the data on that column. Click the header multiple times to switch between an ascending and descending sort order.
9. To view the report in PDF format, click the **PDF** link. To export the report as a comma-separated values (CSV) file, click the **CSV** link.

Audit Trail Report

Select **Administration : Reports : History : Audit Trail**.

With this page you can request a report showing changes made to the security database over a specified period of time. For each transaction listed in the report results, you can view information such as when the transaction occurred, who made the changes, the fields that were modified, and the original and new values.

To narrow down the report results, you can filter the search, either by the person whose record was changed or by the area of the system configuration that was modified. You can also select a specific partition from which you want to retrieve data and the maximum number of transactions you want to retrieve.

To create an Audit Trail report:

1. Select **Administration : Reports : History : Audit Trail**.
2. Click the **From (date)** calendar icon and select a start date for the report.
3. Click the **Thru (date)** calendar icon and select an end date for the report. You can also enter dates by typing them in the text boxes. If you do not enter a start date, the system will search back through the entire history available in archives. If you do not enter an end date, the system will use the current date.
4. (optional) On the **Changed by** drop-down list, select the name of the user whose changes you want to retrieve.

5. (optional) To apply a filter to narrow down the report results, do either of the following:
   - Enter the **Last Name** and/or **First Name** of the user whose person record you want to audit for changes.
   - Select **Configuration** and then select the area of the system configuration (such as nodes, portals, or events) you want to audit for changes.
6. If your system has multiple partitions, select the **Partition** from which you want to retrieve data.

   If you do not select a partition, the report results will include data from all partitions.
7. In the **Limit to** text box, enter the maximum number of transactions you want to retrieve. The default is 3,000 transactions.

   Setting the limit to 5,000 or more transactions is not recommended, because it may increase the time required for the system to generate and display the report results.
8. Click **Run Report**.

   Depending on your system and the number of transactions that must be displayed, it may take several minutes for the system to generate and display the report results.
9. To make the report results available for pasting into other applications, click **Copy to Clipboard**.

   To use the **Copy to Clipboard** button in the Mozilla Firefox browser, you must first enable the button.
10. To print the report results, click **Print** to display the Print dialog.

When you define and run an Audit Trail report, the results are displayed in a table. The table includes a row for each transaction matching the report criteria you specified. The rows are sorted in descending order by date, with most recent transaction appearing at the top of the report.

Information about each transaction is displayed in the following columns:

- **DATE/TIME**: The date and time the transaction occurred.
- **USER**: The user who made the changes.
- **DATA**: The database table in which the changes were made.
- **FIELD**: A field associated with the transaction. A given field might have been changed as part of the transaction, or it might be included in the results only to provide context for the changes.
- **ACTION**: For each change associated with the transaction, the type of change that was made: an **INSERT**, **UPDATE**, or **DELETE**.
- **ORIGINAL VALUE**: For any field included in the results, the field value prior to the transaction.

- **NEW VALUE**: For any field that was changed, the field value after the transaction was completed. For fields that were not changed, **<n/c>** appears in this column.

You can expand a row to view more detail:

- To expand a single row, click the arrow to its left.
- To expand every row in the table, click the **Expand All** button.

CSV Export Report

Select **Administration : Reports : History : CSV Export**.

With this page you can export a report containing events from the Activity Log as a comma-separated values (CSV) file. The CSV file contains the following information for each event:

- Partition (if the **Include activity from all partitions** check box is selected)
- Person ID
- Node Date/time
- Date/time
- Description
- Last Name
- First Name
- Node UID
- Node Name
- Location
- Reader
- Card Number

To create a CSV Export report:

1. Select **Administration : Reports : History : CSV Export**.
2. Click the **From (date)** calendar icon and select the start date for the report.
3. Click the **Thru (date)** calendar icon and select the end date for the report.
4. Select the **Include activity from all partitions** check box if you want the report to include data from all partitions, rather than from the selected partition only.

   This option is available only if you are in the Master partition and you have the full system setup user role. If the check box is selected, the report data will include a Partition column showing the partition in which each event occurred.
5. Click **Export**.

6. In the File Download dialog box, click **Open** to open the CSV file or click **Save** to save it.

Custom History Reports

Select **Administration : Reports : History : Custom Report**.

On this page you can:

- Create custom history report definitions and save them for later re-use.
- Edit or delete saved custom report definitions.
- Run saved custom report definitions to get output in the defined output format (HTML, CSV, or PDF).

To create a custom history report definition:

1. Select **Administration : Reports : History : Custom Report**.
2. If one or more custom history reports are already defined in the system, click **New Report** at the top of the report list.
3. On the page that appears, enter a **Name** for the report.
4. (optional) Enter a **Title** to be displayed with the report results and a **Description** that explains the report's use.
5. On the **Columns** tab, set up the report columns:
   - In the Available list, select each data field you want to display as a report column, and click the right-arrow button > to move it to the Selected list.
   - To specify the way columns will be ordered, select individual entries in the Selected list and use the **Move up** and **Move down** buttons to move them up and down in the list.
6. On the **Date & Time** tab, specify the reporting period:
   - For **From (date)** and **Thru (date),** enter absolute dates, or select relative dates (such as Yesterday or Last month), to specify the beginning and end of the time period for which records to be included in this report.
   - If you want the reporting period to start or end at a specific time of day, change the entry in the appropriate **Time** box, using the format HH:MM.
   - For **Days of the Week**, select the check box for each day of the week to be covered in the report.

Note: If the **From (date)** is weeks or months prior to the current date, it is likely that some of the relevant data is stored in archive files. The report will still run correctly; however retrieving the data from the archive files will take a few minutes.

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7. On the **People Filter**, **Location**, and **Events** tabs, specify criteria to be used to narrow down the report results. For more information, see Entering Filter Criteria on page 59.
8. On the **Run-time Prompts** tab, specify the fields users will be prompted to fill in when the report is run:
   - In the **Fields** column, select up to five fields that will require data entry by the report user.
   - In the **Prompt** column, enter a custom text label for any or all of the selected fields.
   - In the **Type** column, specify the data entry method (text entry or selection from a drop-down list) for any of the selected fields.
   - In the **Width** column, enter a specific width (number of characters) for any or all of the selected fields.

   The report results will be filtered based on the data the report user enters in these fields at runtime.
9. On the **Output** tab, specify any or all of the following: the maximum number of records to be returned, the output format (HTML, CSV, or PDF), and the height and/or width of the report screen display.
10. On the **Schedule** tab:
    - Select the check box for each day of the week you want the report to run.
    - Select the email distribution groups to which you want the report results sent.
    - Select the **To Myself** check box to have the results sent to you.
11. Click **Save**.
12. To run the report, click **Run report**.

    If the defined output format is CSV, you are prompted to open or save the comma-separated values file.

    If the defined output format is HTML or PDF, a separate window opens and displays the results in that format. You can click any column header to sort the data on the column, and you click the header multiple times to switch between an ascending and descending sort order.
13. To delete the report, click **Delete** and click **OK** to confirm the deletion.
14. Click **List** to display a list of the report runs for this report definition.

    On the page that appears, the report runs are listed by date and time. For any run listed, you can use buttons in the Action column to view the results in HTML, PDF, or CSV format, or to delete that run.

Entering Filter Criteria

When creating a custom history report definition, you can specify filter criteria to narrow down the report results.

To filter a report by people:

1. Click the **People Filter** tab and do the following:
   - In the **Fields** column, select up to five data fields the system will use to filter the results. Note that on the drop-down lists, user-defined fields whose labels have not been configured by the system administrator appear as field1, field2, field3, and so on.
   - In the **Comparison** column, select the operator for each data field that the system will use to compare the value you specify with database values for that field. The choices are: **contains**, **is**, **is blank**, **is greater than**, **is less than**, **is not**, **is one of**, **not in**, and **starts with**.
   - In the **Value** column, enter the value for each data field to which the system will compare database values for that field, to determine if there is a match.

     For example, to narrow the report results to people whose last names begin with the letter L, select the **Last Name** field, select the **starts with** operator, and enter the value **L**.
2. Click **Save**.

   The report results will be limited to activity related to people matching your filter criteria.

To filter a report by location:

1. Click the **Location** tab.
2. Use the right-arrow buttons [>] to move portals, readers, elevators, intrusion panels, nodes, portals groups, elevator groups, and reader groups, from the Available lists to the Selected lists.
3. Click **Save**.

   The report results will be limited to activity related to the locations you have selected.

To filter a report by events:

1. Click the **Events** tab.
2. In the **User** section, use the right-arrow buttons [>] to move user-defined events and event groups from the Available lists to the Selected lists.
3. In the **System** section, use the right-arrow buttons [>] to move system-defined events from the Available lists to the Selected lists.
4. Click **Save**.

   The report results will be limited to activity related to the events you have selected.

Duty Log Reports

Select **Administration : Reports : History : Duty Log Report**.

On this page you can request a report showing duty log comments residing in the current security database, including archives, displayed in a four-column table, and view details about each comment and about the Activity Log entry to which it is appended.

To create duty log reports:

1. Select **Administration : Reports : History : Duty Log Report**.
2. Click the **From (date)** calendar icon and select a start date for the report.
3. Click the **Thru (date)** calendar icon and select an end date for the report.

   You can also enter dates by typing them in the text boxes. If you do not enter a start date, the system will search back through the entire history available in archives. If you do not enter an end date, the system will use the current date.
4. (optional) To apply a filter to narrow down the report results, do either of the following:
   - On the **Operator** drop-down list, select the name of the user whose duty log comments you want to retrieve.
   - On the **Event type** drop-down list, select the type of event for which you want to retrieve duty log comments.
5. In the **Limit to** text box, enter the maximum number of Activity Log entries (with appended duty log comments) you want to retrieve. The default is 3,000 entries.

   Setting the limit to 5,000 or more entries is not recommended, because it may increase the time required for the system to generate and display the results.
6. Click **Run Report**.

   Depending on your system and the number of Activity Log entries that must be displayed, it may take several minutes for the system to generate and display the report results.
7. To print the report results, click **Print** to display the print dialog.
8. To make the report results available for pasting into other applications, click **Copy to clipboard**.

   To use the **Copy to clipboard** button in the Mozilla Firefox browser, you must first enable the button.
9. To expand a single row, click the arrow to its left; to expand all rows, click **Expand all**.

General Event History

Select **Administration : Reports : History : General Event History**.

On this page you can create a variety of reports on system activity. The default General Event History report searches the security database and archive files and returns information on all logged system activity.

Before running the report, you can set search parameters to limit the results to particular time periods, portals, elevators, and event types. You can also limit the number of records the report will return.

To generate a specific event type report:

1. Select **Administration : Reports : History : General Event History**.
2. To return only an activity logged during a specific period of time, enter the beginning and end dates in the **From** and **To** date fields, or click the calendar icons and select the dates.

   Note: If you do not enter a beginning date for the report, the system will search back through the entire history available in archives.

3. To return only activity at a particular portal, select it from the **At (portal name)** drop-down list.
4. To return only activity at a particular elevator, select it from the **At (elevator name)** drop-down list.
5. To return no more than a certain number of entries, enter that number in the **Limit to** text box.
6. On the **Output** drop-down list, select **HTML** to save the results as an HTML file, or select **CSV** to export the results to a comma-separated values (CSV) file.
7. To return only activity for particular event types, clear the **All event types** check box and select the check box for each event type you want to include in the report.
8. In the **Columns** list, select the number of columns you want for the report.

   If you leave the default set of columns selected, the results will include the date and time, the activity occurred, a description of the activity, the user's name, the location of the activity, and – if there is recorded video associated with the activity – a camera icon you can click to view the video.
9. Click **Run report**.

   If you selected HTML output, the report is displayed directly on this page. You can click the **PDF** link to save it as a PDF file or the **CSV** link to export it as a comma-separated values (CSV) file.

Portal Access Count Report

Select **Administration : Reports : History : Portal Access Count**.

With this page you can request a report of portal accesses by specific people. You can also specify dates, portals, and a user-defined field from the person detail record.

To generate a portal access count report:

1. Select **Administration : Reports : History : Portal Access Count**.
2. Click the calendar icon to select a **From (date)**. This is the start date for the report.

   Note: If you do not enter a **From (date)** to specify the beginning date for the report the system will search back through the entire history available in archives.

3. Click the calendar icon to select a **Thru (date)**. This is the end date for the report.
4. Select from the **at Portals** drop-down a specific portal for this report.
5. Select from the **Where** drop-down a specific user-defined field and to the right select a value for this field.

   Example: If your person records have a user-defined field called "Department," you could restrict the report to only those records where the department is "Accounting" or "Manufacturing."
6. Enter a last name in the **Person (last name)** text box.
7. Click **Run report**.

People Reports

Select **Administration : Reports : People**.

Access Levels Report

Displays all access levels entered into the system including time specification, reader/reader group, and floor group.

Credential Audit Report

Lists existing credentials by their current status settings. For each credential included in the report results, the report also shows the cardholder's name and ID, and the credential number.

Before running the report, you can filter the report results to include only:

- Credentials with particular status settings. In the **Card Status Filter**, move the status settings you want from the Available list to the Selected list.
- Credentials that were not used within a specific number of days from the date they were issued. Enter the number of days in the **List only credentials not used within days** text box.

In addition, if you have full system setup privileges, you can select the **Span All Partitions** check box before running the report to include data from all partitions, rather than from the current partition only.

Current Users Report

The Current Users report displays a list of all security system users currently logged in to the security system website.

Custom People Report

Select **Administration : Reports : People : Custom Report**.

On this page you can:

- Create custom people report definitions and save them for later re-use.
- Edit or delete saved custom report definitions.
- Run saved custom report definitions to get output in the defined output format (HTML, CSV, or PDF).

To create a custom people report definition:

1. Select **Administration : Reports : People : Custom Report**.
2. If one or more custom people reports are already defined in the system, click **New Report** at the top of the report list.
3. On the page that appears, enter a **Name** for the report.
4. (optional) Enter a **Title** to be displayed with the report results and a **Description** that explains the report's use.
5. On the **Columns** tab, set up the report columns:
   - In the Available list, select each data field you want to display as a report column, and click the right-arrow button > to move it to the Selected list.
   - To specify the way columns will be ordered, select individual entries in the Selected list and use the **Move up** and **Move down** buttons to move them up and down in the list.

Note: If you select "Picture," the report will include the person's ID photo, scaled appropriately for display on the screen. When the report is printed or copied to the clipboard, it will not include the image but will instead display the image file name.

6. On the **People Filter** and **Access Level** tabs, specify criteria to be used to narrow down the report results. For more information, see Entering Filter Criteria on page 66.
7. On the **Sort Order** tab, specify an ascending or descending sort order for up to five fields.
8. On the **Run-time Prompts** tab, specify the fields users will be prompted to fill in when the report is run:
   - In the **Fields** column, select up to five fields that will require data entry by the report user.
   - In the **Prompt** column, enter a custom text label for any or all of the selected fields.
   - In the **Type** column, specify the data entry method (text entry or selection from a drop-down list) for any of the selected fields.
   - In the **Width** column, enter a specific width (number of characters) for any or all of the selected fields.

   The report results will be filtered based on the data the report user enters in these fields at runtime.
9. On the **Output** tab, specify any or all of the following: the maximum number of records to be returned, the output format (HTML, CSV, or PDF), and the height and/or width of the report screen display.
10. On the **Schedule** tab:
    - Select the check box for each day of the week you want the report to run.
    - Select the email distribution groups to which you want the report results sent.
    - Select the **To Myself** check box to have the results sent to you.
11. Click **Save**.
12. To run the report, click **Run report**.

    If the defined output format is CSV, you are prompted to open or save the comma-separated values file.

    If the defined output format is HTML or PDF, a separate window opens and displays the results in that format. You can click any column header to sort the data on the column, and you click the header multiple times to switch between an ascending and descending sort order.
13. To delete the report, click **Delete** and click **OK** to confirm the deletion.
14. Click **List** to display a list of the report runs for this report definition.

On the page that appears, the report runs are listed by date and time. For any run listed, you can use buttons in the Action column to view the results in HTML, PDF, or CSV format, or to delete that run.

Entering Filter Criteria

When creating a custom people report definition, you can specify filter criteria to narrow down the report results.

To filter a report by people:

1. Click the **People Filter** tab and do the following:
   - In the **Fields** column, select up to five data fields the system will use to filter the results. Note that on the drop-down lists, user-defined fields whose labels have not been configured by the system administrator appear as field1, field2, field3, and so on.
   - In the **Comparison** column, select the operator for each data field that the system will use to compare the value you specify with database values for that field. The choices are: **contains**, **is**, **is blank**, **is greater than**, **is less than**, **is not**, **is one of**, **not in**, and **starts with**.
   - In the **Value** column, enter the value for each data field to which the system will compare database values for that field, to determine if there is a match.

     For example, to narrow the report results to people whose last names begin with the letter L, select the **Last Name** field, select the **starts with** operator, and enter the value **L**.
2. Click **Save**.

   The report results will include only people matching your filter criteria.

To filter a report by access level:

1. Click the **Access Level** tab.
2. Select from the Available list each access level you want to use as a filter, and click the right-arrow button [>] to move it to the Selected list.
3. Click **Save**.

   The report results will include only people with the access levels you have selected.

Occupancy Report

The Occupancy report displays a list of defined Regions. For each region, it shows the number of people currently occupying the region and the maximum number of occupants allowed, if a maximum has been specified.

Photo ID Gallery

The Photo ID Gallery report displays all the photo ID pictures in the system and the person's name. Click on the person's name to go to the detailed Personal Information page.

Select a letter from the alphabet at the top of the page and the report will display only those persons whose last name begins with the selected letter.

You can also choose to **Include deleted records** by selecting the **Yes** button. You can ***exclude*** deleted records from the report by selecting the **No** button. By selecting the **Only** button you can display a report that includes deleted records only.

Photo ID Requests Report

The Photo ID Request report displays all outstanding photo ID print requests and lists:

- ID
- Name
- Selected photo ID layout
- The person's activation date in the system
- The date of the photo ID print request

You can print photo IDs directly from this report page by clicking the printer icon in the **Action** column. The print photo ID window will appear. Click **Print Photo ID**.

Portal Access Report

The Portals Access report displays the names and access levels of everyone allowed access at the portal you select from the **Portals** drop-down.

Roll Call Report

The Roll Call report lets you select a defined Region from the drop-down and see a list of people currently in that region.

Roster Report

The Roster report displays every person entered into the system and it lists:

- Name
- ID Photo (thumbnail)
- Expiration date

- Date their record was last modified
- User name
- Access level

Select a letter from the alphabet at the top of the page and the report will display only those persons whose last name begins with the selected letter.

You can also choose to **Include deleted records** by selecting the **Yes** button. You can ***exclude*** deleted records from the report by selecting the **No** button. By selecting the **Only** button you can display a report that includes deleted records only.

You can also choose to **Include expired records** by selecting the **Yes** button. You can ***exclude*** expired records from the report by selecting the **No** button. By selecting the **Only** button you can display a report that includes expired records only.

Time Specifications Report

The Time Specifications report displays all defined time specifications currently in the system. Time specifications define allowed access times. They are used as part of an access level definition.

Start and End times for each time spec are in 24 hour format. As an example, 900 is 9:00 AM and 1700 is 5:00 PM.

Holidays are listed in groups as they were entered.

Backup System and Other Utilities

Backing Up the Security Database

The system data is regularly backed up to the controller each night at 00:15 hours. The Sunday backup is a Full Backup. Backups on Monday through Saturday are Differential backups.

If an FTP server or NAS drive is configured all backups will be written there as well. We strongly recommend that an FTP site or a NAS server be set up for storing system backups off the controller.

You can perform additional backups whenever you want.

To back up system data:

1. Select **Administration : Utilities : Backup System**.
2. Enter a comment to explain the purpose of this backup.
3. Click **Full Backup**.
4. When the backup is complete it is listed in the Existing Backups section. You can download a copy of this backup to a disk drive by clicking the get link in the **Download?** column.

Configuring a NAS (network attached storage):

Note: Once the NAS is properly set up the backup procedure backs up configuration, people, and log data, as well as user photos, floor plan images, badge designs, sound files, and so forth.

The regular nightly backup at 00:15 hours will write to this location if it is properly configured. To properly configure a NAS requires that both Network Administrator and Security System Setup tasks are completed as described below.

Network Administrator tasks:

1. Create a network share on the same sub-net as the network controller.

   Note: The share name may not include spaces.

2. Create a local user account and password (as opposed to a Domain user account) for the network controller to access the network share.
3. Grant the user account share permissions and security permissions for the network share.

Security system setup tasks:

1. Select **Setup : Network Resources : Network Storage**.
2. Complete this page with the information for the share location created above.
3. Click **Save**.
4. Click **Backup Now**.

Configuring an FTP server:

Note: Once the FTP server is properly set up the backup procedure backs up configuration, people, and log data, as well as user photos, floor plan images, badge designs, sound files, and so forth.

The regular nightly backup at 00:15 hours will write to this location if it is properly configured. To properly configure an FTP server requires that both Network Administrator and Security System Setup tasks are completed as described below.

Network Administrator tasks:

1. On the FTP Server create a user name, password, and directory for the security system FTP Backups.

   Note: A password is optional. The backup directory must be created at the root level of the FTP server.

2. Decide whether Active mode FTP or Passive mode FTP shall be used and ensure that firewalls will not block the needed ports.

   Note: When using active FTP, TCP ports 20 and 21 must be open to the FTP server for FTP backups from the Network Controller. When using passive FTP port 20 will not be required.

   Ports must also be left open to the Network Controller for FTP server responses. The network administrator must set up these ports.

Security System setup tasks:

1. Select **Setup : Network Resources : FTP Backup**.
2. Complete this page with the information for the FTP site created above.
3. Click **Save**.
4. Click **Backup Now**.

Arming and Disarming Alarm Panels

Select **Administration : Arm Alarm Panel**.

Burglar alarm panels can be integrated with your access control system. On this page you can arm or disarm an alarm panel.

To arm and disarm an alarm panel:

1. Select **Administration : Arm Alarm Panel**.

   The page displays a table listing all alarm panels configured in the system, their current states, and any activity information.

2. Click the **Arm/Disarm** link in the **Action** column.

   Note: You cannot arm a panel if it shows any zone activity.

3. A password challenge is displayed and you must enter your password to arm or disarm the panel.
4. If you are arming the panel, the Panel arming warning output activates for the Warning duration.

Setting Threat Levels

Select **Administration : Set Threat Level**.

If you have administrator access, you can use this page to set the threat level for all locations or selected locations in the current partition. Depending on how the system threat level settings have been set up, you may need to enter a password to change threat levels.

Note: For more information about locations, see the S2 online help.

You can choose to assign a threat level to:

- The default location for the current partition
- The default location and all of its sublocations
- An individual sub-location
- An individual sub-location and all of its sublocations

Note: Whenever the default location for the current partition is set to anything other than the Default setting, an icon or a single color representing the current threat level for that location appears in the upper right corner of the application window. The icon or color changes to reflect changes to the location's threat level.

If other users are logged in and viewing the same partition, the threat level icon in their application windows will be updated within one minute.

To set or change the current system threat level:

1. Select **Administration : Set Threat Level**.
2. If required, enter your password in the **Password** box .
3. Select the threat level you want to apply
4. From the **Applies to Location** drop-down list, select the location to which you want to apply the threat level. You can apply it to the default location for the current partition or to any of its sublocations.
5. To apply the threat level change to all sublocations of the location you selected at step 4, select the **Also apply to sublocations** check box.
6. If multiple locations are configured in your system, select the location to which you want to apply this threat level from the **Applies to location** drop-down list. Otherwise, the default "Master location" is selected by default.
7. To apply the threat level to all sublocations of the location selected in step 6, select the **Also apply to all sublocations** check box.

Note: Threat level changes might change the behavior of access levels, portals, portal groups, and events.

---

8. Click **Save**.

   The threat level change is written into the Activity Log.

Note: It is also possible to change threat levels using an event action or an API command.

Where to Go for More Information

Documentation that you might need for operating your system can be downloaded from the S2 Security web site (http://www.s2sys.com).

After logging into the secure area for integrators and consultants, certified systems integrators can select their product type and software version from **Support Central** to locate links to manuals, technical notes, software, and utilities.

See the "Getting Started" section of the security management system online help for answers to frequently asked questions and links to additional technical documentation.

For further assistance, please contact S2 Technical Support at +1.508.663.2505 or support@s2sys.com.

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NCAHS Security Access Levels 2013

Instructor Last Name	Instructor First Name	Encoded Num 1	Card Format 1	Access Level 1	Access Level 2	Access Level 3	Access Level 4
Green	Suzanne			AS Admin	AgMech Admin		
Fitzpatrick	Richard			AS Admin	AgMech Admin		
Murphy	Peter			AS Admin	AgMech Admin		
Quinn	Tammy			AS Admin	AgMech Admin		
Conis	Paula			AS Admin	AgMech Admin		
Wiggin	Jane			AS Admin	AgMech Admin		
Thomas	Gregory			AS Admin	AgMech Admin		
Chauvin	Barbara-jean			AS Admin	AgMech Admin		
Pelletier	Lori			AS Admin	AgMech Admin		
Miniter	Nick			AS Foreperson	AgMech Foreperson		
Messinger	Meg			AS Foreperson	AgMech Foreperson		
Christianson	Brad			AS Foreperson	AgMech Foreperson		
Green	David			AS Foreperson	AgMech Foreperson		
Cosato	Tom			Ag Mech Foreperson			
Graham	Tim			Ag Mech Foreperson			
Lynch	Laura			AS Admin	AgMech Admin		
Parker	Doris			AS Teacher	AgMech Teacher		
Boyd	Brian			AgMech Teacher			
Perry	Eric			AgMech Teacher			
Brodeur	Diane			AgMech Teacher			
Brol	Robert			AgMech Teacher			
Kennedy	Justin			AgMech Teacher			
Lee	John			AgMech Teacher			
Mertz	Marc			AgMech Teacher			
Nelson	Michael			AgMech Teacher			
Richards	David			AgMech Teacher			
Muse	Gary			AS Foreperson	AgMech Foreperson		
Guibault	Maurice			AS Teacher	AS Custodian	AgMech Teacher	AgMech Custodian
Allen	Jonathan			AS Teacher			
Cunningham	Alan			AS Teacher			
Doleski	Laura			AS Teacher			
Garrett	Lisa			AS Teacher			
Butler	Kasey			AS Teacher			
Kozel	Jess			AS Teacher			
McKenna	Melissa			AS Teacher			
Spain	Diane			AS Teacher			
Antonetti	Joseph			AS Custodian	AgMech Custodian		
Clark	Robert			AS Custodian	AgMech Custodian		
D'Angelo	Vincent			AS Custodian	AgMech Custodian		
Fonseca	Eduardo			AS Custodian	AgMech Custodian		
McMahon	Andrea			AS Custodian	AgMech Custodian		
Spada	William			AS Custodian	AgMech Custodian		

For all alarms involving any of the above listed individuals, please contact the following:

Suzanne M. Green	sgreen@norfolkaggie.org	508-259-6108
Peter Murphy	pmurphy@norfolkaggie.org	508-259-9038
Rick Fitzpatrick	rfitzpatrick@norfolkaggie.org	508-259-9039

2.5 CAT6 REPORTS

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID	Summary	Test Limit	Length	Headroom	Date / Time
3EAST PAIRS 1-2	PASS	TIA-568-C Multimode	193 ft	2.46 dB (Loss Margin)	08/27/2014 10:58 AM
3EAST PAIRS 3-4	PASS	TIA-568-C Multimode	193 ft	2.38 dB (Loss Margin)	08/27/2014 10:59 AM
3EAST PAIRS 5-6	PASS	TIA-568-C Multimode	194 ft	1.85 dB (Loss Margin)	08/27/2014 10:59 AM
3WEST PAIRS 1-2	PASS	TIA-568-C Multimode	179 ft	2.87 dB (Loss Margin)	08/27/2014 10:53 AM
3WEST PAIRS 3-4	PASS	TIA-568-C Multimode	178 ft	2.81 dB (Loss Margin)	08/27/2014 10:53 AM
3WEST PAIRS 5-6	PASS	TIA-568-C Multimode	178 ft	2.92 dB (Loss Margin)	08/27/2014 10:54 AM
4SOUTH PAIRS 1-2	PASS	TIA-568-C Multimode	154 ft	2.92 dB (Loss Margin)	08/27/2014 10:41 AM
4SOUTH PAIRS 3-4	PASS	TIA-568-C Multimode	154 ft	2.76 dB (Loss Margin)	08/27/2014 10:41 AM
4SOUTH PAIRS 5-6	PASS	TIA-568-C Multimode	154 ft	2.82 dB (Loss Margin)	08/27/2014 10:42 AM
4WEST PAIRS 1-2	PASS	TIA-568-C Multimode	176 ft	2.98 dB (Loss Margin)	08/27/2014 10:34 AM
4WEST PAIRS 3-4	PASS	TIA-568-C Multimode	176 ft	2.97 dB (Loss Margin)	08/27/2014 10:35 AM
4WEST PAIRS 5-6	PASS	TIA-568-C Multimode	177 ft	2.29 dB (Loss Margin)	08/27/2014 10:36 AM
IDF1 PAIRS 1-2	PASS	TIA-568-C Multimode	123 ft	2.48 dB (Loss Margin)	08/27/2014 09:17 AM
IDF1 PAIRS 3-4	PASS	TIA-568-C Multimode	122 ft	2.48 dB (Loss Margin)	08/27/2014 09:18 AM
IDF1 PAIRS 5-6	PASS	TIA-568-C Multimode	123 ft	2.22 dB (Loss Margin)	08/27/2014 09:18 AM
IDF2 PAIRS 1-2	PASS	TIA-568-C Multimode	128 ft	2.64 dB (Loss Margin)	08/27/2014 09:12 AM
IDF2 PAIRS 3-4	PASS	TIA-568-C Multimode	129 ft	2.68 dB (Loss Margin)	08/27/2014 09:12 AM
IDF2 PAIRS 5-6	PASS	TIA-568-C Multimode	128 ft	2.66 dB (Loss Margin)	08/27/2014 09:14 AM
IDF3 PAIRS 1-2	PASS	TIA-568-C Multimode	171 ft	0.11 dB (Loss Margin)	08/27/2014 09:02 AM
IDF3 PAIRS 3-4	PASS	TIA-568-C Multimode	171 ft	0.10 dB (Loss Margin)	08/27/2014 09:05 AM
IDF3 PAIRS 5-6	PASS	TIA-568-C Multimode	171 ft	2.02 dB (Loss Margin)	08/27/2014 09:06 AM

FLUKE networks

Total Length:	3372 ft
Number of Reports:	21
Number of Passing Reports:	21
Number of Failing Reports:	0
Number of Warning Reports:	0
Documentation Only:	0

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3EAST PAIRS 1-2

Date / Time: 08/27/2014 10:58:24 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:58:24 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	290	
Length ft	193	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.75	0.30
Limit (dB)	3.21	3.09
Margin (dB)	2.46	2.79
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3EAST PAIRS 3-4

Date / Time: 08/27/2014 10:59:04 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:59:04 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	290	
Length ft	193	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.83	0.39
Limit (dB)	3.21	3.09
Margin (dB)	2.38	2.70
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3EAST PAIRS 5-6

Date / Time: 08/27/2014 10:59:41 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:59:41 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	291	
Length ft	194	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	1.07	1.24
Limit (dB)	3.21	3.09
Margin (dB)	2.14	1.85
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3WEST PAIRS 1-2

Date / Time: 08/27/2014 10:53:02 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:53:02 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	269	
Length ft	179	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.32	0.03
Limit (dB)	3.19	3.08
Margin (dB)	2.87	3.05
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3WEST PAIRS 3-4

Date / Time: 08/27/2014 10:53:48 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:53:48 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	268	
Length ft	178	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.38	0.02
Limit (dB)	3.19	3.08
Margin (dB)	2.81	3.06
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 3WEST PAIRS 5-6

Date / Time: 08/27/2014 10:54:21 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:54:21 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	268	
Length ft	178	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.27	0.06
Limit (dB)	3.19	3.08
Margin (dB)	2.92	3.02
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4SOUTH PAIRS 1-2

Date / Time: 08/27/2014 10:41:09 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:41:09 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	232	
Length ft	154	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.24	-0.06
Limit (dB)	3.16	3.07
Margin (dB)	2.92	3.13
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4SOUTH PAIRS 3-4

Date / Time: 08/27/2014 10:41:53 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:41:53 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	232	
Length ft	154	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.40	0.25
Limit (dB)	3.16	3.07
Margin (dB)	2.76	2.82
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4SOUTH PAIRS 5-6

Date / Time: 08/27/2014 10:42:19 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:42:19 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	232	
Length ft	154	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.34	0.15
Limit (dB)	3.16	3.07
Margin (dB)	2.82	2.92
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4WEST PAIRS 1-2

Date / Time: 08/27/2014 10:34:51 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:34:51 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	265	
Length ft	176	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.21	-0.01
Limit (dB)	3.19	3.08
Margin (dB)	2.98	3.09
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4WEST PAIRS 3-4

Date / Time: 08/27/2014 10:35:50 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:35:50 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	265	
Length ft	176	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.22	-0.02
Limit (dB)	3.19	3.08
Margin (dB)	2.97	3.10
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: 4WEST PAIRS 5-6

Date / Time: 08/27/2014 10:36:23 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 10:36:23 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	266	
Length ft	177	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.81	0.79
Limit (dB)	3.19	3.08
Margin (dB)	2.38	2.29
Reference (dBm)	-6.52	-7.12

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 10:30:05 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF1 PAIRS 1-2

Date / Time: 08/27/2014 09:17:45 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:17:45 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	185	
Length ft	123	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.65	0.57
Limit (dB)	3.13	3.06
Margin (dB)	2.48	2.49
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF1 PAIRS 3-4

Date / Time: 08/27/2014 09:18:19 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:18:19 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	184	
Length ft	122	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.64	0.58
Limit (dB)	3.13	3.06
Margin (dB)	2.49	2.48
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF1 PAIRS 5-6

Date / Time: 08/27/2014 09:18:51 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:18:51 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	185	
Length ft	123	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.91	0.78
Limit (dB)	3.13	3.06
Margin (dB)	2.22	2.28
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF2 PAIRS 1-2

Date / Time: 08/27/2014 09:12:07 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:12:07 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	193	
Length ft	128	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.50	0.39
Limit (dB)	3.14	3.06
Margin (dB)	2.64	2.67
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF2 PAIRS 3-4

Date / Time: 08/27/2014 09:12:50 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:12:50 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	194	
Length ft	129	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.46	0.35
Limit (dB)	3.14	3.06
Margin (dB)	2.68	2.71
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF2 PAIRS 5-6

Date / Time: 08/27/2014 09:14:38 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:14:38 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	193	
Length ft	128	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.48	0.40
Limit (dB)	3.14	3.06
Margin (dB)	2.66	2.66
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF3 PAIRS 1-2

Date / Time: 08/27/2014 09:02:10 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (M->R)
PASS

Date / Time: 08/27/2014 09:02:10 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	257	
Length ft	171	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	3.07	2.52
Limit (dB)	3.18	3.08
Margin (dB)	0.11	0.56
Reference (dBm)	-6.77	-6.76

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-SX	100BASE-FX
10BASE-FL	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 133	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL		

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF3 PAIRS 3-4

Date / Time: 08/27/2014 09:05:00 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (M->R)
PASS

Date / Time: 08/27/2014 09:05:00 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	257	
Length ft	171	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	3.08	2.69
Limit (dB)	3.18	3.08
Margin (dB)	0.10	0.39
Reference (dBm)	-6.77	-6.76

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-SX	100BASE-FX
10BASE-FL	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 133	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL		

LINKWARE
CABLE TEST MANAGEMENT SOFTWARE

Cable ID: IDF3 PAIRS 5-6

Date / Time: 08/27/2014 09:06:48 AM
Cable Type: OM3 Multimode 50

n = 1.4835 (850 nm)
n = 1.4785 (1300 nm)

Test Summary: PASS

Modal Bandwidth: 2000MHz-km (850 nm)
Modal Bandwidth: 2000MHz-km (1300 nm)

Loss (R->M)
PASS

Date / Time: 08/27/2014 09:06:48 AM
Test Limit: TIA-568-C Multimode
Limits Version: 1.9300
Operator: OBC
DTX-1800 (8801015 v2.7400)
Module: DTX-GFM(8967035)
Calibration Date: 07/08/2014
DTX-1800R (8801026 v2.7400)
Module: DTX-GFM(8967033)
Calibration Date: 07/08/2014

Propagation Delay (ns)	257	
Length ft	171	PASS
Limit 6562		
	850 nm	1310 nm
Result	PASS	PASS
Loss (dB)	0.83	1.06
Limit (dB)	3.18	3.08
Margin (dB)	2.35	2.02
Reference (dBm)	-6.37	-6.70

Number of Adapters: 4
Number of Splices: 0
Patch Type: OM3 Multimode 50
Patch Length1 (ft): 3
Patch Length2 (ft): 3
Reference Date: 08/27/2014 08:53:17 AM
2 Jumper

Compliant Network Standards:

10/100BASE-SX	1000BASE-LX	1000BASE-SX
100BASE-FX	100GBASE-SR10	10BASE-FL
10GBASE-LRM	10GBASE-LX4	10GBASE-SR
40GBASE-SR4	ATM155	ATM155SWL
ATM52	ATM622 Fiber Optic	ATM622SWL Fiber Optic
FDDI Fiber Optic	Fibre Channel 100-M5-SN-I	Fibre Channel 100-M5E-SN-I
Fibre Channel 1200-M5-SN-I	Fibre Channel 1200-M5E-SN-I	Fibre Channel 133
Fibre Channel 200-M5-SN-I	Fibre Channel 200-M5E-SN-I	Fibre Channel 266
Fibre Channel 266SWL	Fibre Channel 400-M5-SN-I	Fibre Channel 400-M5E-SN-I

IDEAL INDUSTRIES, Inc. Certified - Test Report

Job Name: AnnexTests
Company: COMPANY NAME

Report Date: Wednesday, September 24, 2014 2:59 PM
Version: 1.3.1

Summary:

All Cables	Twisted Pair	Coax/Twinax	Fiber
Total: 109	Total: 109	Total: 0	Total: 0
Pass: 109	Pass: 109	Pass: 0	Pass: 0
Fail: 0	Fail: 0	Fail: 0	Fail: 0
Tot. Length: 14233.8ft	Tot. Length: 14233.8ft	Tot. Length: 0ft	Tot. Length: 0ft

Cable ID	Length	Status	Date	Cable Type	Test Standard
ANNEX0001	137.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0002	137.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0003	122.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0004	128.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0005	127.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX00015	62.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0031	101.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0032	108.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0033	123.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0034	120.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0035	92.8ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0036	123.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0037	147.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0038	140.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0039	190.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX0040	173.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0041	145.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0042	145.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0043	145.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0044	134.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0045	134.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0046	133.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0047	133.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0048	140.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0049	141.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0051	140.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0052	87.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0053	184.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0054	71.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0055	94.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0056	93.8ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0057	114.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0058	114.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0059	138.8ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0060	138.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0061	122.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0062	120.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0063	120.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0064	102.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0065	109.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0066	123.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0067	116.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0068	123.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0069	123.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0070	143.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0071	143.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0072	140.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0073	141.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0074	152.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0075	150.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0076	150.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0077	150.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0078	150.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0079	155.8ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0080	155.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0081	156.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0082	189.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0083	189.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0084	190.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0085	189.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0086	85.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0087	183.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0088	184.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0089	183.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0090	183.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0091	183.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2

IDEAL INDUSTRIES, Inc. Certified - Test Report

Job Name: AnnexTests
Company: COMPANY NAME

Report Date: Wednesday, September 24, 2014 2:59 PM
Version: 1.3.1

Cable ID	Length	Status	Date	Cable Type	Test Standard
ANNEXDATA0092	172.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0093	172.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0094	172.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA00109	166.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0100	147.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0101	147.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0102	152.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0103	147.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0104	147.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0105	147.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0106	143.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0107	143.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0108	148.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA01	138.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0002	137.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0003	122.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0004	122.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0005	126.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0006	125.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0007	124.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0008	132.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0009	128.6ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0012	125.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0013	125.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0014	112.9ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0015	113.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0016	158.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0025	79.7ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0026	96.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0027	99.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0028	99.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0029	102.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0030	78.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0031	78.1ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0032	51.2ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0033	60.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0034	62.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA112	105.0ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA113	104.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0036	65.3ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEXDATA0038	79.4ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX012	95.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2
ANNEX013	95.5ft.	✓	8/4/2014	Cat 6-250 UTP Chan	TIA 568-C.2

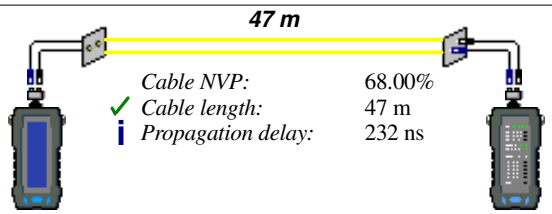
WireScope Pro

Site: **NORFOLK AGGIE**
Cable Label: **12 strand mdf to annex 1&2**

PASS

Fiber Certification Report

Limit: TIA 568, ISO 11801 SMF Limit
Tested: 8/1/2014 8:14 AM
Cable: Singlemode
WS 350 SG42010036 with SmartProbe+ 1550 nm laser
DR 350 SG42010036 with SmartProbe+ 1310 nm laser
Operator: GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.1	9.1
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	2.5	1550	9.1	6.6
✓ Fiber 2	1.5	1550	9.1	7.6

Test limit budgets

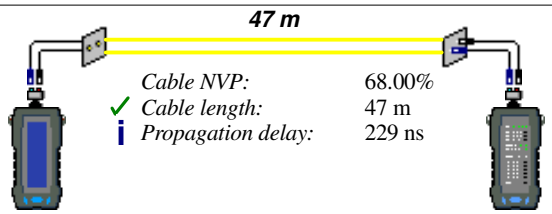
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.047 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	8/1/2014 8:13 AM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1550 nm laser
DR 350	SG42010036 with SmartProbe+ 1310 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.1	9.1
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	1.3	1550	9.1	7.8
✓ Fiber 2	2.6	1550	9.1	6.5

Test limit budgets

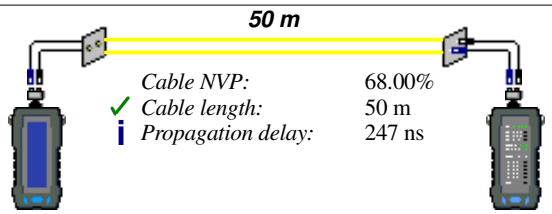
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.047 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	8/1/2014 8:09 AM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1550 nm laser
DR 350	SG42010036 with SmartProbe+ 1310 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	1.9	1310	9.1	7.2
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	3.3	1550	9.1	5.8
✓ Fiber 2	0.4	1550	9.1	8.7

Test limit budgets

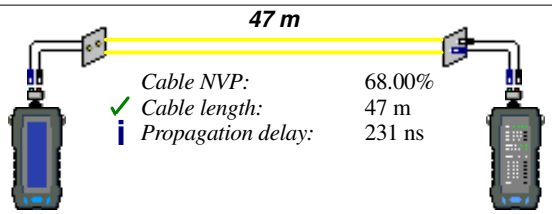
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.050 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit: TIA 568, ISO 11801 SMF Limit
Tested: 8/1/2014 8:11 AM
Cable: Singlemode
WS 350 SG42010036 with SmartProbe+ 1550 nm laser
DR 350 SG42010036 with SmartProbe+ 1310 nm laser
Operator: GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	6.7	1310	9.1	2.4
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	2.7	1550	9.1	6.4
✓ Fiber 2	0.0	1550	9.1	9.1

Test limit budgets

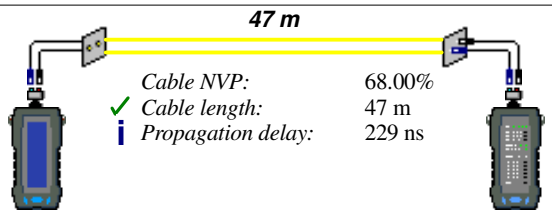
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.047 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	8/1/2014 8:11 AM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1550 nm laser
DR 350	SG42010036 with SmartProbe+ 1310 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.1	9.1
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	0.0	1550	9.1	9.1
✓ Fiber 2	1.2	1550	9.1	7.9

Test limit budgets

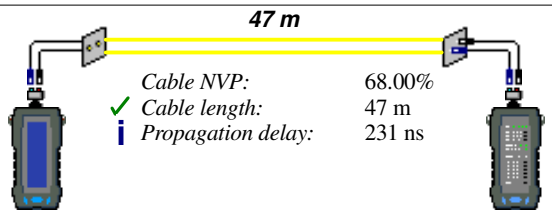
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.047 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	8/1/2014 8:13 AM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1550 nm laser
DR 350	SG42010036 with SmartProbe+ 1310 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.1	9.1
✓ Fiber 2	0.0	1310	9.1	9.1
✓ Fiber 1	2.6	1550	9.1	6.5
✓ Fiber 2	0.4	1550	9.1	8.7

Test limit budgets

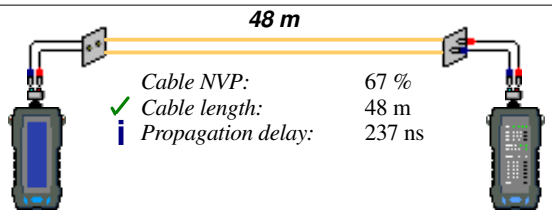
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.047 km	0.05 dB	0.05 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.05 dB***	***9.05 dB***

Fiber Certification Report

Limit: TIA 568, ISO 11801 MMF Limit
Tested: 8/1/2014 8:25 AM
Cable: MMF 50/125 (400 MHz*km)
WS 350 SG42010036 with SmartProbe+ 850 nm
DR 350 SG42010036 with SmartProbe+ 1300 nm
Operator: GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.7	850	6.2	5.5
✓ Fiber 2	0.7	850	6.2	5.5
✓ Fiber 1	1.0	1300	6.1	5.1
✓ Fiber 2	0.4	1300	6.1	5.7

Test limit budgets

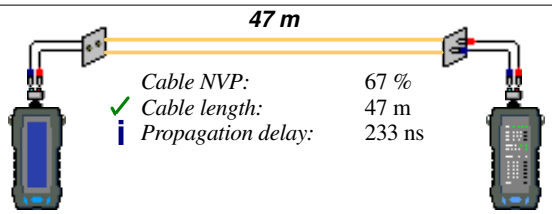
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.048 km	0.17 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.17 dB***	***6.07 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 MMF Limit
Tested:	8/1/2014 8:37 AM
Cable:	MMF 50/125 (400 MHz*km)
WS 350	SG42010036 with SmartProbe+ 850 nm
DR 350	SG42010036 with SmartProbe+ 1300 nm
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.1	850	6.2	6.1
✓ Fiber 2	1.1	850	6.2	5.1
✓ Fiber 1	0.0	1300	6.1	6.1
✓ Fiber 2	0.4	1300	6.1	5.7

Test limit budgets

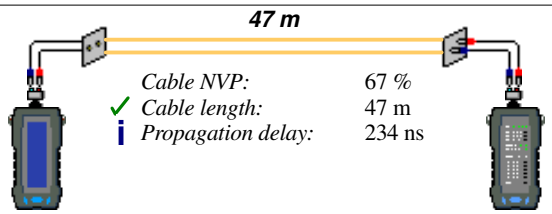
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.047 km	0.16 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.16 dB***	***6.07 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 MMF Limit
Tested:	8/1/2014 8:34 AM
Cable:	MMF 50/125 (400 MHz*km)
WS 350	SG42010036 with SmartProbe+ 850 nm
DR 350	SG42010036 with SmartProbe+ 1300 nm
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.4	850	6.2	5.8
✓ Fiber 2	0.8	850	6.2	5.4
✓ Fiber 1	0.3	1300	6.1	5.8
✓ Fiber 2	0.4	1300	6.1	5.7

Test limit budgets

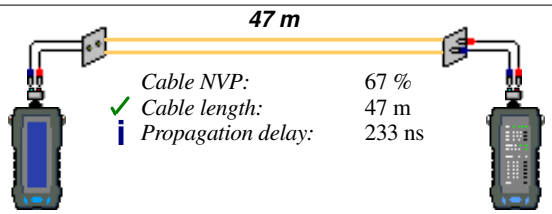
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.047 km	0.16 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.16 dB***	***6.07 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 MMF Limit
Tested:	8/1/2014 8:35 AM
Cable:	MMF 50/125 (400 MHz*km)
WS 350	SG42010036 with SmartProbe+ 850 nm
DR 350	SG42010036 with SmartProbe+ 1300 nm
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.4	850	6.2	5.8
✓ Fiber 2	0.4	850	6.2	5.8
✓ Fiber 1	0.8	1300	6.1	5.3
✓ Fiber 2	0.1	1300	6.1	6.0

Test limit budgets

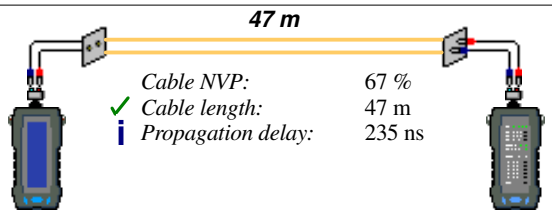
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.047 km	0.16 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.16 dB***	***6.07 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 MMF Limit
Tested:	8/1/2014 8:36 AM
Cable:	MMF 50/125 (400 MHz*km)
WS 350	SG42010036 with SmartProbe+ 850 nm
DR 350	SG42010036 with SmartProbe+ 1300 nm
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.3	850	6.2	5.9
✓ Fiber 2	1.7	850	6.2	4.5
✓ Fiber 1	0.1	1300	6.1	6.0
✓ Fiber 2	1.2	1300	6.1	4.9

Test limit budgets

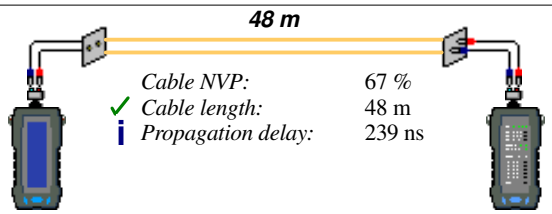
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.047 km	0.17 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.17 dB***	***6.07 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 MMF Limit
Tested:	8/1/2014 8:36 AM
Cable:	MMF 50/125 (400 MHz*km)
WS 350	SG42010036 with SmartProbe+ 850 nm
DR 350	SG42010036 with SmartProbe+ 1300 nm
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	1.3	850	6.2	4.9
✓ Fiber 2	0.3	850	6.2	5.9
✓ Fiber 1	1.0	1300	6.1	5.1
✓ Fiber 2	0.1	1300	6.1	6.0

Test limit budgets

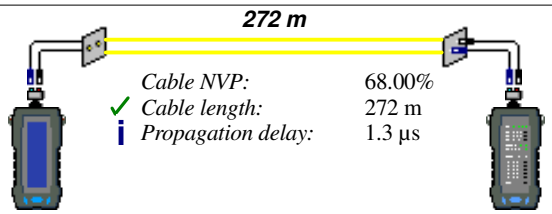
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	8	0.75 dB	6.00 dB
Splices	0	0.30 dB	0.00 dB

		850 nm	1300 nm
Cable loss per km		3.50 dB/km	1.50 dB/km
Cable	0.048 km	0.17 dB	0.07 dB
Connectors	8	6.00 dB	6.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***6.17 dB***	***6.07 dB***

Fiber Certification Report

Limit: TIA 568, ISO 11801 SMF Limit
Tested: 7/31/2014 1:26 PM
Cable: Singlemode
WS 350 SG42010036 with SmartProbe+ 1310 nm laser
DR 350 SG42010036 with SmartProbe+ 1550 nm laser
Operator: GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.2	1310	9.3	9.1
✓ Fiber 2	6.4	1310	9.3	2.9
✓ Fiber 1	1.5	1550	9.3	7.8
✓ Fiber 2	1.9	1550	9.3	7.4

Test limit budgets

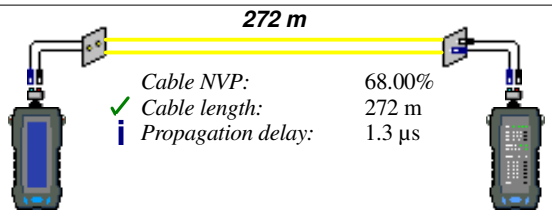
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.272 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	7/31/2014 1:30 PM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1310 nm laser
DR 350	SG42010036 with SmartProbe+ 1550 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.3	9.3
✓ Fiber 2	2.2	1310	9.3	7.1
✓ Fiber 1	0.3	1550	9.3	9.0
✓ Fiber 2	1.5	1550	9.3	7.8

Test limit budgets

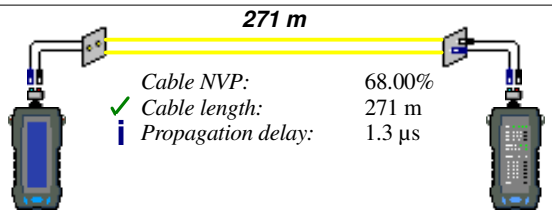
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.272 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	7/31/2014 1:27 PM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1310 nm laser
DR 350	SG42010036 with SmartProbe+ 1550 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.0	1310	9.3	9.3
✓ Fiber 2	1.1	1310	9.3	8.2
✓ Fiber 1	2.1	1550	9.3	7.2
✓ Fiber 2	1.4	1550	9.3	7.9

Test limit budgets

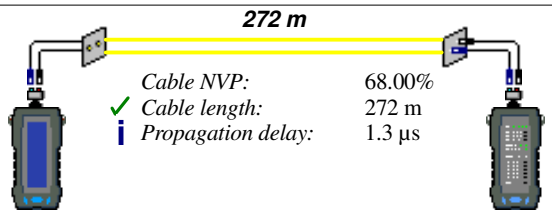
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.271 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	7/31/2014 1:28 PM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1310 nm laser
DR 350	SG42010036 with SmartProbe+ 1550 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	2.0	1310	9.3	7.3
✓ Fiber 2	0.0	1310	9.3	9.3
✓ Fiber 1	1.4	1550	9.3	7.9
✓ Fiber 2	0.5	1550	9.3	8.8

Test limit budgets

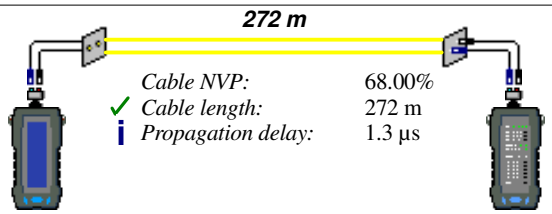
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.272 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	7/31/2014 1:29 PM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1310 nm laser
DR 350	SG42010036 with SmartProbe+ 1550 nm laser
Operator:	GEORGE



Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	1.3	1310	9.3	8.0
✓ Fiber 2	3.5	1310	9.3	5.8
✓ Fiber 1	0.5	1550	9.3	8.8
✓ Fiber 2	2.6	1550	9.3	6.7

Test limit budgets

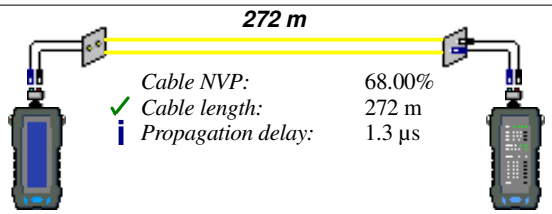
Limit mode: Loss/Length

	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.272 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***

Fiber Certification Report

Limit:	TIA 568, ISO 11801 SMF Limit
Tested:	7/31/2014 1:30 PM
Cable:	Singlemode
WS 350	SG42010036 with SmartProbe+ 1310 nm laser
DR 350	SG42010036 with SmartProbe+ 1550 nm laser
Operator:	GEORGE



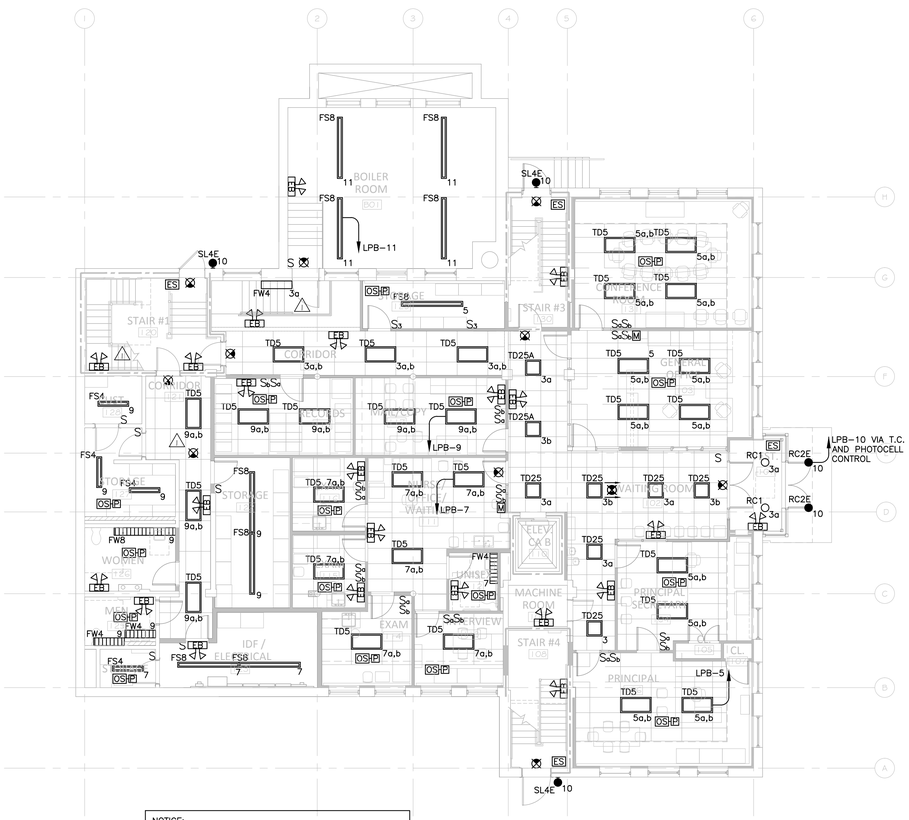
Loss	Value (dB)	Wavelength (nm)	Limit (dB)	Margin (dB)
✓ Fiber 1	0.8	1310	9.3	8.5
✓ Fiber 2	3.4	1310	9.3	5.9
✓ Fiber 1	2.7	1550	9.3	6.6
✓ Fiber 2	0.3	1550	9.3	9.0

Test limit budgets

Limit mode: Loss/Length

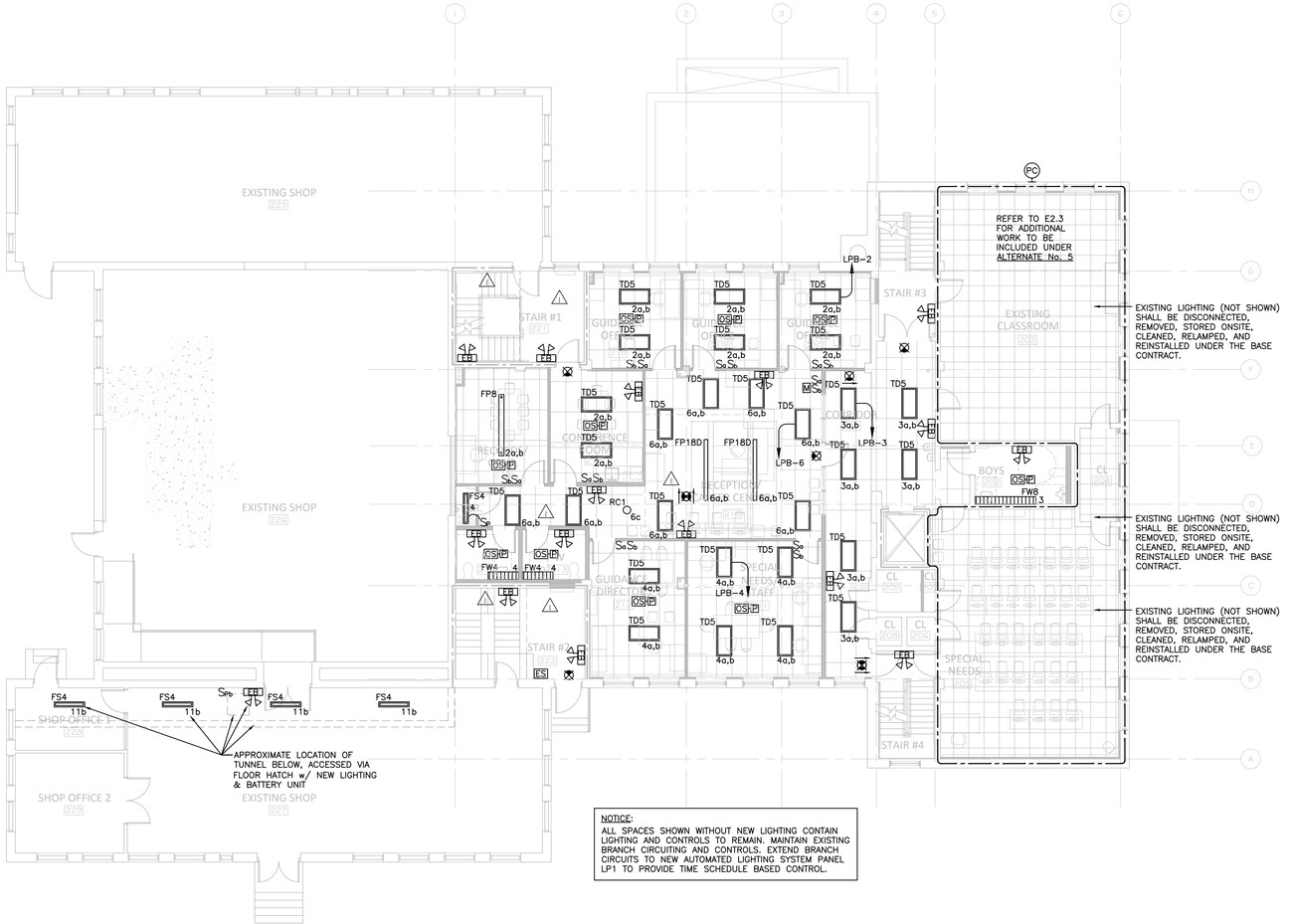
	Total	Loss per	Total Loss
Connectors	12	0.75 dB	9.00 dB
Splices	0	0.30 dB	0.00 dB

		1310 nm	1550 nm
Cable loss per km		1.00 dB/km	1.00 dB/km
Cable	0.272 km	0.27 dB	0.27 dB
Connectors	12	9.00 dB	9.00 dB
Splices	0	0.00 dB	0.00 dB
Overall test limit		***9.27 dB***	***9.27 dB***



NOTICE:
ALL SPACES SHOWN WITHOUT NEW LIGHTING CONTAIN LIGHTING AND CONTROLS TO REMAIN. MAINTAIN EXISTING BRANCH CIRCUITING AND CONTROLS. EXTEND BRANCH CIRCUITS TO NEW AUTOMATED LIGHTING SYSTEM PANEL LP1 TO PROVIDE TIME SCHEDULE BASED CONTROL.

1 E1.1 BASEMENT FLOOR PLAN – LIGHTING
SCALE: 1/8"=1'-0"



NOTICE:
ALL SPACES SHOWN WITHOUT NEW LIGHTING CONTAIN LIGHTING AND CONTROLS TO REMAIN. MAINTAIN EXISTING BRANCH CIRCUITING AND CONTROLS. EXTEND BRANCH CIRCUITS TO NEW AUTOMATED LIGHTING SYSTEM PANEL LP1 TO PROVIDE TIME SCHEDULE BASED CONTROL.

2 E1.1 GROUND FLOOR PLAN – LIGHTING
SCALE: 1/8"=1'-0"

LIGHTING NOTES

1. INSTALL ALL LIGHTING FIXTURES IN ACCORDANCE WITH ARCHITECT'S REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, AND DETAILS.
2. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL FIXTURES INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS. ALL EXPOSED BRANCH CIRCUITS SHALL BE RUN IN CONDUIT. EXPOSED CONDUIT SHALL BE RUN PARALLEL AND PERPENDICULAR TO WALLS AND STRUCTURAL FRAMING.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. OCCUPANCY SENSORS AND PHOTO SENSORS SHALL BE LOCATED TO BE LOCATED IN EACH SPACE PER DEVICE MANUFACTURER'S DIRECTION. COORDINATE ALL LOCATIONS TO AVOID OBSTRUCTIONS NOT READILY APPARENT ON THE LIGHTING PLANS.
7. COORDINATE EXACT FIXTURE MOUNTING HEIGHTS AND LOCATIONS WITH LATEST ARCHITECTURAL DRAWINGS PRIOR TO ROUGHING. CONFIRM REQUIRED RIGID PENDANT / CABLE SUSPENSION LENGTHS PRIOR TO SUBMITTING SHOP DRAWINGS TO ENSURE PROPER COMPONENTS ARE PROVIDED.
8. ALL LIGHTING CIRCUITS TO AUTOMATED LIGHTING PANEL SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE FOR PROGRAMMING OF ALL CIRCUITS/SWITCH LEGS FOR ON/OFF SCHEDULING. REFER TO AUTOMATED LIGHTING SYSTEM DETAILS, SCHEDULES, AND SPECIFICATIONS.
9. DO NOT TAP METAL ROOF DECK FOR SUPPORT OF ANY ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT AS REQUIRED FOR SUPPORT OF ALL ELECTRICAL EQUIPMENT.
10. ALL EXIT SIGN LIGHTING WILL BE CIRCUITED AHEAD OF ANY SWITCH CONTROL FOR CONSTANT ON OPERATION CIRCUIT ALL EXIT SIGNS ON THIS DRAWING TO LPB-1
11. ALL 8' LINEAR FIXTURES INDICATED WITH TWO SWITCH LEGS SHALL BE PROVIDED WITH SINGLE OR TWO LAMP BALLASTS WIRED TO PROVIDE INDEPENDENT SWITCHING OF 4' LAMPS IN PATTERNS INDICATED. BI-LEVEL STEP DIMMING BALLASTS SHALL NOT BE USED IN THESE APPLICATIONS.
12. TYPICALLY CONNECT SELF CONTAINED LOCAL BATTERY UNITS TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHES (CONSTANT 'ON')

Turowski2 Architecture
P.O. Box 1290
313 Wareham Road
Marion, MA 02738
508.758.9777 phone
508.748.2444 fax
www.t2architecture.com

CONSULTANTS:

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GARCIA•GALUSKA•DESOUSA CONSULTING ENGINEERS, INC.
55 Flying Cloud Mall, Falmouth, MA 02541
508-548-5700 • FAX 508-548-0882 • E-MAIL: info@g-g.com

STAMP:

REVISIONS:

NO.	DATE:
1	JANUARY 6, 2012 ADDENDUM No.1

AS-BUILTS
Richard T. Losordo Electrical Services Inc.
534 Liberty Street,
Brockton, MA 02301
TEL 508 436 4640 FAX 508-436 4649
Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE:
BASEMENT AND GROUND FLOOR PLANS - LIGHTING

JOB NO: 10-05

DRAWN BY:

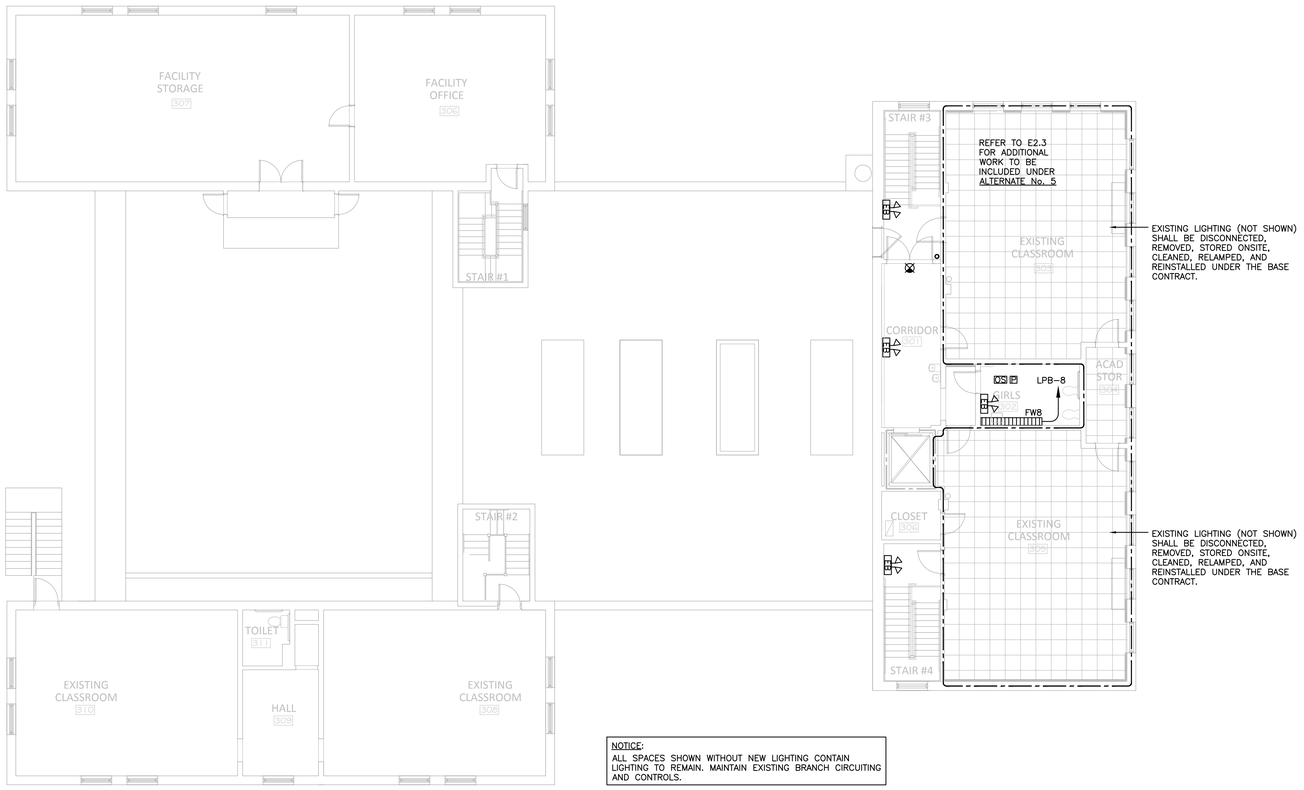
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: E1.1



NOTICE:
ALL SPACES SHOWN WITHOUT NEW LIGHTING CONTAIN LIGHTING TO REMAIN. MAINTAIN EXISTING BRANCH CIRCUITING AND CONTROLS.

1 / E1.2 SECOND FLOOR PLAN – LIGHTING
SCALE: 1/8"=1'-0"

LIGHTING NOTES

1. INSTALL ALL LIGHTING FIXTURES IN ACCORDANCE WITH ARCHITECT'S REFLECTED CEILING PLANS.
2. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL FIXTURES INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. OCCUPANCY SENSOR TO BE LOCATED IN CENTER OF ROOM AND UNOBSTRUCTED PER MANUFACTURER'S RECOMMENDATION IN ALL LOCATIONS.
7. TYPICALLY SUSPEND FIXTURES "FP" SERIES WITH AIRCRAFT CABLE SO THAT FIXTURES ARE 18" FROM CEILING TO TOP OF FIXTURE U.N.O.
8. DESIGNATED 'o' CONTROL SHALL BE PROGRAMMED FOR 50% LIGHT OUTPUT OR 'OFF' BY CIRCUIT NUMBER AS SHOWN. DESIGNATED 'b' CONTROL SHALL BE PROGRAMMED FOR THE OTHER 50% LIGHT OUTPUT OR 'OFF' BY CIRCUIT NUMBER AS SHOWN. BOTH CIRCUITS MUST BE ON SAME PHASE. FIXTURES ARE PROVIDED WITH (1) BALLAST WITH DUAL LEVEL CONTROL.
9. ALL CIRCUIT BREAKERS SERVING CLASSROOMS SHALL BE PROVIDED W/ LOW VOLTAGE CONTROL THROUGH THE OCCUPANCY SENSOR SYSTEMS.
10. ALL HOMERUNS TO AUTOMATED LIGHTING PANEL SHALL BE COORDINATED W/ OWNER'S REPRESENTATIVE FOR PROGRAMMING OF ALL CIRCUITS FOR ON/OFF SCHEDULING.
11. DO NOT TAP METAL ROOF DECK FOR SUPPORT OF ANY ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT AS REQUIRED FOR SUPPORT OF ALL ELECTRICAL EQUIPMENT.
12. ALL EXIT SIGN LIGHTING WILL BE CIRCUITED AHEAD OF ANY SWITCH CONTROL FOR CONSTANT ON OPERATION CIRCUIT ALL EXIT SIGNS ON THIS DRAWING TO LPB–1
13. REMOVE, DISCONNECT, STORE, & REINSTALL ALL CEILING MOUNTED EQUIPMENT AFFECTED BY NEW TILES INCLUDING BUT NOT LIMITED TO SMOKE DETECTORS, SENSORS, ETC. EXISTING GRID IS TO REMAIN THEREFORE LIGHTS MAY REMAIN. SUPPORT ALL EXISTING WIRING RESTING ON GRID.
14. TYPICALLY CONNECT SELF CONTAINED LOCAL BATTERY UNITS TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHES (CONSTANT 'ON')

Turowski2 Architecture
P.O. Box 1290
313 Wareham Road
Marion, MA 02738
508.758.9777 phone
508.748.2444 fax
www.t2architecture.com

CONSULTANTS:

GARCIA-GALUSKA-DESOUSA CONSULTING ENGINEERS, INC.
MEP/FP
60 Ames Street, Suite 101, Hopkinton, MA 508-598-8700 • FAX 508-598-8982 • E-MAIL: info@g-g.com

STAMP:

REVISIONS:

NO.	DATE:

AS-BUILTS
Richard T. Losordo Electrical Services Inc.
534 Liberty Street, Brockton, MA 02301
TEL. 508 436 4640 FAX. 508-436 4649
Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: SECOND FLOOR PLAN - LIGHTING

JOB NO: 10-05

DRAWN BY:

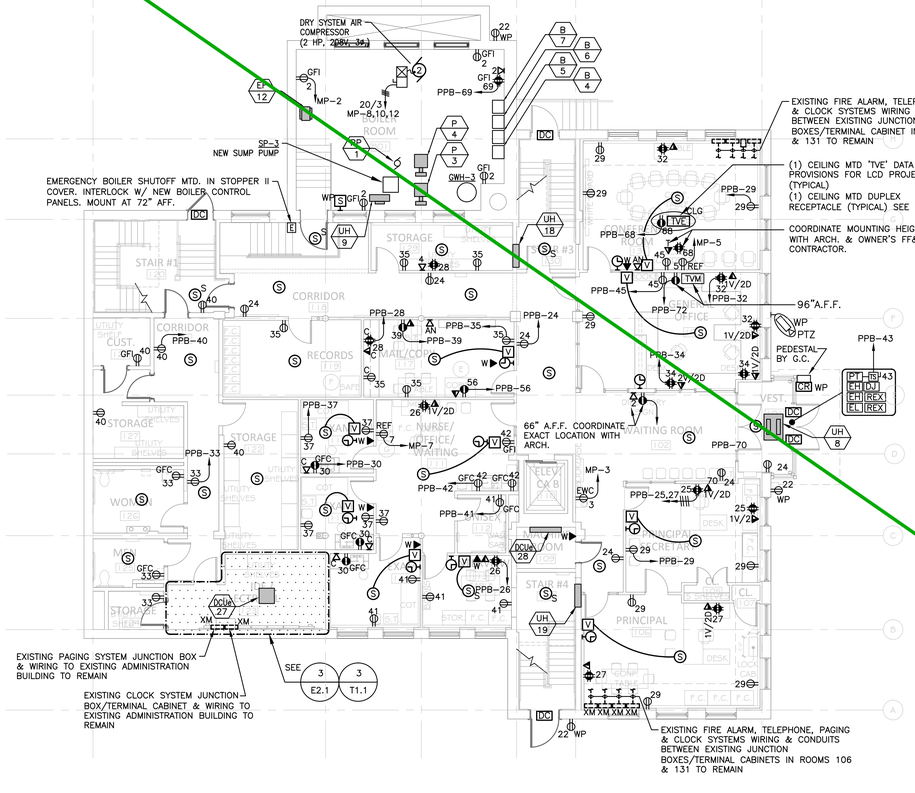
CHECKED BY:

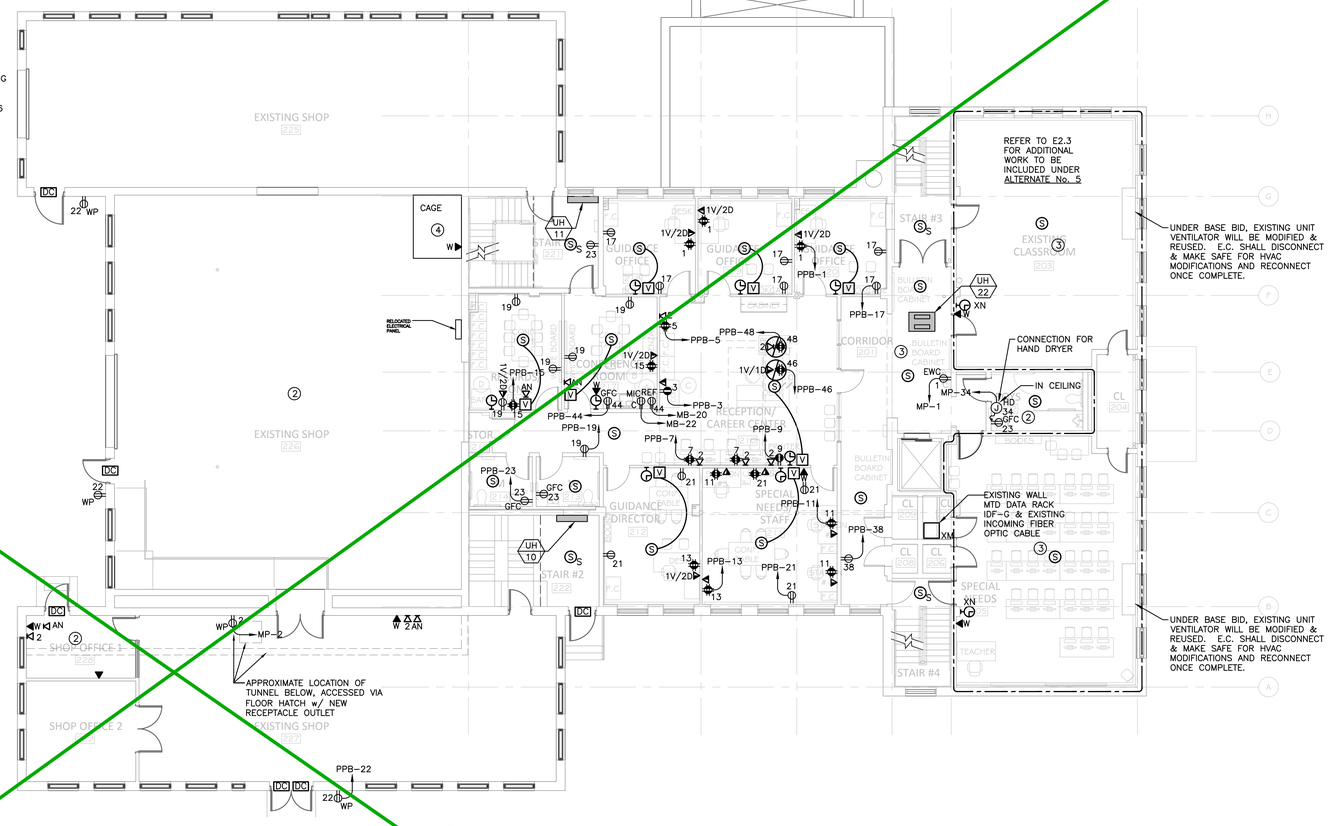
DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: E1.2



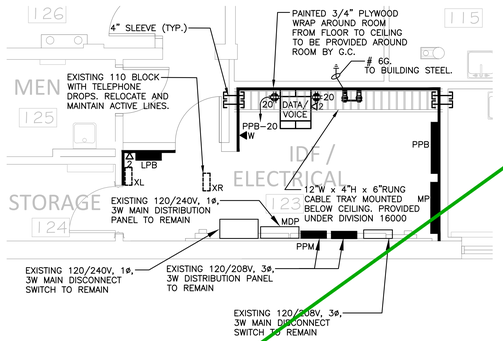


1 E2.1 BASEMENT PLAN – POWER

SCALE: 1/8"=1'-0"

2 E2.1 GROUND FLOOR PLAN – POWER

SCALE: 1/8"=1'-0"



3 E2.1 IDF/ELECTRICAL 123 PART PLAN

SCALE: 1/4"=1'-0"

LEGEND:

- QUADRAPLEX ELECTRICAL OUTLET WITH 20 AMP DEDICATED CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.

120/208V,1ø,3W,22KAIC

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE			2 POLE			3 POLE			TOTAL POLES	OTHERS
						15	20	30	15	20	30	15	20	30	50	
	LPB	ELECTRIC ROOM	S	REFER TO AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LPB"												
	PPB	ELECTRIC ROOM	S	225	–	–	84	–	–	–	–	–	–	–	84	–
	MP	ELECTRIC ROOM	S	100	⚠1 –	–	30	–	2	–	2	–	–	–	84	–
1	MDP	ELECTRIC ROOM	S	600	–	–	–	–	–	–	–	–	–	–	42	(1) 100/2

1 EXISTING GE PANEL. PROVIDE NEW CIRCUIT BREAKERS AS NOTED IN SCHEDULE.

AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LPB"

LOCATION: GND. FLR. ELECTRIC ROOM — RATING: 100A MLO, 120/240V, 1ø, 22KAIC, W/ BREAKERS BRAND TO MATCH DISTRIBUTION

	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	
1	1	3a	20A/1P	M	INTERIOR EGRESS LIGHTING	2	2	20A/1P	M	INTERIOR LIGHTING	1
1	3	3b	20A/1P	M	INTERIOR EGRESS LIGHTING	4	4	20A/1P	M	INTERIOR LIGHTING	1
1	5	6a	20A/1P	M	INTERIOR EGRESS LIGHTING	6	5	20A/1P	M	INTERIOR LIGHTING	1
1	7	6b	20A/1P	M	INTERIOR EGRESS LIGHTING	8	7	20A/1P	M	INTERIOR LIGHTING	1
1	9	9a	20A/1P	M	INTERIOR EGRESS LIGHTING	10	8	20A/1P	M	INTERIOR LIGHTING (ALT. #5)	1
1	11	9b	20A/1P	M	INTERIOR EGRESS LIGHTING	12	11	20A/1P	M	INTERIOR LIGHTING	1
2	13	10	20A/1P	M	EXTERIOR EGRESS LIGHTING	14	EX.	20A/1P	–	EXISTING CIRCUIT	1
1	15	EX.	20A/1P	–	EXISTING CIRCUIT	16	EX.	20A/1P	–	EXISTING CIRCUIT	1
1	17	EX.	20A/1P	–	EXISTING CIRCUIT	18	EX.	20A/1P	–	EXISTING CIRCUIT	1
	19	19	20A/1P	–	SPARE	–	20	60A/3P	–	SPD UNIT	
	21	21	20A/1P	–	SPARE	–	22	–	–	–	
	23	23	20A/1P	–	SPARE	–	24	–	–	–	

GENERAL NOTE: REFER TO FLOOR PLANS FOR ALL SPECIFIC SWITCH STATION CONTROL DESIGNATIONS.

1 TIME CLOCK CONTROLLED (TIMED "ON" & TIMED "OFF" W/ SWEEPS) WITH SWITCH STATION AND SENSOR OVERRIDES.

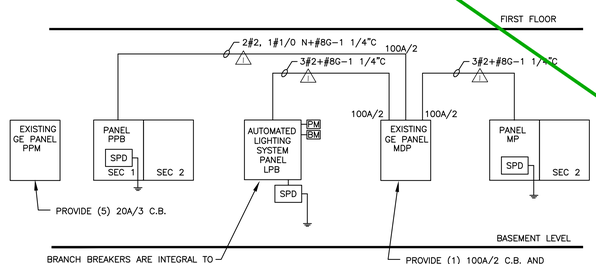
2 TIME CLOCK AND PHOTOCELL CONTROLLED (PHOTO "ON" & TIMED "OFF") WITH SWITCH STATION OVERRIDES

120/208V,3ø,3W

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE			2 POLE			3 POLE			TOTAL POLES	OTHERS
						15	20	30	15	20	30	15	20	30	50	
1	PPM	ELECTRIC ROOM	S	225	–	–	–	–	–	–	–	5	–	–	42	

1 EXISTING GE PANEL. PROVIDE NEW CIRCUIT BREAKERS AS NOTED IN SCHEDULE.



4 E2.1 ONE LINE POWER RISER DIAGRAM

SCALE: NOT TO SCALE

BRANCH CIRCUIT NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT W/ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
8. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN EXISTING BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS & BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
9. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 6" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC & ARCHITECT PRIOR TO ROUGHING.
10. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
11. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
12. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
13. PROVIDE (2) 2" THROUGH-WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH CLASSROOM OR ANY OTHER ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING.
14. DO NOT INSTALL OUTLETS BACK TO BACK. PROVIDE 24 INCH SPACING IN WALLS.
15. TYPICALLY MOUNT PROJECTION SCREEN DATA OUTLET ABOVE CEILING. MOUNT DUPLEX RECEPTACLE ON CEILING TILE, FACE DOWN CENTERED 10'-12' FROM SCREEN.

EXISTING CEILING TYPES

1. SPLINE CEILING
2. PLASTER CEILING
3. ACOUSTICAL CEILING
4. NO CEILING (OPEN)

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STAMP:

REVISIONS:

NO.	DATE:
1	JANUARY 6, 2012 ADDENDUM No.1

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE:
BASEMENT AND GROUND FLOOR PLANS - POWER

JOB NO: 10-05

DRAWN BY:

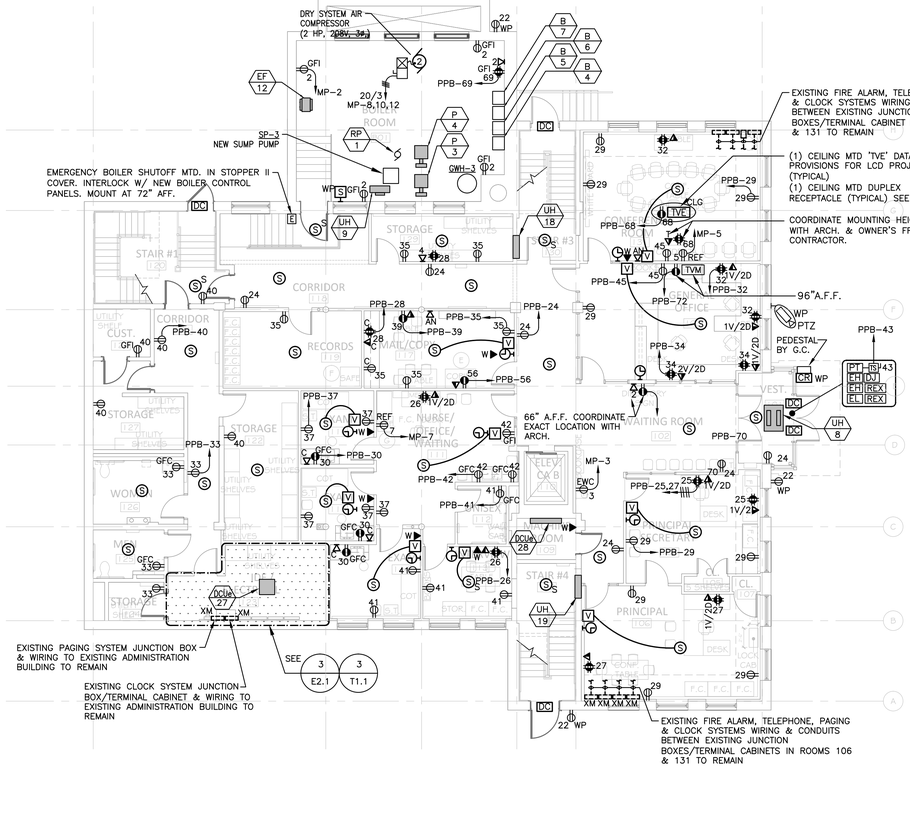
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

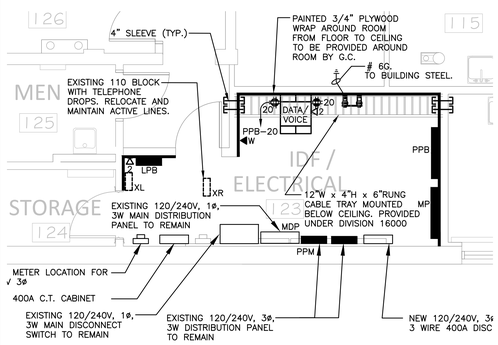
BUILDING: AN

SHEET NO: E2.1



1 E2.1 BASEMENT PLAN – POWER
SCALE: 1/8"=1'-0"

2 E2.1 GROUND FLOOR PLAN – POWER
SCALE: 1/8"=1'-0"



3 E2.1 IDF/ELECTRICAL 123 PART PLAN
SCALE: 1/4"=1'-0"

LEGEND:

- ❹ QUADRAPLEX ELECTRICAL OUTLET WITH 20 AMP DEDICATED CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.

120/208V,1ø,3W,22KAIC

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	1 POLE 20	1 POLE 30	2 POLE 15	2 POLE 20	2 POLE 30	3 POLE 15	3 POLE 20	3 POLE 30	3 POLE 50	TOTAL POLES	OTHERS
	LPB	ELECTRIC ROOM	S	REFER TO AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LPB"													
	PPB	ELECTRIC ROOM	S	225	–	–	84	–	–	–	–	–	–	–	–	84	–
	MP	ELECTRIC ROOM	S	100	–	–	30	–	2	–	2	–	–	–	–	84	–
1	MDP	ELECTRIC ROOM	S	600	–	–	–	–	–	–	–	–	–	–	–	42	(1) 100/2

(1) EXISTING GE PANEL. PROVIDE NEW CIRCUIT BREAKERS AS NOTED IN SCHEDULE.

AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LPB"

LOCATION: GND. FLR. ELECTRIC ROOM — RATING: 100A MLO, 120/240V, 1ø, 22KAIC, W/ BREAKERS BRAND TO MATCH DISTRIBUTION

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1	1	3a	20A/1P	M	INTERIOR EGRESS LIGHTING	2	2	20A/1P	M	INTERIOR LIGHTING	1
1	3	3b	20A/1P	M	INTERIOR EGRESS LIGHTING	4	4	20A/1P	M	INTERIOR LIGHTING	1
1	5	6a	20A/1P	M	INTERIOR EGRESS LIGHTING	6	5	20A/1P	M	INTERIOR LIGHTING	1
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1	11	9b	20A/1P	M	INTERIOR EGRESS LIGHTING	12	11	20A/1P	M	INTERIOR LIGHTING	1
2	13	10	20A/1P	M	EXTERIOR EGRESS LIGHTING	14	EX.	20A/1P	–	EXISTING CIRCUIT	1
1	15	EX.	20A/1P	–	EXISTING CIRCUIT	16	EX.	20A/1P	–	EXISTING CIRCUIT	1
1	17	EX.	20A/1P	–	EXISTING CIRCUIT	18	EX.	20A/1P	–	EXISTING CIRCUIT	1
	19	19	20A/1P	–	SPARE	–	20	60A/3P	–	SPD UNIT	
	21	21	20A/1P	–	SPARE	–	22	–	–	–	
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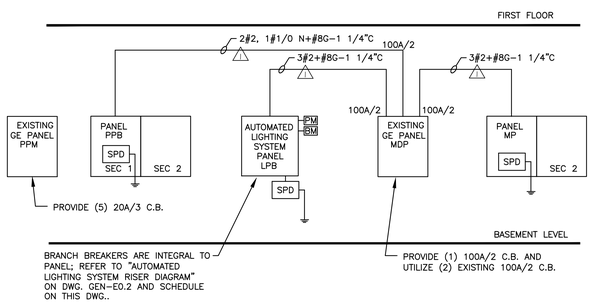
120/208V,3ø,3W

PANEL SCHEDULE

	PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	1 POLE 20	1 POLE 30	2 POLE 15	2 POLE 20	2 POLE 30	3 POLE 15	3 POLE 20	3 POLE 30	3 POLE 50	TOTAL POLES	OTHERS
1	PPM	ELECTRIC ROOM	S	225	–	–	–	–	–	–	–	–	5	–	–	42	

(1) EXISTING GE PANEL. PROVIDE NEW CIRCUIT BREAKERS AS NOTED IN SCHEDULE.



4 E2.1 ONE LINE POWER RISER DIAGRAM
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STAMP:

REVISIONS:

NO.	DATE:
1	JANUARY 6, 2012 ADDENDUM No.1

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Nov 24, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: BASEMENT AND GROUND FLOOR PLANS - POWER

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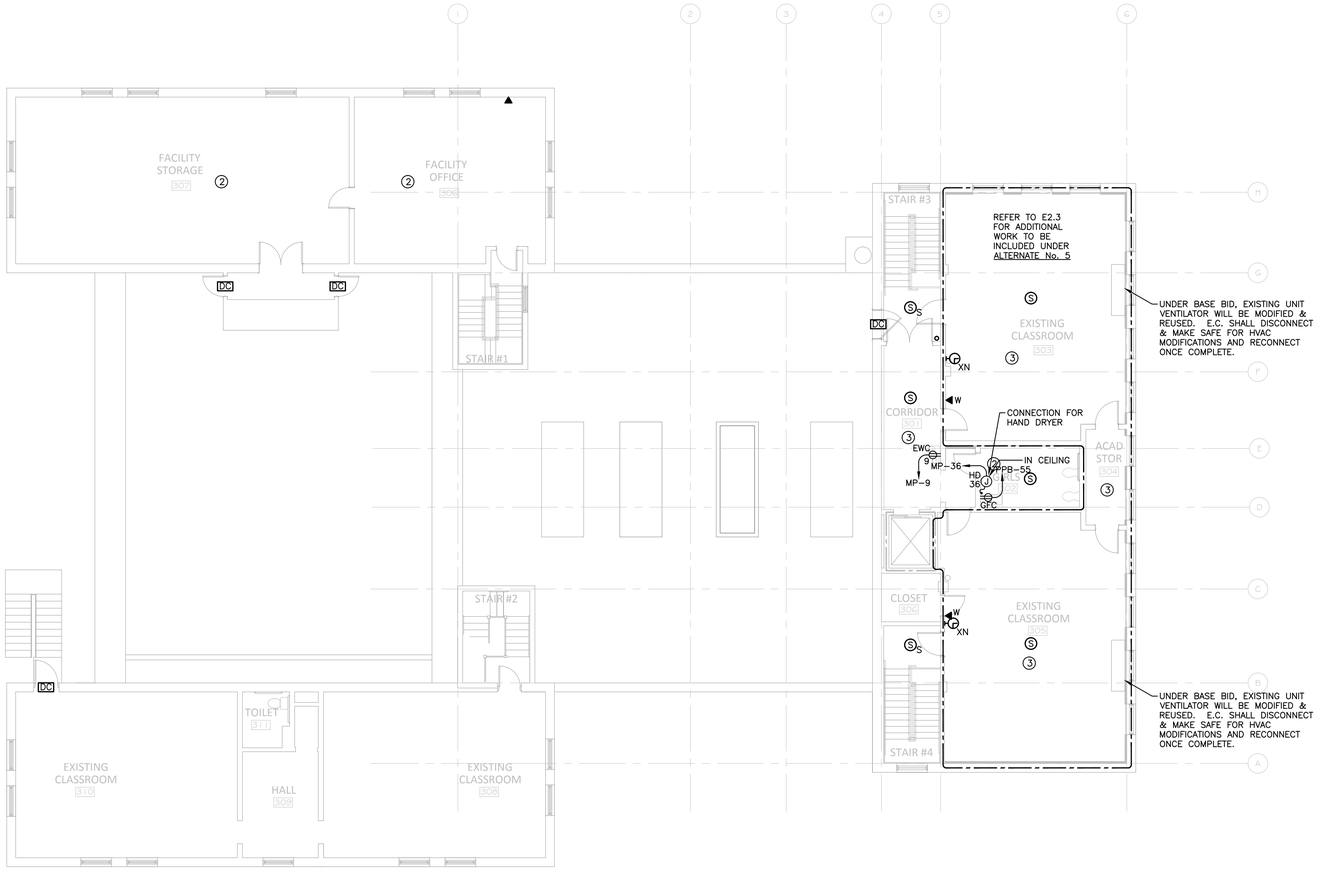


1 E2.2 SECOND FLOOR PLAN – POWER

SCALE: 1/8"=1'-0"

SCHEDULE OF NEW MECHANICAL EQUIPMENT

UNIT NO.	DESCRIPTION	LOCATION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNECTIONS											REMARKS
									TS							WP			VFD	
RTU-2	ROOF-TOP UNIT	ROOF	3HP	240	3	PPM-2,4,6	80-3P	3#12+#12G-3/4"C			X		X	(2)X	X	X	X	(2)X		CONNECT LTG & REC. TO MP-37 , SEE DETAIL 3/E2.2
ATC-1	ATC PANEL	AN	–	120	1	MP-13	20A-1P	2#12&1#12G-3/4"C	X				X				X			⑬
B-4	HOT WATER BOILER	BOILER ROOM B01	104 WATT	120	1	MP-11	20A-1P	2#12&1#12G-3/4"C	X				X				X			
B-5	HOT WATER BOILER	BOILER ROOM B01	104 WATT	120	1	MP-11	–	2#12&1#12G-3/4"C	X				X				X			
B-6	HOT WATER BOILER	BOILER ROOM B01	104 WATT	120	1	MP-11	–	2#12&1#12G-3/4"C	X				X				X			
B-7	HOT WATER BOILER	BOILER ROOM B01	104 WATT	120	1	MP-11	–	2#12&1#12G-3/4"C	X				X				X			
DCUc-27	INTERIOR COOLING UNIT	AN 123	–	240	1	–	–	3#12&1#12G-3/4"C			X		X				X			FEED FROM EXTERIOR UNIT DCUc-10, CP-1 ⑧⑨⑪
DCUc-10	EXTERIOR COOLING UNIT	ROOF	–	240	1	MP-43,45	20A-2P	3#12&1#12G-3/4"C			X		X				X			
DCUc-28	INTERIOR COOLING UNIT	AN 109	–	240	1	–	–	3#12&1#12G-3/4"C			X		X				X			FEED FROM EXTERIOR UNIT DCUc-12, CP-1 ⑧⑨⑫
DCUc-12	EXTERIOR COOLING UNIT	ROOF	–	240	1	MP-44,46	20A-2P	3#12&1#12G-3/4"C			X		X				X			
CP-1	CONDENSATE PUMP			120	1	–	20A-1P	2#12&1#12G-3/4"C	X				X							
EF-12	EXHAUST FAN	BOILER ROOM B01	1/4 HP	120	1	MP-15	20A-1P	2#12&1#12G-3/4"C	X	X			X				X			
EF-13	EXHAUST FAN	ROOF	1/4 HP	120	1	MP-17	20A-1P	2#12&1#12G-3/4"C	X	X			X				X			
UH-8	UNIT HEATER	AN 101	1/15 HP	120	1	MP-4	20A-1P	2#12&1#12G-3/4"C	X				X				X			
UH-9	UNIT HEATER	AN B01	1/15 HP	120	1	MP-4	–	2#12&1#12G-3/4"C	X				X				X			
UH-10	UNIT HEATER	AN STAIR 2	1/15 HP	120	1	MP-6	20A-1P	2#12&1#12G-3/4"C	X				X				X			
UH-11	UNIT HEATER	AN STAIR 1	1/15 HP	120	1	MP-6	–	2#12&1#12G-3/4"C	X				X				X			
UH-18	UNIT HEATER	AN STAIR 3	1/30 HP	120	1	MP-38	20A-1P	2#12&1#12G-3/4"C	X				X				X			
UH-19	UNIT HEATER	AN STAIR 4	1/30 HP	120	1	MP-38	–	2#12&1#12G-3/4"C	X				X				X			
UH-22	UNIT HEATER	AN CORR. 201	1/30 HP	120	1	MP-38	–	2#12&1#12G-3/4"C	X				X				X			
P-3	WATER PUMP	BOILER ROOM B01	3 HP	240	3	PPM-14,16,18	20A-3P	3#12+#12G-3/4"C			X		X				X		X	
P-4	WATER PUMP	BOILER ROOM B01	3 HP	240	3	PPM-19,21,23	20A-3P	3#12+#12G-3/4"C			X		X				X		X	
UV-10	UNIT VENTILATOR	1ST FLOOR	1/4 HP	120	1	MP-26	20A-1P	2#12&1#12G-3/4"C	X				X				X			FURNISHED UNDER ALTERNATE No.5
UV-11	UNIT VENTILATOR	1ST FLOOR	1/4 HP	120	1	MP-26	–	2#12&1#12G-3/4"C	X				X				X			FURNISHED UNDER ALTERNATE No.5
UV-12	UNIT VENTILATOR	2ND FLOOR	1/4 HP	120	1	MP-28	20A-1P	2#12&1#12G-3/4"C	X				X				X			FURNISHED UNDER ALTERNATE No.5
UV-13	UNIT VENTILATOR	2ND FLOOR	1/4 HP	120	1	MP-28	–	2#12&1#12G-3/4"C	X				X				X			FURNISHED UNDER ALTERNATE No.5

2 E2.2 MECHANICAL EQUIPMENT SCHEDULE

SCALE: N.T.S.

MECHANICAL SCHEDULE NOTES:

① DUCT SMOKE DETECTORS SHALL BE PROVIDED ON RETURN DUCT FOR ALL MECHANICAL UNITS OVER 2000CFM. PROVIDE DUCT SMOKE ON RETURN AND SUPPLY DUCTWORK FOR ALL MECHANICAL UNITS OVER 15000 CFM. PROVIDE REMOTE TEST STATION WITH EACH DETECTOR. LOCATION OF TEST STATION SHALL BE ADJACENT TO THE FACP. DUCT SMOKES TO INITIATE SUPERVISORY ALARM.

② PROVIDE FLEXIBLE CONNECTION TO EQUIPMENT REFER TO SPECIFICATIONS.

③ CONTROLLERS AND DISCONNECT DEVICES SHALL BE NRTL RATED FOR USE WITH A DESIGN E MOTOR WITH A HORSE POWER RATING NOT LESS THAN 1.4 TIMES THE MOTOR HORSE POWER. (REFER TO ELECTRICAL CODE ARTICLE 430).

④ TWO SPEED MOTORS SHALL HAVE TWO MOTOR BRANCH CIRCUITS AND SIX POLE DISCONNECTS.

⑤ PROVIDE WEATHERPROOF DUPLEX RECEPTACLES AT MECHANICAL EQUIPMENT. PROVIDE 3/4"C. WITH 2#12+#12G AWG TO NEAREST PANEL AND CONNECT TO 20A/1P CIRCUIT BREAKER UNLESS OTHERWISE INDICATED.

⑥ TYPICALLY LOCATE STARTERS IN ELECTRIC ROOM (NEAR PANEL).

⑦ ALL EXTERIOR MOUNTED DISCONNECT SWITCHES SHALL BE NEMA "3R."

⑧ PROVIDE 3/4"CONDUIT W/PULL WIRE BETWEEN INDOOR UNIT & OUTDOOR UNIT FOR EACH SPLIT SYSTEM.

⑨ PROVIDE HARD CONNECTION FOR CONDENSATE PUMP (CP). CONNECT TO NEAREST 120V, 1ø BRANCH CIRCUIT. PROVIDE THERMAL SWITCH AT UNIT. FIELD COORDINATE EXACT LOCATION WITH HVAC.

SEE DETAIL 5 E2.2

⑩ THE E.C. SHALL PROVIDE NEMA 7 DISCONNECT SWITCHES AND SEAL FITTINGS AT EXPLOSION PROOF FANS.

⑪ PROVIDE 4#12&#12G-3/4"C BETWEEN INDOOR UNIT & OUTDOOR UNIT (DCUc-10).

⑫ PROVIDE 4#12&#12G-3/4"C BETWEEN INDOOR UNIT & OUTDOOR UNIT (DCUc-12).

⑬ EXACT LOCATION TO BE FIELD COORDINATED w/ HVAC

BRANCH CIRCUIT NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT W/ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH. TAMPER SWITCH, ETC.
8. MAKE CONNECTIONS FOR ELECTRIFIED SYSTEM FURNITURE. COORDINATE WITH ARCHITECT.
9. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
10. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN EXISTING BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS & BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
11. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
12. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 6" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC & ARCHITECT PRIOR TO ROUGHING.
13. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
14. PROVIDE ALL EMPTY CONDUITS WITH PULL–STRINGS.
15. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
16. PROVIDE (2) 2" THROUGH–WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH CLASSROOM OR ANY OTHER ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING.
17. COORDINATE AND CONFIRM METHOD OF WIRING AND LOCATION PRIOR TO INSTALLATION OF TEL/DATA DEVICES.

CEILING TYPE

① SPLINE CEILING
② PLASTER CEILING
③ ACOUSTICAL CEILING
④ NO CEILING (OPEN)

SCHEDULE OF PLUMBING EQUIPMENT

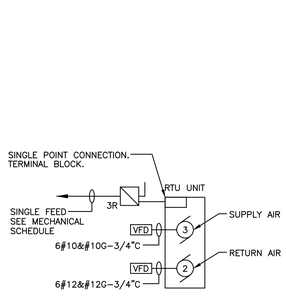
UNIT NO.	DESCRIPTION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS										REMARKS
								TS						WP				
GWH-3	DOMESTIC HOT WATER	(GAS–FIRED)	120	1	MP-30	20A-1P	2#12+1#12G-3/4"C	X				X			X			
RP-1	CIRC. PUMP (120' HWR)	1/6 HP	120	1	MP-32	20A-1P	2#12+1#12G-3/4"C	X				X			X			VIA TIME CLOCK & AQUASTAT ②③
SP-3	SUMP PUMP	1/3 HP	120	1	MP-31	20A-1P	2#10+1#10G-3/4"C					X		X	X			VIA CONTROL PANEL
	SUMP PUMP CONTROL PANEL	–	120	1	MP-24	20A-1P	2#12+1#12G-3/4"C					X			X			
	FP DRY SYSTEM COMPRESSOR	2 HP	240	3	PPM-26,28,30	20A-3P	3#10+1#10G-3/4"C		X		X	X			X			

PLUMBING SCHEDULE NOTES

① E.C. TO PROVIDE SECURITY & CONNECT TO SECURITY SYSTEM.
② TIMECLOCKS FURNISHED BY PC, INSTALLED & WIRED BY EC.
③ AQUASTATS FURNISHED AND INSTALLED BY PC, 120V CONNECTION BY EC.

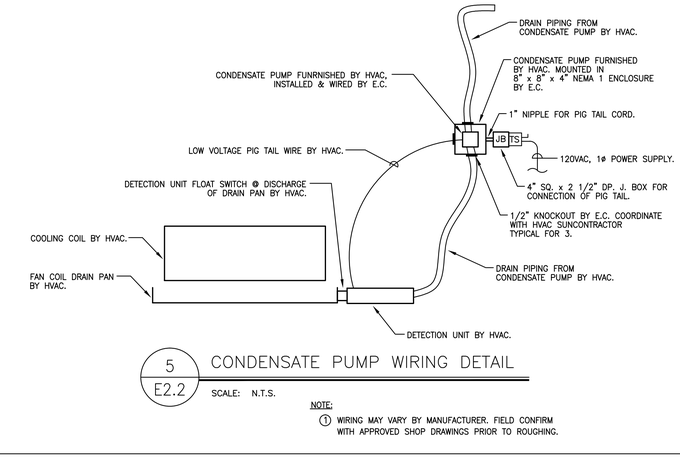
4 E2.2 PLUMBING EQUIPMENT SCHEDULE

SCALE: N.T.S.



3 E2.2 RTU-2 UNIT WIRING DIAGRAM

SCALE : N.T.S.



5 E2.2 CONDENSATE PUMP WIRING DETAIL

SCALE: N.T.S.

NOTE:
① WIRING MAY VARY BY MANUFACTURER. FIELD CONFIRM WITH APPROVED SHOP DRAWINGS PRIOR TO ROUGHING.

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: SECOND FLOOR PLAN - POWER & SCHEDULES

JOB NO: 10-05

DRAWN BY:

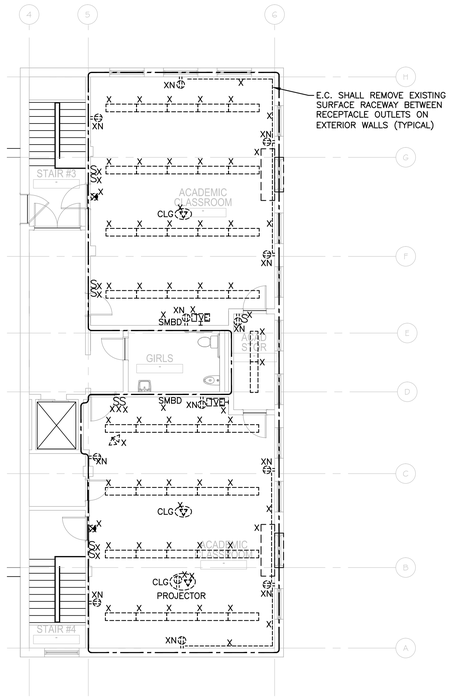
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

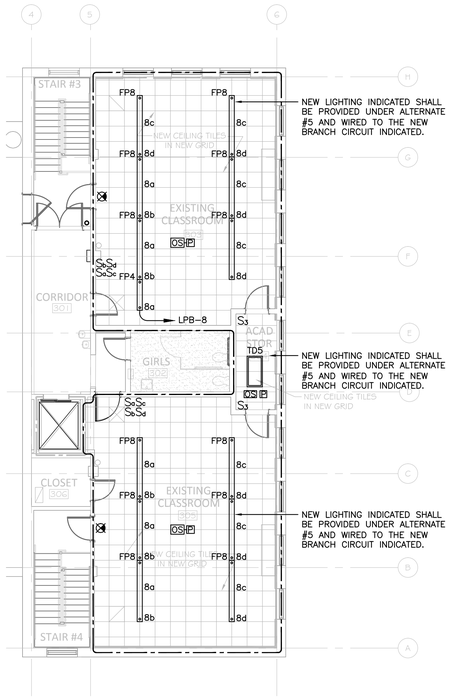
BUILDING: AN

SHEET NO: E2.2



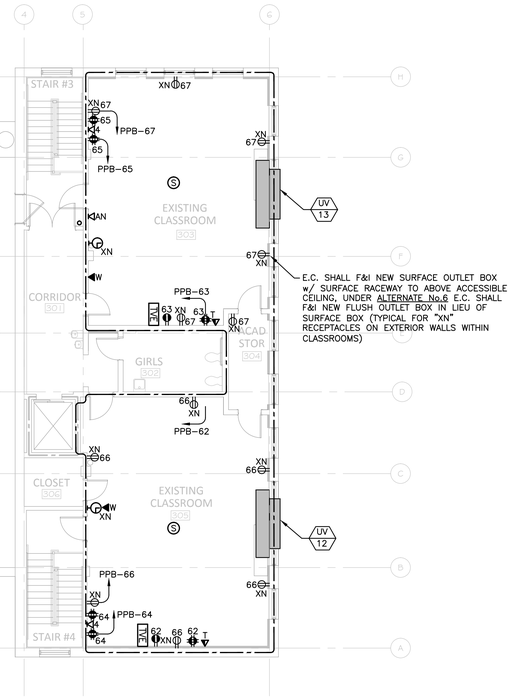
4 E2.3 SECOND FLOOR DEMO – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



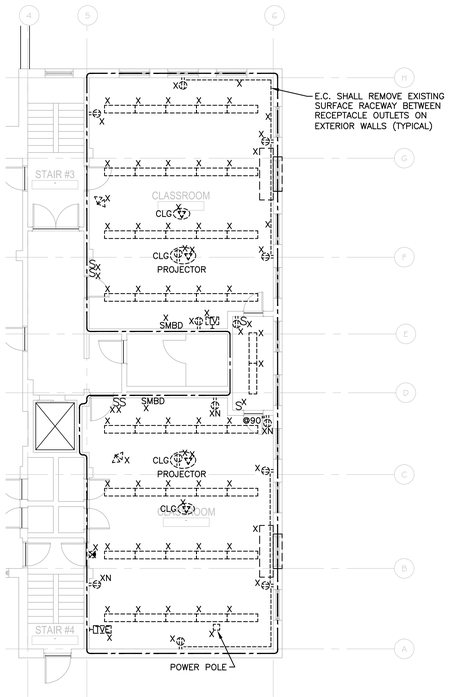
5 E2.3 SECOND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



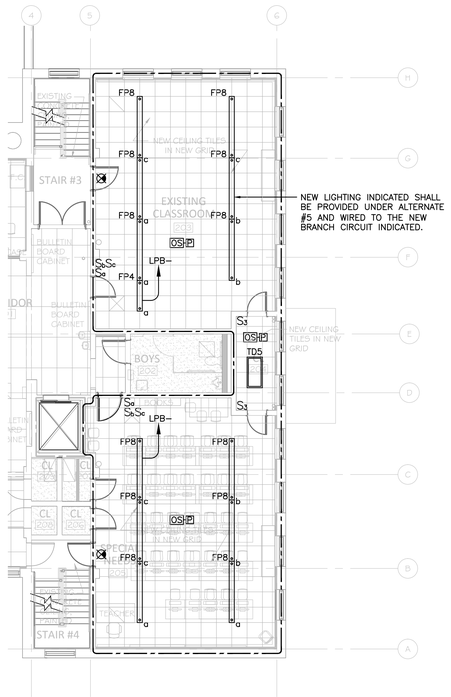
6 E2.3 SECOND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



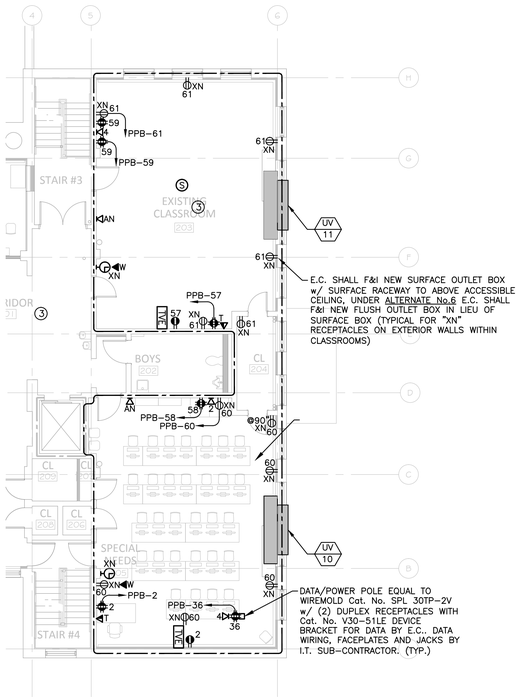
1 E2.3 GROUND FLOOR DEMO – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



2 E2.3 GROUND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



3 E2.3 GROUND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"

GENERAL DEMOLITION NOTES:

1. REFER TO DEMOLITION SECTION OF SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
2. WHERE DOWNSTREAM DEVICES ARE AFFECTED BY THE DEMOLITION WORK THIS CONTRACTOR SHALL PROVIDE NEW SERVICES/CIRCUITRY AS REQUIRED TO MAINTAIN SUCH DOWNSTREAM DEVICES.
3. ALL DEVICES AND/OR EQUIPMENT REMOVED BY THIS CONTRACTOR SHALL BE INSPECTED BY THE OWNER FOR DETERMINATION OF DISPOSAL OR STORAGE AS DIRECTED BY THE OWNER.
4. IT IS NOT THE INTENT OF THESE DRAWINGS TO SHOW ALL EQUIPMENT TO BE DISCONNECTED AND/OR REMOVED. THE CONTRACTOR SHALL FIELD COORDINATE AND VERIFY EXISTING CIRCUITRY. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCY THAT MAY DIFFER FROM INTENT.
5. PARTICULAR CARE SHALL BE TAKEN TO AVOID CREATING HAZARDS ON THE PROJECT OR CAUSING DISRUPTION OF SERVICES REMAINING.
6. ALL EXISTING EQUIPMENT INDICATED TO BE REMOVED SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER. ALL EXISTING EQUIP-MENT INDICATED TO BE TURNED OVER TO THE OWNER SHALL BE PRESENTED TO THE OWNER IN GOOD CONDITION AT A LOCATION DESIGNATED BY THE OWNER. ALL OTHER EQUIPMENT SHALL BE REMOVED FROM THE SITE.
7. REMOVE ALL ABANDONED CONDUCTORS AND EQUIPMENT NOT BUILT INTO THE BUILDING CONSTRUCTION. WHERE CEILING AND WALLS ARE REMOVED, ABANDONED WIRING SHALL BE REMOVED, AND ENDS OF LIVE SERVICES TO BE DISCONNECTED AND CUT-OFF. ALL EXISTING TO REMAIN WIRING IN AREAS OF CONSTRUCTION SHALL BE SUPPORTED IN ACCORDANCE WITH CODES. THIS INCLUDES POWER, LIGHTING, FIRE ALARM, SECURITY, TEL/DATA, ETC. WIRING WITHIN EXISTING TUNNELS SHALL BE REMOVED. DO NOT RUN ANY NEW WIRING WITHIN TUNNELS.
8. ABANDONED ELEMENTS BUILT INTO WALLS SHALL BE MARKED "ABANDONED".
9. REFER TO MECHANICAL DEMOLITION PLAN FOR EXACT LOCATION AND QUANTITY OF EQUIPMENT BEING REMOVED.

LIGHTING NOTES

1. INSTALL ALL LIGHTING FIXTURES IN ACCORDANCE WITH ARCHITECT'S REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, AND DETAILS.
2. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL FIXTURES INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS. ALL EXPOSED BRANCH CIRCUITS SHALL BE RUN IN CONDUIT. EXPOSED CONDUIT SHALL BE RUN PARALLEL AND PERPENDICULAR TO WALLS AND STRUCTURAL FRAMING.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. OCCUPANCY SENSORS AND PHOTO SENSORS SHALL BE LOCATED TO BE LOCATED IN EACH SPACE PER DEVICE MANUFACTURER'S DIRECTION. COORDINATE ALL LOCATIONS TO AVOID OBSTRUCTIONS NOT READILY APPARENT ON THE LIGHTING PLANS.
7. COORDINATE EXACT FIXTURE MOUNTING HEIGHTS AND LOCATIONS WITH LATEST ARCHITECTURAL DRAWINGS PRIOR TO ROUGHING. CONFIRM REQUIRED RIGID PENDANT / CABLE SUSPENSION LENGTHS PRIOR TO SUBMITTING SHOP DRAWINGS TO ENSURE PROPER COMPONENTS ARE PROVIDED.
8. ALL LIGHTING CIRCUITS TO AUTOMATED LIGHTING PANEL SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE FOR PROGRAMMING OF ALL CIRCUITS/SWITCH LEGS FOR ON/OFF SCHEDULING. REFER TO AUTOMATED LIGHTING SYSTEM DETAILS, SCHEDULES, AND SPECIFICATIONS.
9. DO NOT TAP METAL ROOF DECK FOR SUPPORT OF ANY ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT AS REQUIRED FOR SUPPORT OF ALL ELECTRICAL EQUIPMENT.
10. ALL EXIT SIGN LIGHTING WILL BE CIRCUITED AHEAD OF ANY SWITCH CONTROL FOR CONSTANT ON OPERATION CIRCUIT ALL EXIT SIGNS ON THIS DRAWING TO LPB-1.
11. ALL 8' LINEAR FIXTURES INDICATED WITH TWO SWITCH LEGS SHALL BE PROVIDED WITH SINGLE OR TWO LAMP BALLASTS WIRED TO PROVIDE INDEPENDENT SWITCHING OF 4' LAMPS IN PATTERNS INDICATED. BI-LEVEL STEP DIMMING BALLASTS SHALL NOT BE USED IN THESE APPLICATIONS.

BRANCH CIRCUIT NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT W/ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
8. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN EXISTING BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS & BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
9. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 6" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC & ARCHITECT PRIOR TO ROUGHING.
10. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
11. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
12. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
13. PROVIDE (2) 2" THROUGH-WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH CLASSROOM OR ANY OTHER ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING.
14. DO NOT INSTALL OUTLETS BACK TO BACK. PROVIDE 24 INCH SPACING IN WALLS.

CEILING TYPE

1. SPLINE CEILING
2. PLASTER CEILING
3. ACOUSTICAL CEILING
4. NO CEILING (OPEN)

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: ALTERNATE No. 5 - ELECTRICAL WORK

JOB NO: 10-05

DRAWN BY:

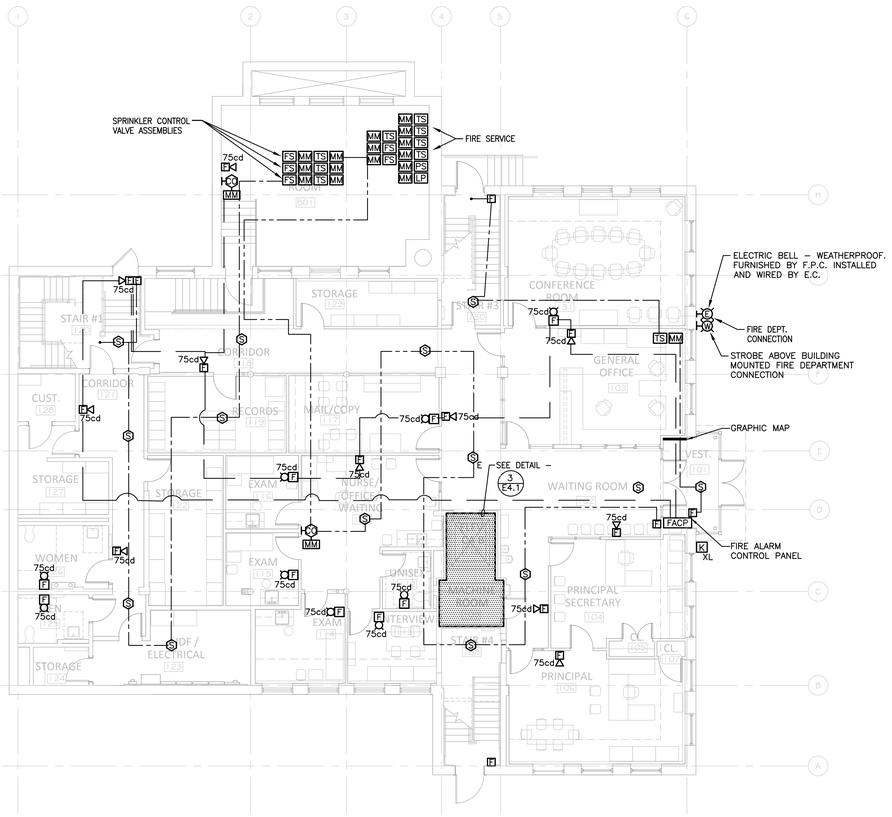
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: E2.3

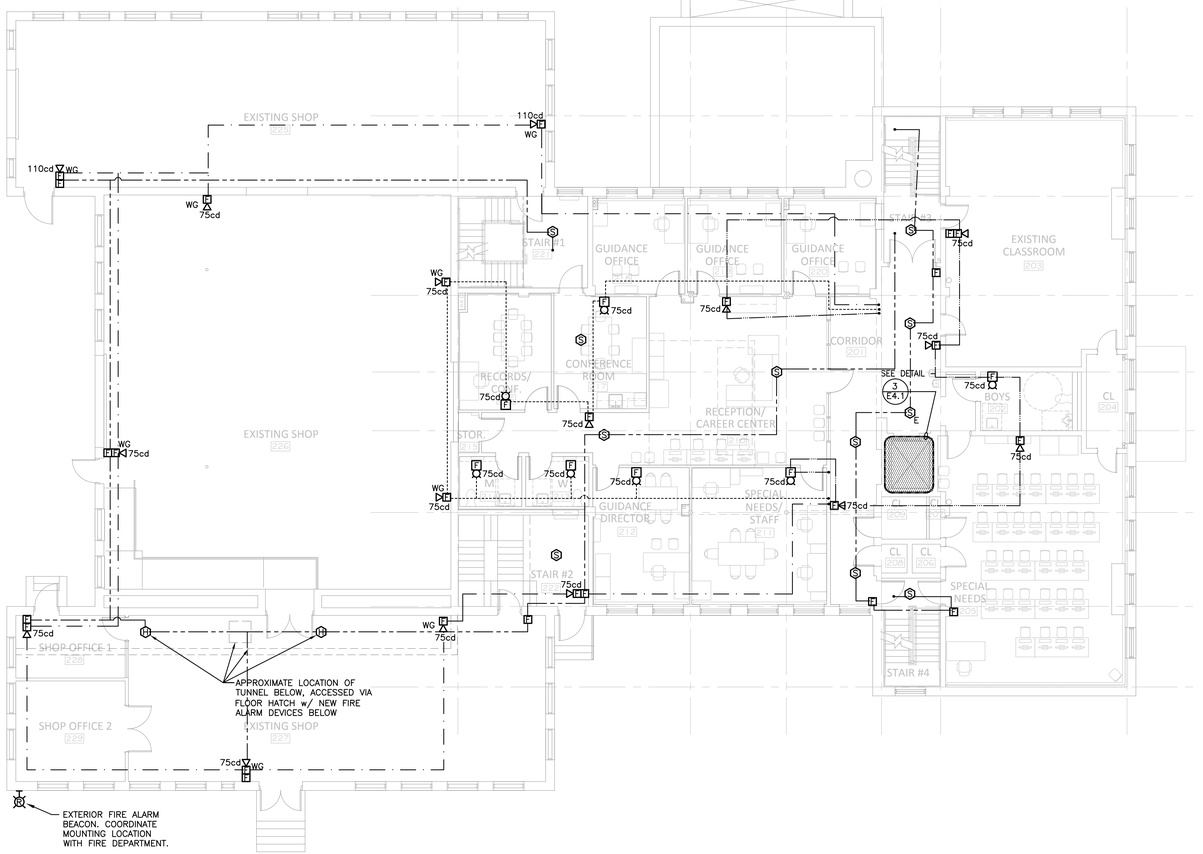


1 E3.1 BASEMENT PLAN – FIRE ALARM

SCALE: 1/8"=1'-0"

LEGEND

- DATA
- SPEAKER A/STROBE A
- SPEAKER A/STROBE B



2 E3.1 GROUND FLOOR PLAN – FIRE ALARM

SCALE: 1/8"=1'-0"

LEGEND

- DATA
- SPEAKER B/STROBE C
- SPEAKER B/STROBE D
- SPEAKER B/STROBE E

FIRE ALARM NOTES:

1. ELECTRICAL CONTRACTOR SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. ELECTRICAL CONTRACTOR SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR; INSTALLED BY HVAC.
3. PROVIDE EACH FIRE ALARM TERMINAL CABINET AND FIRE ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOORS.
4. TYPICALLY FIRE ALARM SYSTEM CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY. MC CABLE ALLOWED WHERE CONCEALED.
5. ALL ELECTRICAL ROOMS ARE FIRE RATED. FIREPROOF PENETRATIONS AS REQUIRED.
6. ALL PULL STATIONS IN SHOPS, MECHANICAL ROOMS, ETC. TO HAVE STOPPER II COVERS.
7. COORDINATE FINAL LOCATIONS OF MAGNETIC DOOR CLOSERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER PRIOR TO ROUGH-IN.
8. TYPICALLY PROVIDE (1) MONITOR MODULE FOR EACH CARBON MONOXIDE DETECTOR, GAS DETECTOR, ETC.

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REVISIONS:

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE:
BASEMENT & GROUND FLOOR PLANS - FIRE ALARM

JOB NO: 10-05

DRAWN BY:

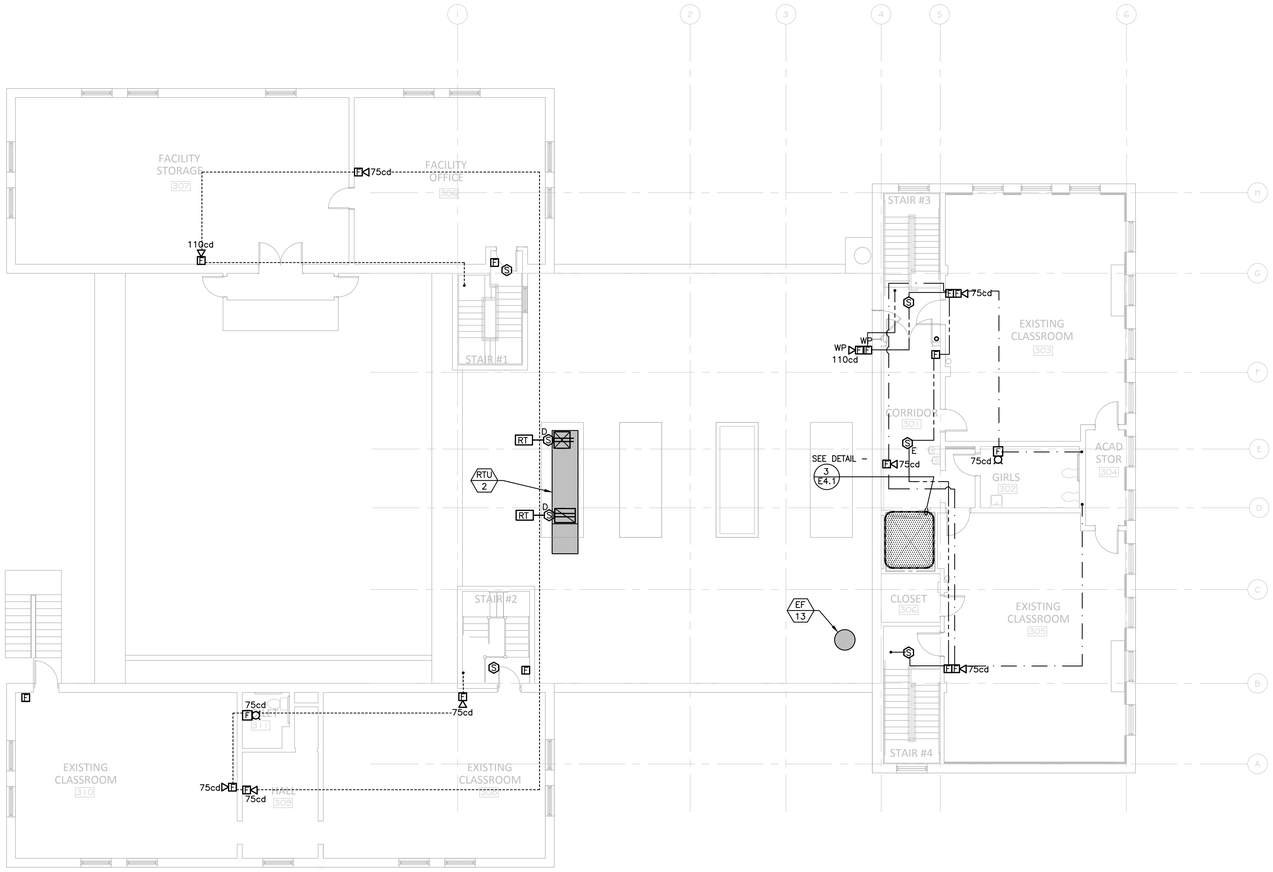
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: E3.1



1 E3.2 SECOND FLOOR PLAN – FIRE ALARM

SCALE: 1/8"=1'-0"

LEGEND

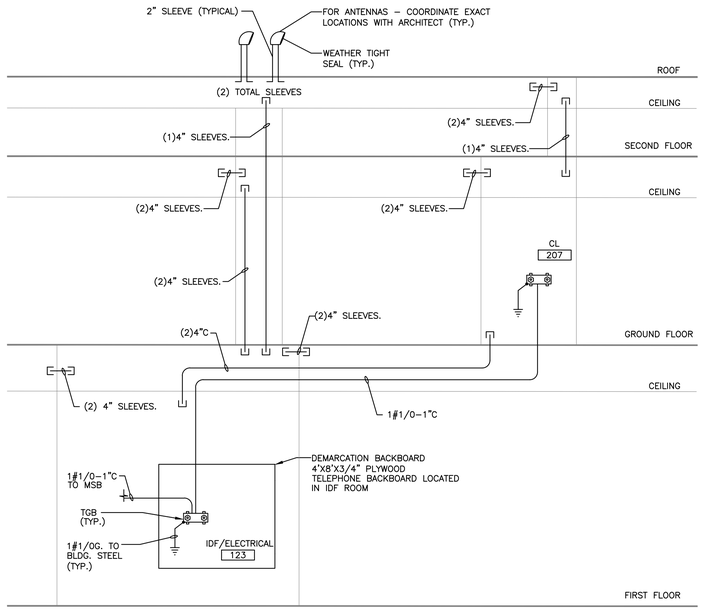
DATA

SPEAKER C/STROBE F

SPEAKER C/STROBE G

FIRE ALARM NOTES:

1. ELECTRICAL CONTRACTOR SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. ELECTRICAL CONTRACTOR SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR; INSTALLED BY HVAC.
3. PROVIDE EACH FIRE ALARM TERMINAL CABINET AND FIRE ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOORS.
4. TYPICALLY FIRE ALARM SYSTEM CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY. MC CABLE ALLOWED WHERE CONCEALED.
5. ALL ELECTRICAL ROOMS ARE FIRE RATED. FIREPROOF PENETRATIONS AS REQUIRED.
6. ALL PULL STATIONS IN SHOPS, MECHANICAL ROOMS, ETC. TO HAVE STOPPER II COVERS.
7. MECHANICAL EQUIPMENT, MOTORIZED FIRE/SMOKE DAMPER – FURNISHED & INSTALLED BY HVAC CONTRACTOR, WIRED BY E.C. FIRE ALARM INTERLOCK WIRING BY E.C. PROVIDE A CONTROL MODULE, FOR EACH UNIT AND INTERLOCK EACH DAMPER SO THAT DAMPER IS POWERED OPEN AND IS SPRING CLOSED. LOCATE CONTROL MODULES ADJACENT TO DAMPERS. REFER TO HVAC DRAWINGS FOR DAMPER LOCATIONS.



2 E3.2 TELECOMMUNICATIONS SLEEVES & GROUNDING RISER DIAGRAM

SCALE: N.T.S.

NOTES:

1. COORDINATE ALL SLEEVE LOCATIONS WITH TELECOMMUNICATIONS CONTRACTOR PRIOR TO INSTALLATION.
2. COORDINATE ALL CONDUIT ROUTING WITH TELECOMMUNICATIONS CONTRACTOR. PROVIDE PULL BOXES WHERE CONDUIT BEND EXCEEDS A TOTAL OF 180 DEGREES OR DISTANCE EXCEEDS 150'. ALWAYS ALIGN CONDUITS ON OPPOSITE ENDS OF PULL BOX.
3. PULL BOX SIZES FOR 4" CONDUITS SHALL BE MINIMUM 15" WIDE X 60" LONG X 8" DEEP. INCREASE WIDTH OF PULL BOX 8" FOR EVERY ADDITIONAL 4" CONDUIT.
4. ALL CONDUIT BENDS SHALL BE MINIMUM 36" RADIUS.
5. DO NOT RUN CONDUITS PARALLEL WITH POWER CONDUITS. MAINTAIN MINIMUM OF 4' CLEARANCE.
6. E.C. SHALL BOND ALL CABLE TRAY TO "TGB" IN RESPECTIVE DATA ROOM WITH #6 GROUND. THE CABLE TRAY SHALL BE ELECTRICALLY CONTINUOUS THROUGH, ENTIRE RUN INCLUDING ALL FITTINGS.

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STAMP:

REVISIONS:

NO.	DATE:

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: SECOND FLOOR PLAN - FIRE ALARM

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

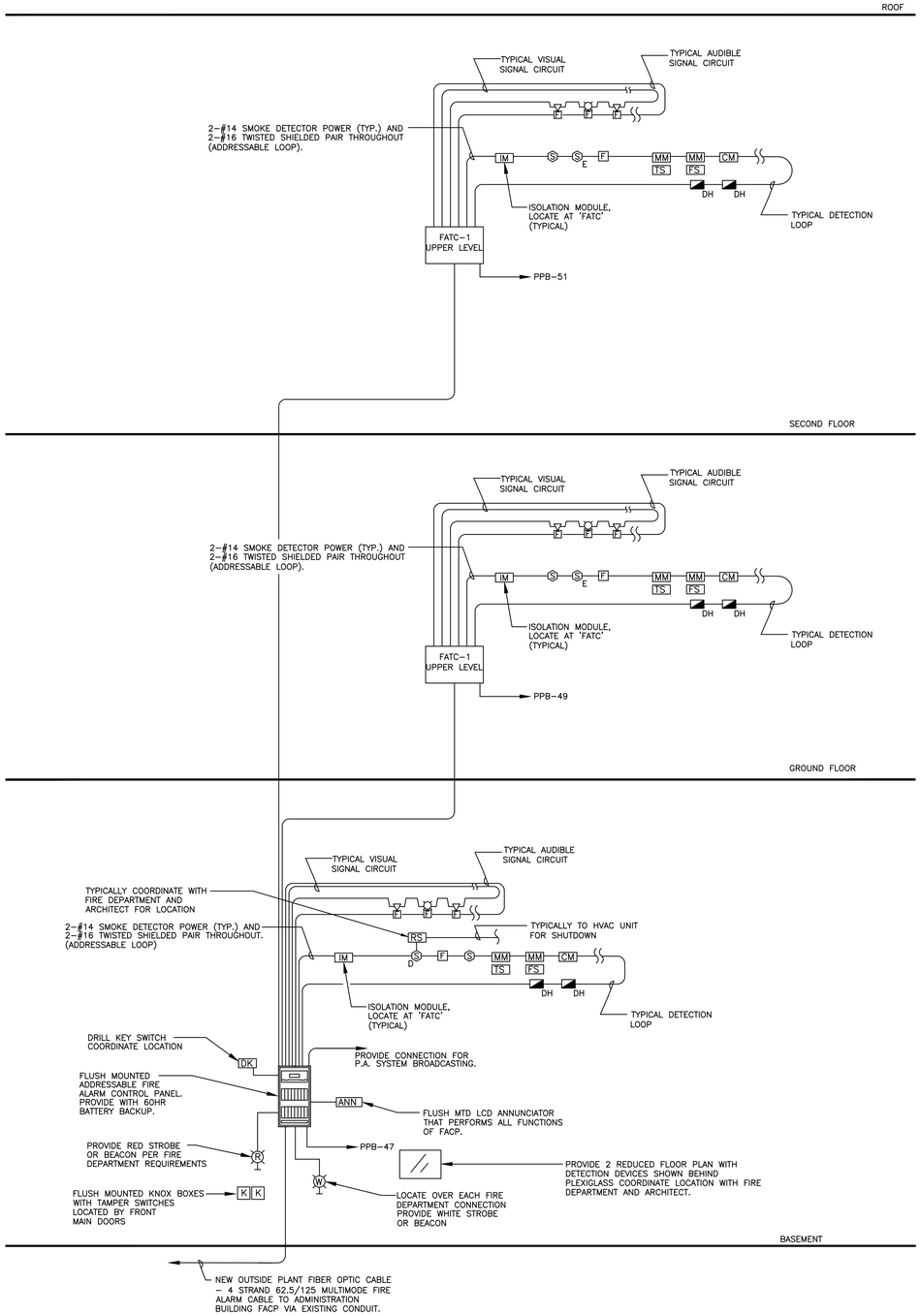
DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: E3.2

LOOP NUMBER	ADDRESSABLE LOOP SCHEDULE
1	FIRST FLOOR
2	SECOND FLOOR
3	SPARE
4	SPARE



1 E4.1 FIRE ALARM RISER DIAGRAM

SCALE: NONE

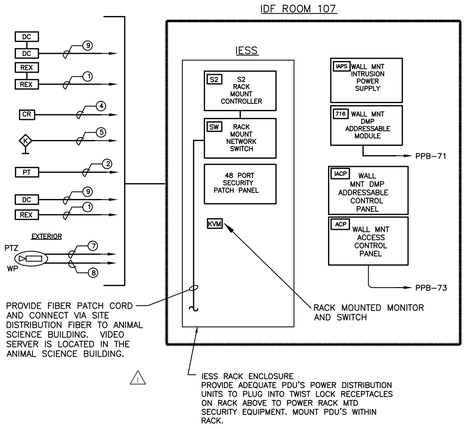
NOTE:
PROVIDE A COMPLETE FIRE ALARM SYSTEM FOR EACH BUILDING. EACH FACP WILL BE CONNECTED TO THE MAIN FACP IN THE ADMINISTRATION BUILDING.

SPACING ALLOCATION FOR WALL-MOUNTED VISUAL ALARMS

MINIMUM REQUIRED LIGHT OUTPUT, CANDELA () (EFFECTIVE INTENSITY)			
MAXIMUM AREA OF COVERAGE	ONE LIGHT PER AREA	TWO LIGHTS PER AREA	FOUR LIGHTS PER AREA
20' x 20'	15	NOT PERMITTED	NOT PERMITTED
30' x 30'	34	15	NOT PERMITTED
40' x 40'	60	30	NOT PERMITTED
50' x 50'	94	60	NOT PERMITTED
60' x 60'	135	95	NOT PERMITTED
70' x 70'	185	95	NOT PERMITTED
80' x 80'	240	135	60
90' x 90'	304	185	95
100' x 100'	375	240	95
110' x 110'	455	240	135
120' x 120'	540	305	135
130' x 130'	635	375	185

ROOM SPACING ALLOCATION FOR WALL-MOUNTED VISIBLE SIGNALING APPLIANCES

MAXIMUM ROOM SIZE (FT)	ONE LIGHT (CD)	TWO LIGHTS OPPOSITE WALLS (CD)	FOUR LIGHTS PER WALL (CD)
20' x 20'	15	–	–
30' x 30'	34	15	–
40' x 40'	60	30	15
50' x 50'	94	60	30
60' x 60'	135	95	30
70' x 70'	184	95	60
80' x 80'	240	135	60
90' x 90'	304	185	95
100' x 100'	375	240	95
110' x 110'	455	240	135
120' x 120'	540	305	135
130' x 130'	635	375	185



2 E4.1 PARTIAL IESS RISER

SCALE: N.T.S.

WIRING LEGEND

1. INPUT – CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON-SHIELDED FOR DPS ONE PAIR PER POLE, FOR REX ONE PAIR SPARE
2. OUTPUT – CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON-SHIELDED
3. NOT USED
4. READER – CABLE REQUIREMENTS 20AWG THREE PAIR SHIELDED REFERENCE MODEL BELDEN 82777 FOR PLENUM RATED APPLICATIONS
5. KEYPAD – CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON SHIELDED
6. NOT USED
7. CAT 6 PLENUM RATED UTP CABLE TO SECURITY PATCH PANEL
8. POWER SUPPLY CABLE AND CONTROL FOR EXTERIOR PTZ CAMERA. 2#18&2#18TSP.
9. INPUT – CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON-SHIELDED

IESS KEY NOTES

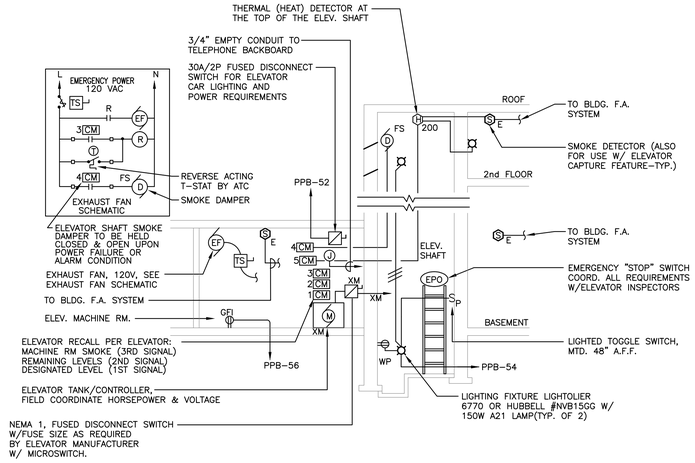
1. E.C. SHALL INTERFACE TO NETWORK TO ALLOW ANY NETWORKED PC TO VIEW ALARM EVENTS, LIVE OR RECORDED VIDEO AND SYSTEM SCHEDULES. VIEWING SOFTWARE TO BE WEB-BASED. SYSTEMS THAT REQUIRE CLIENT SOFTWARE TO BE USED WILL NOT BE ACCEPTABLE.
2. TYPICALLY EXTERIOR CAMERA LOCATIONS FURNISH AND INSTALL DAY/NIGHT DOME CAMERAS WITH HEATER BLOWERS AT THESE LOCATIONS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.

GENERAL NOTES

1. ALL HARDWARE SETS SHALL CONTAIN INTEGRAL REQUEST TO EXIT DEVICE. E.C. SHALL TIE INTO THESE DEVICES AND INSURE PROPER OPERATION.

NOTES

1. E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. E.C. SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY E.C.; INSTALLED BY HVAC.
3. TYPICALLY FIRE ALARM SYSTEM SIGNAL CONDUCTORS SHALL BE #14 AWG MINIMUM, TYPE THHN SOLID. ALL FIRE ALARM WIRING SHALL BE INSTALLED IN CONDUIT OR FIRE ALARM MC CABLE. PROVIDE A SYSTEM OF RACEWAYS EQUAL TO WIREMOLD WHERE EXPOSED TO PUBLIC SPACES AND ONLY WHEN UNABLE TO RUN CONCEALED.
4. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED SO THAT THE SPEAKERS CAN BE SILENCED AND THE STROBES WILL REMAIN FLASHING UNTIL RESET.
5. ALL SPEAKER/STROBES WITHIN ALL CLASSROOMS SHALL BE MULTI-TAPPED TYPE. ELECTRICAL CONTRACTOR SHALL OWN dB ADJUSTING DURING FIRE DEPARTMENT TESTING.
6. ALL SPEAKER/STROBES SHALL BE MOUNTED IN ACCORDANCE WITH ADA ROOM SPACING ALLOCATION TABLES FOR VISUAL SIGNALING DEVICES.
7. ALL DEVICES SHALL BE LABELED WITH CLEAR TAPE WITH BLACK INK. LABEL SHALL IDENTIFY LOOP NUMBER AND DEVICE NUMBER.
8. ALL REMOTE TEST STATIONS SHALL BE KEYED AND MOUNTED ADJACENT TO FACP OR AS DIRECTED BY BELMONT FIRE DEPARTMENT. LABEL EACH UNIT.
9. PULL STATIONS SHALL BE DOUBLE ACTION. PROVIDE TAMPER RESISTANT PLASTIC COVERS IN AUDITORIUM, GYM, AND LOCKER ROOM AREAS, ETC.
10. A/V DEVICES SHALL NOT BE INSTALLED WITHIN CHALK BOARDS. COORDINATE EXACT LOCATION OF ALL A/V DEVICES WITH ARCHITECT PRIOR TO INSTALLING.
11. ALL TAMPER AND SUPERVISORY SWITCHES SHALL BE WIRED AS LOCAL TROUBLE ALARM CONDITION UPON ACTIVATION. TROUBLE OR SUPERVISORY SHALL BE SELF RESTORING. TRANSMIT SIGNAL TO FIRE DEPARTMENT BUT DO NOT ALARM BUILDING.
12. PRIOR TO SUBMITTING SHOP DRAWINGS, COORDINATE WITH BELMONT FIRE DEPARTMENT FOR EXACT REQUIREMENTS. OBTAIN FIRE PREVENTION RULES AND REGULATIONS WHEN AVAILABLE AND COMPLY IN FULL.
13. COORDINATE WITH SELECTED SYSTEM MANUFACTURER FOR WIRING REQUIREMENTS.
14. ALL DETECTION AND SIGNAL WIRING SHALL BE CLASS "A".
15. SUBMIT AS PART OF SHOP DRAWINGS COMPLETE FLOOR PLANS AND RISERS WITH ALL DEVICES SHOWN AND WITH DEVICE ADDRESSES.
16. PROVIDE ISOLATION MODULE FOR EVERY 25 DEVICES. TYPICAL.



3 E4.1 ELEVATOR SHAFT AND MACHINE ROOM (NO SPRINKLER) DETAIL

N.T.S.

NOTES:
ELEVATOR RECALL: SMOKE DETECTORS LOCATED IN EACH ELEVATOR LOBBY, MACHINE ROOM AND FIXED TEMPERATURE HEAT DETECTOR AT TOP OF HOISTWAY, IN ADDITION TO SENDING SYSTEM INTO "AUTO" ALARM MODE SHALL ALSO INITIATE ELEVATOR RECALL FOR FIRE FIGHTERS SERVICE. FIVE (5) CONTROL MODULES WILL BE LOCATED IN THE ELEVATOR MACHINE ROOM. THE SMOKE DETECTOR LOCATED IN THE DESIGNATED RECALL LOBBY WILL ACTUATE THE FIRST CONTROL MODULE OF EACH ELEVATOR. THE SMOKE DETECTORS IN THE REMAINING ELEVATOR LOBBIES WILL ACTUATE THE SECOND CONTROL MODULE FOR EACH ELEVATOR. THE SMOKE DETECTOR IN THE MACHINE ROOM WILL ACTUATE THE THIRD CONTROL MODULE (WHERE THE ELEVATOR MACHINE ROOM IS LOCATED AT THE DESIGNATED LEVEL, THAT MACHINE ROOM SMOKE DETECTOR WILL ALSO ACTUATE THE FIRST CONTROL MODULE). THE MACHINE ROOM EXHAUST FAN WILL BE ENERGIZED UPON ACTUATION OF THE THIRD CONTROL MODULE. THE HEAT DETECTOR AT TOP OF HOISTWAY WILL ACTUATE THE FIFTH CONTROL MODULE AND WILL ALSO ACTUATE TOP HAT OUTSIDE ON CORRIDOR.

SECURITY PARTITION SCHEDULE

PARTITION NO.	DESCRIPTION
1	MAIN ENTRANCE
2	STAIR #1
3	STAIR #2
4	STAIR #3
5	STAIR #4
6	SPARE
7	SPARE
8	SPARE

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GARCIA-GALUSKA-DESOUSA CONSULTING ENGINEERS, INC.

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REVISIONS:

NO.	DATE:
1	JANUARY 6, 2012 ADDENDUM No.1

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: FIRE ALARM & SECURITY RISER DIAGRAMS

JOB NO: 10-05

DRAWN BY:

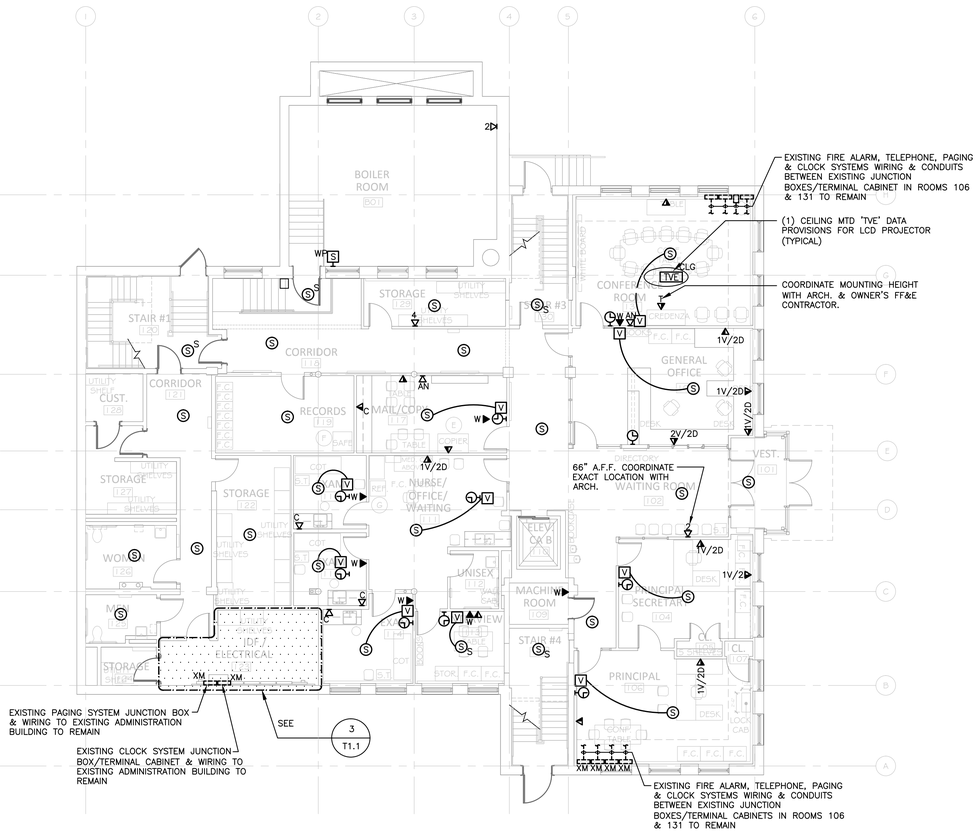
CHECKED BY:

DATE: APRIL 1, 2013

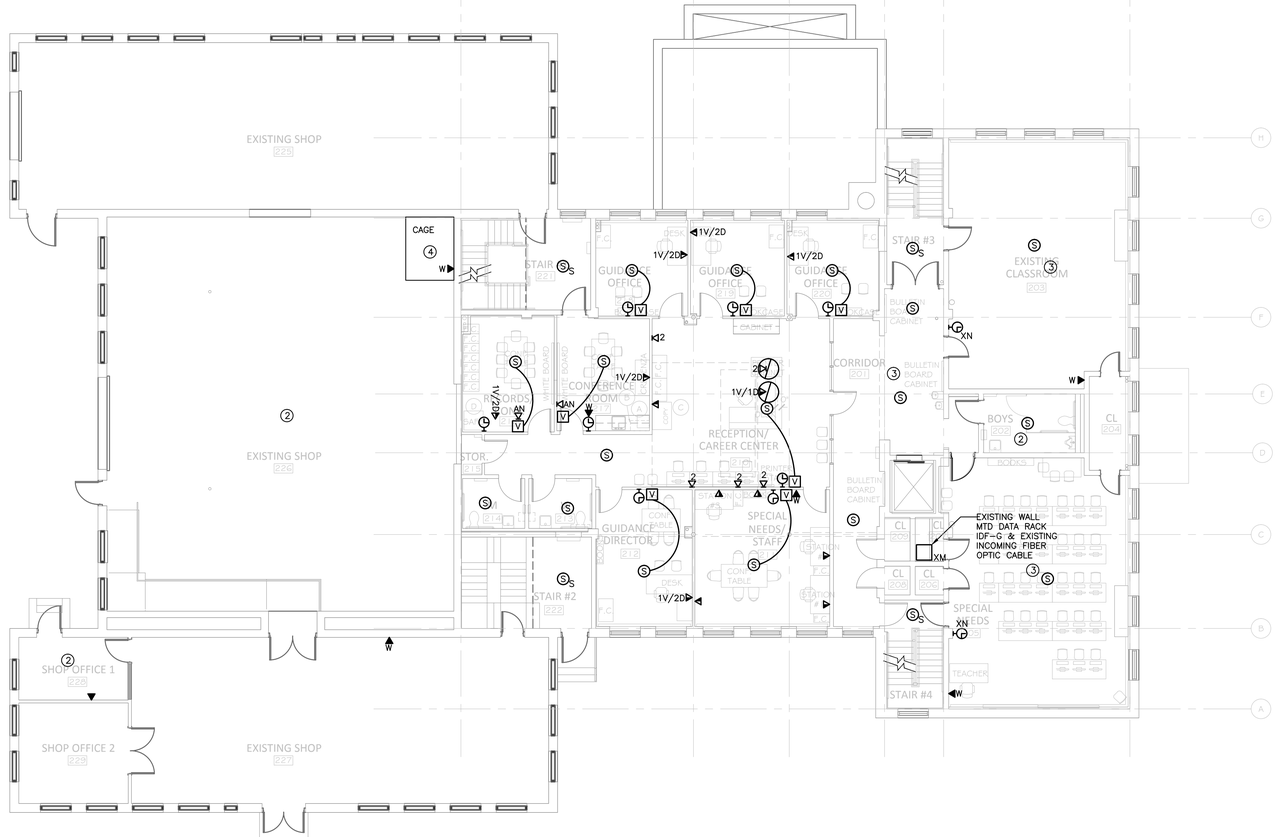
SCALE:

BUILDING: AN

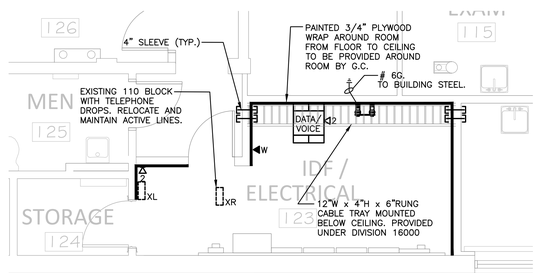
SHEET NO: E4.1



1 T1.1 BASEMENT PLAN – TECHNOLOGY
SCALE: 1/8"=1'-0"



2 T1.1 GROUND FLOOR PLAN – TECHNOLOGY
SCALE: 1/8"=1'-0"



3 T1.1 IDF/ELECTRICAL 123 PART PLAN
SCALE: 1/4"=1'-0"

GENERAL NOTES

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.

EXISTING CEILING TYPES

① SPLINE CEILING
② PLASTER CEILING
③ ACOUSTICAL CEILING
④ NO CEILING (OPEN)

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REVISIONS:

NO.	DATE:

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: BASEMENT AND GROUND FLOOR PLANS - TECHNOLOGY

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: T1.1

1 / T1.2 SECOND FLOOR PLAN – TECHNOLOGY

SCALE: 1/8"=1'-0"

GENERAL NOTES

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.
4. COORDINATE AND CONFIRM METHOD OF WIRING AND LOCATION PRIOR TO INSTALLATION OF TEL/DATA DEVICES.

EXISTING CEILING TYPES

1. SPLINE CEILING
2. PLASTER CEILING
3. ACOUSTICAL CEILING
4. NO CEILING (OPEN)

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: SECOND FLOOR PLAN - TECHNOLOGY

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

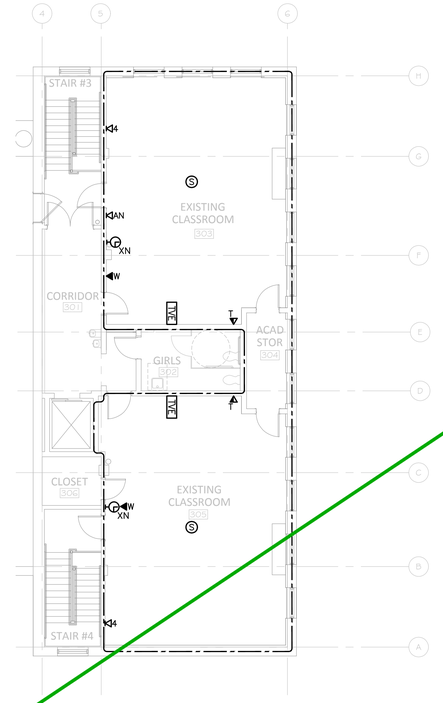
SHEET NO: T1.2

GENERAL NOTES

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.
4. COORDINATE AND CONFIRM METHOD OF WIRING AND LOCATION PRIOR TO INSTALLATION OF TEL/DATA DEVICES.

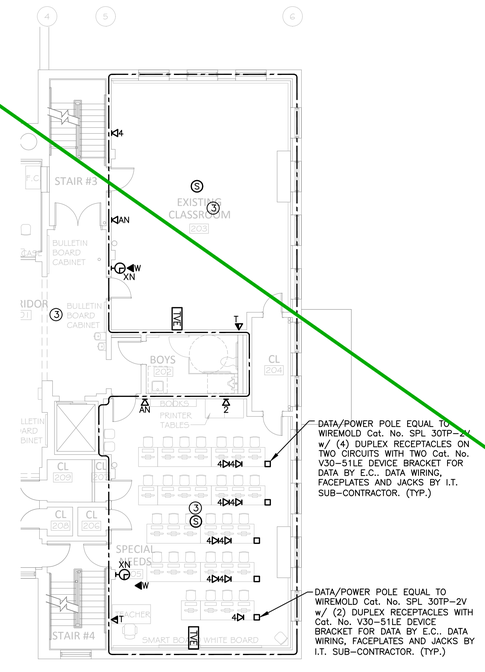
CEILING TYPE

1. SPLINE CEILING
2. PLASTER CEILING
3. ACOUSTICAL CEILING
4. NO CEILING (OPEN)



1 / T1.3 SECOND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



T / T1.3 GROUND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"

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REVISIONS:

NO.	DATE:

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: ALTERNATE No. 5 - TECHNOLOGY WORK

JOB NO: 10-05

DRAWN BY:

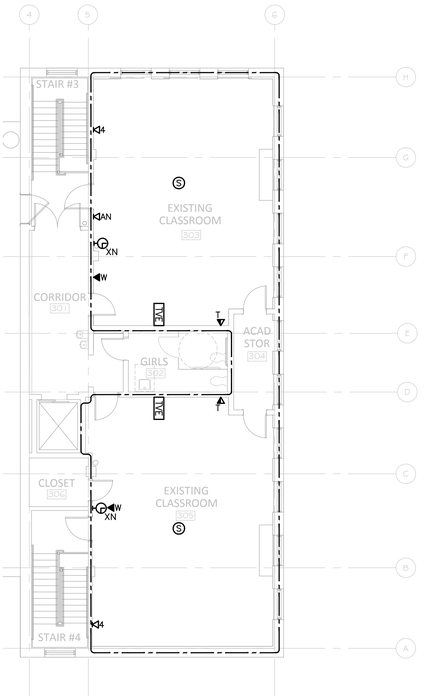
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

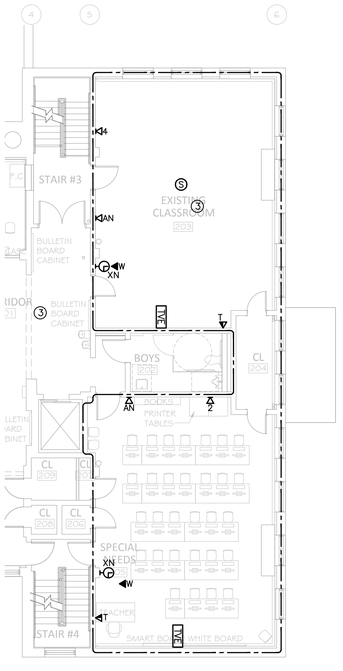
BUILDING: AN

SHEET NO: T1.3



1 / T1.3 SECOND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"



T / T1.3 GROUND FLOOR – ALTERNATE No. 5

SCALE: 1/8"=1'-0"

GENERAL NOTES

1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.
4. COORDINATE AND CONFIRM METHOD OF WIRING AND LOCATION PRIOR TO INSTALLATION OF TEL/DATA DEVICES.

CEILING TYPE

1. SPLINE CEILING
2. PLASTER CEILING
3. ACOUSTICAL CEILING
4. NO CEILING (OPEN)

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Nov 24, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: ALTERNATE No. 5 - TECHNOLOGY WORK

JOB NO: 10-05

DRAWN BY:

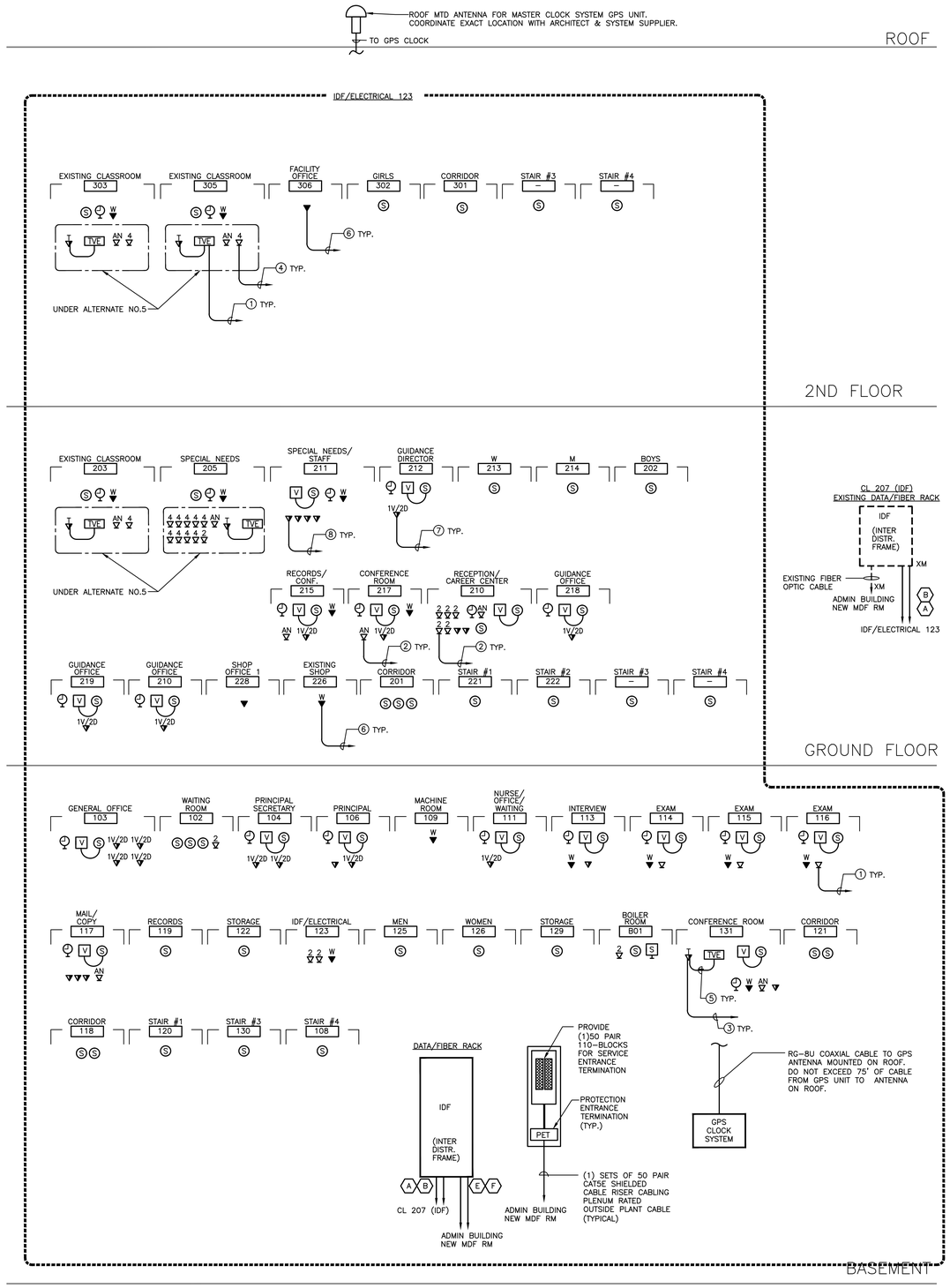
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: AN

SHEET NO: T1.3



QUANTITY OF DEVICES
IDF/ELECTRICAL 123

	DATA	VOICE
▽ = 3	3	–
2 ▽ = 9	18	–
3 ▽ = –	–	–
4 ▽ = 1	4	–
6 ▽ = –	–	–
AN ▽ = 5	10	–
T ▽ = 1	3	–
▽ = 13	13	13
1V/2D ▽ = 14	28	14
▼ = 2	–	2
W ▼ = 15	–	15
TVE = 1	1	–
TOTAL	80	44

INTERMEDIATE DISTRIBUTION FRAME IDF
LOCATION: IDF/ELECTRICAL 123

CAT 6 (RJ45) VOICE PORT			CAT 6 (RJ45) DATA PORTS		
USED	SPARE	PATCH PANEL SIZE	USED	SPARE	PATCH PANEL SIZE
44	4	(1) 48 PORT	80	16	(2) 48 PORT

QUANTITY OF DEVICES
IDF/ELECTRICAL 123
(ALTNERATE NO.5)

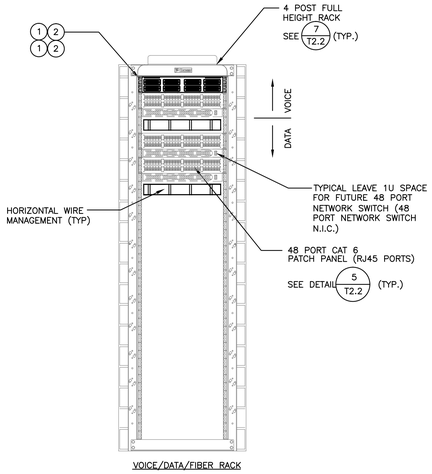
	DATA	VOICE
▽ = 3	3	–
2 ▽ = 10	20	–
3 ▽ = –	–	–
4 ▽ = 13	52	–
6 ▽ = –	–	–
AN ▽ = 9	18	–
T ▽ = 5	15	–
▽ = 13	13	13
1V/2D ▽ = 13	26	13
2V/2D ▽ = 1	2	2
▼ = 2	–	2
W ▼ = 16	–	16
TVE = 5	5	–
TOTAL	154	46

INTERMEDIATE DISTRIBUTION FRAME IDF
LOCATION: IDF/ELECTRICAL 123
(ALTNERATE NO.5)

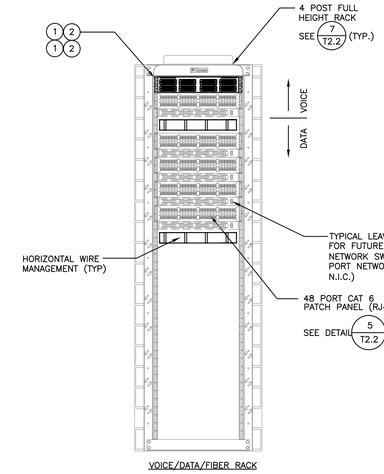
CAT 6 (RJ45) VOICE PORT			CAT 6 (RJ45) DATA PORTS		
USED	SPARE	PATCH PANEL SIZE	USED	SPARE	PATCH PANEL SIZE
46	2	(1) 48 PORT	154	38	(4) 48 PORT

CABLE/FIBER SCHEDULE

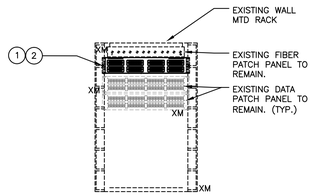
1. FIBER OPTIC MULTIMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (12 PORT – SC CONNECTORS) – PREMISES DISTRIBUTION
2. FIBER OPTIC SINGLEMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (6 PORT – ST CONNECTORS) – PREMISES DISTRIBUTION



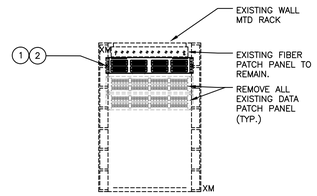
1 T2.0 IDF/ELECTRICAL 123 DETAIL
NOT TO SCALE



2 T2.0 IDF/ELECTRICAL 123 DETAIL (ALTERNATE NO.5)
NOT TO SCALE



3 T2.0 CL 207 (IDF) DETAIL
NOT TO SCALE



4 T2.0 CL 207 (IDF) DETAIL (ALTERNATE NO. 5)
NOT TO SCALE

NOTES:

1. – (1) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
2. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
3. – (3) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
4. – (4) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
5. – (2) RCA CABLES – (1) VGA CABLE – (1) COMPOSITE VIDEO – (1) 3.5MM STEREO CABLE – (2) CAT6 UTP CABLES PLENUM RATED CABLE
6. – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
7. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
8. – (1) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
9. – (6) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
10. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA – (2) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA

A. 12 STRAND MULTI–MODE FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER–DUCT.
B. 6 STRAND SINGLE MODE 8/9 MICRON FIBER CABLE TO MDF. INSTALL PLENUM RATED INNER–DUCT.
E. 12 STRAND MULTI–MODE FIBER OUTSIDE PLANT CABLE INSTALL PLENUM RATED INNER–DUCT.
F. 6 STRAND SINGLE MODE 8/9 MICRON FIBER OUTSIDE PLANT CABLE INSTALL PLENUM RATED INNER–DUCT.

NOTE:

1. THIS CONTRACTOR SHALL PROVIDE FOR A COMPLETE INSTALLATION. FURNISH ALL EQUIP. LABOR, WIRING AND OUTLETS REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM.
2. ALL WIRING SHALL BE IN ACCORDANCE WITH EQUIPMENT SUPPLIER. COORDINATE ALL WIRING REQUIREMENTS PRIOR TO ROUGHING–IN.
3. PROVIDE APPROPRIATE QUANTITIES OF DATA PATCH PANELS TO ACCOMODATE ALL RESPECTIVE DATA CIRCUITS.
4. PROVIDE CAT 6 PATCH CORDS TO MATCH TOTAL QUANTITY OF PATCH PANEL PORTS. AT BOTH MDF/IDF AND WORK STATION.

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: TECHNOLOGY RISER DIAGRAM & SCHEDULE

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

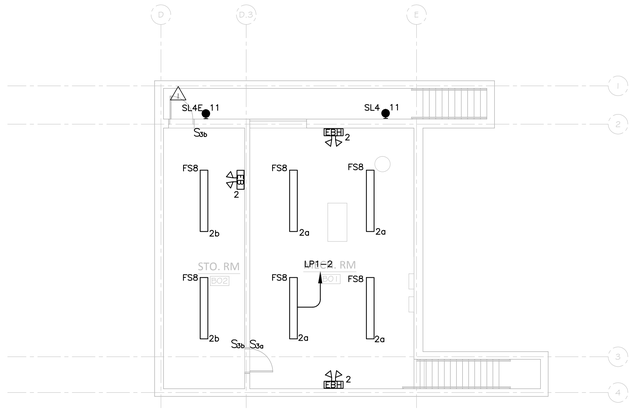
SCALE:

BUILDING: AN

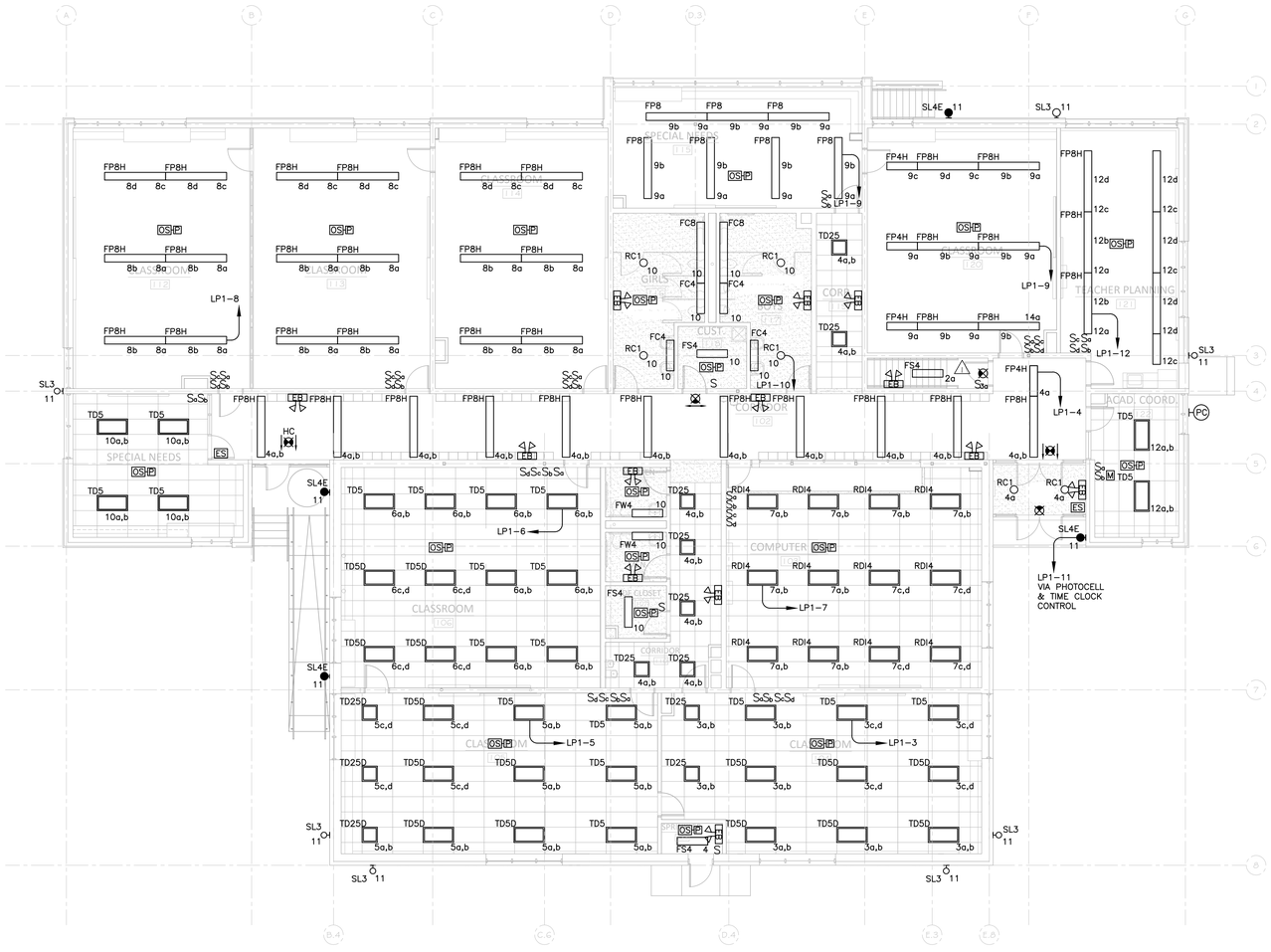
SHEET NO: T2.0

LIGHTING NOTES

1. INSTALL ALL LIGHTING FIXTURES IN ACCORDANCE WITH ARCHITECT'S REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, AND DETAILS.
2. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL FIXTURES INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS. ALL EXPOSED BRANCH CIRCUITS SHALL BE RUN IN CONDUIT. EXPOSED CONDUIT SHALL BE RUN PARALLEL AND PERPENDICULAR TO WALLS AND STRUCTURAL FRAMING.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. OCCUPANCY SENSORS AND PHOTO SENSORS SHALL BE LOCATED TO BE LOCATED IN EACH SPACE PER DEVICE MANUFACTURER'S DIRECTION. COORDINATE ALL LOCATIONS TO AVOID OBSTRUCTIONS NOT READILY APPARENT ON THE LIGHTING PLANS.
7. COORDINATE EXACT FIXTURE MOUNTING HEIGHTS AND LOCATIONS WITH LATEST ARCHITECTURAL DRAWINGS PRIOR TO ROUGHING. CONFIRM REQUIRED RIGID PENDANT / CABLE SUSPENSION LENGTHS PRIOR TO SUBMITTING SHOP DRAWINGS TO ENSURE PROPER COMPONENTS ARE PROVIDED.
8. ALL LIGHTING CIRCUITS TO AUTOMATED LIGHTING PANEL SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE FOR PROGRAMMING OF ALL CIRCUITS/SWITCH LEGS FOR ON/OFF SCHEDULING. REFER TO AUTOMATED LIGHTING SYSTEM DETAILS, SCHEDULES, AND SPECIFICATIONS.
9. DO NOT TAP METAL ROOF DECK FOR SUPPORT OF ANY ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT AS REQUIRED FOR SUPPORT OF ALL ELECTRICAL EQUIPMENT.
10. ALL EXIT SIGN LIGHTING WILL BE CIRCUITED AHEAD OF ANY SWITCH CONTROL FOR CONSTANT ON OPERATION CIRCUIT ALL EXIT SIGNS ON THIS DRAWING TO LP1-1.
11. ALL 8' LINEAR FIXTURES INDICATED WITH TWO SWITCH LEGS SHALL BE PROVIDED WITH SINGLE OR TWO LAMP BALLASTS WIRED TO PROVIDE INDEPENDENT SWITCHING OF 4' LAMPS IN PATTERNS INDICATED. BI-LEVEL STEP DIMMING BALLASTS SHALL NOT BE USED IN THESE APPLICATIONS.
12. TYPICALLY CONNECT SELF CONTAINED LOCAL BATTERY UNITS TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHES (CONSTANT 'ON')



2 / E1.1 BASEMENT PLAN – LIGHTING
SCALE: 1/8"=1'-0"



1 / E1.1 FIRST FLOOR PLAN – LIGHTING
SCALE: 1/8"=1'-0"

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE:
BASEMENT & FIRST FLOOR PLANS - LIGHTING

JOB NO: 10-05

DRAWN BY:

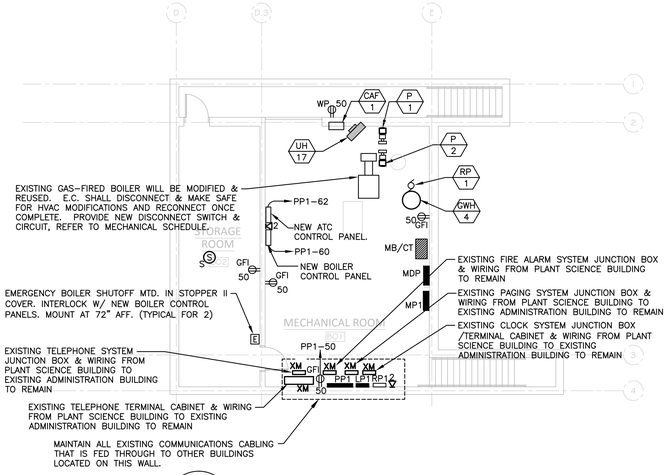
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

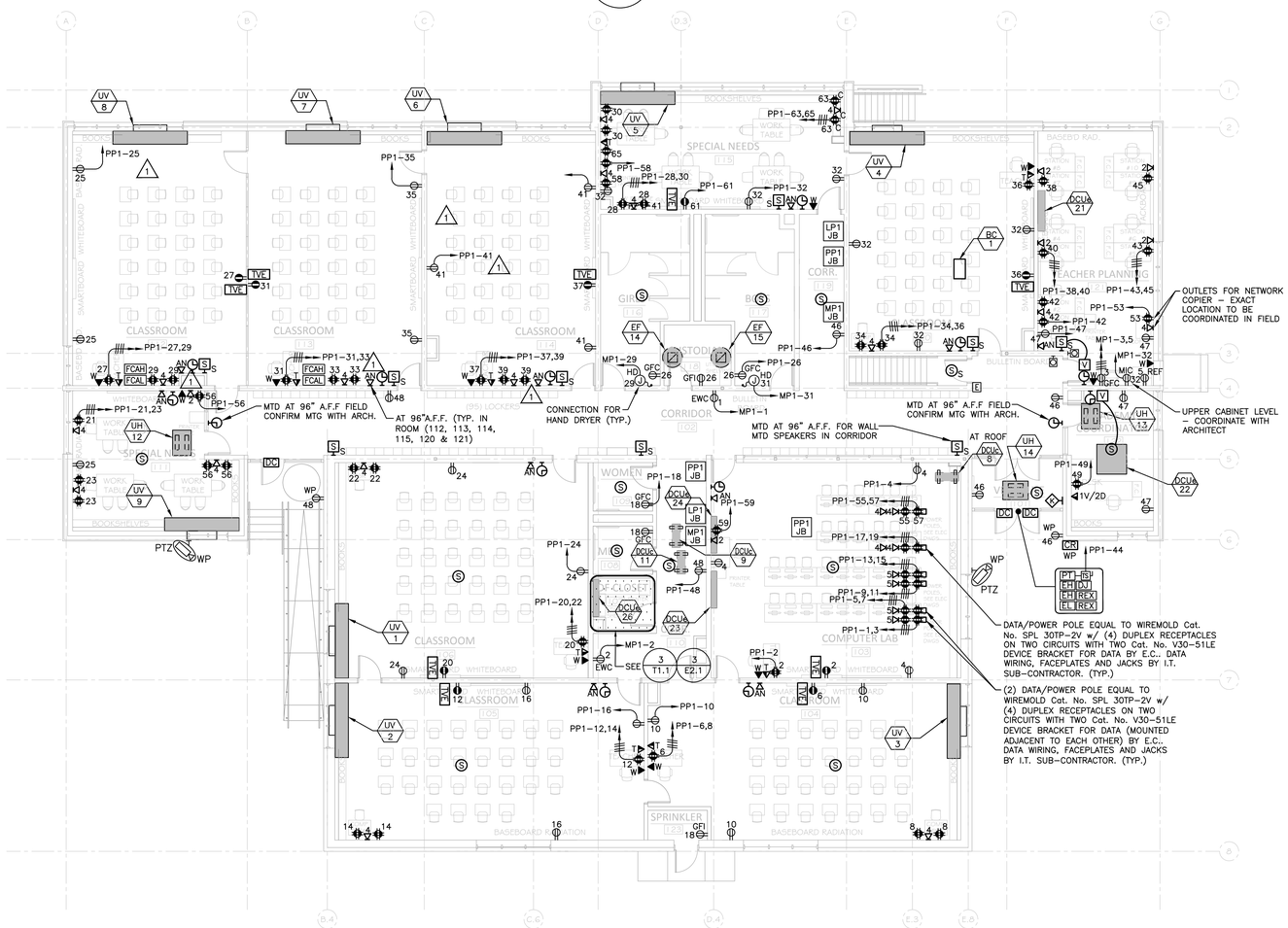
BUILDING: CB

SHEET NO: E1.1



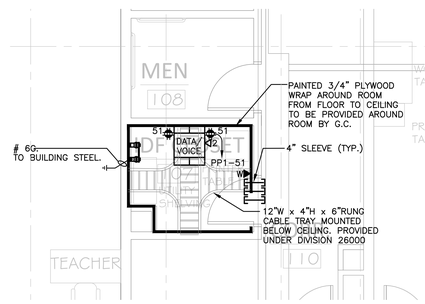
1 E2.1 BASEMENT PLAN – POWER

SCALE: 1/8"=1'-0"



2 E2.1 FIRST FLOOR PLAN – POWER

SCALE: 1/8"=1'-0"



3 E2.1 IDF ROOM 107 PART PLAN

SCALE: 1/4"=1'-0"

BRANCH CIRCUIT NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT W/ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE TYPE MC 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THWN/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH. TAMPER SWITCH, ETC.
8. MAKE CONNECTIONS FOR ELECTRIFIED SYSTEM FURNITURE. COORDINATE WITH ARCHITECT.
9. DO NOT PENETRATE STAIRS WITH ANY UTILITIES EXCEPT FOR UTILITIES SPECIFICALLY SERVING THAT STAIR.
10. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN EXISTING BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS & BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
11. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
12. ALL OUTLETS ON EXTERIOR WALLS WITH CASEWORK SHALL BE MOUNTED 6" ABOVE CASEWORK. CONFIRM HEIGHT OF CASEWORK WITH HVAC & ARCHITECT PRIOR TO ROUGHING.
13. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
14. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
15. TYPICALLY PROVIDE (2) 4" SLEEVES OVER EACH CORRIDOR DOOR.
16. PROVIDE (2) 2" THROUGH-WALL SLEEVE ABOVE CEILING OVER THE DOORS INTO EACH CLASSROOM OR ANY OTHER ROOM LEADING FROM THE CORRIDOR FOR COMMUNICATIONS/DATA WIRING.

TECHNOLOGY ROOM NOTES:

1. CONTRACTOR IS TO USE THE L5-20R RECEPTACLE MOUNTED ON CABLE TRAY FOR POWERING OF ALL EQUIPMENT RACKS.
2. ALL CABLE TRAY IS TO PROVIDED BY E.C. CABLE TRAY SHALL BE 18" W x 4" HIGH AND 6" RUNG ALUMINUM CONSTRUCTION.

LEGEND:

QUADRAPLEX ELECTRICAL OUTLET WITH 20 AMP DEDICATED CIRCUIT. MOUNTED ABOVE EQUIPMENT RACK ON UNDERSIDE OF CABLE TRAY. COORDINATE EXACT LOCATION OF OUTLET WITH EQUIPMENT RACK INSTALLER.

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: BASEMENT & FIRST FLOOR PLANS - POWER

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

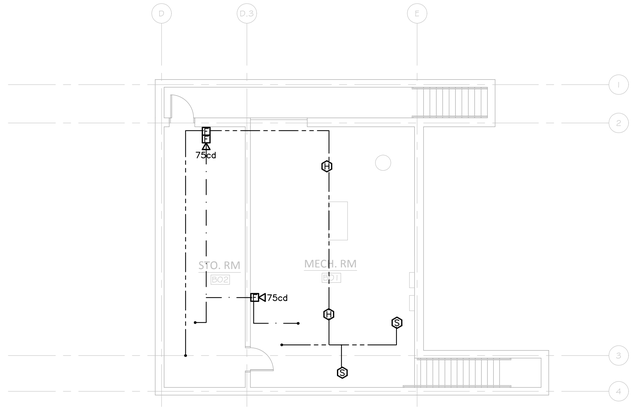
SCALE:

BUILDING: CB

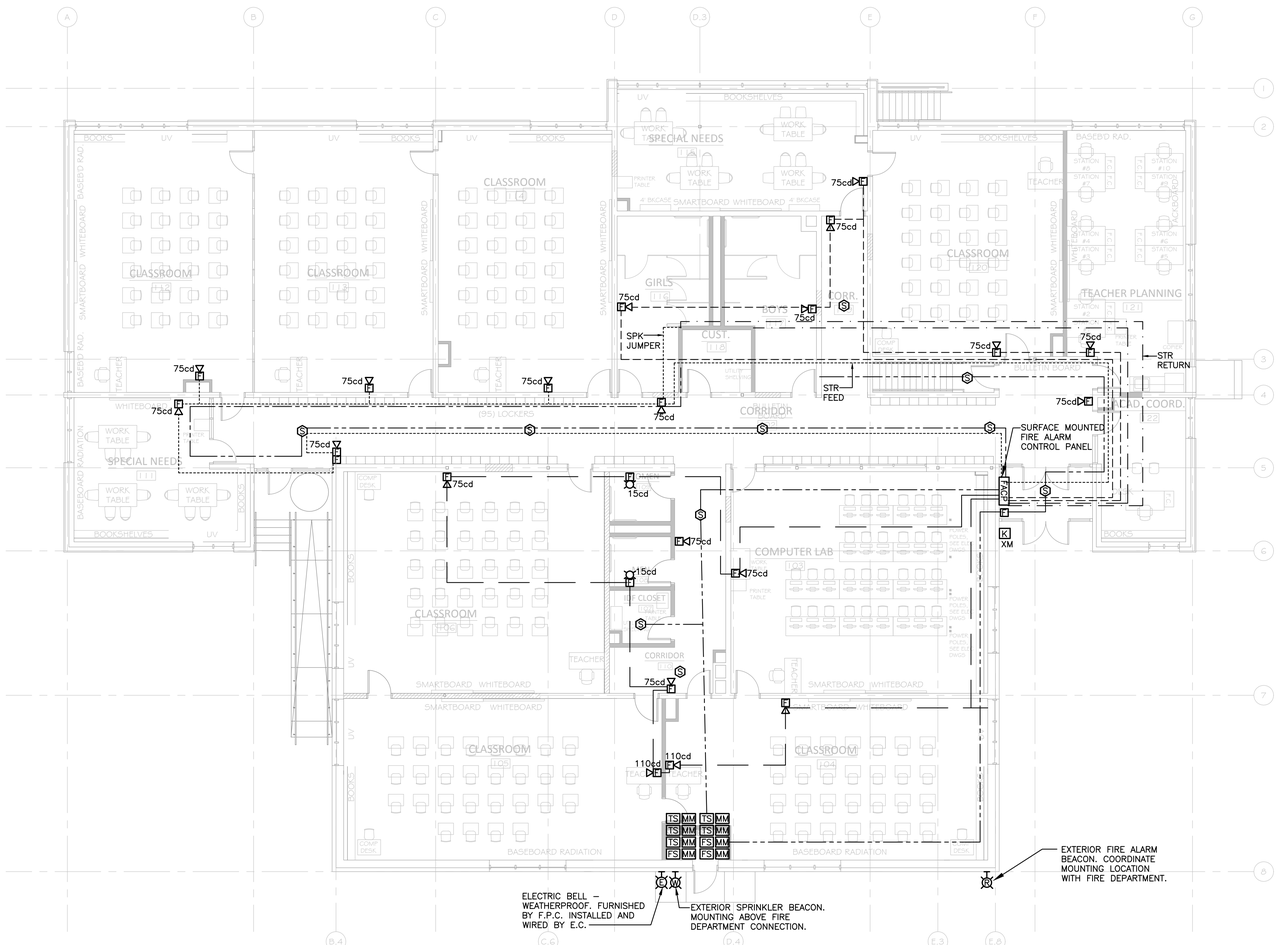
SHEET NO: E2.1

FIRE ALARM NOTES:

1. ELECTRICAL CONTRACTOR SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. ELECTRICAL CONTRACTOR SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR; INSTALLED BY HVAC.
3. PROVIDE EACH FIRE ALARM TERMINAL CABINET AND FIRE ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOORS.
4. TYPICALLY FIRE ALARM SYSTEM CONDUCTORS SHALL BE #14 AWG, TYPE THHN SOLID. ALL WIRING SHALL BE INSTALLED IN CONDUIT OR SURFACE METAL RACEWAY.
5. ALL ELECTRICAL ROOMS ARE FIRE RATED. FIREPROOF PENETRATIONS AS REQUIRED.
6. ALL PULL STATIONS IN MECHANICAL ROOMS, ETC. TO HAVE STOPPER II COVERS.



2 / E3.1 BASEMENT FLOOR PLAN – FIRE ALARM
SCALE: 1/8"=1'-0"



LEGEND
- DATA
- SPEAKER A/STROBE A
- SPEAKER A/STROBE B
- SPEAKER B/STROBE C
- SPEAKER B/STROBE D

1 / E3.1 FIRST FLOOR PLAN – FIRE ALARM
SCALE: 1/8"=1'-0"

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: BASEMENT & FIRST FLOOR PLANS FIRE ALARM

JOB NO: 10-05

DRAWN BY:

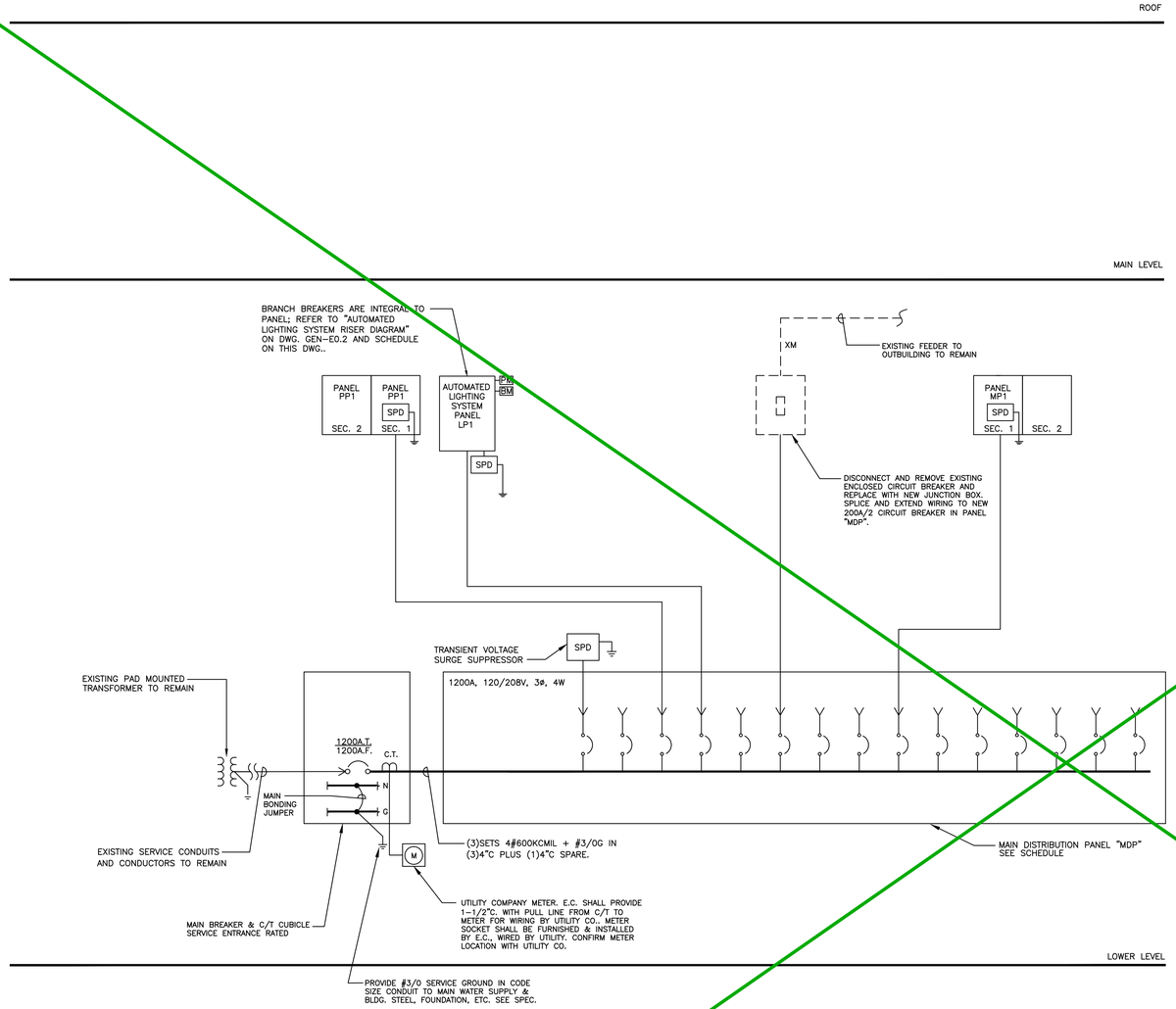
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: CB

SHEET NO: E3.1



1 / E4.0 ONE LINE RISER DIAGRAM
SCALE: NONE

1200A,120/208V, 3ø, 4W
AIC:65,000A RMS

MAIN DISTRIBUTION PANEL "MDP" SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
1	60	100	SURGE PROTECTION	4#6+#6G	1 1/4"	PER MANUFACTURES REQUIREMENTS
2	200	225	PP1	4#3/0+#6G	2"	
3	100	100	LP1	4#2++#6G	2"	
4	200	225	MP1	4#3/0+#6G	2"	
5	50	100	PUMP P-1	4#6+#10G	1"	
6	50	100	PUMP P-2	4#6+#10G	1"	
7	100	100	SPARE			
8	100	100	SPARE			
9	200	225	OUT BUILDING	3#3/0+#6G	2"	TWO POLE CIRCUIT BREAKER
10	–	225	SPACE			
11	–	100	SPACE			
12						

120/208V,3ø,4W, 65KAIC

PANEL SCHEDULE

PANEL NO.	LOCATION	MTG	MAIN BUS AMPS	MAIN CB	BRANCH CKT BREAKER (AMPS) 1 POLE 15	1 POLE 20	1 POLE 30	2 POLE 15	2 POLE 20	2 POLE 30	3 POLE 15	3 POLE 20	3 POLE 30	3 POLE 50	TOTAL POLES	OTHERS
LP1	ELECTRIC ROOM	S	REFER TO AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LP1"													
PP1	ELECTRIC ROOM	S	225	–	–	76	–	–	–	–	–	–	–	–	84	–
MP1	ELECTRIC ROOM	S	225	–		30		5			3			1	84	

AUTOMATED LIGHTING SYSTEM PANEL SCHEDULE "LP1"

LOCATION: GND. FLR. ELECTRIC ROOM — RATING: 100A MCB, 120/208V, 42KAIC, W/ BREAKERS BRAND TO MATCH DISTRIBUTION

	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	
(1)	1	3	20A/1P	M	INTERIOR LIGHTING	2	2	20A/1P	M	INTERIOR LIGHTING	(1)
(1)	3	5	20A/1P	M	INTERIOR LIGHTING	4	4a	20A/1P	M	INTERIOR EGRESS LIGHTING	(1)
(1)	5	6	20A/1P	M	INTERIOR LIGHTING	6	10	20A/1P	M	INTERIOR LIGHTING	(1)
(1)	7	7	20A/1P	M	INTERIOR LIGHTING	8	11	20A/1P	M	EXTERIOR EGRESS LIGHTING	(2)
(1)	9	8	20A/1P	M	INTERIOR LIGHTING	10	12	20A/1P	M	INTERIOR LIGHTING	(1)
(1)	11	9	20A/1P	M	INTERIOR LIGHTING	12	4b	20A/1P	M	INTERIOR EGRESS LIGHTING	(1)
(–)	13	13	20A/1P	–	SPARE	14	14	20A/1P	–	SPARE	
(–)	15	15	20A/1P	–	SPARE	16	16	20A/1P	–	SPARE	
(–)	17	17	20A/1P	–	SPARE	18	18	20A/1P	–	SPARE	
(–)	19	19	20A/1P	–	SPARE	–	20	60A/3P	–	SPD UNIT	
(–)	21	21	20A/1P	–	SPARE	–	22	–	–	–	
(–)	23	23	20A/1P	–	SPARE	–	24	–	–	–	

GENERAL NOTE: REFER TO FLOOR PLANS FOR ALL SPECIFIC SWITCH STATION CONTROL DESIGNATIONS.

(1) TIME CLOCK CONTROLLED (TIMED "ON" & TIMED "OFF" W/ SWEEPS) WITH SWITCH STATION OVERRIDES.

(2) TIME CLOCK AND PHOTOCELL CONTROLLED (PHOTO "ON" & TIMED "OFF") WITH SWITCH STATION OVERRIDES

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NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: ONE-LINE RISER DIAGRAM

JOB NO: 10-05

DRAWN BY:

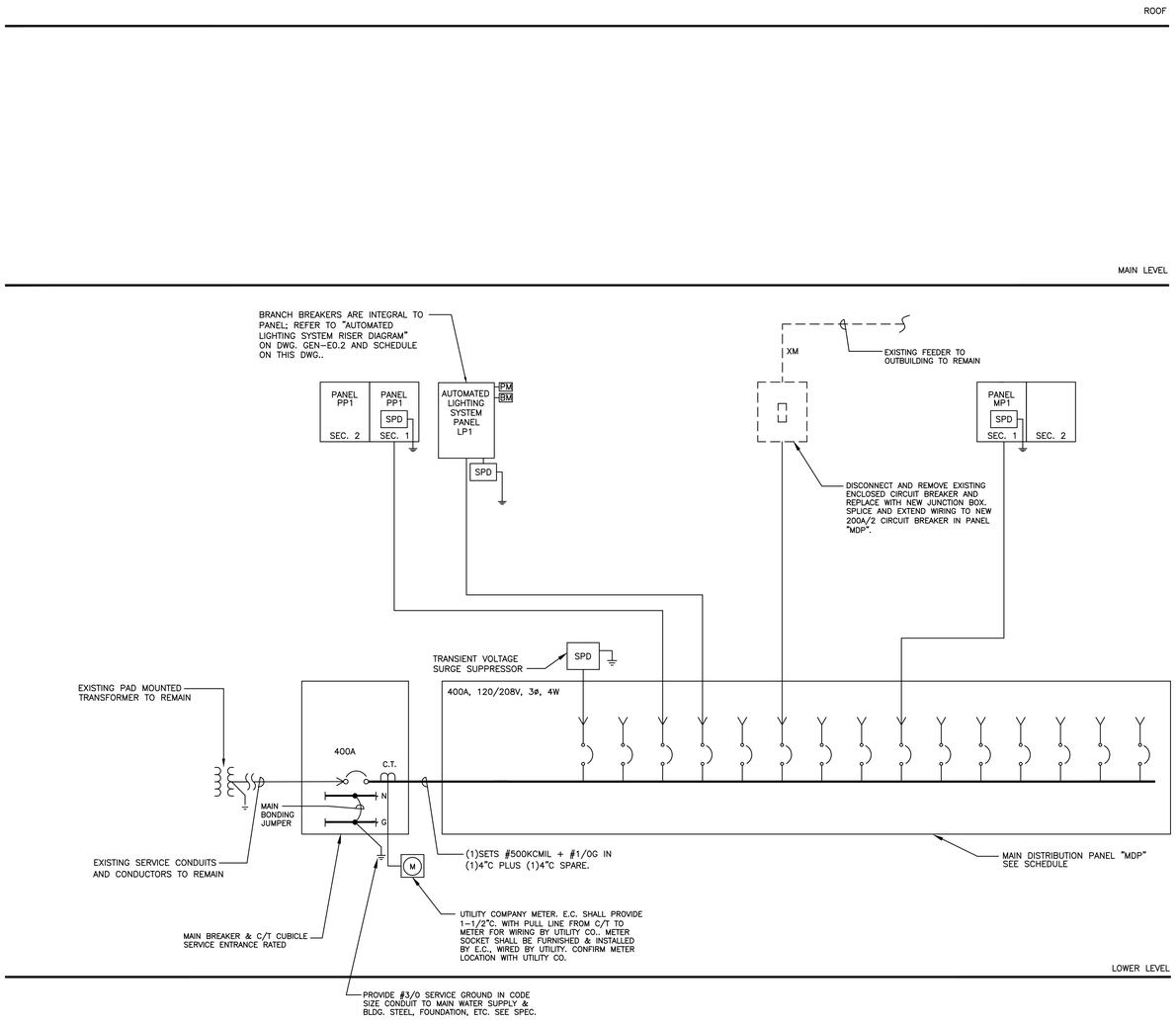
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: CB

SHEET NO: E4.0



1 / E4.0 ONE LINE RISER DIAGRAM –
SCALE: NONE

1200A,120/208V, 3ø, 4W
AIC:65,000A RMS

MAIN DISTRIBUTION PANEL "MDP" SCHEDULE

OVER CURRENT DEVICES No.	TRIP	FRAME	CIRCUIT	FEEDER SIZE	COND. SIZE	REMARKS
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7	100	100	SPARE			
8	100	100	SPARE			
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120/208V,3ø,4W, 65KAIC

PANEL SCHEDULE

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	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	RELAY NO.	CIRCUIT NO.	BRANCH BREAKER	SWITCH INPUT	LOADS CONTROLLED	
1	1	3	20A/1P	M	INTERIOR LIGHTING	2	2	20A/1P	M	INTERIOR LIGHTING	1
1	3	5	20A/1P	M	INTERIOR LIGHTING	4	4a	20A/1P	M	INTERIOR EGRESS LIGHTING	1
1	5	6	20A/1P	M	INTERIOR LIGHTING	6	10	20A/1P	M	INTERIOR LIGHTING	1
1	7	7	20A/1P	M	INTERIOR LIGHTING	8	11	20A/1P	M	EXTERIOR EGRESS LIGHTING	2
1	9	8	20A/1P	M	INTERIOR LIGHTING	10	12	20A/1P	M	INTERIOR LIGHTING	1
1	11	9	20A/1P	M	INTERIOR LIGHTING	12	4b	20A/1P	M	INTERIOR EGRESS LIGHTING	1
–	13	13	20A/1P	–	SPARE	14	14	20A/1P	–	SPARE	
–	15	15	20A/1P	–	SPARE	16	16	20A/1P	–	SPARE	
–	17	17	20A/1P	–	SPARE	18	18	20A/1P	–	SPARE	
–	19	19	20A/1P	–	SPARE	–	20	60A/3P	–	SPD UNIT	
–	21	21	20A/1P	–	SPARE	–	22	–	–	–	
–	23	23	20A/1P	–	SPARE	–	24	–	–	–	

GENERAL NOTE: REFER TO FLOOR PLANS FOR ALL SPECIFIC SWITCH STATION CONTROL DESIGNATIONS.

(1) TIME CLOCK CONTROLLED (TIMED "ON" & TIMED "OFF" W/ SWEEPS) WITH SWITCH STATION OVERRIDES.

(2) TIME CLOCK AND PHOTOCELL CONTROLLED (PHOTO "ON" & TIMED "OFF") WITH SWITCH STATION OVERRIDES

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NO.	DATE:
1	JANUARY 6, 2012 ADDENDUM No.1

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Nov 24, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: ONE-LINE RISER DIAGRAM

JOB NO: 10-05

DRAWN BY:

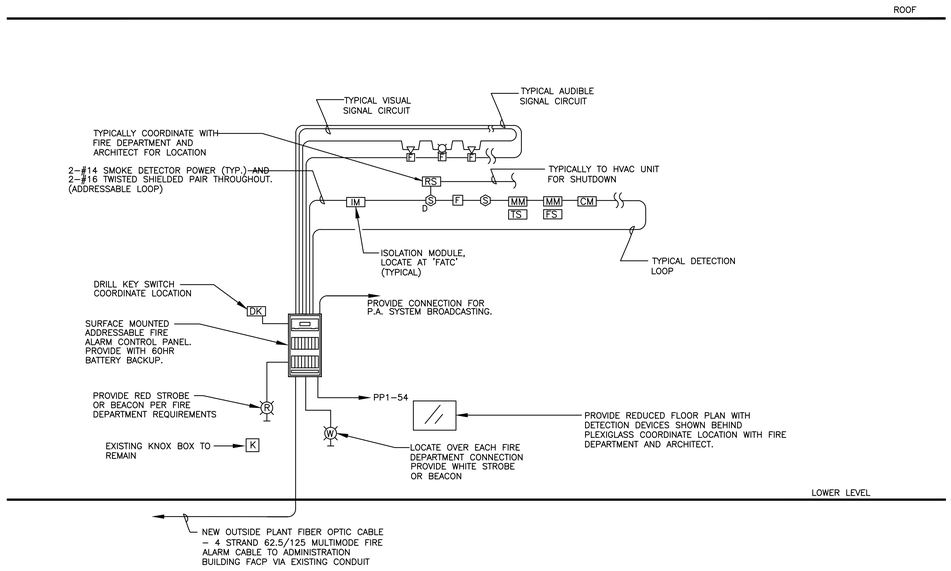
CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: CB

SHEET NO: E4.0



1 / E4.1 FIRE ALARM RISER DIAGRAM –

SCALE: NONE

NOTE:
PROVIDE A COMPLETE FIRE ALARM SYSTEM CONNECTED TO THE MAIN FACP IN THE ADMINISTRATION BUILDING.

LOOP NUMBER	ADDRESSABLE LOOP SCHEDULE
1	FIRST FLOOR
2	SPARE

SPACING ALLOCATION FOR WALL–MOUNTED VISUAL ALARMS

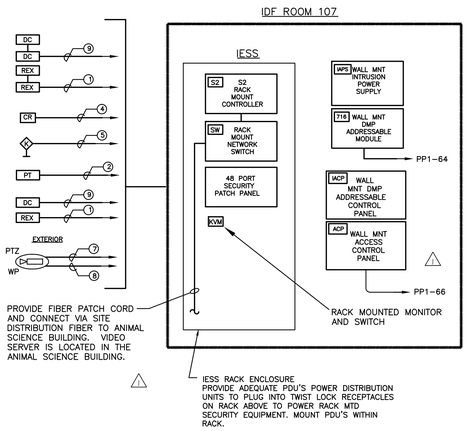
MINIMUM REQUIRED LIGHT OUTPUT, CANDELA () (EFFECTIVE INTENSITY)			
MAXIMUM AREA OF COVERAGE	ONE LIGHT PER AREA	TWO LIGHTS PER AREA	FOUR LIGHTS PER AREA
20' x 20'	15	NOT PERMITTED	NOT PERMITTED
30' x 30'	30	15	NOT PERMITTED
40' x 40'	60	30	NOT PERMITTED
50' x 50'	95	60	NOT PERMITTED
60' x 60'	135	95	NOT PERMITTED
70' x 70'	185	95	NOT PERMITTED
80' x 80'	240	135	60
90' x 90'	305	185	95
100' x 100'	375	240	95
110' x 110'	455	240	135
120' x 120'	540	305	135
130' x 130'	635	375	185

ROOM SPACING ALLOCATION FOR WALL–MOUNTED VISIBLE SIGNALING APPLIANCES

MAXIMUM ROOM SIZE (FT)	ONE LIGHT (CD)	TWO LIGHTS OPPOSITE WALLS (CD)	FOUR LIGHTS PER WALL (CD)
20' x 20'	15	–	–
30' x 30'	30	15	–
40' x 40'	60	30	15
50' x 50'	94	60	30
60' x 60'	135	95	30
70' x 70'	184	95	60
80' x 80'	240	135	60
90' x 90'	304	185	95
100' x 100'	375	240	95
110' x 110'	455	240	135
120' x 120'	540	305	135
130' x 130'	635	375	185

NOTES

1. E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
2. E.C. SHALL REFER TO HVAC DRAWINGS FOR EXACT LOCATION OF UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DUCT DETECTORS FURNISHED AND WIRED BY E.C.; INSTALLED BY HVAC.
3. TYPICALLY FIRE ALARM SYSTEM SIGNAL CONDUCTORS SHALL BE #14 AWG MINIMUM, TYPE THHN SOLID. ALL FIRE ALARM WIRING SHALL BE INSTALLED IN CONDUIT OR FIRE ALARM MC CABLE. PROVIDE A SYSTEM OF RACEWAYS EQUAL TO WIREMOLD WHERE EXPOSED TO PUBLIC SPACES AND ONLY WHEN UNABLE TO RUN CONCEALED.
4. TYPICALLY ALL SPEAKER/STROBE UNITS SHALL BE WIRED SO THAT THE SPEAKERS CAN BE SILENCED AND THE STROBES WILL REMAIN FLASHING UNTIL RESET.
5. ALL SPEAKER/STROBES WITHIN ALL CLASSROOMS SHALL BE MULTI–TAPPED TYPE. ELECTRICAL CONTRACTOR SHALL OWN dB ADJUSTING DURING FIRE DEPARTMENT TESTING.
6. ALL SPEAKER/STROBES SHALL BE MOUNTED IN ACCORDANCE WITH ADA ROOM SPACING ALLOCATION TABLES FOR VISUAL SIGNALING DEVICES.
7. ALL DEVICES SHALL BE LABELED WITH CLEAR TAPE WITH BLACK INK. LABEL SHALL IDENTIFY LOOP NUMBER AND DEVICE NUMBER.
8. ALL REMOTE TEST STATIONS SHALL BE KEYED AND MOUNTED ADJACENT TO FACP OR AS DIRECTED BY BELMONT FIRE DEPARTMENT. LABEL EACH UNIT.
9. PULL STATIONS SHALL BE DOUBLE ACTION. PROVIDE TAMPER RESISTANT PLASTIC COVERS IN AUDITORIUM, GYM, AND LOCKER ROOM AREAS, ETC.
10. A/V DEVICES SHALL NOT BE INSTALLED WITHIN CHALK BOARDS. COORDINATE EXACT LOCATION OF ALL A/V DEVICES WITH ARCHITECT PRIOR TO INSTALLING.
11. ALL TAMPER AND SUPERVISORY SWITCHES SHALL BE WIRED AS LOCAL TROUBLE ALARM CONDITION UPON ACTIVATION. TROUBLE OR SUPERVISORY SHALL BE SELF RESTORING. TRANSMIT SIGNAL TO FIRE DEPARTMENT BUT DO NOT ALARM BUILDING.
12. PRIOR TO SUBMITTING SHOP DRAWINGS, COORDINATE WITH BELMONT FIRE DEPARTMENT FOR EXACT REQUIREMENTS. OBTAIN FIRE PREVENTION RULES AND REGULATIONS WHEN AVAILABLE AND COMPLY IN FULL.
13. COORDINATE WITH SELECTED SYSTEM MANUFACTURER FOR WIRING REQUIREMENTS.
14. ALL DETECTION AND SIGNAL WIRING SHALL BE CLASS "A".
15. SUBMIT AS PART OF SHOP DRAWINGS COMPLETE FLOOR PLANS AND RISERS WITH ALL DEVICES SHOWN AND WITH DEVICE ADDRESSES.
16. PROVIDE ISOLATION MODULE FOR EVERY 25 DEVICES. TYPICAL.



2 / E4.1 PARTIAL IESS RISER

SCALE: N.T.S.

SECURITY PARTITION SCHEDULE

PARTITION NO.	DESCRIPTION
1	MAIN ENTRANCE
2	MECHANICAL ROOM DOOR
3	SECONDARY DOOR
4	SPARE
5	SPARE
6	SPARE
7	SPARE
8	SPARE

WIRING LEGEND

1. INPUT – CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON–SHIELDED FOR DPS ONE PAIR PER POLE, FOR REX ONE PAIR SPARE
2. OUTPUT – CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON–SHIELDED
3. NOT USED
4. READER – CABLE REQUIREMENTS 20AWG THREE PAIR SHIELDED REFERENCE MODEL BELDEN 82777 FOR PLENUM RATED APPLICATIONS
5. KEYPAD – CABLE REQUIREMENTS 18AWG FOUR CONDUCTOR STRANDED NON SHIELDED
6. NOT USED
7. CAT 6 PLENUM RATED UTP CABLE TO SECURITY PATCH PANEL
8. POWER SUPPLY CABLE AND CONTROL FOR EXTERIOR PTZ CAMERA. 2#18&2#18TSP.
9. INPUT – CABLE REQUIREMENTS 18AWG TWO CONDUCTOR STRANDED NON–SHIELDED

IESS KEY NOTES

1. E.C. SHALL INTERFACE E.C. TO NETWORK TO ALLOW ANY NETWORKED PC TO VIEW ALARM EVENTS, LIVE OR RECORDED VIDEO AND SYSTEM SCHEDULES. VIEWING SOFTWARE TO BE WEB–BASED. SYSTEMS THAT REQUIRE CLIENT SOFTWARE TO BE USED WILL NOT BE ACCEPTABLE.
2. TYPICALLY EXTERIOR CAMERA LOCATIONS FURNISH AND INSTALL DAY/NIGHT DOME CAMERAS WITH HEATER BLOWERS AT THESE LOCATIONS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.

GENERAL NOTES

1. ALL HARDWARE SETS SHALL CONTAIN INTEGRAL REQUEST TO EXIT DEVICE. E.C. SHALL TIE INTO THESE DEVICES AND INSURE PROPER OPERATION.

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: FIRE ALARM & SECURITY RISER DIAGRAMS

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: CB

SHEET NO: E4.1

SCHEDULE OF NEW MECHANICAL EQUIPMENT

UNIT NO.	DESCRIPTION	LOCATION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNECTIONS											REMARKS	
									TS	⊠	◹	□	⊸	Ⓢ D	WP	J	J S WP	NEMA 3R	VFD	
DCUe-21	INTERIOR COOLING UNIT	CB 121	–	208	1	MP1-4,6	15A-2P	3#12&1#12G-3/4"C			X		X			X				CP-1	⑧⑨⑪
DCUe-22	INTERIOR COOLING UNIT	CB 122	–	208	1	MP1-8,10	15A-2P	3#12&1#12G-3/4"C			X		X			X				CP-1	⑧⑨⑪
DCUc-8	EXTERIOR COOLING UNIT	ROOF	–	208	1	MP1-12,14	30A-2P	3#10&1#10G-3/4"C			X		X			X					
BC-1	BC CONTROLLER	CB 120	–	208	1	–	–	3#10&1#10G-3/4"C			X		X			X				FEED FROM EXTERIOR UNIT DCUc-8	
DCUe-23	INTERIOR COOLING UNIT	CB 103	–	208	1	MP1-7,9	15A-2P	3#12&1#12G-3/4"C			X		X			X				CP-1	⑧⑨⑫
DCUe-24	INTERIOR COOLING UNIT	CB 103	–	208	1	MP1-11,13	15A-2P	3#12&1#12G-3/4"C			X		X			X				CP-1	⑧⑨⑫
DCUc-9	EXTERIOR COOLING UNIT	ROOF	–	208	1	MP1-19,21	30A-2P	3#10&1#10G-3/4"C			X		X			X					
DCUe-26	INTERIOR COOLING UNIT	CB 107	–	208	1	–	–	3#12&1#12G-3/4"C			X		X			X				FEED FROM EXTERIOR UNIT DCUc-11, CP-1	⑧⑨⑬
DCUc-11	EXTERIOR COOLING UNIT	ROOF	–	208	1	MP1-33,35	20A-2P	3#12&1#12G-3/4"C			X		X			X					
EF-14	EXHAUST FAN	CB 118	1/4 HP	120	1	MP1-16	20A-1P	2#12&1#12G-3/4"C	X				X			X					
EF-15	EXHAUST FAN	CB 118	1/2 HP	120	1	MP1-18	20A-1P	2#12&1#12G-3/4"C	X				X			X					
CAF-1	COMBUSTION AIR FAN	CB B01	1/3 HP	208	3	MP1-38,40,42	20A-3P	4#12&1#12G-3/4"C			X		X			X					
B-1	EXISTING BOILER	CB B01	–	120	1	MP1-15	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UH-12	UNIT HEATER	CB 111	1/30 HP	120	1	MP1-20	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UH-13	UNIT HEATER	CB 122	1/30 HP	120	1	MP1-22	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UH-14	UNIT HEATER	CB 101	1/15 HP	120	1	MP1-22	–	2#12&1#12G-3/4"C	X				X			X					
UH-17	UNIT HEATER	CB B01	1/15 HP	120	1	MP1-20	–	2#12&1#12G-3/4"C	X				X			X					
P-1	WATER PUMP	CB B01	5 HP	208	3	MP1	20A-3P	4#6+#10G-1"C			X		X			X			X		
P-2	WATER PUMP	CB B01	5 HP	208	3	MP1	20A-3P	4#6+#10G-1"C			X		X			X			X		
UV-1	UNIT VENTILATOR	CB 106	1/4 HP	120	1	MP1-23	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UV-2	UNIT VENTILATOR	CB 105	1/4 HP	120	1	MP1-23	–	2#12&1#12G-3/4"C	X				X			X					
UV-3	UNIT VENTILATOR	CB 104	1/4 HP	120	1	MP1-25	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UV-4	UNIT VENTILATOR	CB 120	1/4 HP	120	1	MP1-25	–	2#12&1#12G-3/4"C	X				X			X					
UV-5	UNIT VENTILATOR	CB 115	1/4 HP	120	1	MP1-27	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UV-6	UNIT VENTILATOR	CB 114	1/4 HP	120	1	MP1-27	–	2#12&1#12G-3/4"C	X				X			X					
UV-7	UNIT VENTILATOR	CB 113	1/4 HP	120	1	MP1-24	20A-1P	2#12&1#12G-3/4"C	X				X			X					
UV-8	UNIT VENTILATOR	CB 112	1/4 HP	120	1	MP1-24	–	2#12&1#12G-3/4"C	X				X			X					
UV-9	UNIT VENTILATOR	CB 111	1/4 HP	120	1	MP1-26	20A-1P	2#12&1#12G-3/4"C	X				X			X					

1 E4.2 MECHANICAL EQUIPMENT SCHEDULE

SCALE: N.T.S.

SCHEDULE OF PLUMBING EQUIPMENT

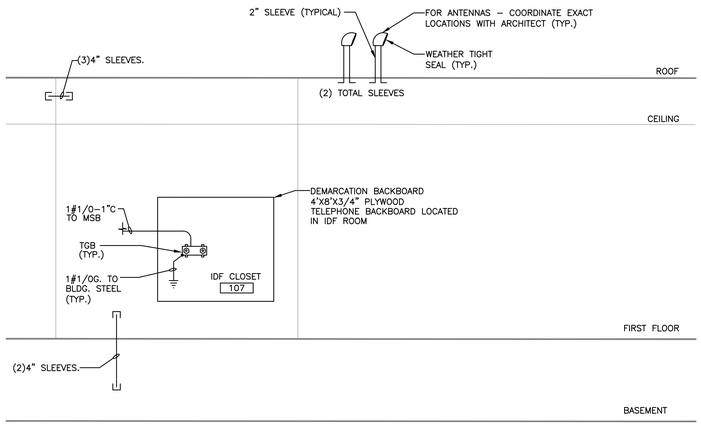
UNIT NO.	DESCRIPTION	LOAD CHARACTERISTICS	VOLT	PH	PANEL CIRCUIT	CIRCUIT BREAKER	FEEDER	EQUIPMENT AND CONNCECTIONS									REMARKS	
								TS	⊠	◹	□	⊸	Ⓢ D	WP	J	J S WP		
GWH-4	WATER HEATER (GAS-FIRED)	–	120	1	MP1-28	20A-1P	2#12+1#12G-3/4"C	X				X			X			
RP-1	CIRC. PUMP	1/6 HP	120	1	MP1-30	20A-1P	2#12+1#12G-3/4"C	X				X			X		VIA TIME CLOCK & AQUASTAT	②③

PLUMBING SCHEDULE NOTES

① E.C. TO PROVIDE SECURITY & CONNECT TO SECURITY SYSTEM.
② TIMECLOCKS FURNISHED BY PC, INSTALLED & WIRED BY EC.
③ AQUASTATS FURNISHED AND INSTALLED BY PC, 120V CONNECTION BY EC.

2 E4.2 PLUMBING EQUIPMENT SCHEDULE

SCALE: N.T.S.



4 E4.2 TELECOMMUNICATIONS SLEEVES & GROUNDING RISER DIAGRAM

SCALE: N.T.S.

NOTES:

1. COORDINATE ALL SLEEVE LOCATIONS WITH TELECOMMUNICATIONS CONTRACTOR PRIOR TO INSTALLATION.
2. COORDINATE ALL CONDUIT ROUTING WITH TELECOMMUNICATIONS CONTRACTOR. PROVIDE PULL BOXES WHERE CONDUIT BEND EXCEEDS A TOTAL OF 180 DEGREES OR DISTANCE EXCEEDS 150'. ALWAYS ALIGN CONDUITS ON OPPOSITE ENDS OF PULL BOX.
3. PULL BOX SIZES FOR 4" CONDUITS SHALL BE MINIMUM 15" WIDE X 60" LONG X 8" DEEP. INCREASE WIDTH OF PULL BOX 8" FOR EVERY ADDITIONAL 4" CONDUIT.
4. ALL CONDUIT BENDS SHALL BE MINIMUM 36" RADIUS.
5. DO NOT RUN CONDUITS PARALLEL WITH POWER CONDUITS. MAINTAIN MINIMUM OF 4' CLEARANCE.
6. E.C. SHALL BOND ALL CABLE TRAY TO "TGB" IN RESPECTIVE DATA ROOM WITH #6 GROUND. THE CABLE TRAY SHALL BE ELECTRICALLY CONTINUOUS THROUGH. ENTIRE RUN INCLUDING ALL FITTINGS.

MECHANICAL SCHEDULE NOTES:

① DUCT SMOKE DETECTORS SHALL BE PROVIDED ON RETURN DUCT FOR ALL MECHANICAL UNITS OVER 2000CFM. PROVIDE DUCT SMOKE ON RETURN AND SUPPLY DUCTWORK FOR ALL MECHANICAL UNITS OVER 15000 CFM. PROVIDE REMOTE TEST STATION WITH EACH DETECTOR. LOCATION OF TEST STATION SHALL BE ADJACENT TO THE FACP. DUCT SMOKES TO INITIATE SUPERVISORY ALARM.

② PROVIDE FLEXIBLE CONNECTION TO EQUIPMENT REFER TO SPECIFICATIONS.

③ CONTROLLERS AND DISCONNECT DEVICES SHALL BE NRTL RATED FOR USE WITH A DESIGN E MOTOR WITH A HORSE POWER RATING NOT LESS THAN 1.4 TIMES THE MOTOR HORSE POWER. (REFER TO ELECTRICAL CODE ARTICLE 430).

④ TWO SPEED MOTORS SHALL HAVE TWO MOTOR BRANCH CIRCUITS AND SIX POLE DISCONNECTS.

⑤ PROVIDE WEATHERPROOF DUPLEX RECEPTACLES AT MECHANICAL EQUIPMENT. PROVIDE 3/4"C. WITH 2#12+#12G AWG TO NEAREST PANEL AND CONNECT TO 20A/1P CIRCUIT BREAKER UNLESS OTHERWISE INDICATED.

⑥ TYPICALLY LOCATE STARTERS IN ELECTRIC ROOM (NEAR PANEL).

⑦ ALL EXTERIOR MOUNTED DISCONNECT SWITCHES SHALL BE NEMA "3R."

⑧ PROVIDE 3/4"CONDUIT W/PULL WIRE BETWEEN INDOOR UNIT & OUTDOOR UNIT FOR EACH SPLIT SYSTEM.

⑨ PROVIDE HARD CONNECTION FOR CONDENSATE PUMP (CP). CONNECT TO NEAREST 120V, 1ø BRANCH CIRCUIT. PROVIDE THERMAL SWITCH AT UNIT. FIELD COORDINATE EXACT LOCATION WITH HVAC.

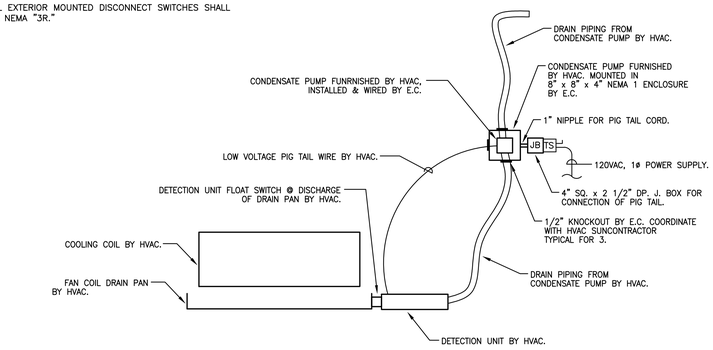
SEE DETAIL 3/E4.2

⑩ THE E.C. SHALL PROVIDE NEMA 7 DISCONNECT SWITCHES AND SEAL FITTINGS AT EXPLOSION PROOF FANS.

⑪ PROVIDE 4#12&#12G-3/4"C BETWEEN INDOOR UNIT & OUTDOOR UNIT (DCUc-8).

⑫ PROVIDE 4#12&#12G-3/4"C BETWEEN INDOOR UNIT & OUTDOOR UNIT (DCUc-9).

⑬ PROVIDE 4#12&#12G-3/4"C BETWEEN INDOOR UNIT & OUTDOOR UNIT (DCUc-11).



3 E4.2 CONDENSATE PUMP WIRING DETAIL

SCALE: N.T.S.

NOTE:

① WIRING MAY VARY BY MANUFACTURER. FIELD CONFIRM WITH APPROVED SHOP DRAWINGS PRIOR TO ROUGHING.

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Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE:
MECHANICAL & PLUMBING EQUIPMENT SCHEDULES

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

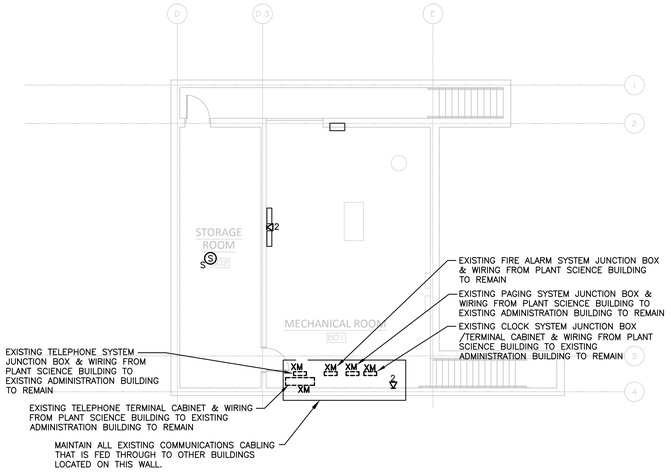
SCALE:

BUILDING: CB

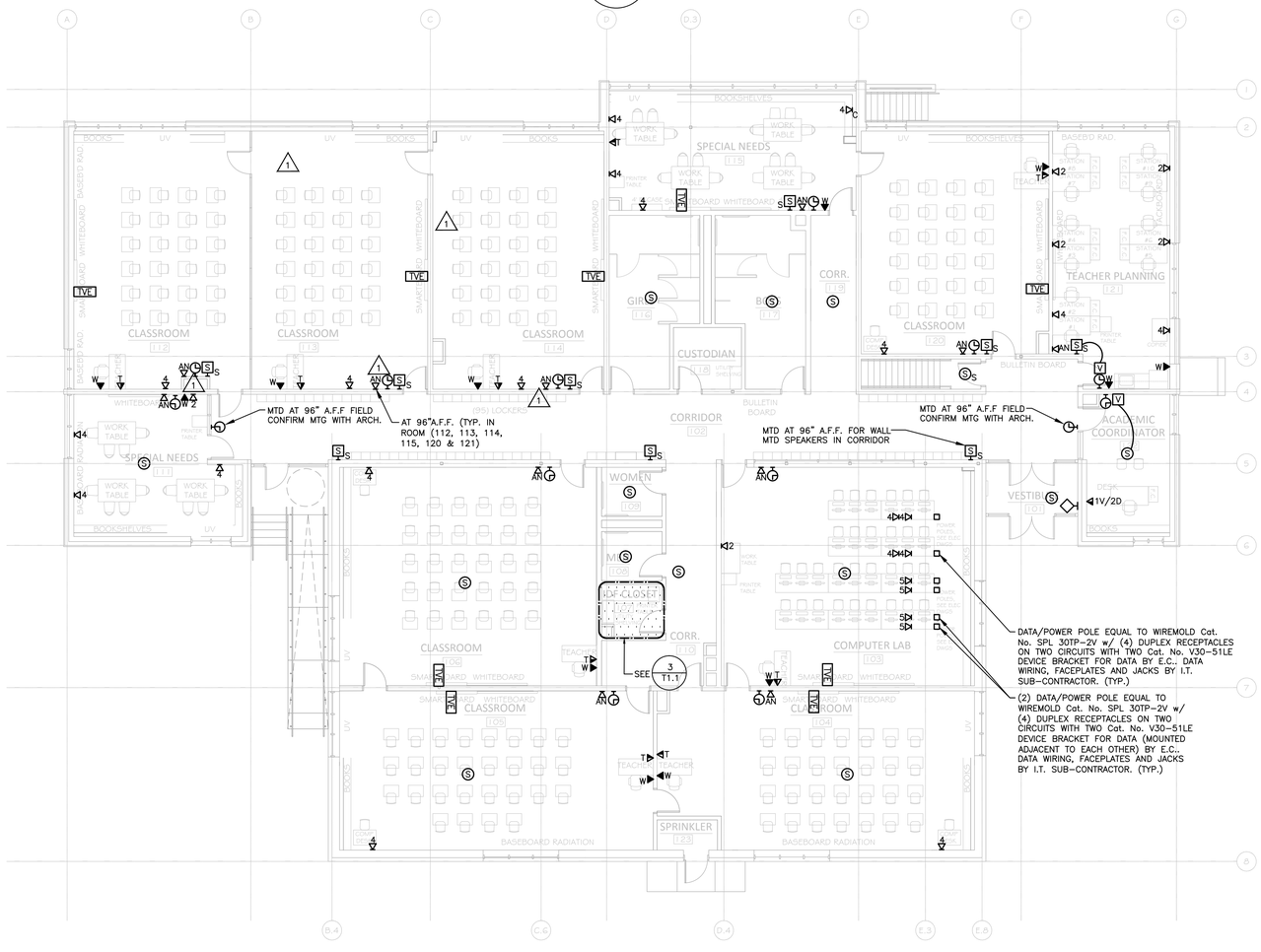
SHEET NO: E4.2

GENERAL NOTES

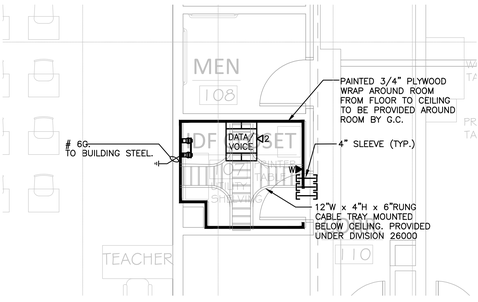
1. COMMUNICATIONS OUTLETS ARE SHOWN FOR REFERENCE PURPOSES. EXACT LOCATIONS WILL BE AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE INSTALLATION OF ALL CABLING WITH ELECTRICAL SUBCONTRACTOR.
2. KEEP COMMUNICATIONS CABLING AT LEAST 12" AWAY FROM POWER WIRING.
3. ALL CONDUITS AND JUNCTION BOXES TO BE PROVIDED UNDER DIVISION 260000. CONDUITS SHOWN ARE FOR REFERENCE ONLY.



1 / E2.1 BASEMENT FLOOR PLAN – TECHNOLOGY
SCALE: 1/8"=1'-0"



2 / T1.1 FIRST FLOOR PLAN – TECHNOLOGY
SCALE: 1/8"=1'-0"



3 / T1.1 IDF ROOM 107 PART PLAN
SCALE: 1/4"=1'-0"

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NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
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WALPOLE, MASSACHUSETTS

TITLE:
BASEMENT & FIRST FLOOR PLANS - TECHNOLOGY

JOB NO: 10-05

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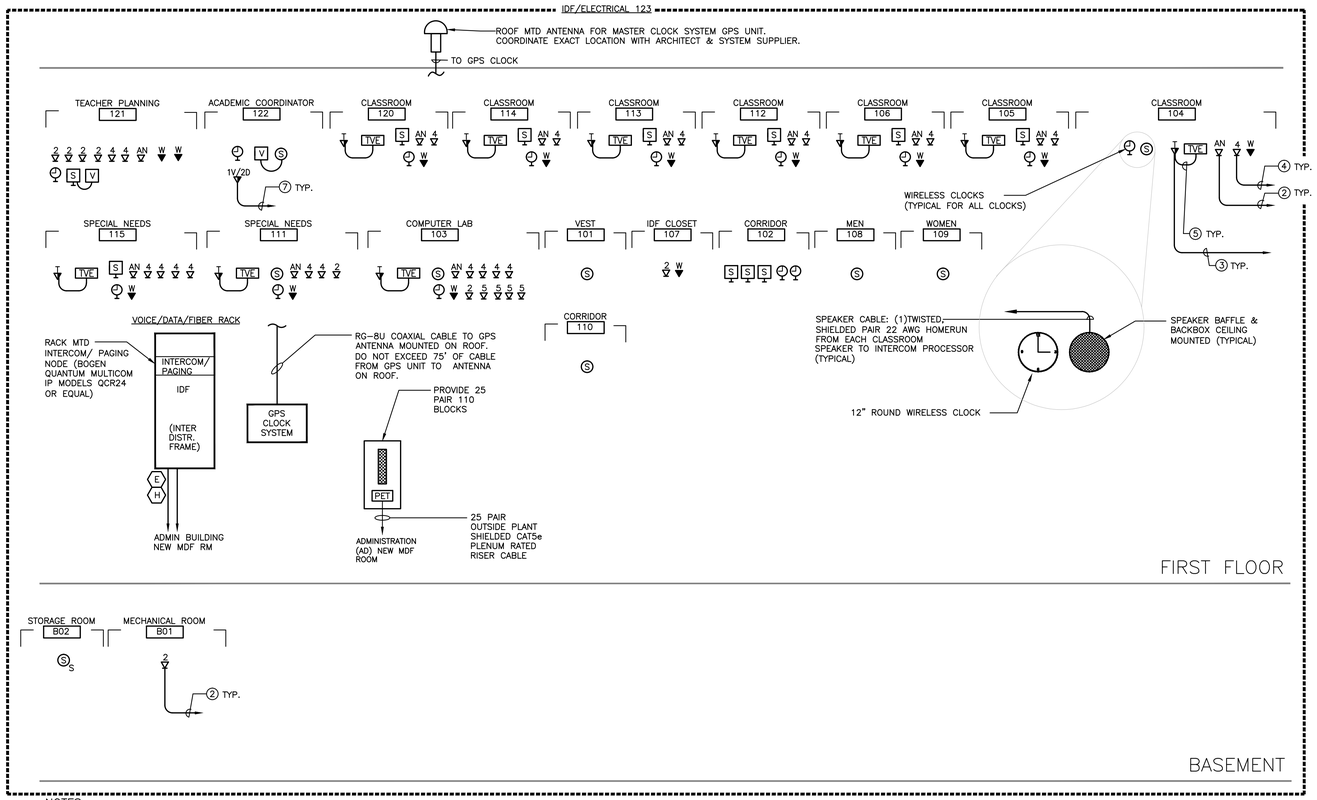


NOTES:

1. – (1) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
2. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
3. – (3) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
4. – (4) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
5. – (2) RCA CABLES
   – (1) VGA CABLE
   – (1) COMPOSITE VIDEO
   – (1) 3.5MM STEREO CABLE
   – (2) CATE UTP CABLES
   PLENUM RATED CABLE
6. – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
7. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA
   – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
8. – (1) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA
   – (1) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA
9. – (6) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKED AREA (TYPICAL)
10. – (2) CAT 6 UTP CABLES PLENUM RATED TO IDF/MDF DATA RACK IN BLOCKD AREA
    – (2) CAT 6 UTP CABLE PLENUM RATED TO IDF/MDF VOICE RACK IN BLOCKED AREA

E. 12 STRAND MULTI-MODE FIBER OUTSIDE PLANT CABLE INSTALL PLENUM RATED INNER-DUCT.

H. 12 STRAND SINGLE MODE 8/9 MICRON FIBER OUTSIDE PLANT CABLE INSTALL PLENUM RATED INNER-DUCT.

NOTE:

1. THIS CONTRACTOR SHALL PROVIDE FOR A COMPLETE INSTALLATION. FURNISH ALL EQUIP. LABOR, WIRING AND OUTLETS REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM.
2. ALL WIRING SHALL BE IN ACCORDANCE WITH EQUIPMENT SUPPLIER. COORDINATE ALL WIRING REQUIREMENTS PRIOR TO ROUGHING-IN.
3. PROVIDE APPROPRIATE QUANTITIES OF DATA PATCH PANELS TO ACCOMODATE ALL RESPECTIVE DATA CIRCUITS.
4. PROVIDE CAT 6 PATCH CORDS TO MATCH TOTAL QUANTITY OF PATCH PANEL PORTS. AT BOTH MDF/IDF AND WORK STATION.

QUANTITY OF DEVICES
IDF/ELECTRICAL 123

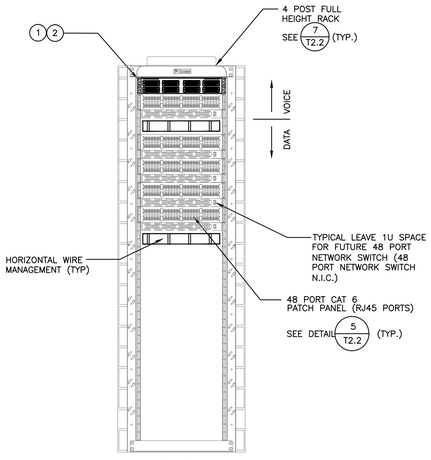
	DATA	VOICE	CATV
▽ = –	–	–	–
2▽ = 7	14	–	–
4▽ = 19	76	–	–
T▽ = 10	30	–	–
▼ = –	–	–	–
AN▽ = 11	22	–	–
4V/4D▽ = –	–	–	–
1V/3D▽ = –	–	–	–
1V/2D▽ = 1	2	1	–
W▼ = 13	–	13	–
TVB = –	–	–	–
TVC = –	–	–	–
TVE = 10	10	–	–
TOTAL	154	14	–

INTERMEDIATE DISTRIBUTION FRAME IDF
LOCATION: IDF/ELECTRICAL 123

CAT 6 (RJ45) VOICE PORT			CAT 6 (RJ45) DATA PORTS		
USED	SPARE	PATCH PANEL SIZE	USED	SPARE	PATCH PANEL SIZE
14	34	(1) 48 PORT	154	38	(4) 48 PORT

CABLE/FIBER SCHEDULE

1. FIBER OPTIC MULTIMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (12 PORT – SC CONNECTORS) – PREMISES DISTRIBUTION
2. FIBER OPTIC SINGLEMODE LIU (LIGHTGUIDE INTERFACE UNIT) PATCH PANEL (6 PORT – ST CONNECTORS) – PREMISES DISTRIBUTION



VOICE/DATA/FIBER RACK

1/T2.0 IDF/ELECTRICAL 123 DETAIL
NOT TO SCALE

Turowski2 Architecture
P.O. Box 1290
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Marion, MA 02738
508.758.9777 phone
508.748.2444 fax
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CONSULTANTS:

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60 Temple Place Boston, Massachusetts 02111 617-451-2777
508-898-9700 • FAX 508-898-0852 • E-MAIL: info@g-g-d.com

STAMP:

REVISIONS:

NO.	DATE:

AS-BUILTS
Richard T. Losordo Electrical Services Inc.
534 Liberty Street, Brockton, MA 02301
TEL 508 436 4649 FAX 508-436 4649
Oct. 14, 2014

NORFOLK COUNTY AGRICULTURAL HIGH SCHOOL
NEW CONSTRUCTION AND RENOVATIONS
400 MAIN STREET
WALPOLE, MASSACHUSETTS

TITLE: TECHNOLOGY RISER DIAGRAM & SCHEDULE

JOB NO: 10-05

DRAWN BY:

CHECKED BY:

DATE: APRIL 1, 2013

SCALE:

BUILDING: CB

SHEET NO: T2.0