

# O&M and Customer Records

09/12/2019

**SIEMENS**

Smart Infrastructure – Regional  
Services & Solutions  
Austin, Texas  
Phone : 512-339-6991

**TFC A600 Bio Threat**

**44OP-227505**

## **Operation, Maintenance, and Record Documentation for Owner**

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**Version 1.0**

12 September 2019

Owners Engineer  
HMG & Associates Inc.

Siemens Project Manager  
Dennis Mattson

## **Table of Contents**

- 1. Warranty Letter**
- 2. Record / Shop Drawings**
- 3. Equipment Schedules**
- 4. Equipment Datasheets**
- 5. Operation & Maintenance Manuals (For Equipment)**

## **Warranty Letter**



**Industry**  
Smart Infrastructure

**DYNAMIC SYSTEMS INC  
3901 S LAMAR BLVD  
AUSTIN TX 78704**

Name Dennis Mattson  
Project Manager

Telephone 512-497-8764

E-mail Dennis.mattson@siemens.com

**Project Address:  
STATE OF TEXAS  
1711 SAN JACINTO BLVD  
AUSTIN TX 78701**

Date 08/19/2019  
Project Name TFC DSHS A600 Bio Threat  
Project Number 44OP-227505  
Warranty Start Date: 08/13/2019  
Warranty End Date: 08/12/2021

**Re: Solutions Warranty Letter**

Siemens has begun the warranty of your system and completed the instruction and training of your personnel.

As of this date, the equipment is in warranty and is guaranteed to be free from defects in material and workmanship for a period of 1 year(s). This warranty does not include recalibration and set-up now that the systems have been commissioned and are operational. Normal maintenance is the responsibility of the owner.

If you feel your system is not performing due to defects in the material or the workmanship provided, please contact:

Phone: 866-387-7136

Service Coordinator: Jesica Mata

Service Manager: Randy Carlisle

Sales Manager: Mike Dehart

If you have any questions on your warranty, please contact me using the information provided within this letter. If not, please fill out the requested information below and send back to me to confirm your approval.

On behalf of our Project Installation Team, we appreciate the opportunity to complete the installation of these systems with you. Our goal is to provide you with a customer experience that will lead you to recommend Siemens to anyone.

Sincerely,

Dennis Mattson  
Project Manager

How are we doing? The Customer Feedback Form may be found at [www.usa.siemens.com/customerfeedback](http://www.usa.siemens.com/customerfeedback).

**ACCEPTED BY:**

---

**Company Name**

---

**Authorized Person**

**Title**

**Date**

## **Record / Shop Drawings**

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# SIEMENS

Siemens Building Technologies

1835-B Kramer Ln  
Suite 180  
Austin, TX 78758  
USA

PHONE: 512-339-6991  
FAX:

12/15/17

FOR INFORMATION CONTACT  
Dennis Mattson

ENGINEERING DATA FOR  
TFC A600 Bio Threat

1100 West 49th  
Austin, TX 78758  
USA

44OP-227505

ARCHITECT

HMG & Associates Inc.  
ENGINEER

Dynamic Systems, Inc.  
CONTRACTOR

09/12/2019

**DWG | DESCRIPTION**

LEG	<b>GENERAL</b> Cover Sheet Legend & Abbreviations
	<b>CONTROL DRAWINGS</b> 000 Riser Diagram 000 Riser Diagram 100 Bio Threat Flow Diagram 101 Bio Watch Flow Diagram 101 Bio Watch Flow Diagram 400 EF-1,3 Flow Diagram 401 EF-2,4 Flow Diagram 402 Lab Exhaust Fan BIO-Watch 800 Room Pressure Monitor
900	<b>DDC PANEL LAYOUTS</b> RTU1.BSL3.A600.PXC36
901	PXCM05
901A	TDH.A600.PXCM05p002

**REVISION HISTORY****SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:**TFC A600 Bio Threat****Austin, TX**

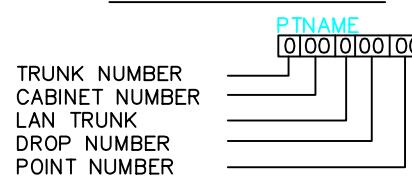
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

**Table of Contents****440P-227505****0****TOCA**

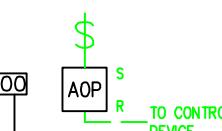
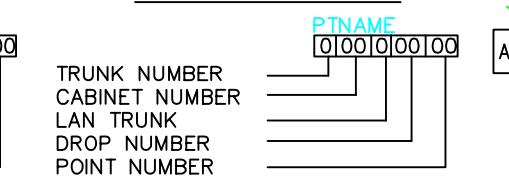
09/12/2019

CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION	CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION	CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
AC	AIR COMPRESSOR	HHC	HAND-HELD OPERATOR'S TERMINAL	RCU	REMOTE CONTROL UNIT
AD	AIR DRYER	HL	HIGH LIMIT	RE	RELAY ELECTRIC
AE	ACTUATOR ELECTRIC	HMI	GAMMA TOUCH PANEL	RP	RELAY PNEUMATIC
AEM	APOGEE ETHERNET MICROSERVER	HOA	HAND-OFF-AUTO SWITCH	RS	RESTRICTOR
AF	AIR FILTER	HORN	HORN	RV	RELIEF VALVE
AFS	AIR FLOW STATION	HPC	HEAT PUMP CONTROLLER	S/W	SOFTWARE
AOP	ANALOG OUTPUT, PNEUMATIC	HTD	HIGH TEMPERATURE DETECTOR	SC	STEP CONTROLLER
AP	ACTUATOR PNEUMATIC	HTE	HUMIDITY TRANSMITTER ELECTRIC	SCU	STAND ALONE CONTROL UNIT
APS	AUX. POWER SUPPLY	HTP	HUMIDITY TRANSMITTER PNEUMATIC	SD	SMOKE DETECTOR
AT	AUTOMATIC TRAP	INT	INTERCOM	SE	SWITCH ELECTRIC
ATD	AUTO TANK DRAIN	KWM	ELECTRIC KILOWATT METER	SIO	SLX IO MODULES
ATEC	ACTUATOR TEC	LC	LIMIT CONTROLLER (LIMITEM)	SLX	APOGEE SLX CONTROLLER
AZM	AUTOZERO MODULE	LLS	LIQUID LEVEL SWITCH	SPKR	SPEAKER
BELL	BELL	LLT	LIQUID LEVEL TRANS.	SPP	STATIC PRESSURE PROBE
BIM	BUS INTERFACE MODULE	LPR	POWER SUPPLY 24VAC/24VDC	SPR	STATIC PRESSURE REGULATOR
BOIL	BOILER	LTDE	LOW TEMP. DETECTOR ELECTRIC	SV	SOLENOID VALVE
BRT	BRIGHTNESS	LTDP	LOW TEMP. DETECTOR PNEUMATIC	SW	SWITCH PNEUMATIC
BRTT	BRIGHTNESS AND TEMPERATURE	LUI	LOCAL USER INTERFACE	T	ROOM THERMOSTAT, PNEUMATIC
CBL	CABLES	MBC	MODULAR BUILDING CONTROLLER	TBC	TERMINAL BOX CONTROLLER
CKV	CHECK VALVE	MDM	MODEM	TC	TEMPERATURE CONTROLLER(S200)
CM	CONSTRUCTION MATERIALS	ME	ELECTRONIC ACTUATOR	TCU	TERMINAL CONTROL UNIT
CP	COMPONENT PANEL	MEC	MODULAR EQUIPMENT CONTROLLER	TDR	TIME DELAY RELAY
CPU	CENTRAL PROCESSING UNIT	MG	MAGNEHELIC GAUGE	TE	THERMOSTAT, ELECTRIC
CRT	CATHODE RAY TUBE	MPU	MULTI-POINT UNIT	TEC	TERMINAL EQUIPMENT CONTROLLER
CS	CURRENT SWITCH	MS	MOTOR STARTER	TH	THERMOMETER
CT	CURRENT TRANSDUCER	OCC	OCCUPANCY	TI	TRUNK INTERFACE
CTTE	CO2 TEMP TRANSMITTER ELEC	OCCB	OCCUPANCY AND BRIGHTNESS	TIE	TRUNK ISOLATOR EXTENDER
CVC	CONSTANT VOLUME CONTROLLER	OBS	OBsolete	TIU	TELCOM INTERFACE UNIT
D	DAMPER	ODP	OPERATOR DATA PANEL	TMR	TIMER, TIME CLOCK
DDC	DUAL DUCT CONTROLLER	P	PUMP	TTE	TEMPERATURE TRANSMITTER ELECTRIC
DEM	DEMAND ENERGY MONITOR	PA	PULSE ACCUMULATOR	TTP	TEMPERATURE TRANSMITTER PNEUMATIC
DP	DEW POINT TRANSMITTER	PCT	PROGRAMMABLE CLOCK TIMER	TXIO	TX-I/O FAMILY CONTROLLER MODULES
DPR	DIFFERENTIAL PRESS. REGULATOR	PE	PRESSURE ELECTRIC SWITCH	UC	UNITARY CONTROLLER
DPS	DIFFERENTIAL PRESSURE SWITCH	PL	PILOT LIGHT	UCC	UNIT CONDITIONER CONTROLLER
DPTE	DIFF. PRESS. TRANSMITTER ELEC.	PM	POWER MONITOR	UVC	UNIT VENT CONTROLLER
DPTP	DIFFERENTIAL PRESSURE PNEUMATIC	PNL	PANEL	V	VALVE
DPU	DIGITAL POINT UNIT	PPM	POINT PICKUP MODULE	V*	VALVE SERVICE PARTS
DXR	TERMINAL EQUIPMENT CONTROLLER	PRC	PRESSURE REG. CONTROLLER	VA	TEC VALVE ACTUATOR
EC	ENTHALPY COMPARATOR	PRV	PRESSURE REDUCING VALVE	VAC	VARIABLE AIR VOLUME CONTROLLER
EP	ELECTRO-PNEUMATIC VALVE	PS	POSITIONING SWITCH	VB	VIBRATION ISOLATOR
ES	END SWITCH	PSE	POSITION SENSOR ELECTRIC	VTE	VELOCITY TRANSMITTER ELECTRICAL
ET	ENTHALPY TRANSMITTER	PST	PULL STATION	W	WELL
EXP	EXPANSION PANEL	PT	PITOT TUBE	WST	WEATHER STATION
FAN	FAN	PTE	PRESSURE TRANSMITTER ELECTRIC	XDR	TRANSDUCER
FHC	FUME HOOD CONTROLLER	PTP	PRESSURE TRANSMITTER PNEUMATIC	XFMR	TRANSFORMER
FM	FLOW MTR. (FLOW METER STATION)	PTR	PRINTER		
FMS	FIRE MGMT. SYSTEM	PV	PILOT VALVE		
FS	FLOW SWITCH	PXCC	PX COMPACT CONTROLLER		
FTP	FLOW TRANSMITTER PNEU.	PXCM	PXC-MODULAR CONTROLLER		
G	GAUGE	PXG3	BACNET ROUTER ETHERNETIP-MS/TP		
GD	GAS DETECTOR	RBC	REMOTE BUILDING CONTROLLER		
H	HYGROSTATS	RC	RECEIVER CONTROLLER		
HE	HUMIDIFIER ELECTRIC				

## DDC ELECTRICAL POINT



## DDC PNEUMATIC POINT



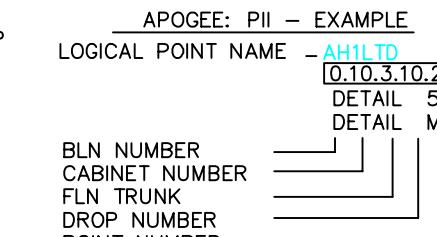
## DETAILS

 ELECTRICAL TERMINATION PNEUMATIC TERMINATION

DETAIL XX STANDARD DDC TERMINATION

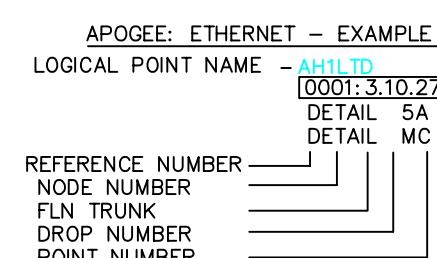
 NOTE OR REVISION

DETAIL XX PAGE REFERENCE



READ AS " SEE PAGE 5A FOR MORE DETAIL "

DIGITAL INPUT



READ AS " SEE PAGE 5A FOR MORE DETAIL "

DIGITAL INPUT

## REVISION HISTORY

SIEMENS

Siemens Smart Infrastructure

Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

## TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

## Legend &amp; Abbreviations

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09/12/2019

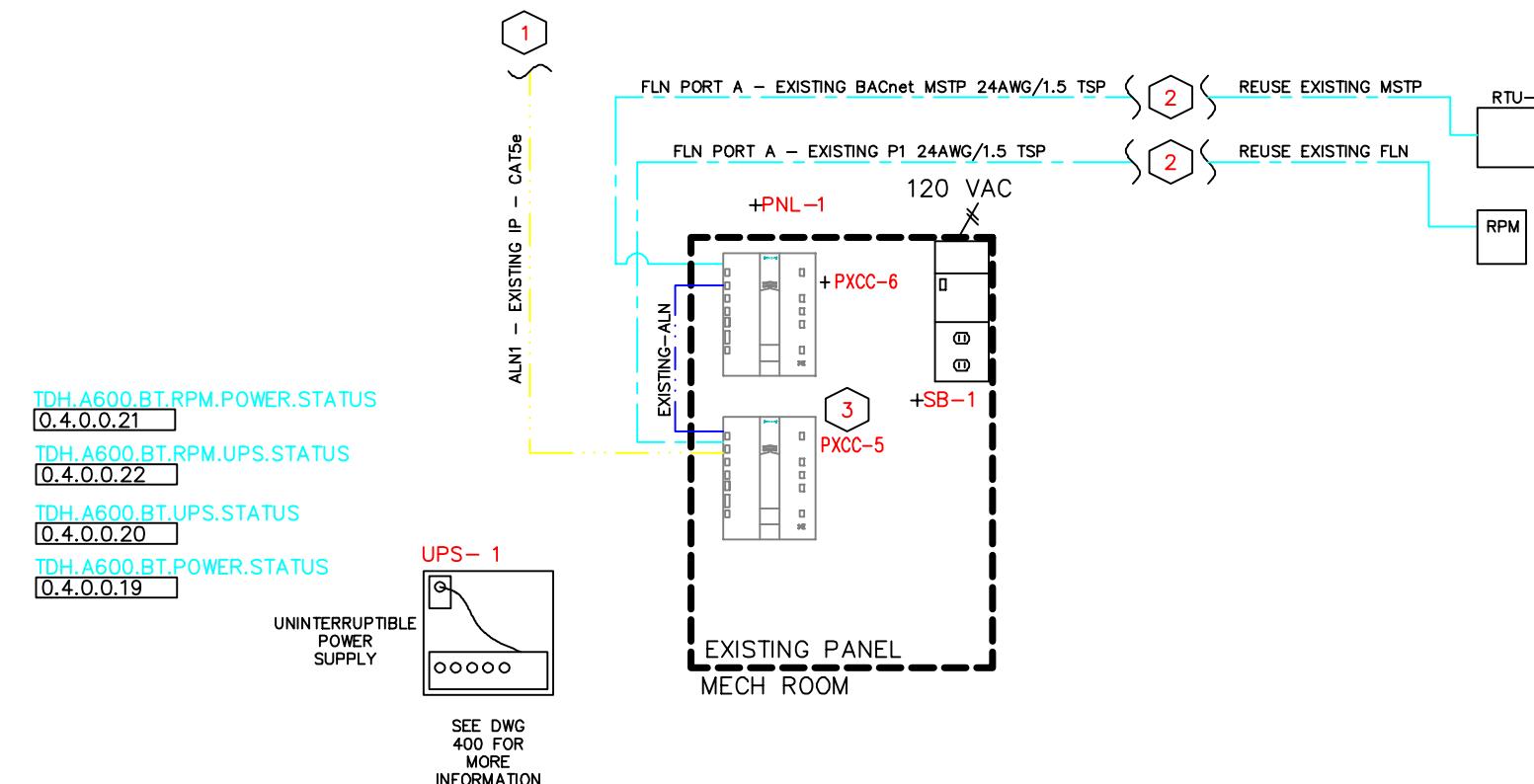
INSTALLATION NOTES:

① EXISTING CAT5e IP ETHERNET DROP PROVIDED BY CUSTOMER.

② TO FLN DEVICES.

③ FAST FORWARD EXISTING MEC TO PXCC5. NEW BIO LAB POINTS ASSOCIATED TO THIS CONTROLLER.

4. "+" INDICATES EXISTING DEVICE TO REMAIN.



1  
000 BUILDING ALN RISER DIAGRAM  
LOCATION: A600 MECH ROOM  
COPYRIGHT 2017 SIEMENS BUILDING TECHNOLOGIES, INC.

**REVISION HISTORY**

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

**SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

**TFC A600 Bio Threat****Austin, TX**

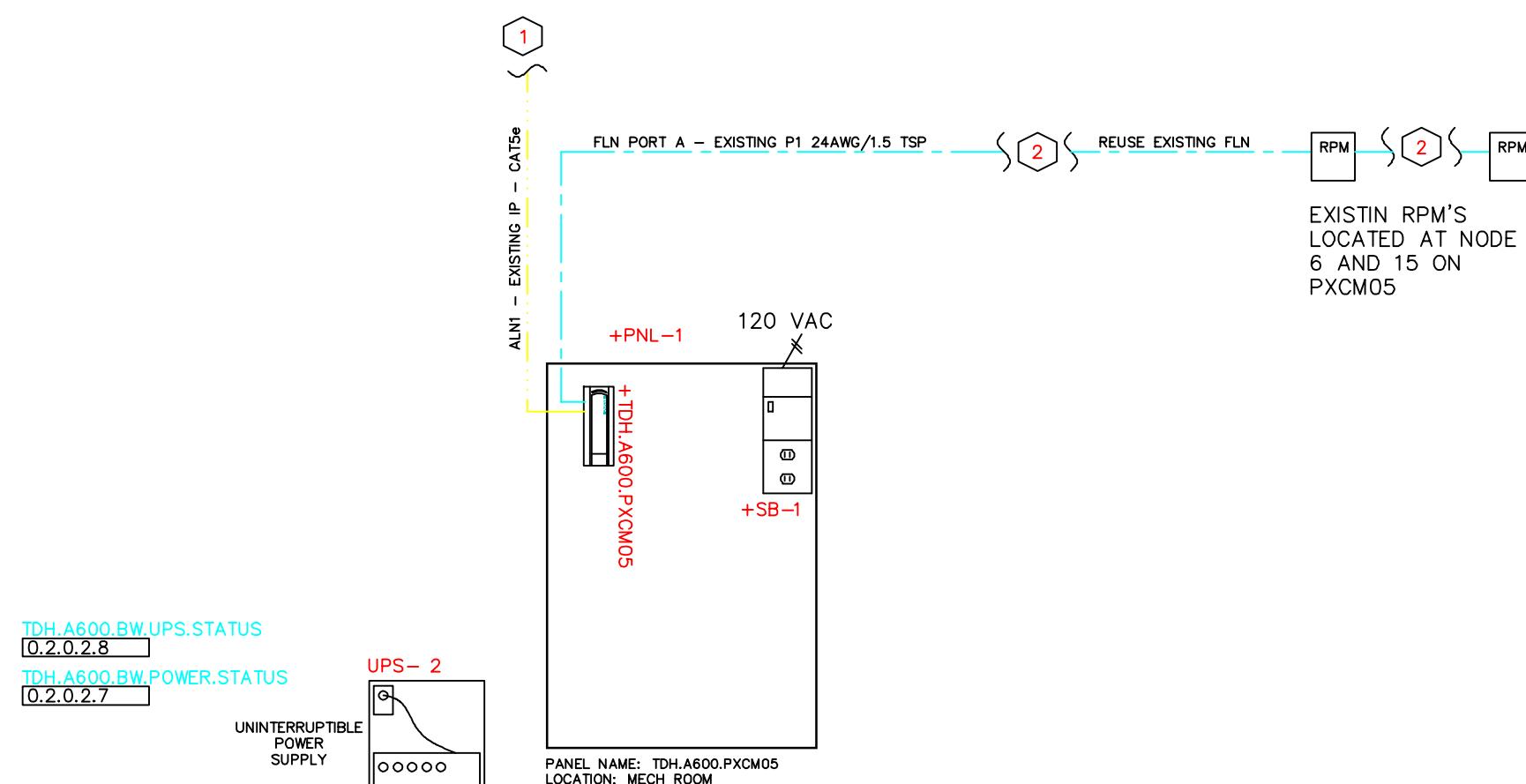
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

**Riser Diagram****440P-227505****0  
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09/12/2019

INSTALLATION NOTES:

- 1** EXISTING CAT5e IP ETHERNET DROP PROVIDED BY CUSTOMER.  
**2** TO FLN DEVICES.  
 4. "+" INDICATES EXISTING DEVICE TO REMAIN.

**REVISION HISTORY**

2 9/12/2019 JV Record Drawings

**SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
Phone: 512-339-6991  
Fax:

**TFC A600 Bio Threat****Austin, TX**

ENGINEER DR	DRAFTER DR	CHECKED BY RW	INITIAL RELEASE 12/15/17	LAST EDIT DATE 09/12/19
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**Riser Diagram****440P-227505**

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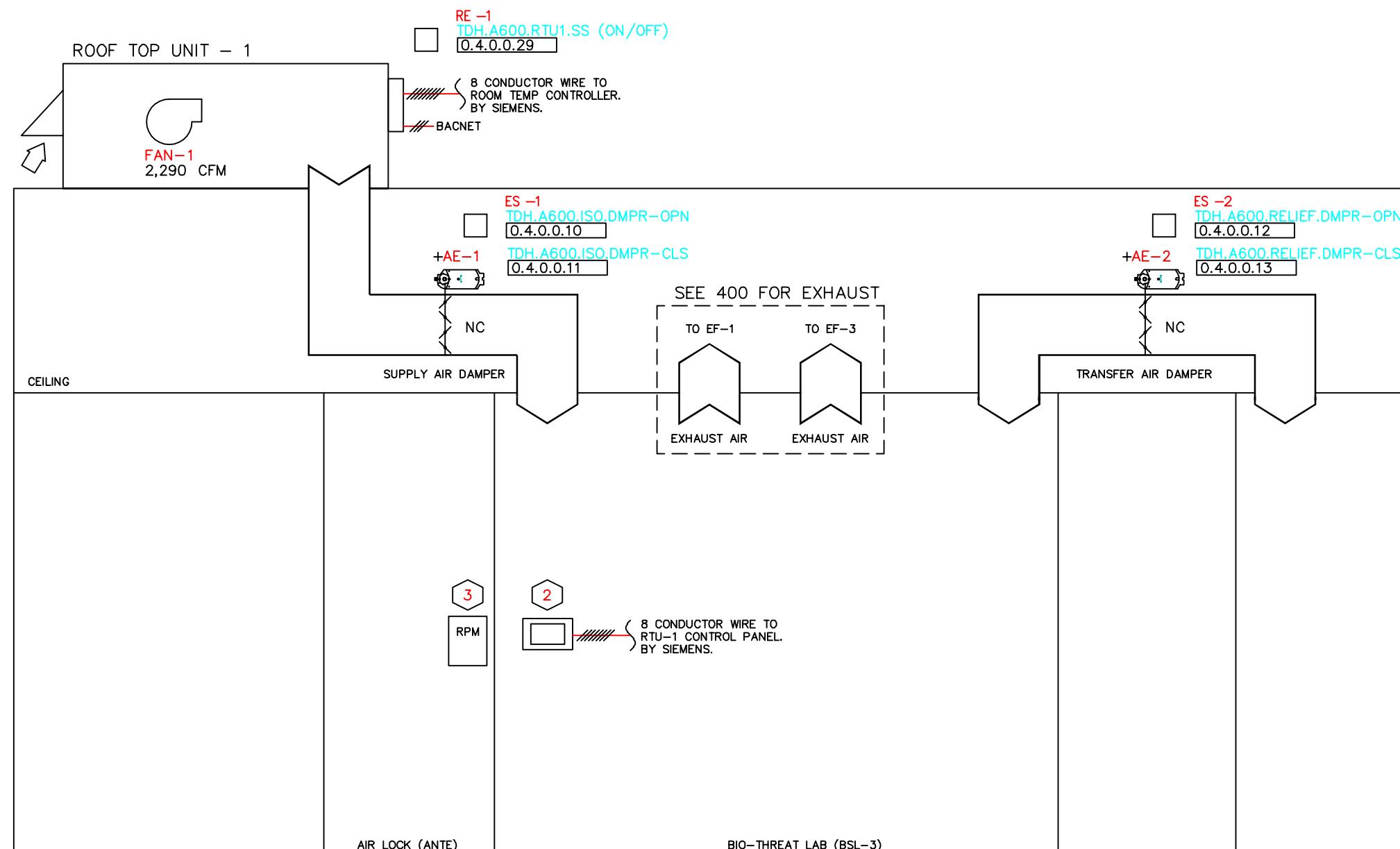
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09/12/2019

## INSTALLATION NOTES:

- 1 SEE WIRING DETAIL ON ELECTRICAL DRAWING 100A.
  - 2 ROOM TEMPERATURE SENSOR PROVIDED BY RTU MANUFACTURER.  
SIEMENS TO WIRE DEVICE BACK TO RTU.
  - 3 NEW ROOM PRESSURE MONITOR TO REPLACE EXISTING DPM.  
SEE 800 FOR INSTALLATION.
- "+" EXISTING DEVICES TO REMAIN.

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## Bio-Threat Flow Diagram

LOCATION: BIO THREAT LAB (BSL-3)

SERVES: BIO THREAT LAB

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## REVISION HISTORY

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

**SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
Phone: 512-339-6991  
Fax:

## TFC A600 Bio Threat

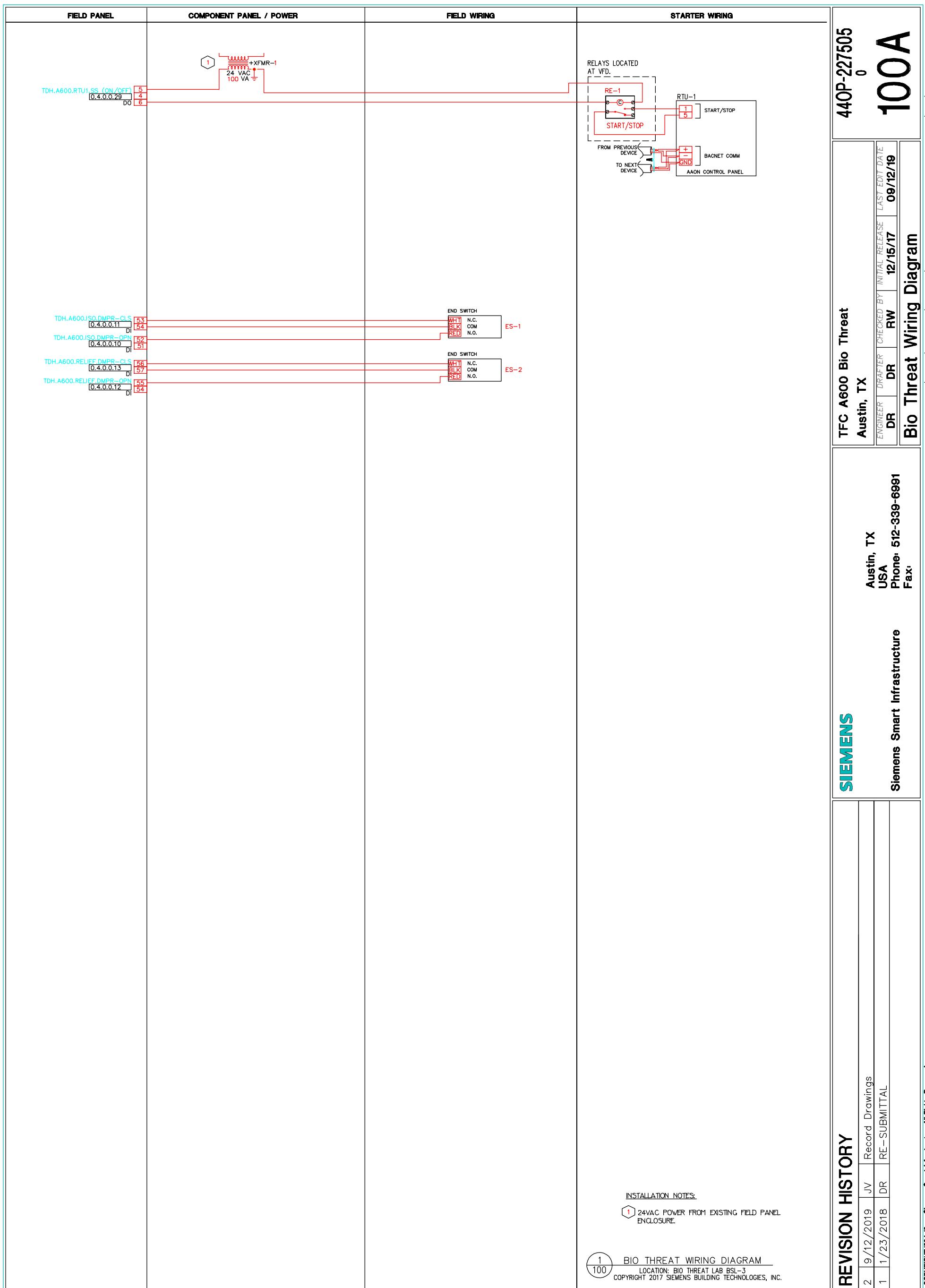
Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

## Bio Threat Flow Diagram

440P-227505  
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09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
<b>Field Mounted Devices</b>					
ES 1-2	2	TS-475	KELE INC	N/A	Non Mercury Damper End Switch
RE 1	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

- iv.EF-1 will remain operating
- v. Enable the audio / visual devices
- f. **Manual Horn Silence:** There is an existing manual horn silence at the local A600 DDC control panel. It will continue to operate as it currently does.
- g. **RTU Air Filter Alarm:** When the differential pressure across the air filters is 1.00 inWC (adj) or above send a dirty air filter alarm to the DDC and show the alarm on the GUI. (Point monitored via integration)
- h. **Safeties:** Provide a typical safety circuit with motor overloads, smoke detector, ETC., to shutdown the entire Lab.
- i. **General:** All control points to be accessible for monitoring, control and override from GUI. All setpoints will be adjustable through the GUI. Provide manual control of all outputs through GUI.

#### Sequence of Operation

Bio Threat BSL-3 Lab  
D/X Cooling / Gas Heating

#### Normal Mode

1. The exhaust fans EF-1 and EF-3 will be started and stopped under control of software. The fans are intended to run 24 hours per day, 365 days per year. When the exhaust fans are signaled to start and run continuously. The fans both have air flow stations at the fan duct that the DDC system monitors.
2. A current sensing relay will prove the exhaust fan status. If the sensor fails to prove status, the BAS will identify the unit (EF-1 or EF-3), and report an exhaust fan failure alarm.
3. When the exhaust fans are operating and have achieved 600 cfm (adjustable) or more for EF-1 and 550 cfm (adj) or more for EF-3, the DDC will command the transfer air damper to begin opening. When the end switch in the transfer air damper confirms that the damper is fully open the DDC system will enable RTU-1, EF-2, and EF-4.
4. The AAON controller will monitor the space temperature and modulate the D/X cooling to maintain the space cooling set point (adj). (Initially set to 70F)
5. The AAON controller will monitor the space temperature and modulate the gas heating to maintain the space heating set point (adj). (Initially set to 68F)
6. The DDC will monitor all points shown on the points list. These will all be visible from the GUI and will provide reset capability from the GUI.
  - a. **Low Flow Alarm:** When the exhaust air flow EF-1 falls below 660 cfm (adj) for more than 5 minutes (adj) send a low-flow alarm to the DDC which will display on the GUI. TFC service personnel will be notified by this alarm.
  - b. **Power Fail Sequence:** Upon a loss of power, all equipment will shutdown and all dampers will close. When power has been restored for 2 minutes (adj), the laboratory will restart in the normal mode sequence.
  - c. **Reverse Flow & Fan Alarm Sequence:** Initiate the following sequence when either a) the room differential pressure monitor (RPM) in the airlock has dropped to 0.00 inWC (adj) OR b) EF-1 or EF-3 lose status.,
    - i. Disable RTU-1
    - ii. Close the transfer air and supply air dampers
    - iii. Disable EF-2 and EF-4
    - iv. EF-1 and EF-3 will remain operating
    - v. Enable the audio / visual devices
  - d. When the RPM reports that differential air pressure has risen to .030inWC (adj) disable the Audio/Visual devices and restore to normal mode sequence.
  - e. **Emergency Pushbutton Sequence:** There is an existing Emergency Push-Button located in the BSL-3 Laboratory. If the push-button is activated by a lab technician the building DDC system will immediately initiate the following sequence.
    - i. Disable RTU-1
    - ii. Close the transfer air and supply air dampers
    - iii. Disable EF-2, EF-3, and EF-4

#### REVISION HISTORY

**SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

#### TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

**Bio Threat Flow Diagram - BOM**

**440P-227505**

**100B**

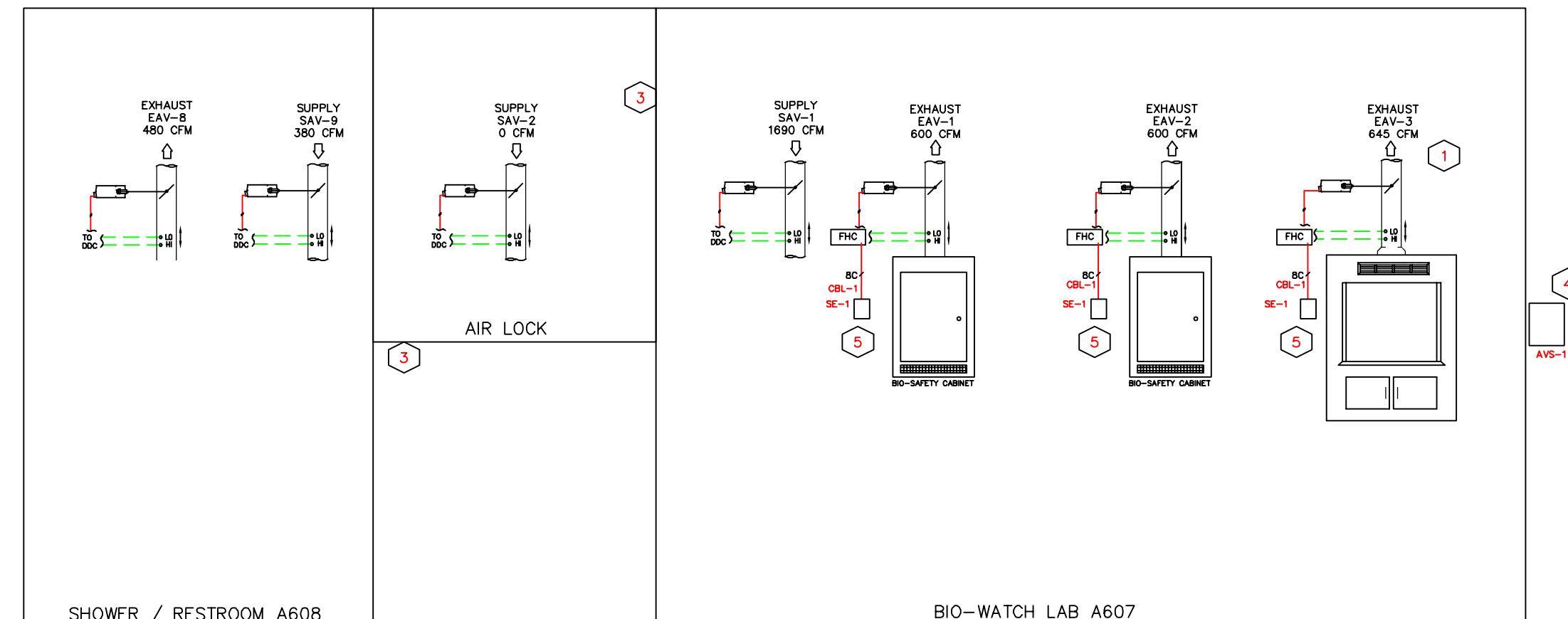
09/12/2019

INSTALLATION NOTES:

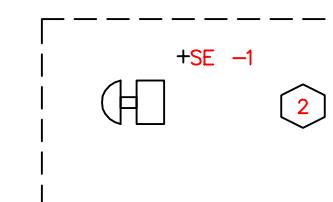
GENERAL NOTE:  
CHANGE EXISTING EQUIPMENT CONTROLLER FLOW  
SETPOINTS TO MATCH CONTRACT DOCUMENT SPECIFIED.  
SEE ATTACHED SCHEDULE.

- ① FUME HOODS CURRENTLY OPERATE AS CONSTANT VOLUME HOODS ON APPLICATION 940. IF THERE IS AN EXISTING FUME HOOD SASH SENSOR, REMOVE THE SENSOR AND ASSOCIATED CONNECTIONS TO FHC. REMOVE THE EXISTING OPERATOR DISPLAY PANEL AND CONNECTION TO THE FUME HOOD CONTROLLER.
- ② EXISTING SILENCE SWITCH TO SILENCE AUDIO CIRCUIT. LOCATED AT EXISTING FIELD PANEL
- ③ NEW RPM TO REPLACE EXISTING RPM. SEE DWG 801 FOR DETAILS.
- ④ EXISTING AUDIO/VISUAL ALARM IN EAST HALL TO BE REPLACED BY SIEMENS. FIELD VERIFY VOLTAGE (24VAC OR 120VAC) IF EXISTING CIRCUIT IS 120V TTAP AND ADD TRANSFORMER FOR 24V DEVICE.

- ⑤ CONNECT NEW 8 CONDUCTOR CABLE TO FUME HOOD CONTROLLER COMM PORT AND MOUNT RJ-45 WALL PLATE NEAR THE CONTROLLERS ASSOCIATED EQUIPMENT. WALL PLATE CONNECTION WILL BE USED FOR OPERATOR CONFIGURATION OF FUME HOOD CONTROLLER THROUGH A SEPARATE ODP AND INTERFACE CABLE.



101      BIO-WATCH FLOW DIAGRAM  
SERVES: BIO WATCH LAB  
LOCATION: A607, 608



+SE -1  
TDH.A600.MAIN.FA  
0.2.0.2.16

**REVISION HISTORY**

2	9/12/2019	JV	Record Drawings
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**SIEMENS**

Siemens Smart Infrastructure

Austin, TX  
USA  
Phone: 512-339-6991  
Fax:

**TFC A600 Bio Threat**

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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**Bio Watch Flow Diagram**

440P-227505  
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101

09/12/2019

TERMINAL TAG	TERMINAL TYPE	TERM FUNCTION	TERM LOCATION	TERM SIZE IN.	TERM AREA SQ.FT.	DESIGN OCCP TOTAL MAX CFM	TERM VEL @ MAX FL FPM	DESIGN OCCP TOTAL MIN CFM	TERM VEL @ MIN FL FPM	DESIGN UNOCC TOTAL CFM	TERM VEL UNOCC FPM	DESIGN UNOCC TOTAL MIN CFM	TERM VEL UNOCC FPM	CNTLR TYPE	CTLR APPL.
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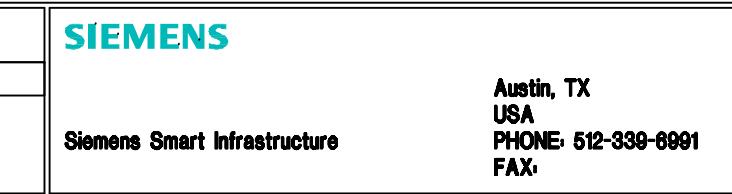
**A-607 Bio Watch Lab**

TDH.A600.LAB-A607-LCM	CV or VAV Supply	A-607	11.92	0.775	1690	2181	1690	2181	1690	2181	1690	2181	LCM	2458
TDH.A600.LAB-A607-BSC1	Bio Safety Cabinet Exhaust	A-607	12	0.7853	600	764	600	764	600	764	600	764	FH	940
TDH.A600.LAB-A607-BSC2	Bio Safety Cabinet Exhaust	A-607	12	0.7853	600	764	600	764	600	764	600	764	FH	940
TDH.A600.LAB-A607-FHC	Fume Hood FH- Exhaust	A-607	10	0.5456	645	1182	645	1182	645	1182	645	1182	FH	940

System Name	TDH.A600.LAB-A607-LCM	TDH.A600.LAB-A607-BSC1	TDH.A600.LAB-A607-BSC2	TDH.A600.LAB-A607-FHC
Point 1	31	37	37	37
Old Value	4000	703	703	703
New Value	645	600	600	645
Point 2	32	38	38	38
Old Value	340	703	703	703
New Value	645	600	600	645
Point 3	36	87	87	87
Old Value	*Pending balancer	703	703	703
New Value	*Pending balancer	600	600	645
Point 4	71			
Old Value	2200			
New Value	1690			
Point 5	72			
Old Value	220			
New Value	1690			
Point 6	88			
Old Value	400			
New Value	255			
Point 7	89			
Old Value	*Currently written by PPCL - Remove PPCL write so that it can auto-calculate			
New Value	0 (The LCM should pick up both bio-safety cabinets and fume hood)			
Point 8	90			
Old Value	40			
New Value	10			
Point 9	91			
Old Value	160			
New Value	10			

ENGINEER TO SPECIALIST NOTE:  
THIS IS A TABLE OF SUGGESTED  
VALUES TO CHANGE IN THE LCM  
AND FUME HOOD CONTROLLERS

REVISION HISTORY			
2	9/12/2019	JV	Record Drawings



TFC A600 Bio Threat				
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19
Bio Watch Flow Diagram				

440P-227505  
0  
**101**

09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
<b>Field Mounted Devices</b>					
AVS	1	1	869STR-C-AQ	KELE INC	1011cut017 INDR STRB HORN CLEAR 24 AC/DC
<b>Panel Mounted Devices</b>					
CBL	1	3	537-773	SIEMENS	149 245 CABLE, 25FT MODULAR
SE	1	3	13U616	N/A	N/A N/A
		3	14J391	N/A	N/A N/A

7. close LEF-1B isolation damper

#### Power Failure Sequence

An alternate "shutdown" mode will be started when there is a power failure. During the "shutdown" mode, fan status points will not go into alarm.

If normal power is lost, the UPS will power the controller, and a RENO alarm will be sent indicating power has failed.

#### Manual Horn Silence

There is an existing horn silence switch located in an unknown location in the building. The switch will disable the audio portion of the alarm circuit and strobes will still be operational. This existing switch will be reused.

#### Bio-Watch lab mode of operation

The existing fume hood associated with EAV-3 operates as a constant volume fume hood with FHC application 940. Adjust the sub-points of this application as necessary to comply with engineers required flows (see attached laboratory flow schedule). Adjust hood flow coefficient if required by balancing contractor.

#### New Low Flow Monitoring in lab A-607

Monitor the exhaust air flow for EAV-1, EAV-2, and EAV-3. If EAV-1 or EAV-2 flows fall below 450 CFM for more than 5 minutes (ADJ.) then initiate alarm sent to insight workstation. If EAV-3 flow falls below 485 CFM for more than 5 minutes (ADJ.) the initiate alarm sent to insight workstation.

#### Flow Alarm Sequence

If the room differential pressure monitors serving Bio-Watch A607 raises to 0.000 inWC (ADJ.) initiate the following sequence:

1. Disable the rooftop unit RTU-2
2. Close SAV-1, SAV-9, and EAV-8
3. LEF-1A, LEF-1B, EAV-1, EAV-2, EAV-3 will remain in normal operating sequence
4. Enable audio/visual alarms (point TDH.A600.DSHS.STROBES)

When the RPM reports that the differential pressure has risen to 0.030 inWC for 2 minutes (ADJ.) disable the audio/visual alarms and restore to normal mode of operation.

#### Safety Shut Down

Upon fire alarm the fire alarm/electrical contractor shall:

1. Shut down RTU-2
2. Close RTU-2 dampers
3. Shut down LEF-1A
4. Shut down LEF-1B
5. close LEF-1 bypass damper
6. close LEF-1A isolation damper

#### REVISION HISTORY

Siemens Smart Infrastructure

Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

#### TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

#### Bio Watch Flow Diagram

440P-227505

101B

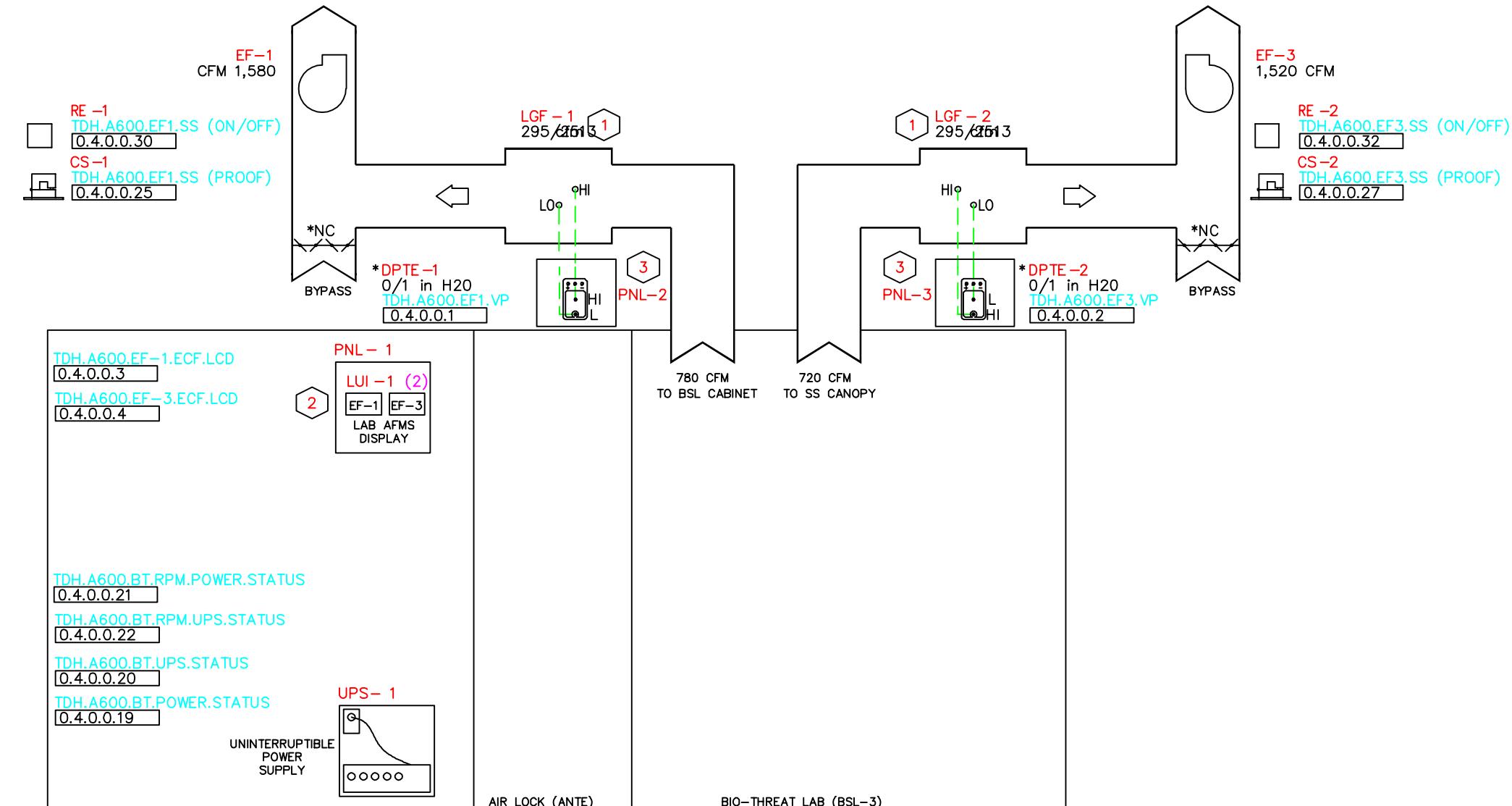
09/12/2019

## INSTALLATION NOTES:

**1** LAB AIR FLOW MEASURING STATION TO BE INSTALLED WITH A MINIMUM OF 2.5 TIMES DUCT DIAMETER UPSTREAM FROM SENSOR, AND A MINIMUM OF 3 TIMES DUCT DIAMETER BEFORE FAN INLET.

**2** LCD READ-OUTS TO BE MOUNTED ADJACENT TO EXISTING MAGNAHETIC PRESSURE GAGE ASSOCIATED WITH RTU-1. LABELS TO READ "EF-1 FLOW RATE (CFM)" "EF-3 FLOW RATE (CFM)"

**3** NEMA RATED ENCLOSURE TO BE INSTALLED FOR AIR FLOW TRANSMITTER.



EF-1,3 Flow Diagram

LOCATION: ROOF  
SERVES: BIO THREAT LAB  
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Fax:

## TFC A600 Bio Threat

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

440P-227505

0

400

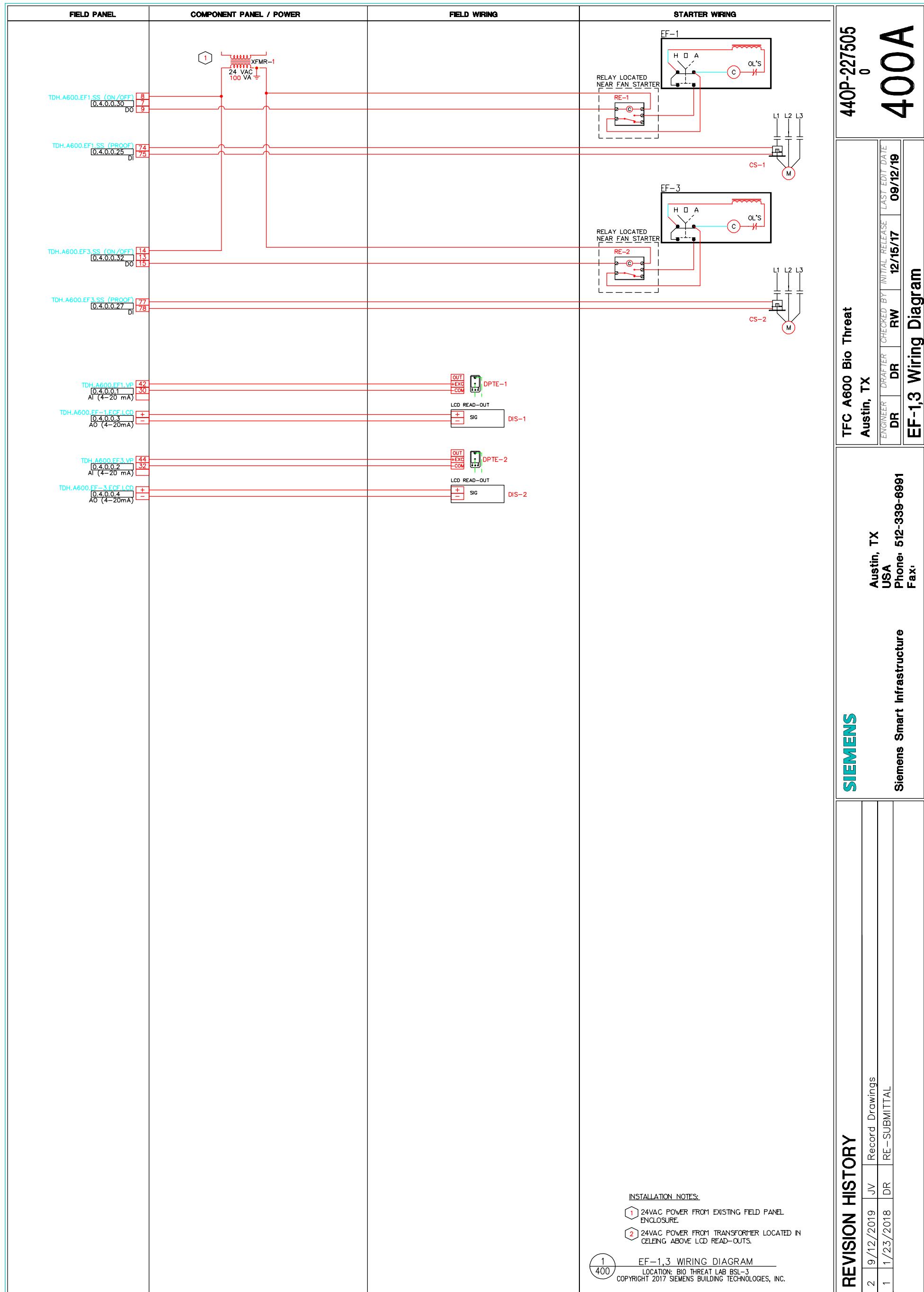
## EF-1,3 Flow Diagram

C:\USERS\Z003VRZK\Desktop\440P-227505\_TFC\_A600\_BIO\_THREAT\MDT\400 EF-1,3.DWG

## REVISION HISTORY

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

09/12/2019



09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
DIS 1	2	GP-5132	N/A	N/A	N/A
LGF 1-2	2	LGFE851R12BAS	HART & COOLEY	149 317	AIRFLOW 12 SSSL ENCL S10
LUI 1	2	LPI-4	KELE INC	N/A	LARGE LCD BLACK INDICATOR
PNL 1	1	A14N124	N/A	N/A	N/A
PNL 2-3	2	ONEBOX161608P	N/A	N/A	N/A
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
Panel Mounted Devices					
UPS 1	1	PSH600-UPS	FUNCTIONAL	N/A	Enclosed UPS and interface board

Exhaust Fan sequence of operation included in 100B.

**REVISION HISTORY****SIEMENS**

Siemens Smart Infrastructure

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FAX:

**TFC A600 Bio Threat****Austin, TX**

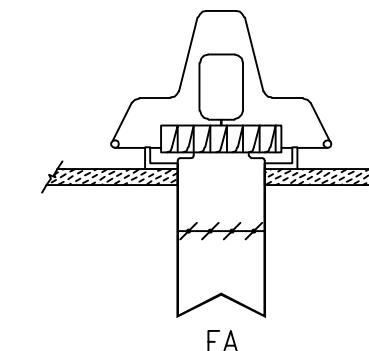
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

**EF-1,3 Flow Diagram - BOM****440P-227505****400B**

09/12/2019

INSTALLATION NOTES:

① CONTROL RELAY AND CURRENT SENSING  
RELAY LOCATED AT FAN STARTER.



1  
401 GENERAL EXHAUST FAN  
LOCATION: ROOF  
SERVES: RESTROOMS/TEST LABS  
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**REVISION HISTORY**

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

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**TFC A600 Bio Threat****Austin, TX**

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

**EF-2,4 Flow Diagram****440P-227505  
0****401**

09/12/2019

FIELD PANEL	COMPONENT PANEL / POWER	FIELD WIRING	STARTER WIRING	440P-227505 0										
TDH.A600.EF2.SS (ON/OFF) [0.4.0.0.31] DO 10			 RELAY LOCATED NEAR DISCONNECT BOX RE-1	<b>401A</b>										
TDH.A600.EF2.SS (PROOF) [0.4.0.0.26] DI 75														
TDH.A600.EF4.SS (ON/OFF) [0.4.0.0.33] DO 18			 RELAY LOCATED NEAR DISCONNECT BOX RE-2											
TDH.A600.EF4.SS (PROOF) [0.4.0.0.28] DI 78														
<b>SIEMENS</b> Austin, TX USA Phone: 512-339-6991 Fax: <b>TFC A600 Bio Threat</b> Austin, TX DR DR RW 12/15/17 09/12/19 <b>EF-2,4 Wiring Diagram</b>														
<b>REVISION HISTORY</b> <table border="1"> <tr> <td>2</td><td>9/12/2019</td><td>JV</td><td>Record Drawings</td><td></td></tr> <tr> <td>1</td><td>1/23/2018</td><td>DR</td><td>RE-SUBMITTAL</td><td></td></tr> </table>					2	9/12/2019	JV	Record Drawings		1	1/23/2018	DR	RE-SUBMITTAL	
2	9/12/2019	JV	Record Drawings											
1	1/23/2018	DR	RE-SUBMITTAL											
<small>INSTALLATION NOTES:</small>  1 24VAC POWER FROM EXISTING FIELD PANEL ENCLOSURE. 1 FF-2,4 WIRING DIAGRAM LOCATION: BIO THREAT LAB BSL-3 COPYRIGHT 2017 SIEMENS BUILDING TECHNOLOGIES, INC.														

09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

Exhaust Fan sequence of operation included in 100B.

**REVISION HISTORY****SIEMENS**

Siemens Smart Infrastructure

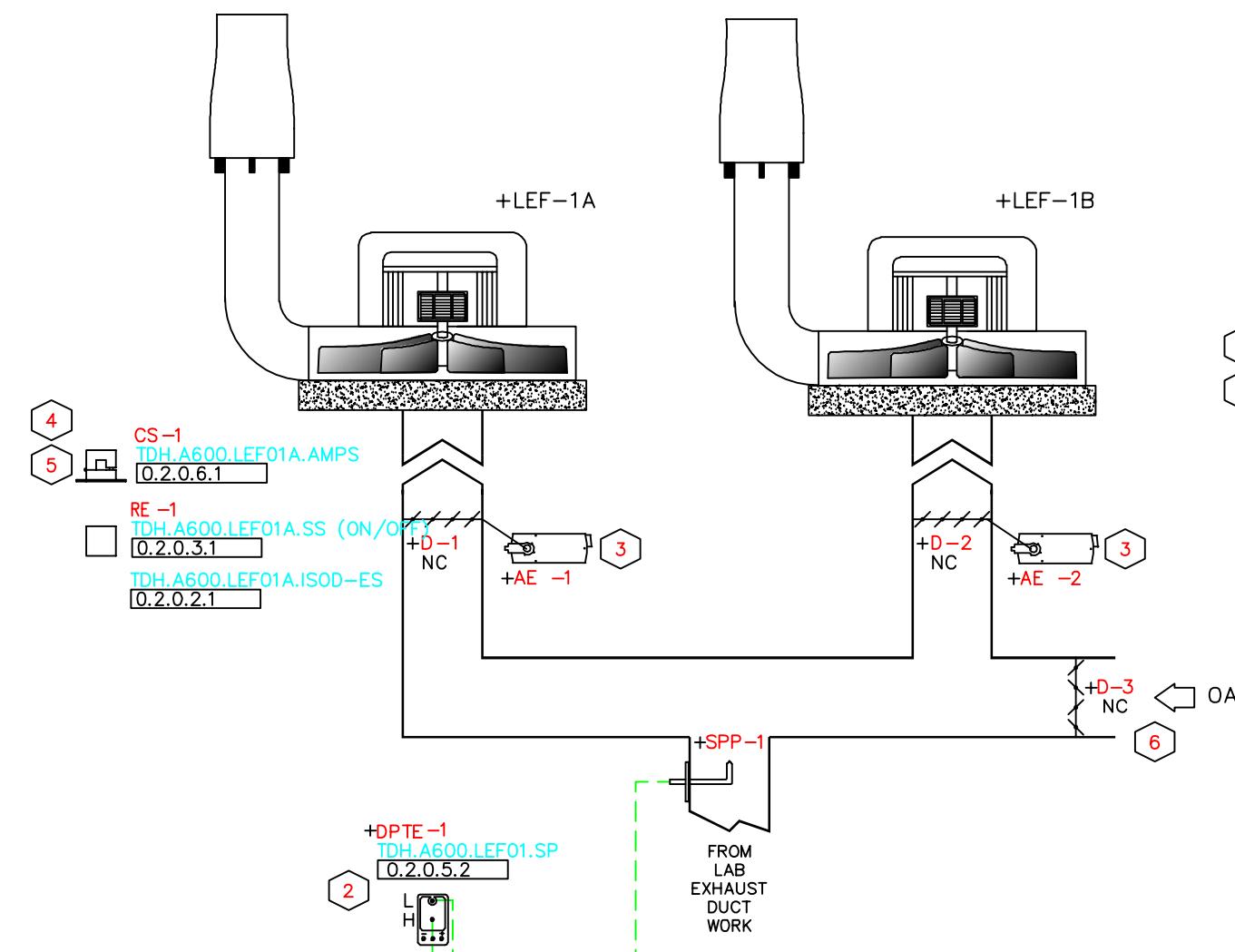
Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

**TFC A600 Bio Threat****Austin, TX**

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

**EF-2,4 Flow Diagram - BOM****440P-227505****401B**

09/12/2019

INSTALLATION NOTES:

- ① "+" INDICATES EXISTING DEVICE TO REMAIN
- ② BALANCER TO SET NEW STATIC PRESSURE SETPOINT TO MAINTAIN EXHAUST FAN EXIT VELOCITY
- ③ SEE DWG 402A FOR NEW ACTUATOR WIRING
- ④ TEST AND BALANCER TO DETERMINE FAN AMPEREAGE AT LOW FLOW OR FAILURE CONDITION FOR FAN FAILURING MONITORING BY ANALOG CURRENT SENSOR
- ⑤ NO NEW WIRING FOR NEW CURRENT SENSOR. REPLACE OLD SENSOR WITH NEW ANALOG VERSION AND CHANGE TERMINATIONS
- ⑥ OUTDOOR AIR DAMPER AND ACTUATOR EXISTING EQUIPMENT TO REMAIN AND THERE IS NO NEW WORK WITH THIS EQUIPMENT.

**REVISION HISTORY**

2 9/12/2019 JV Record Drawings

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**TFC A600 Bio Threat**

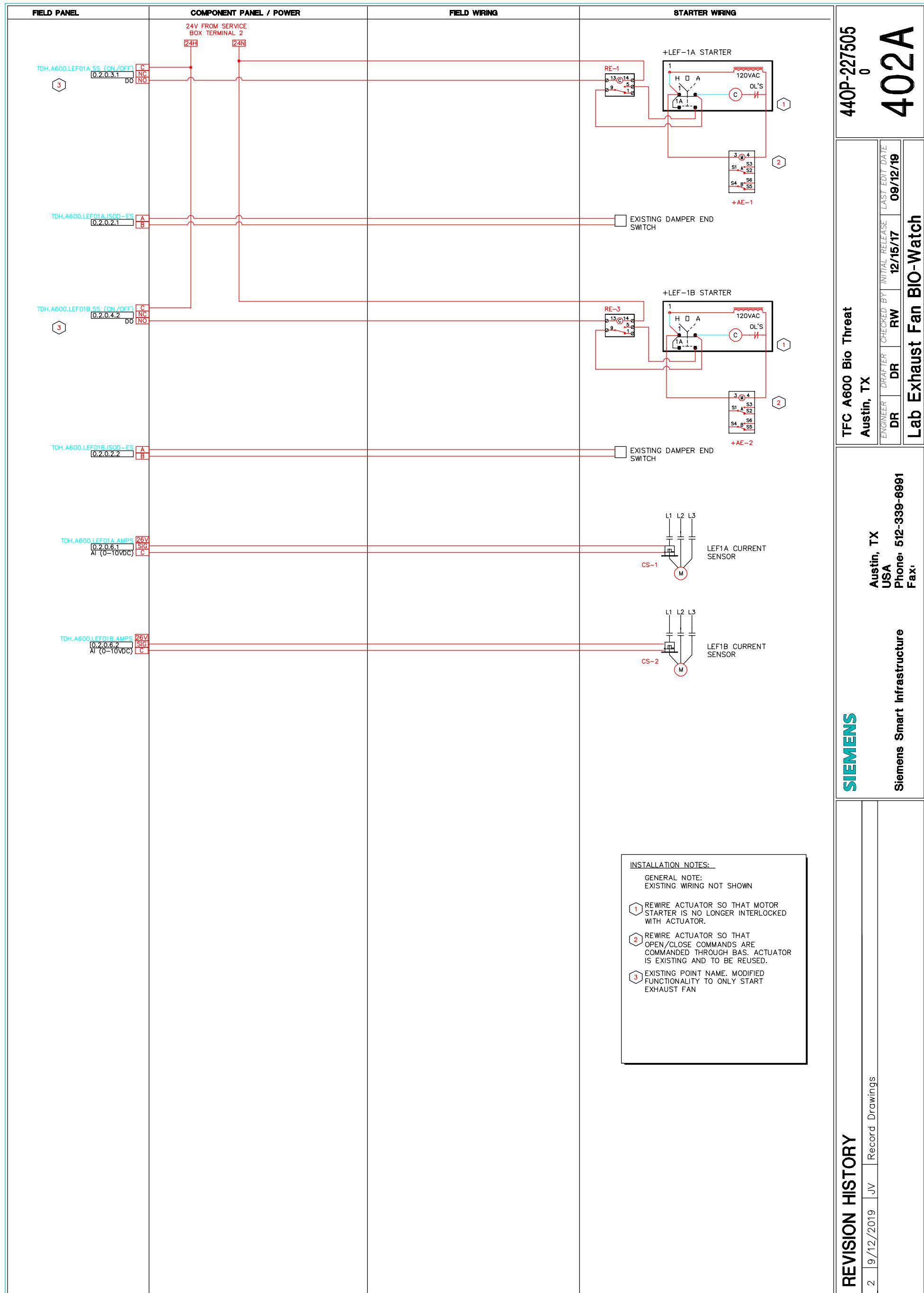
Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

**Lab Exhaust Fan BIO-Watch****440P-227505**

0

**402**



09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
<b>Field Mounted Devices</b>					
CS 1-2	2	H623-10	N/A	N/A	N/A
RE 1	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 3	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
<b>Existing Equipment To Remain</b>					
AE 1-2	2	FIELD VERIFY	N/A	N/A	N/A

Fire alarm shut down  
See DWG 101B for fire alarm sequence.

#### Mode of Operation

Exhaust fans will operate at constant speed and serve a common exhaust plenum. The common exhaust plenum will be connected to two exhaust fans running in a lead lag configuration.

An outside air damper will modulate to maintain duct static pressure measured by a differential pressure transducer located in the exhaust duct, which will have a set-point based on the balancer recommendations.

#### Fan Proof

The exhaust fans have two proofs:

1. The analog current sensor used as a power proof
2. A damper end switch
3. The analog current sensor providing a "low flow" signal

If when starting an exhaust fans, the current sensor or damper end switch have not proven on within 20 seconds (adjustable) then the lag fan will be started and the lead fan shut down once the lag fan has proven on. Send a failure alarm to the workstation.

If the analog current sensor falls below a threshold determined by the balancing contractor for greater than 10 minutes (adjustable), then start the lag fan and turn off the former lead fan after the lag fan has proven on. Send a flow alarm to the workstation.

#### Fan Start/Stop and Changeover Routine

Start the fan and proof that current is running through the fan using the analog current sensor. At the same time, open the associated fans isolation damper. Once the fan and its isolation damper have proven open using the dampers end switch, close the former lead fans damper. After a time delay, shut down the former lead fan.

#### Lead/Lag Sequence

The two exhaust fans will be rotated weekly in a lead/lag configuration. During changeover, the lag fan will be started in its normal start/stop routine as written in the paragraph above. Once the lag fan has proven with the digital current sensor, shut down the former lead fan and designate it the lag fan.

#### Exhaust Fan Failure

If the lead exhaust fan has not been proven within 20 seconds (adjustable) by the analog current sensor and dampers end switch, or if the lead fan has been in a low flow state for 10 minutes (adjustable) as determined by the analog current sensor, then the BAS will start the lag fan and shut down the lead fan 10 seconds after the lag fan has started.

#### REVISION HISTORY

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#### TFC A600 Bio Threat

Austin, TX

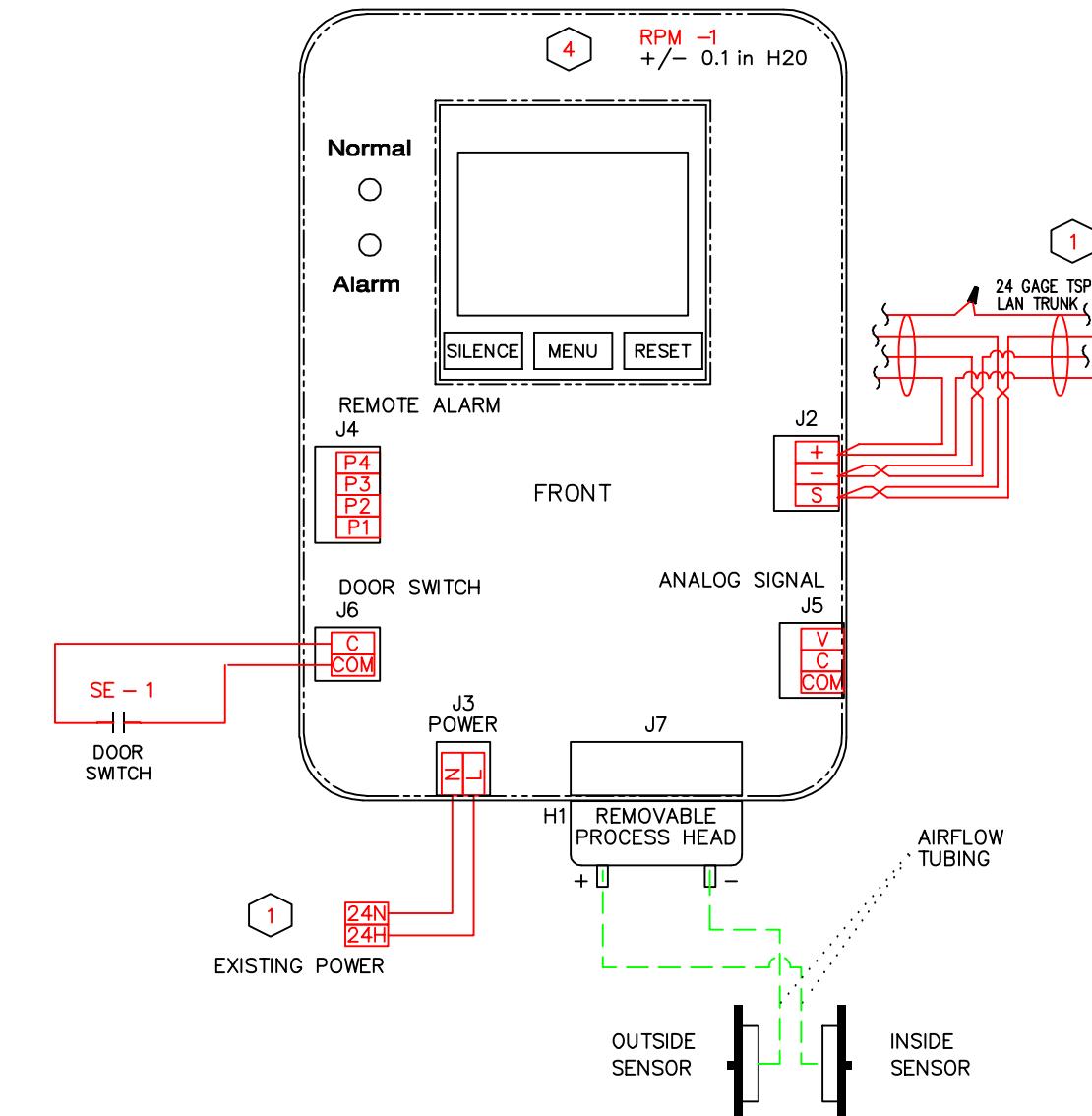
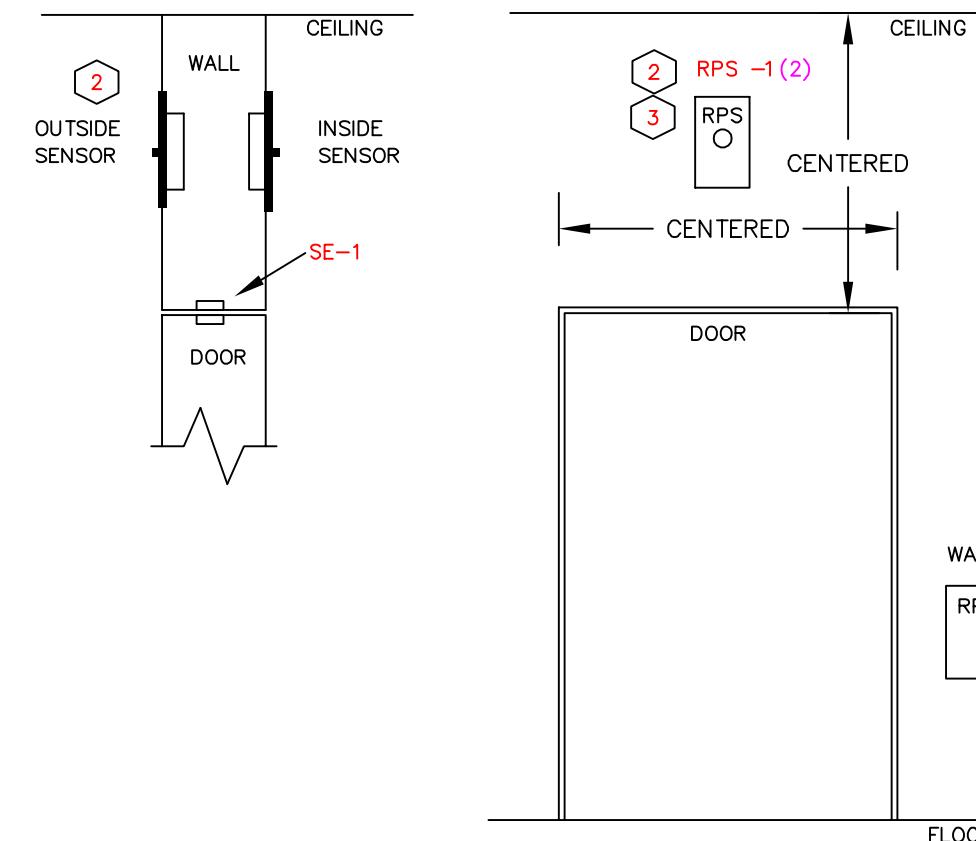
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

**Lab Exhaust Fan BIO-Watch**

**440P-227505**

**402B**

09/12/2019

ROOM PRESSURE MONITORREMOTE PRESSURE SENSOR

IF MOUNTED ABOVE THE DOOR, THE PRESSURE ALARM LIMITS OF THE ROOM PRESSURE MONITOR (RPM) NEEDS TO BE INCREASED BY 0.002 BECAUSE THE PRESSURE OF A ROOM IS HIGHER CLOSER TO THE CEILING.

1  
800      ROOM PRESSURE MONITOR  
LOCATION: SEE MECHANICAL PLANS  
SERVES: ISOLATION ANTE ROOM  
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INSTALLATION NOTES:

- 1 POWER/FLN FROM EXISTING ROOM PRESSURE MONITOR.
- 2 MOUNT RPS SENSOR ABOVE DOOR IN LOCATIONS SHOWN ON PLANS.
- 3 MOUNT RPM OUTSIDE OF SPACE AS SHOWN ON PLANS.
- 4 THE SRPM IS DESIGNED TO BE MOUNTED ON A STANDARD DOUBLE GANG METAL ELECTRICAL BOX USING A 4X4 INCH PLASTER RING ADAPTER. THE RING MUST BE ROTATED 90° FROM CONVENTIONAL MOUNTING.

REVISION HISTORY

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

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TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

Room Pressure Monitor440P-227505  
0

800

09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
RPM	1	1	547-102A	SIEMENS	149101 RPM SM P1 +/-0.1"WC( 25 PA)0.5%FS
RPS	1	2	547-100	SIEMENS	149214 RPM PRESSURE TAP PLATE
SE	1	1	1076CW	N/A	N/A N/A

RPM sequence of operation included in 100B.

**REVISION HISTORY****SIEMENS**

Siemens Smart Infrastructure

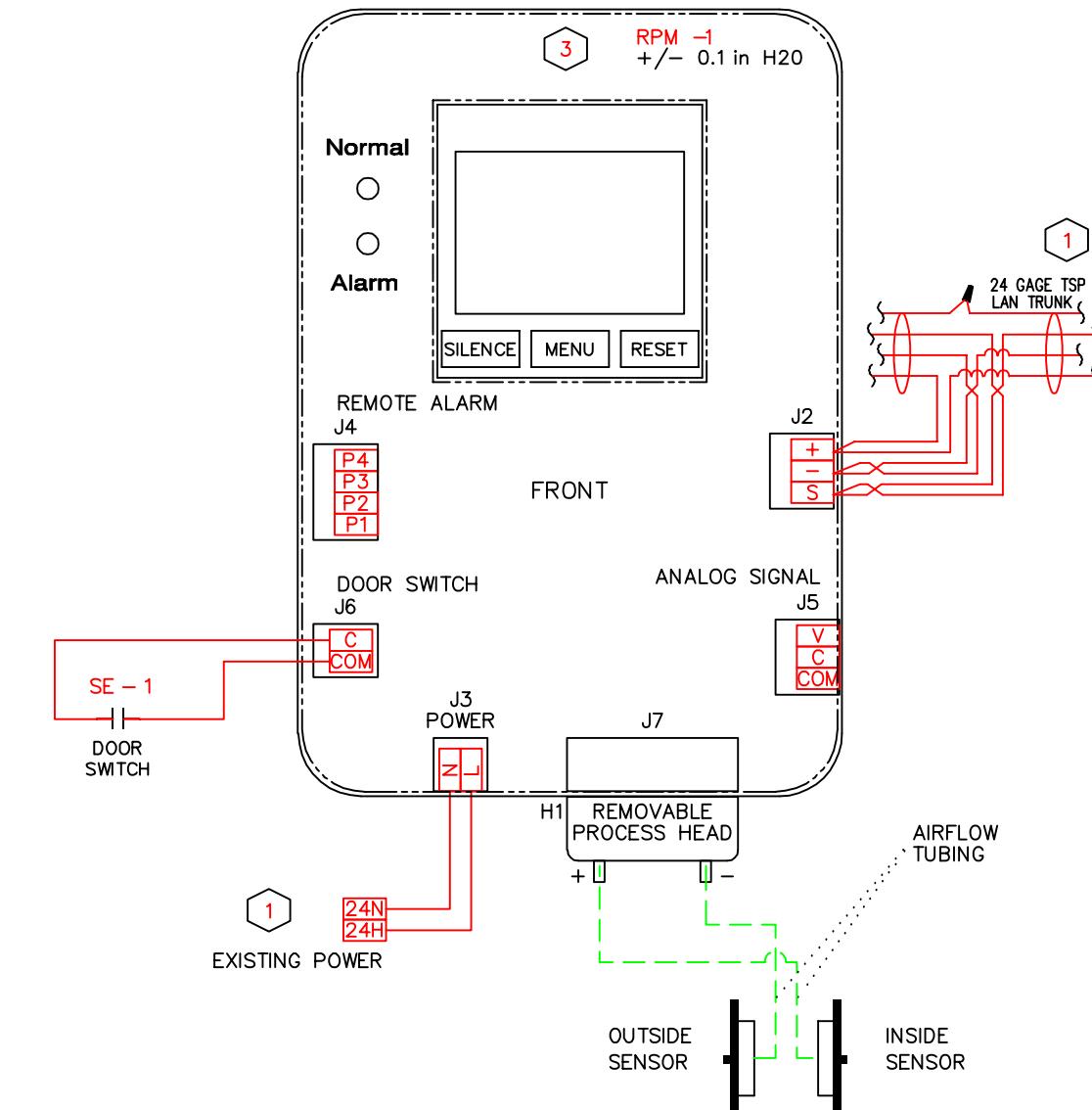
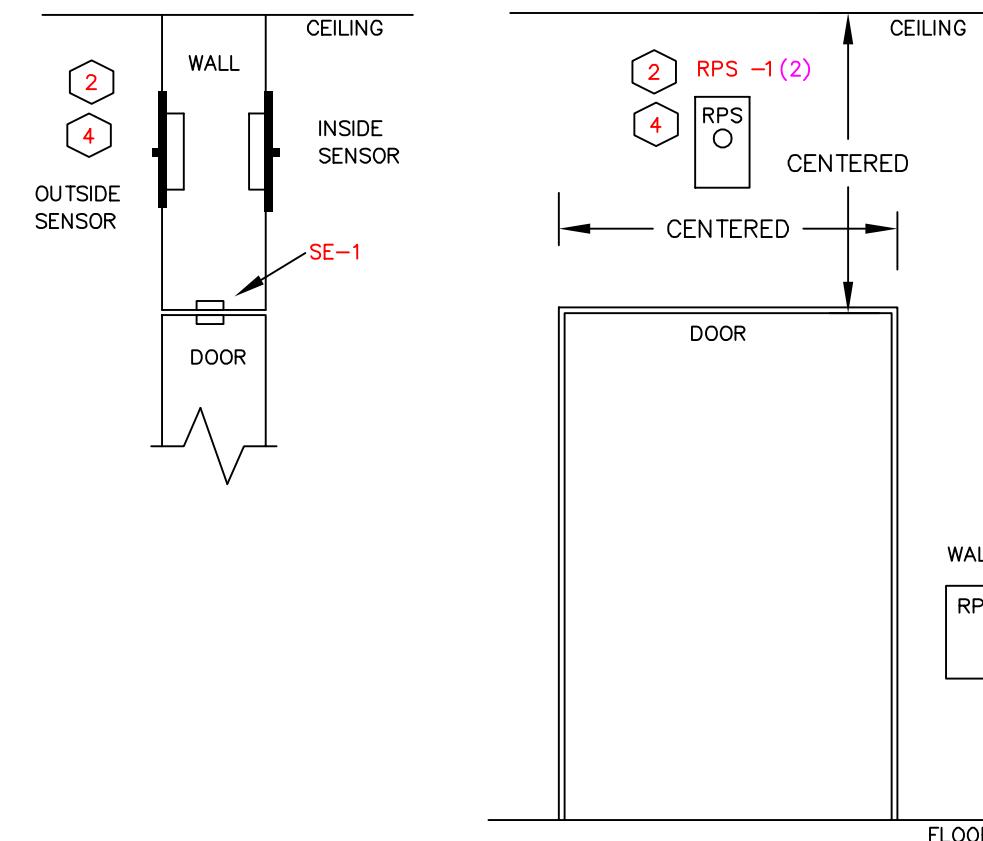
Austin, TX  
USA  
PHONE: 512-339-6991  
FAX:

**TFC A600 Bio Threat****Austin, TX**

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW		09/12/19

**Room Pressure Monitor - BOM****440P-227505****800A**

09/12/2019

ROOM PRESSURE MONITORREMOTE PRESSURE SENSOR

IF MOUNTED ABOVE THE DOOR, THE PRESSURE ALARM LIMITS OF THE ROOM PRESSURE MONITOR (RPM) NEEDS TO BE INCREASED BY 0.002 BECAUSE THE PRESSURE OF A ROOM IS HIGHER CLOSER TO THE CEILING.

1  
801

BIO-WATCH RPM

LOCATION: SEE ATTACHED SCHEDULE  
SERVES: BIO-WATCH LAB

INSTALLATION NOTES:

- 1 POWER/FLN FROM EXISTING ROOM PRESSURE MONITOR.
- 2 MOUNT IN SPACE OCCUPIED BY PREVIOUS ROOM PRESSURE MONITOR
- 3 THE SRPM IS DESIGNED TO BE MOUNTED ON A STANDARD DOUBLE GANG METAL ELECTRICAL BOX USING A 4X4 INCH PLASTER RING ADAPTER. THE RING MUST BE ROTATED 90° FROM CONVENTIONAL MOUNTING.
- 4 CONFIGURATION APPLICABLE IF EXISTING DEVICE IS MOUNTED ABOVE DOOR. MOUNT IN PREVIOUS RPM WALL LOCATION.

REVISION HISTORY

2	9/12/2019	JV	Record Drawings
1	1/23/2018	DR	RE-SUBMITTAL

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

**Room Pressure Monitor BIO-Watch****440P-227505****0****801**

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09/12/2019

## Room Pressure Monitor Setup Details

Equipment Tag	Serves Room	Positive Probe Location	Reference Probe Location	Application Number	Display Averaging (S)	Lower Limit "W.G.	Upper Limit "W.G.	Room Type	Operator Password	Audible Alarm	Door Alarm Input	Mute Time Out (S)	Alarm Delay (S)	Volume	FLN Baud	Device Address
RPM-1	Bio-Watch	Air Lock	Bio-Watch lab	2653	5	-0.04	0	Negative	No	Yes	Yes	60	1	2	4800	5
RPM-2	Air Lock	Corridor	Air Lock	2653	5	-0.04	0	Negative	No	Yes	Yes	60	1	2	4800	6

## REVISION HISTORY

2 9/12/2019 JV Record Drawings

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## TFC A600 Bio Threat

Austin, TX

ENGINEER DR	DRAFTER DR	CHECKED BY RW	INITIAL RELEASE 12/15/17	LAST EDIT DATE 09/12/19
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Room Pressure Monitor BIO-Watch

440P-227505  
0

801

09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
RPM	1-2	2	547-102A	SIEMENS	149101 RPM SM P1 +/-0.1"WC( 25 PA)0.5%FS
RPS	1-2	4	547-100	SIEMENS	N/A RPM PRESSURE TAP PLATE
SE	1-2	2	1076CW	N/A	N/A N/A

See drawing 101 for RPM sequence of operations with low pressure alarm is reached.  
See attached RPM schedule for configuration options and alarm limits.

## REVISION HISTORY

2 9/12/2019 JV Record Drawings

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## TFC A600 Bio Threat

Austin, TX

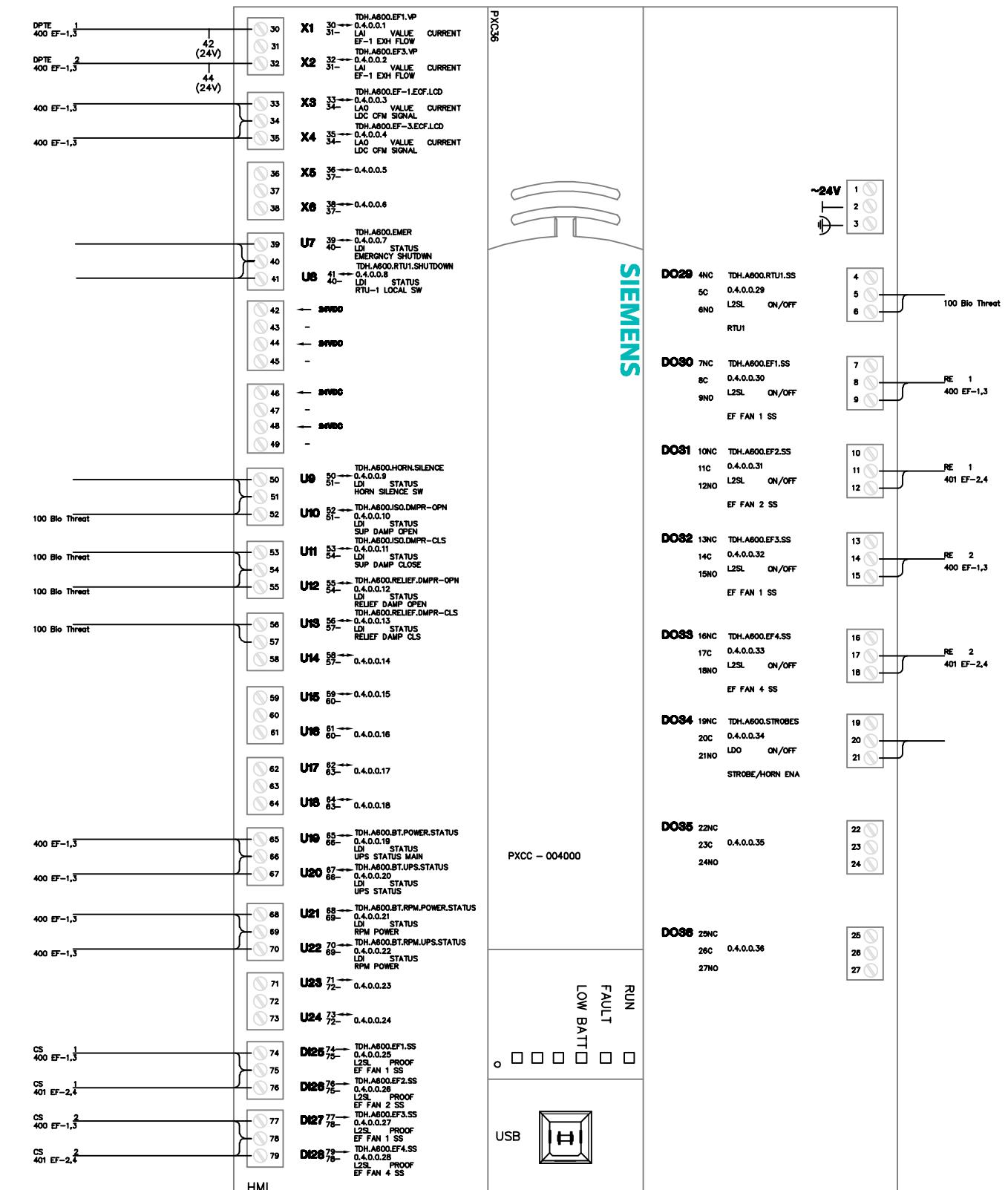
ENGINEER DR	DRAFTER DR	CHECKED BY RW	INITIAL RELEASE 12/15/17	LAST EDIT DATE 09/12/19
-------------	------------	---------------	--------------------------	-------------------------

Room Pressure Monitor BIO-Watch

440P-227505  
0

801B

09/12/2019



## REVISION HISTORY

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## TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

RTU1.BSL3.A600.PXC36

440P-227505

900

09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCC 001000	1	PXC36-PE.A	SIEMENS	149454	APOGEE 36PT, P2 RS485/IP ALN
	1	LSM-FLN36.A	SIEMENS	N/A	FLN LICENSE FOR PXC36

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FAX:

TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

RTU1.BSL3.A600.PXC36

440P-227505

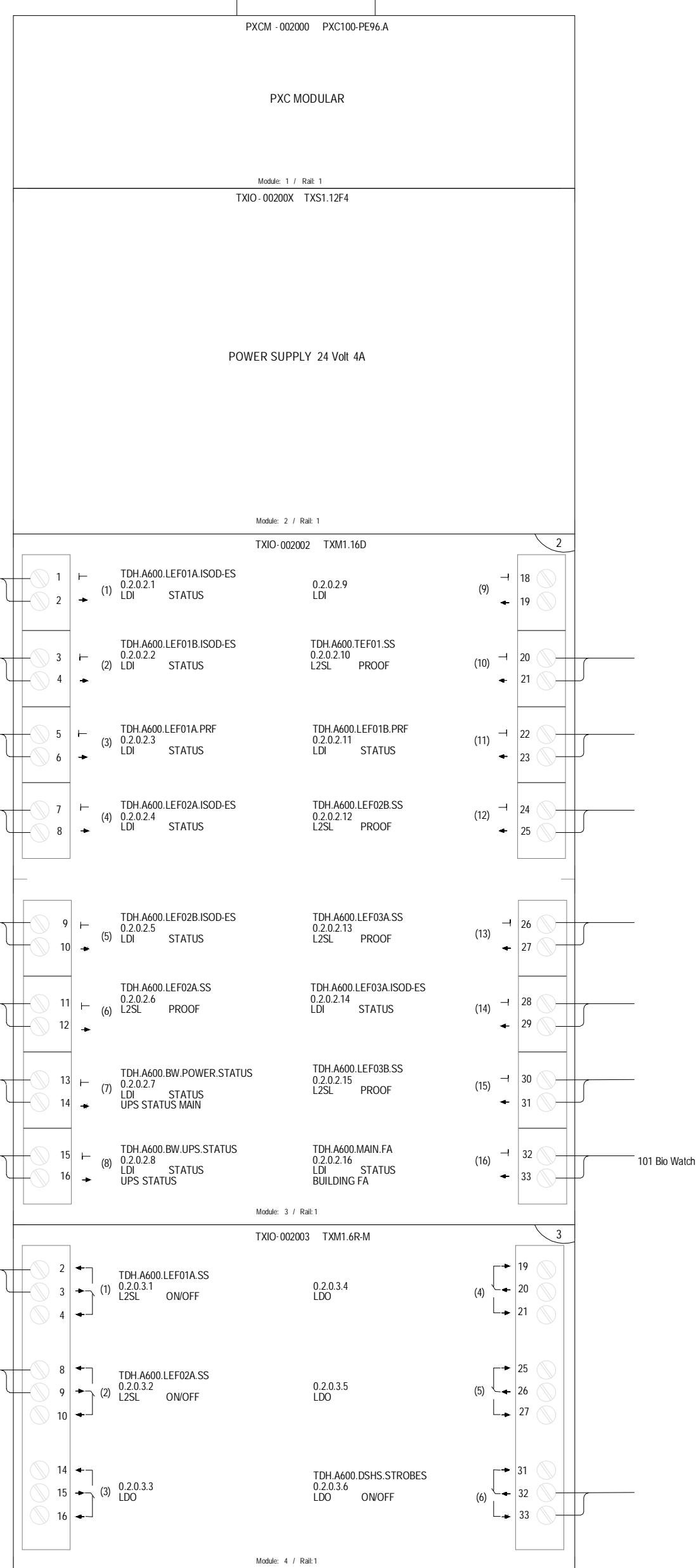
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09/12/2019

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**SIEMENS**Siemens Smart Infrastructure  
Landis DivisionAustin, TX  
USA  
Phone: 512-339-6991  
Fax:

TFC A600 Bio Threat					
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	
DR	DR	RW	12/15/17	09/12/19	PXCM05

440P-227505  
1  
901

09/12/2019

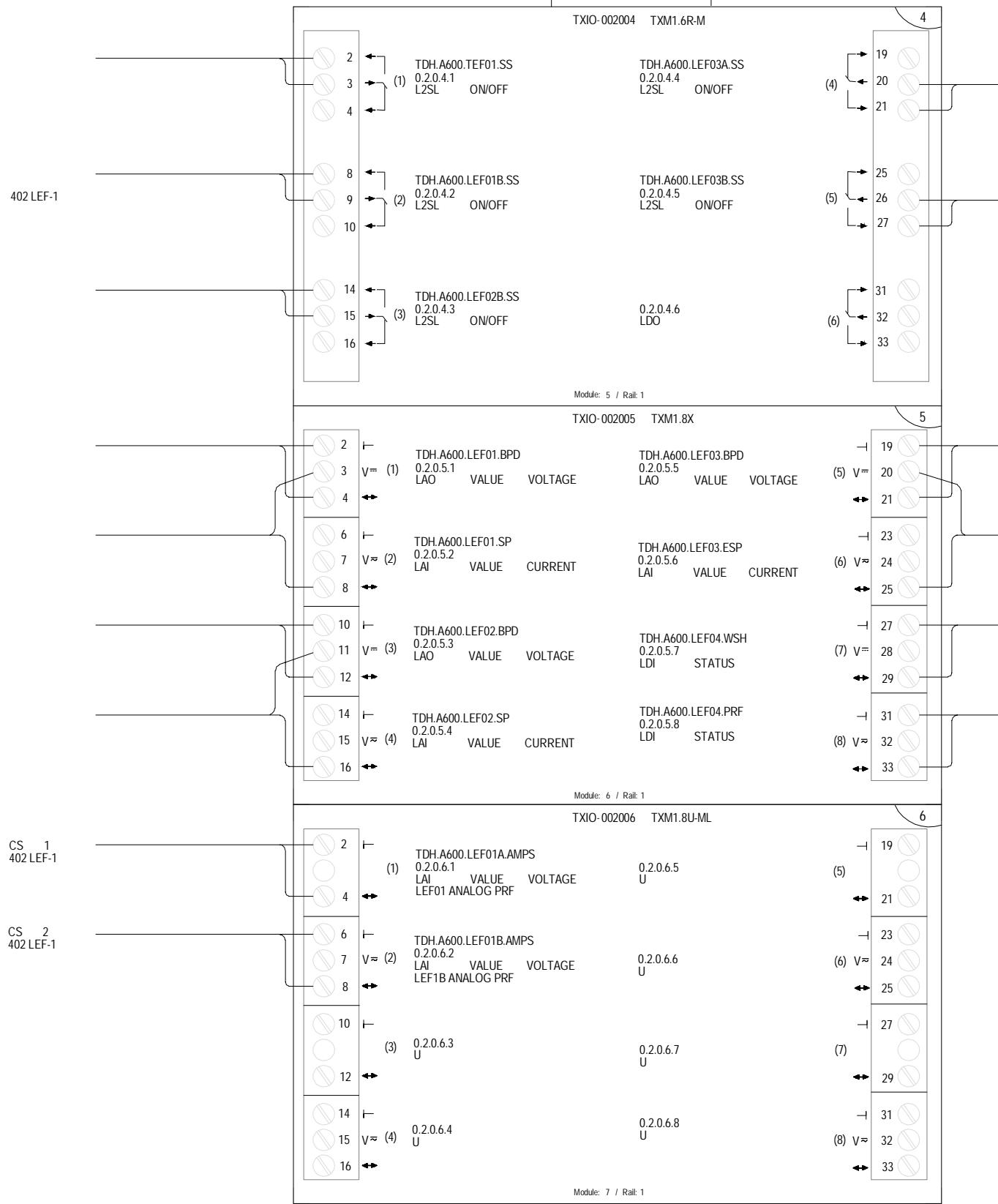
## REVISION HISTORY

**SIEMENS**Siemens Smart Infrastructure  
Landis DivisionAustin, TX  
USA  
Phone: 512-339-6991  
Fax:

TFC A600 Bio Threat					
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	
DR	DR	RW	12/15/17	09/12/19	TDH.A600.PXCM05p002

440P-227505  
<sub>1</sub>

901A



09/12/2019

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 002000	1	TXA1.K24	SIEMENS	149476	@ADDRESS KEY 1-24
	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
Existing Equipment To Remain					
PXCM 002000	1	PXC100-PE96.A	SIEMENS	149478	PXC MOD, P2, TX-I/O, 96 NODE, APOGEE
	1	PXX-485.3	SIEMENS	149478	PXC MOD EXPANSION MODULE, 3 RS-485
	1	TXS1.12F4	SIEMENS	149476	24VDC SUPPLY 1200MA, 4 A FUSE
	2	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.8X	SIEMENS	149476	8 UNIV I/O MODULE W/ 4-20MA

## REVISION HISTORY

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FAX:

## TFC A600 Bio Threat

Austin, TX

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DR	DR	RW	12/15/17	09/12/19

TDH.A600.PXCM05

440P-227505

1

901B

## **Equipment Schedules**

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## **Equipment Datasheets**

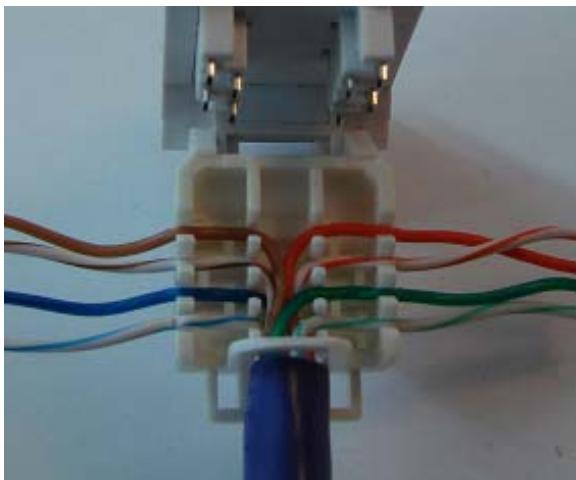
Keystone installation and  
datasheet

**How to:**

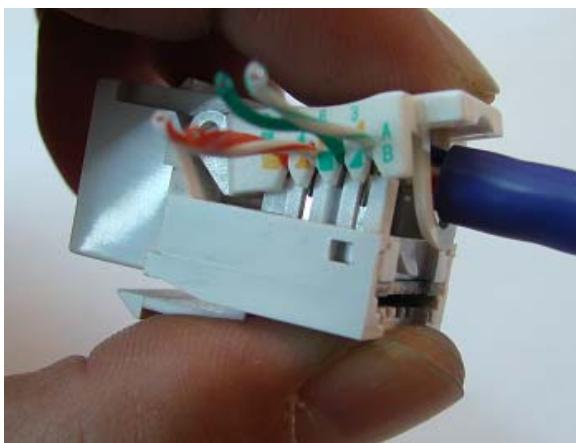
**Connect a Cat5e/Cat6 RJ-45 Toolless Keystone Jack**



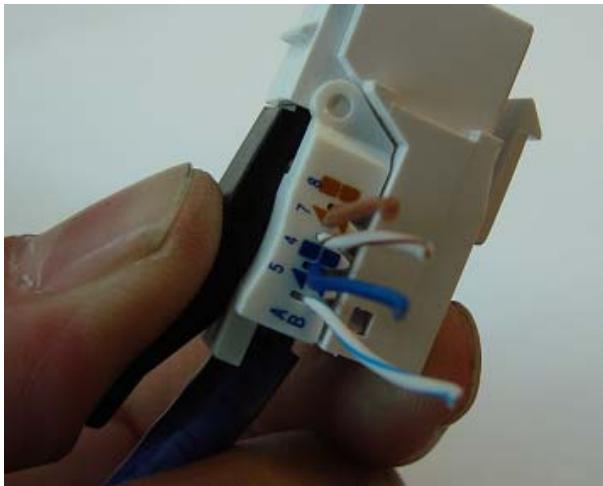
**Step 1.** Strip about 1" off of the outer jacket of the cable. If using Cat6 cable, trim off the spleen so that it doesn't get in the way of the wires.



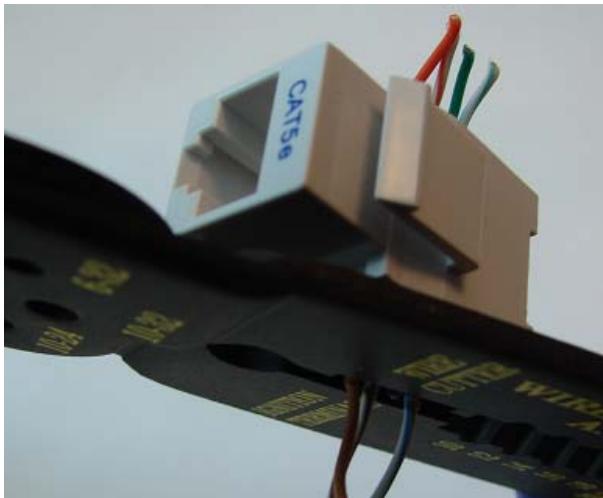
**Step 2.** Open the lid of the keystone and insert the wires through the loop at the end. Untwist and splay out the wires and sort them through the appropriate slots on the lid. Follow the color coding diagram on the side of the lid for the proper wiring standard you wish to use.



**Step 3.** Close the lid and squeeze tightly.



**Step 4.** Use the included lever to snap the lid all the way down.



**Step 5.** Trim away the excess wires from both sides of the keystone.



**Step 6.** If your model came with a zip tie, use it to secure the cable jacket to the keystone.

# ALARMS & INDICATION

**STROBES & HORNS**  
**125STRH, 89STR, 869STR, 869, 868STR, 868**



## DESCRIPTION

The **Edwards Signaling** strobes and horns are available in wall-mount and panel-mount configurations with a variety of colors and voltages. Model **125STRH** is a 120 VAC panel-mount strobe in NEMA 4X enclosure. Model **89STR** mounts on a single-gang box and is a single, indoor, flush-mount strobe. Model **869STR** is an indoor, flush-mount horn and strobe combination. Model **869** is an indoor, flush-mount horn only. Model **868STR** is an outdoor, surface-mount horn and strobe combination. Model **868** is an outdoor, surface-mount horn.

NEW!

**Edwards  
Signaling™**



## FEATURES

- Indoor and outdoor applications
- Amber, blue, clear, green, and red colors
- 24 VAC, 24 VDC, and 120 VAC
- Surface and panel mount

## SPECIFICATIONS

Supply Voltage	120 VAC
-N5 (89, 869, 868)	24 VDC, 24 VAC
-AQ (89, 869, 868)	120 VAC -20% to +10
Current Rating	
125STRH	120 mA
Horn/Strobe	24 VDC, 22 mA/390 mA 24 VAC, 72 mA/390 mA 120 VAC, 24 mA/87 mA
Average Candela with Colored Lens	
Amber	90 cd
Blue	20 cd
Clear	150 cd
Green	70 cd
Red	21 cd
Color	Amber, Blue, Clear, Green, Red
Horn Loudness	90 dba @ 10'
Peak Candela	300,000 cd
Strobe Tube Life	3,000 hrs, 1,000 hrs
Operating Temperature	
869, 869STR, 89STR	32° to 120°F (0° to 49°C)
868, 868STR, 125STRH	-31° to 150°F (-35° to 66°C)

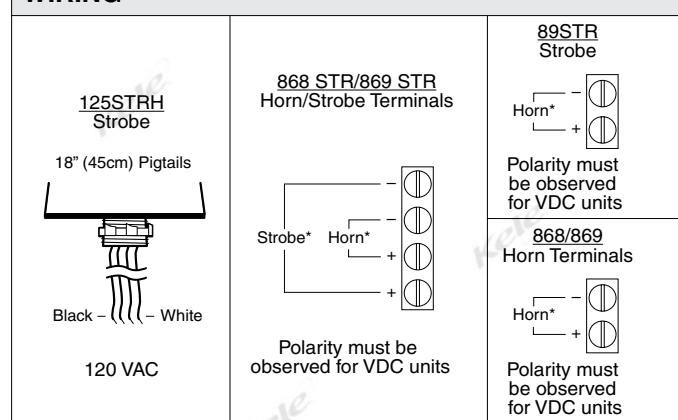
Operating Humidity	
89STR	85% RH @ 86°F(30°C)
869, 869STR	93% RH @ 90°F (32°C)
868, 868STR, 125STRH	98% RH @ 104F (40°C)
Mounting	
125STRH	1/2" MNPT in center of plate
868	Weatherproof surface box supplied – no NEMA rating
869	3" sq x 1-1/2" electrical box with 1-1/2" extension ring (need 3" depth) Single gang box or equivalent
89STR	NEMA 4X
Enclosure Rating	Indoor, No NEMA rating Outdoor surface, NEMA rating is mounting box dependent
125 STRH	
89STR, 869STR	
868, 868STR	
Dimensions	
89 STR	5.0"H x 3.375"W (12.7 x 8.6 cm)
869 STR, 868 STR, 869, 868	
125STRH	5.50"H x 5.50"W (14 x 14 cm) 3.875"H x 3.25"W (9.84 x 8.26 cm)
Approvals	CE, CSA, UL File #E122942 & E11459
Warranty	2 years

## ORDERING INFORMATION

MODEL	DESCRIPTION
125STRH	Panel-mount strobe only
89STR	Indoor flush-mount strobe only
869STR	Indoor flush-mount electronic horn and strobe
868STR	Outdoor surface-mount electronic horn and strobe
868	Outdoor surface-mount electronic horn only
869	Indoor flush- or panel-mount electronic horn only
COLOR (skip for 868 and 869)	
A	Amber
B	Blue
C	Clear
G	Green
R	Red
SUPPLY VOLTAGE	
AQ	24 VAC/VDC (89, 869, 868)
N5	120 VAC (89, 869, 868)
120A	120 VAC (125STRH only)
868STR	B AQ

**Example:** 868STR-B-AQ Outdoor surface-mount electronic horn with blue strobe and 24 VAC/VDC

## WIRING



# Room Pressure Monitor

## Description

The Room Pressure Monitor (RPM) is designed for critical low differential pressure applications that require stringent pressure monitoring and alarming. The unit can be configured to monitor positive or negative pressure in protected environments and hospital isolation rooms per CDC guidelines.



## Features

- Touchscreen display
- Password enabled
- Local audible alarm
- Visual red and green room status displays
- SPST alarm relay
- Door status monitor
- Variable alarm delay
- Positive and negative pressure monitoring
- Bar graph display
- CE and RoHS compliant
- Easy to install, set-up and calibrate
- Fingertip operation
- Password security
- Local display of room

## Applications

- Hospital patient isolation wards
- Pharmaceutical manufacturing
- Semiconductor fabs
- Cleanrooms
- Research laboratories

## Specifications

### Performance Data

	<b>547-xxxB</b>	<b>547-xxxA</b>
Accuracy RSS *	$\pm 0.25\%$	$\pm 0.5\%$
(at constant temp)		
Non-linearity (BFSL based)	$\pm 0.24\%$	$\pm 0.49\%$
Hysteresis	$\pm 0.05\%$	$\pm 0.05\%$
Non-repeatability	$\pm 0.05\%$	$\pm 0.05\%$
Zero setting tolerance	$\pm 0.5\% \text{ FS}$	$\pm 0.5\% \text{ FS}$
Span setting tolerance	$\pm 0.5\% \text{ FS}$	$\pm 0.5\% \text{ FS}$

### Thermal Effects \*\*

Compensated range °F (°C)	$\pm 0.03\% \text{ FS}$ ( $\pm 0.05\% \text{ FS}$ )
Overpressure	$\pm 1 \text{ PSI}$ $\pm 15" \text{ WC}$ for $\pm 0.1$ and $\pm 0.05$ in WC

\* RSS of Non-linearity, non-repeatability, and hysteresis

\*\* Units calibrated at nominal 70°F (21°C). Maximum thermal error computed from this datum.

### Environmental Data

Temperature	
Operating *	32°F (0°C) to 120°F (50°C)
Storage	-20°F (-30°C) to 160°F (70°C)
Operating humidity	5% to 95% rh (non-condensing)

\* Operating temperature limits of electronics only.

### Physical Description

Case	Fire retardant plastic (NEMA 1, IP20 rated for indoor applications)
Dimensions	8" H x 5.1" W x 1.8" D (203 mm H x 130 mm W x 46 mm D)
Electrical connection	Removable terminal block
Pressure fittings	Barbed fittings for 1/4" OD tubing

## Specifications, Continued

Weight (approx.)	1.5 lbs (680 g)
Mounting	4 x 4 plaster ring (mounts to double gang electrical box)
<b>Communications Option</b>	
BACnet P1	MS/TP ASC FLN trunk
<b>Display</b>	
LCD Status indicators	128 x 128 RGB backlit Green LED – Normal Red LED – Alarm Backlit LCD
<b>Electrical Data (Voltage)</b>	
Circuit Output *	3-wire (Exc, Out, Com) 0 to 5 Vdc 0 to 10 Vdc
Excitation	18 to 32 Vac, 50 to 60 Hz
Power consumption	5 W
Alarm output	SPDT relay 1A @ 24 Vdc

\* Calibrated into a 50K ohm load, operable into a 5000 ohm load or greater.

### Electrical Data (Current)

Circuit Output	2-wire
External load	4 to 20 mA
Excitation	0 to 510 ohms
	18 to 32 Vac, 50 to 60 Hz

### Pressure Media

Air or non-conductive, non-explosive gases.

### Certifications

CSA Standard C22.2 No. 0-M91	General Requirements Canadian Electrical, Part 1
CAN/CSA C22.2 N9. 0.4-04	Bonding of Electrical Equipment
CAN/CSA-C22.2 No. 61010-1-04	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use Part 1: General Requirements
ANSI/UL61010-1 (2 <sup>nd</sup> Edition)	Safety Requirements for Electrical Equipment for Measurement, Control

### Accessories



547-100 Pressure Tap Plate

## Ordering Information

Product Number	WC	Protocol	FS
547-101A	+/- 0.05" WC (12.5 Pa)	P1	0.5%
547-102A	+/- 0.1" WC (25 Pa)	P1	0.5%
547-103A	+/- 0.25" WC (62.5 Pa)	P1	0.5%
547-104A	+/- 0.50" WC (12.5 Pa)	P1	0.5%
547-105A	+/- 1.0" WC (250 Pa)	P1	0.5%
547-106A	+/- 2.55" WC (625 Pa)	P1	0.5%
547-107A	+/- 5.0" WC (1250 Pa)	P1	0.5%
547-101B	+/- 0.05" WC (12.5 Pa)	P1	0.25%
547-102B	+/- 0.1" WC (25 Pa)	P1	0.25%
547-103B	+/- 0.25" WC (62.5 Pa)	P1	0.25%
547-104B	+/- 0.50" WC (12.5 Pa)	P1	0.25%
547-105B	+/- 1.0" WC (250 Pa)	P1	0.25%
547-106B	+/- 2.55" WC (625 Pa)	P1	0.25%
547-107B	+/- 5.0" WC (1250 Pa)	P1	0.25%
547-201A	+/- 0.05" WC (12.5 Pa)	BACnet	0.5%
547-202A	+/- 0.1" WC (25 Pa)	BACnet	0.5%
547-203A	+/- 0.25" WC (62.5 Pa)	BACnet	0.5%
547-204A	+/- 0.50" WC (12.5 Pa)	BACnet	0.5%
547-205A	+/- 1.0" WC (250 Pa)	BACnet	0.5%
547-206A	+/- 2.55" WC (625 Pa)	BACnet	0.5%
547-207A	+/- 5.0" WC (1250 Pa)	BACnet	0.5%
547-201B	+/- 0.05" WC (12.5 Pa)	BACnet	0.25%
547-202B	+/- 0.1" WC (25 Pa)	BACnet	0.25%
547-203B	+/- 0.25" WC (62.5 Pa)	BACnet	0.25%
547-204B	+/- 0.50" WC (12.5 Pa)	BACnet	0.25%
547-205B	+/- 1.0" WC (250 Pa)	BACnet	0.25%
547-206B	+/- 2.55" WC (625 Pa)	BACnet	0.25%
547-207B	+/- 5.0" WC (1250 Pa)	BACnet	0.25%

## Dimensions

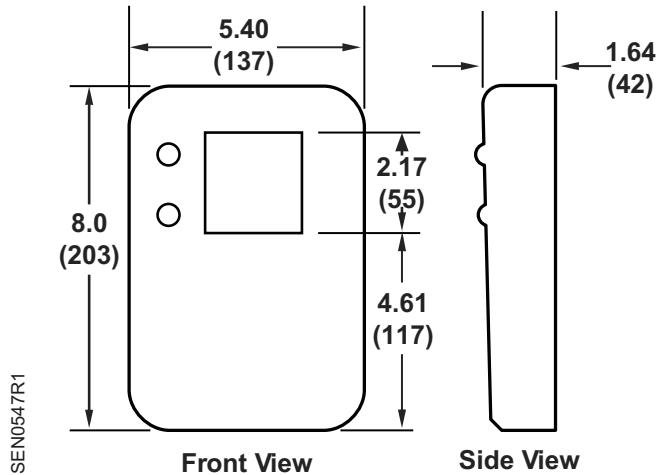
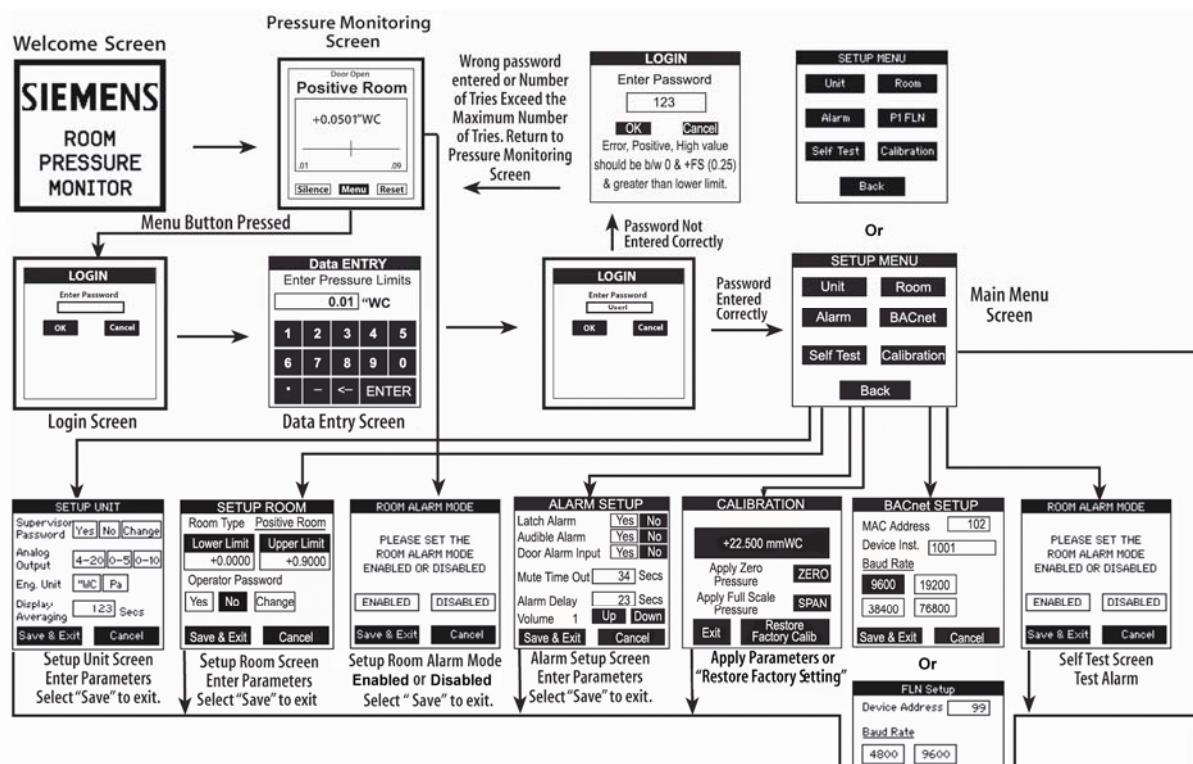
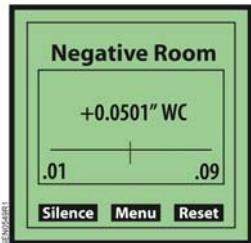


Figure 1. Dimensions in Inches (Millimeters).

# RPM Menu Tree



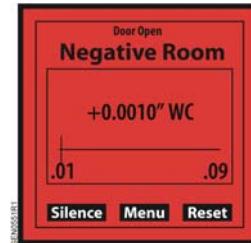
SEN0548R1



If pressure is normal, the screen is green



When the door is open, the screen is yellow until the alarm delay is reached



If pressure falls outside of preset limits (Alarmed State), the screen is red

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# Very Low Differential Pressure Transducer



Figure 1. Very Low Differential Pressure Transducer

## Description

The Very Low Differential Pressure Transducers sense differential or guage (static) pressures and convert pressure difference to a proportional electrical output. The 590 Series is offered with a 0 to 10 Vdc or 4 to 20 mA output.

Used in Building Energy Management Systems, these transducers are capable of measuring pressures with the accuracy necessary for proper building pressurization and airflow control.

The 590 Series Transducers are available in five (5) different air pressure ranges. Static accuracy is  $\pm 1\%$  full scale in normal ambient temperature environments. The units are temperature compensated to less than  $\pm 0.033\% \text{ FS}/^{\circ}\text{F}$  of thermal error over the temperature range of  $0^{\circ}\text{F}$  to  $+150^{\circ}\text{F}$ .

The 590 Series uses an improved all stainless steel micro-tig welded sensor.

The tensioned stainless steel diaphragm and insulated stainless steel electrode, positioned close to the diaphragm, form a variable capacitor. Positive pressure moves the diaphragm toward the electrode, increasing the capacitance.

A decrease in pressure moves the diaphragm away from the electrode, decreasing the capacitance. The change in capacitance is detected and converted to a linear DC electrical signal by the unique electronic circuit of the 590 Series.

The micro-tig-welded tension sensor allows up to 10 PSI overpressure (in either direction) with no damage to the unit. In addition, the sensor parts have thermally matched coefficients, which promotes improved temperature performance and excellent long-term stability.

## Applications

- Heating, Ventilation and Air Conditioning (HVAC)
- Energy Management Systems
- Variable Air Volume (VAV) and Fan Control
- Environmental pollution control
- Static duct and clean room pressures

## Benefits

- 10 psi proof pressure on all ranges.
- 24 Vac excitation.
- 0 to 10 Vdc and 4 to 20 mA analog output is compatible with all energy management systems.
- Fully protected against reverse wiring.
- Internal regulation permits use with unregulated DC power supplies.
- 1% accuracy improves variable air volume system performance.
- Meets CE conformance standards.
- No field calibration or adjustment necessary.

## Pressure Ranges

Unidirectional Pressure	Bi-directional Pressure
0 to 0.5 in. WC	± 0.25 in. WC
0 to 1 in. WC	± 0.1 in. WC
0 to 2 in. WC	
0 to 5 in. WC	

## Ordering Information

Description	Product Part Number
Conduit Assembly Kit For Differential Pressure Sensors	590-500
Differential Pressure Sensor, 1% FS, 5" WC, 0 to 10 Vdc	590-501
Differential Pressure Sensor, 1% FS, 2" WC, 0 to 10 Vdc	590-502
Differential Pressure Sensor, 1% FS, 1" WC, 0 to 10 Vdc	590-503
Differential Pressure Sensor, 1% FS, ±0.25" WC, 0 to 10 Vdc	590-505
Differential Pressure Sensor in Conduit Box, 1% FS, 5" WC, 0 to 10 Vdc	590-506
Differential Pressure Sensor in Conduit Box, 1% FS, 2" WC, 0 to 10 Vdc	590-507
Differential Pressure Sensor in Conduit Box, 1% FS, 1" WC, 0 to 10 Vdc	590-508
Differential Pressure Sensor in Conduit Box, 1% FS, ± 0.25" WC, 0 to 10 Vdc	590-510
Differential Pressure Sensor in Conduit Box, 0.4% FS, 1" WC, 4 to 20 mA	590-780
Differential Pressure Sensor in Conduit Box, 0.4% FS, 0.65" WC, 4 to 20 mA	590-781
Differential Pressure Sensor in Conduit Box, 0.4% FS, 0.5" WC, 4 to 20 mA	590-782

## Specifications (Application of some available options may impact standard specifications)

### Environmental Data

Temperature

Operating °F (°C)\* 0 to 150 (-18 to 65)

Storage °F (°C) -40 to 185 (-40 to 85)

\*Operating temperature limits of the electronics only.

Pressure media temperatures may be considerably higher or lower.

### Physical Description

Case	Fire retardant glass filled polyester
Electrical connection	Screw terminal strip
Pressure fitting	1/4" fitting
Weight	3 ounces

### Electrical Data (Voltage)

Circuit	3-wire (Com, Out, Exc)
Excitation/Output*	12 to 30 Vac/0 to 10 Vdc**
Bi-directional output at zero pressure:	5.0 Vdc**
Output Impedance	100 ohms

\* Calibrated into a 50K ohm load, operable into a 5000-ohm load or greater.

\*\* Zero and span outputs factory-set to within  $\pm$  50mV ( $\pm$  25 mV for optional accuracies).

### Electrical Data (Current)

Circuit	2-Wire
Excitation/Output*	24 Vdc***/4 to 20 mA**
Bi-directional output at zero pressure:	12 mA**
Controller Load	0 to 800 ohms

\* Calibrated at factory with a 24 Vdc loop supply voltage and a 250 ohm load.

\*\* Zero and Span outputs factory set to within  $\pm$  0.16 mA ( $\pm$  0.08 mA for optional accuracies).

\*\*\* Minimum loop supply voltage (Vdc) =  $9 + 0.02 \times$  (Resistance of controller input plus field wiring).

Maximum loop supply voltage (Vdc) =  $30 + 0.004 \times$  (Resistance of controller input plus field wiring).

### Pressure Media

Typically air or similar non-conducting gases

### Position Effect \*

Range	Zero Offset (%FS/G)
To 0.5 in. WC	0.60
To 1.0 in. WC	0.50
To 2.5 in. WC	0.22
To 5.0 in. WC	0.14

\* Unit is factory calibrated at 0g effect in the vertical position.

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## GE Magnetic Contacts

## Product Information

[www.GE-Interlogix.com](http://www.GE-Interlogix.com)

### Overview

The GE Interlogix 1078 Series Steel Door contacts are designed specifically for use in the steel doors commonly found in commercial building applications. The unique housing design features a rugged unibody construction with flexible ribbed sides for quick, secure installation without gluing. The magnet housing isolates the magnet from the surrounding steel for maximum gap distances, both make and break. Over seven models including: Wide Gap, SPDT, DPDT, and Biased for High Security applications make the 1078 Series the most widely used and comprehensive line available.

On available models a terminal connection (T) makes installation easier. Simply strip the wire, insert it into the terminal block and tighten. The terminal accepts any wire size from 14 to 22 gauge, and has a unique one piece design for added strength.

An optional Rare Earth Magnet is available. It is designed for use in metal entry/exit doors with a channel in the top of the door. The magnet eliminates the need to cut a mounting hole in the door channel. The flexible magnet housing can be compressed to accommodate a variety of channel widths for quick, easy installation. Adhesive is recommended.

### Architectural and Engineering Specifications

The contact contains a hermetically sealed magnetic reed switch. The reed shall be potted in the contact housing with a polyurethane based compound. Contact and magnet housing shall snap-lock into a 3/4" or 1" dia. hole. Housings shall be molded of flame retardant ABS plastic. Color of housings shall be off-white, grey or mahogany brown. The magnet shall be made of Alnico V. Rare Earth Magnet shall be made of neodymium iron boron.

### Designed for use in Steel Doors

Snap-lock insulation bushing for tight fit and maximum gap in steel.

Both contact and magnet plastic housings are constructed of one piece of thick-walled ABS plastic for maximum strength and durability.

## Steel Door Contact

3/4" and 1" contacts  
1078/1076 Series



Optional 1840  
Rare Earth Magnet



### Standard Features

- Fly leads and terminal options available
- Designed specifically for use in steel doors
- Special ribbed sides allow for easy installation
- Rugged unibody construction for maximum durability and reliability
- Terminal models available for easier installation
- Regular, Wide Gap, SPDT, DPDT, and High Security models available
- Rare Earth Magnet designed for steel door with top channel available

### Model numbers

1076, 1076W, 1076C, 1076CW, 1076D, 1078, 1078W,  
1078C, 1078CT, (R)1078, 1078CTW

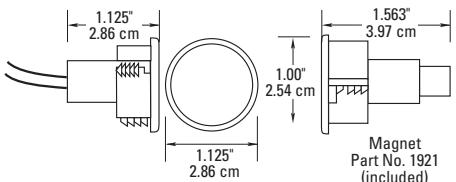
# Steel Door Contact

$\frac{3}{4}$ " and 1" contacts  
1078/1076 Series

## Dimensions

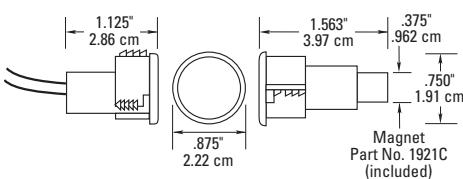
### Models:

(R)1078, 1078W, 1076,  
1076W, 1076D



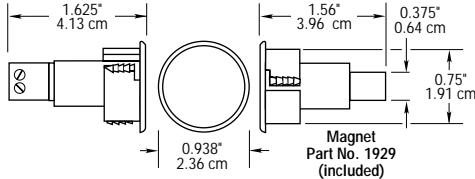
### Models:

1078C, 1076C,  
1076CW, 1076CH



### Models:

1078CT, 1076CTW,



(R) prefix indicates  
Rare Earth Magnet

## Specifications

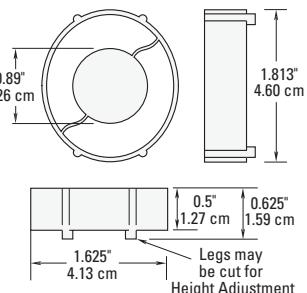
### Form A: (R)1078, 1078W, 1078C, 1078CT, 1078CTW

**Voltage** 100V AC/DC max.  
**Current** 0.5 A max.  
**Power** 7.5 W max.

### Form C: 1076, 1076W, 1076D, 1076C(D), 1076CW, 1076CH

**Voltage** 30V AC/DC max.  
**Current** 0.25 A max.  
**Power** 3.0 W max.

## Rare Earth Magnet



Protected by  
U.S. Patent 5,844,458.



## Ordering Information

Model	Dia.	Loop Type	Electrical Config.	Hole Required Contact	Magnet	Gap Distance* Wood*	Steel*	Rare Earth	Color
1076	1"	Open or Closed	SPDT	1" x 1.125"	1" x 1.563"	1"	Up to $\frac{1}{2}$ "	Up to $\frac{5}{8}$ "	M, N, G
1076W	1"	Open or Closed	SPDT	1" x 1.125"	1" x 1.563"	2"	Up to 1"		M, N, G
1076D	1"	Open or Closed	DPDT	1" x 1.125"	1" x 1.563"	$\frac{3}{4}$ "	Up to $\frac{3}{8}$ "	Up to $\frac{5}{8}$ "	M, N, G
1078	1"	Closed	N/O	1" x 1.125"	1" x 1.563"	1"	Up to $\frac{1}{2}$ "	Up to $\frac{5}{8}$ "	M, N, G
1078W	1"	Closed	N/O	1" x 1.125"	1" x 1.563"	2"	Up to 1"		M, N, G
1076C	$\frac{3}{4}$ "	Open or Closed	SPDT	.75" x 1.125"	.75" x 1.563"	$\frac{7}{8}$ "	Up to $\frac{3}{8}$ "	Up to $\frac{5}{8}$ "	M, N, G
1076CW	$\frac{3}{4}$ "	Open or Closed	SPDT	.75" x 1.125"	.75" x 1.563"	2"	Up to $\frac{3}{4}$ "		M, N
1078C	$\frac{3}{4}$ "	Closed	N/O	.75" x 1.125"	.75" x 1.563"	$\frac{1}{2}$ "	N/A		M, N, G
(R)1078	1"	Closed	N/O	1" x 1.125"	1" x 1.563"	1"	Up to $\frac{1}{2}$ "	Up to $\frac{5}{8}$ "	M, N
1078CT	$\frac{3}{4}$ "	Closed	N/O	.75" x 1.625"	.75" x 1.56"	$\frac{7}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	M, N
1078CTW	$\frac{3}{4}$ "	Closed	N/O	.75" x 1.625"	.75" x 1.56"	$\frac{5}{8}$ "	$\frac{3}{4}$ "	N/A	N

\* Gap distances are nominal make distance  $\pm 20\%$ . Gap specifications are for switch to make.  
Break distance is approximately 1.1 to 1.5 times make.



GE Interlogix

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Faxback: 800-483-2495

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North St. Paul, MN 55109

Phone: 651-777-2690

USA & Canada: 800-777-5484

Technical Service: 800-777-2624

## SMALL, TYPE 1



### INDUSTRY STANDARDS

UL 50, 50E Listed; Type 1; File No. E27567  
cUL Listed per CSA C22.2 No 40; Type 1; File No. E27567

NEMA/EEMAC Type 1  
CSA, File 42184: Type 1  
IEC 60529, IP30

### APPLICATION

These enclosures have a size range of 6 x 6 x 4-in. to 14 x 12 x 8-in. and meet basic functionality requirements for applications that do not require oil- or dust-tight enclosures.

### FEATURES

- Flush slotted latch operated with a screwdriver; optional latches available
- Weldnuts provided for mounting optional panels
- Butt hinges
- Mounting holes on back of enclosure

### SPECIFICATIONS

- 16 gauge steel

### FINISH

ANSI 61 gray polyester powder paint finish inside and out over pretreated surfaces. Optional solid panels are white and optional perforated panels are gray.

### ACCESSORIES

*See also Accessories.*

T-Handle Latch and Keyed Cylinder Lock Kits

Grounding Device

Panels for Type 1 Enclosures and Small Type 3R Enclosures

Touch-Up Paint

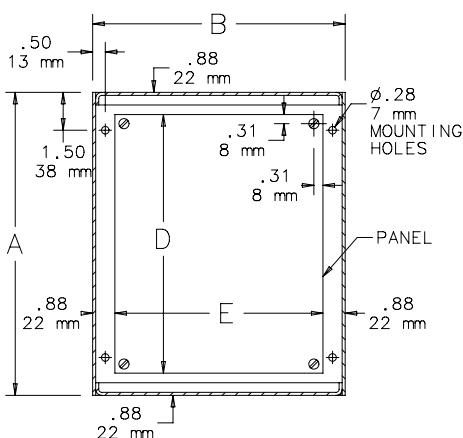
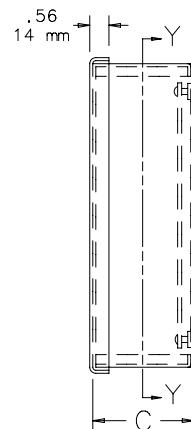
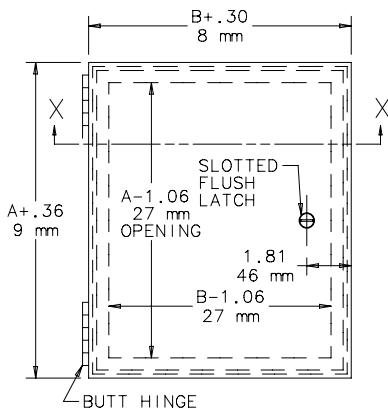
Steel and Stainless Steel Window Kits

**BULLETIN: A1SM**

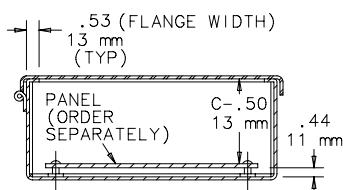
### Standard Product

Catalog Number	AxBxC in./mm	Panel	Perforated Panel	Panel Size D x E in./mm
A6N64	6.00 x 6.00 x 4.00 152 x 152 x 102	A6N6P	A6N6PP	4.25 x 4.25 108 x 108
A8N64	8.00 x 6.00 x 4.00 203 x 152 x 102	A8N6P	A8N6PP	6.25 x 4.25 159 x 108
A8N84	8.00 x 8.00 x 4.00 203 x 203 x 102	A8N8P	A8N8PP	6.25 x 6.25 159 x 159
A10N84	10.00 x 8.00 x 4.00 254 x 203 x 102	A10N8P	A10N8PP	8.25 x 6.25 210 x 159
A10N104	10.00 x 10.00 x 4.00 254 x 254 x 102	A10N10P	A10N10PP	8.25 x 8.25 210 x 210
A12N104	12.00 x 10.00 x 4.00 305 x 254 x 102	A12N10P	A12N10PP	10.25 x 8.25 260 x 210
A12N124	12.00 x 12.00 x 4.00 305 x 305 x 102	A12N12P	A12N12PP	10.25 x 10.25 260 x 260
A14N124	14.00 x 12.00 x 4.00 356 x 305 x 102	A14N12P	A14N12PP	12.25 x 10.25 311 x 260
A8N66	8.00 x 6.00 x 6.00 203 x 152 x 152	A8N6P	A8N6PP	6.25 x 4.25 159 x 108
A8N86	8.00 x 8.00 x 6.00 203 x 203 x 152	A8N8P	A8N8PP	6.25 x 6.25 159 x 159
A10N86	10.00 x 8.00 x 6.00 254 x 203 x 152	A10N8P	A10N8PP	8.25 x 6.25 210 x 159
A10N106	10.00 x 10.00 x 6.00 254 x 254 x 152	A10N10P	A10N10PP	8.25 x 8.25 210 x 210
A12N106	12.00 x 10.00 x 6.00 305 x 254 x 152	A12N10P	A12N10PP	10.25 x 8.25 260 x 210
A12N126	12.00 x 12.00 x 6.00 305 x 305 x 152	A12N12P	A12N12PP	10.25 x 10.25 260 x 260
A14N126	14.00 x 12.00 x 6.00 356 x 305 x 152	A14N12P	A14N12PP	12.25 x 10.25 311 x 260
A16N126	16.00 x 12.00 x 6.00 406 x 305 x 152	A16N12P	A16N12PP	14.25 x 10.25 362 x 260
A20N126	20.00 x 12.00 x 6.00 508 x 305 x 152	A20N12P	A20N12PP	18.25 x 10.25 464 x 260
A12N128	12.00 x 12.00 x 8.00 305 x 305 x 203	A12N12P	A12N12PP	10.25 x 10.25 260 x 260
A14N128	14.00 x 12.00 x 8.00 356 x 305 x 203	A14N12P	A14N12PP	12.25 x 10.25 311 x 260

Purchase panels separately.



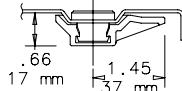
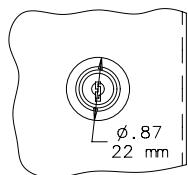
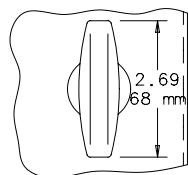
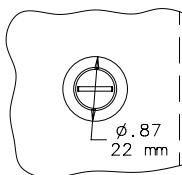
NOTE: 1. Panels are 14 gauge steel.  
2. Panel screws have #10-32 threads.



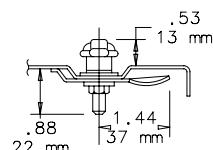
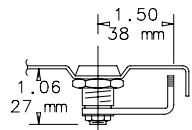
SECTION X-X

SECTION Y-Y

Optional Latches



Standard Slotted Flush Latch

"T" Handle Latch Kit  
AL7ACylinder Lock Kit  
AL12AR  
C2572-C

# HX08 SERIES & H701

Detect Belt Loss, Coupling Shear, and Mechanical Failure



H908



H708



H608



H808



H308



Maximize Reliability  
Minimize Installed Cost

Hx08 Series and H701 adjustable current switches offer high performance, with a wide array of amperage range options. These products can accurately detect belt loss, coupling shear, or other mechanical failure on unit vents, exhaust fans, recirculation pumps, and other fixed loads down to as little as 1/5 HP.

## SPECIFICATIONS

Hx08 Series & H701

Sensor Power	Induced from monitored conductor
Insulation Class	600 Vac RMS (UL), 300VAC RMS (CE)
Frequency Range <sup>2</sup>	50/60 Hz, On/Off status for Variable Frequency Drive (VFD) outputs at 12 to 115 Hz
Temperature Range	-15 to 60 °C (5 to 140 °F)
Humidity Range	10 to 90% RH non-condensing
Hysteresis	10% (typical)
Terminal Block Wire Size	H308: 22-16 AWG (0.3 to 1.3 mm <sup>2</sup> ) Others: 24-14 AWG (0.2 to 2.1 mm <sup>2</sup> )
Terminal Block Torque	H308: 3.5 to 7 in-lbs (0.8 N-m) Others: 3.5 to 4.4 in-lbs (0.4 to 0.5 N-m)

## WARRANTY

Limited Warranty 5 years

## AGENCY APPROVALS

Agency Approvals UL 508 open device listing; CE: EN61010-1, CAT III, Pollution Degree 2, basic insulation



800.354.8556

+1 503.598.4564

sales@veris.com

intl@veris.com

www.veris.com

## Retrofit or new construction

High performance devices in split- and solid-core housings

## Small size

Fits easily inside small enclosures

## Adjustable trip point

Precise current trip point setting

## Low setpoint

Minimum trip point as low as 0.5 A (H608)...no need for multiple wraps of the conductor through the sensor, even on loads as small as 1/5 HP

## Self-gripping iris

Self-gripping iris on split-core housings for easy installation

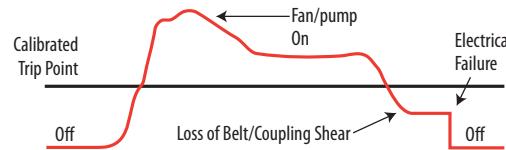
## Status LEDs

Status LEDs available for easy setup and local indication

## APPLICATIONS

- Detecting belt loss, coupling shear, and mechanical failure
- Verifying lighting circuit and other electrical service run times
- VFD output on/off status

### DETECTS BELT LOSS/COUPLING SHEAR!



Now you can easily detect when drive belts slip, break, or pump couplings shear. In fact, a typical HVAC motor that loses its load has a reduction of current draw of up to 50%. That's why our sensors are the industry standard for status.

\*The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

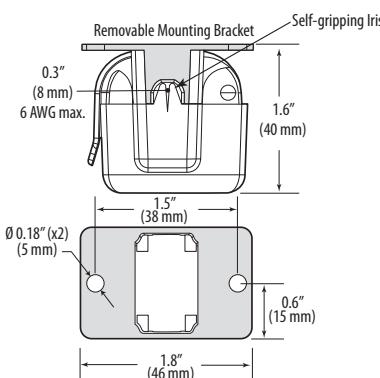
Notes: Do not use the LED status indicators as evidence of applied voltage.

If using this switch in an application that includes an electronically commutated motor (ECM), see Veris Application Note VN61, at [www.veris.com](http://www.veris.com).

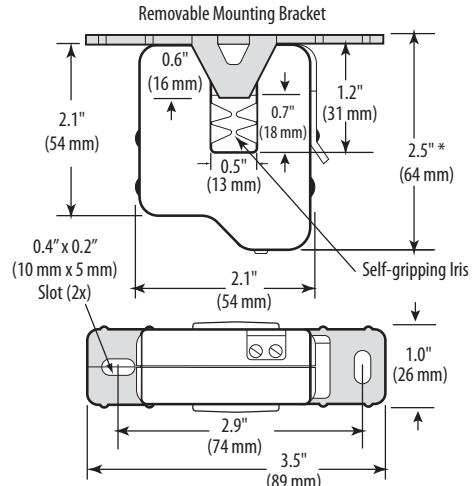
VFD systems generate fields that can disrupt electrical devices. Ensure that these fields are minimized and are not affecting the sensor.

**H308**

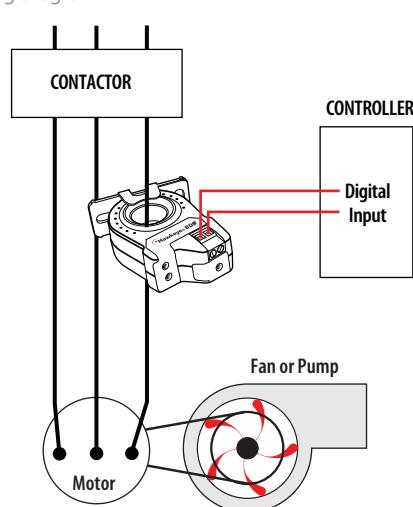
Dimensional Drawing

**H608**

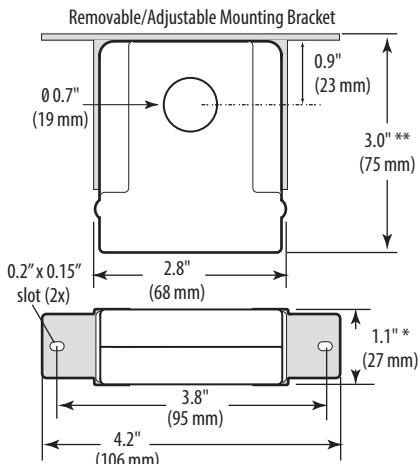
Dimensional Drawing

**MONITORING FAN /PUMP MOTORS FOR POSITIVE PROOF OF FLOW**

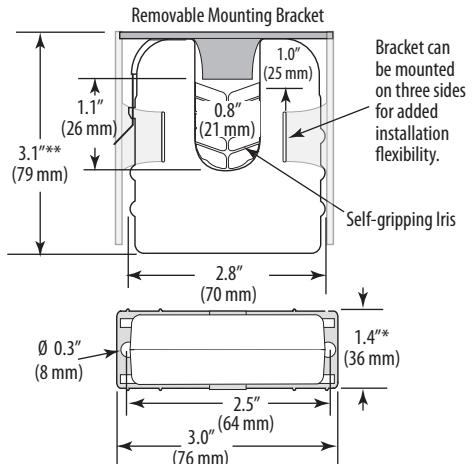
Wiring Diagram

**H708/701**

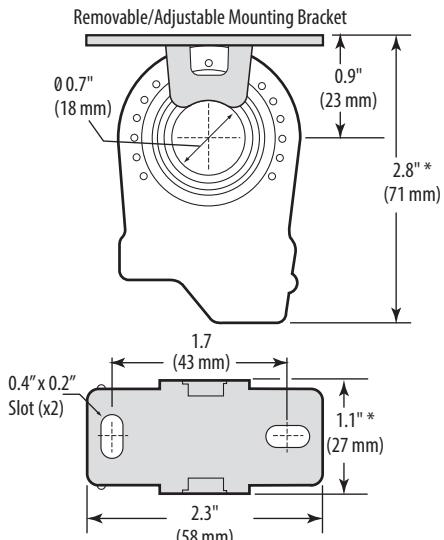
Dimensional Drawing

**H908**

Dimensional Drawing

**H808**

Dimensional Drawing



\* Terminal block may extend up to 1/8" over the height dimensions shown.  
\*\* Slide switch may extend up to 1/4" over the height dimensions shown.

**ORDERING INFORMATION**

MODEL	AMPERAGE RANGE @ 50/60 Hz ONLY	STATUS OUTPUT (MAX.)	MIN. TRIP POINT	HOUSING	STATUS LED	UL	CE
H308	0.75 to 50 A	N.O. 1.0 A @ 30 Vac/dc	0.75 A or less	Split-Core	•	• <sup>2</sup>	•
H608	0.5 to 175 A		0.5 A or less	Split-Core	•	• <sup>1</sup>	•
H701	1 to 135 A		1.0 A or less	Solid-Core		•	
H708	1 to 135 A		1.0 A or less	Solid-Core	•	•	
H808	0.75 to 50 A		0.75 A or less	Solid-Core	•	•	•
H908	2.5 to 135 A		2.5 A or less	Split-Core	•	•	•

1. Listed for use on 75 °C insulated conductors.

2. Product provides functional insulation only.

## HX23 SERIES

Load Trending with 0 to 10 Vdc Output



H923



H723



H623-xx



H623-10

The Hawkeye 623-xx, 723LC, 723HC, and 923 Series provide accurate load trending information with a proportional 0 to 10 Vdc output signal. Devices offer three amperage range options, with slide-switch selection for easy field adjustment – no need for jumpers.

### SPECIFICATIONS

Sensor Power	Induced from monitored current
Insulation Class	600 Vac RMS (UL) (H623-xx) 300 Vac RMS (CE) (H623-xx, H723, H923)
Frequency Range	50/60 Hz nominal
Temperature Range	-15 to 60 °C (5 to 140 °F)
Humidity Range	10 to 90% RH, non-condensing
Accuracy	±2% F.S. from 10% to 100% (range)
Response Time	2 sec.
Terminal Block Wire Size	24 to 14 AWG (0.2 to 2.1 mm <sup>2</sup> )
Terminal Block Torque	3.5 to 4.4 in-lbs (0.4 to 0.5 N-m)

### WARRANTY

Limited Warranty	5 years
------------------	---------

### AGENCY APPROVALS

Agency Approvals	UL 508 open device listing (H623-xx only); CE: EN61010-1, CAT III, Pollution Degree 2, basic insulation
------------------	---



1. The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

### Self-powered analog

Self-powered analog current transducer 0 to 10 Vdc output

### No external power required

No external power required for sensor

### Retrofit

Self-gripping, split-core design for fast retrofit installation...no need to remove conductor (H623-xx and H923)

### Factory calibrated

Factory calibrated ranges for high resolution and installation ease

### No jumpers

No jumpers on unit...reduces installation error

### Field-selectable ranges

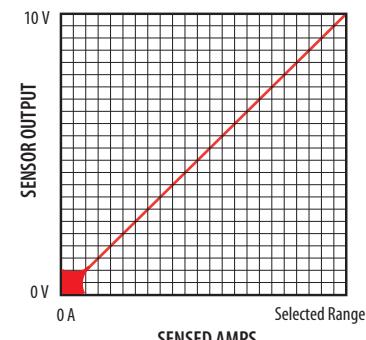
Some models available with field-selectable ranges

### APPLICATIONS

- Load trending
- Motor control
- Fan/pump status

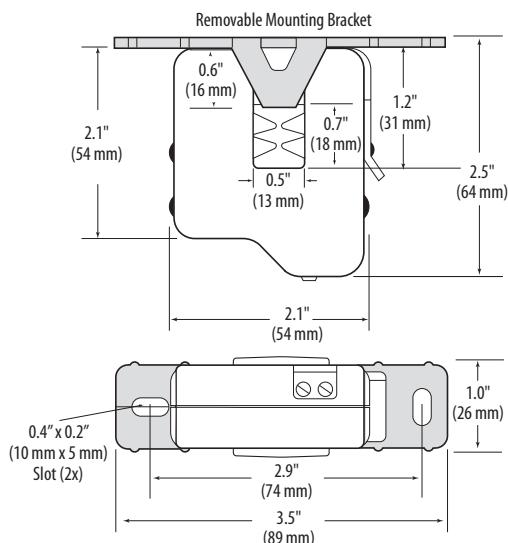
### EXAMPLE LINEAR OUTPUT

Scale software as shown



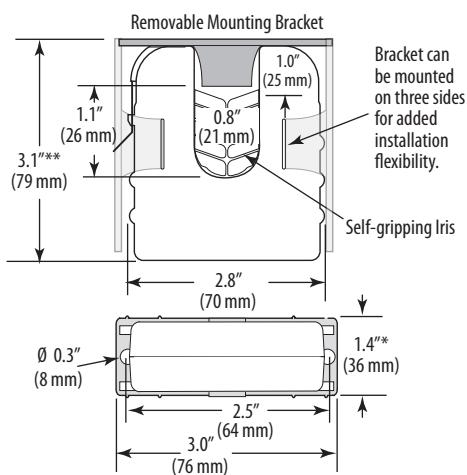
## H623-XX

Dimensional Drawing



## H923

Dimensional Drawing

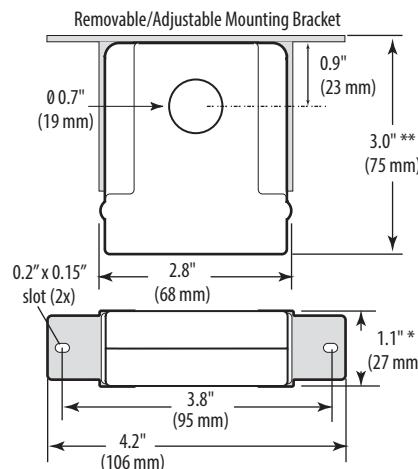


\* Terminal block may extend up to 1/8" over the height dimensions shown.

\*\* Slide switch may extend up to 1/4" over the height dimensions shown.

## H723LC/H723HC

Dimensional Drawing

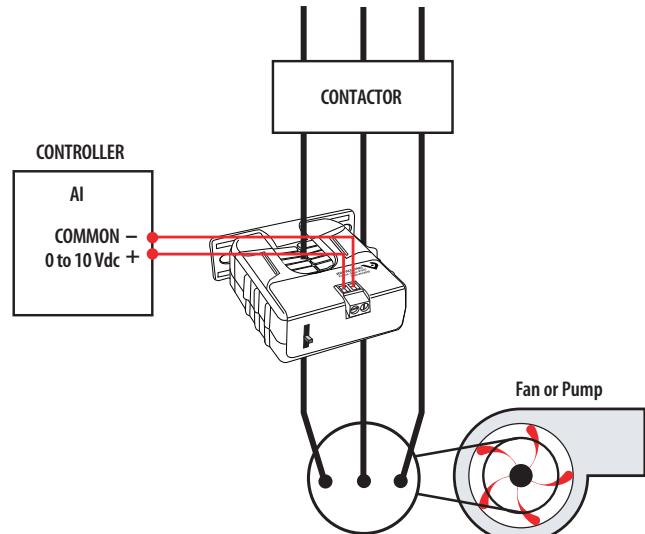


\* Terminal block may extend up to 1/8" over the height dimensions shown.

\*\* Slide switch may extend up to 1/4" over the height dimensions shown.

## MONITORING FAN/PUMP MOTORS FOR POSITIVE PROOF OF FLOW

Wiring Diagram



## ORDERING INFORMATION

MODEL	AMPERAGE RANGE	SENSOR OUTPUT	HOUSING	UL	CE
H623-10	0 to 10 A	0 to 10 Vdc	Split-core	•	•
H623-20	0 to 20 A		Split-core	•	•
H723LC	0 to 10/20/40 A		Solid-core		•
H723HC	0 to 50/100/200 A		Solid-core		•
H923	0 to 20/100/150 A		Split-core		•



# 3-1/2 DIGIT LARGE BLACK/RED/GREEN/AMBER DISPLAY MODEL LPI-4

## DESCRIPTION

The **Model LPI-4** loop-powered indicator features a large 1" (2.54 cm) 3-1/2 digit display. It is designed to display any 4-20 mA signal in desired scale. The **Model LPI-4** is powered directly from the 4-20 mA signal loop, so there is no need for a power supply for the black digit model. It is also available in a 24 VDC powered version with red, green, or amber digits.

## FEATURES

- *Indication of 4-20 mA signal in desired scale*
- *3-1/2 digit LCD display*
- *Large, easy-to-read digits*
- *Available in either black, red, green, or amber digits*
- *Precalibrated for desired range*
- *Snap-in panel mount with retainer*
- *Negative range indicator*
- *Includes weather-resistant seal*
- *Optional jumper-selectable display units °F, °C, %, PSI*

## APPLICATIONS

- |               |                      |
|---------------|----------------------|
| • Temperature | • Kilowatt demand    |
| • Humidity    | • Gallons per minute |
| • Pressure    | • Voltage/current    |

LPI-4



LPI-4G



LPI-4R



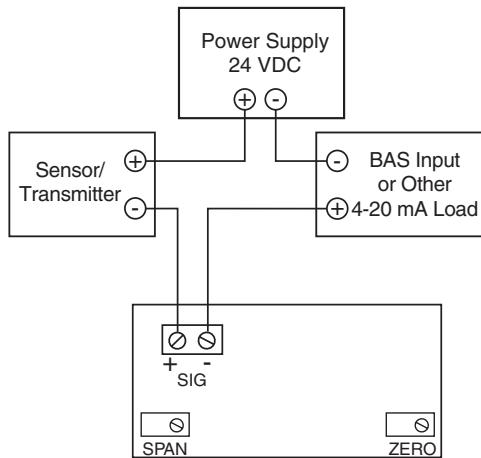
LPI-4A



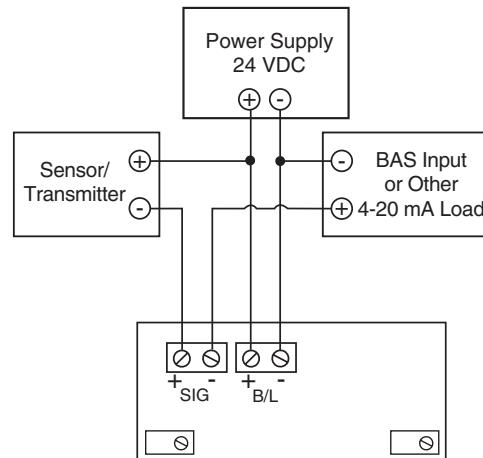
## SPECIFICATIONS

<b>Signal Power</b>	4-20 mA	<b>Range Accuracy</b>	-1999 to +1999
<b>Black</b>	Loop powered	<b>Ambient</b>	±0.05% of scale +1 digit
<b>Red/Green/Amber</b>	24 VDC, 35 mA max	<b>32° to 122°F (0° to 50°C)</b>	32° to 122°F (0° to 50°C)
<b>Impedance</b>	300Ω	<b>95% noncondensing</b>	95% noncondensing
<b>Digit count</b>	3-1/2 digits (1999 max)	<b>Cutout required</b>	1.77" x 3.62" (4.5 x 9.2 cm)
<b>Digit size</b>	1" (2.54 cm)	<b>Dimensions</b>	3.78"W x 1.89"H (9.6 x 4.8 cm)
<b>Decimal point</b>	3 positions or none (1.0.0.0)	<b>Depth</b>	1.5" (3.81 cm)
		<b>Weight</b>	4 oz (113g)

## WIRING

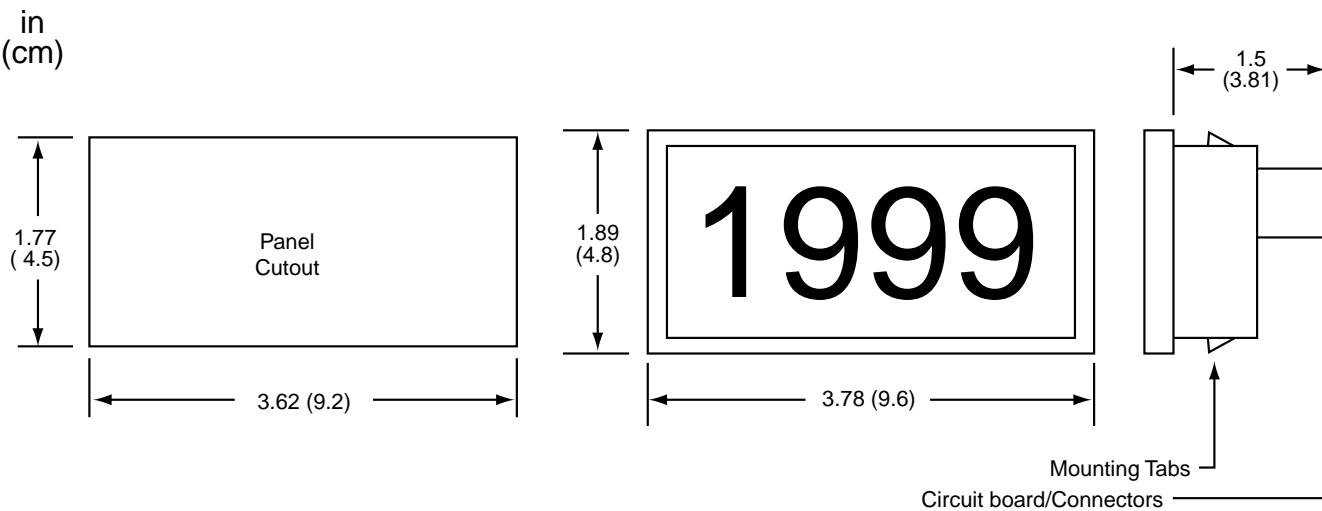


LPI-4



LPI-4R, G, A

## PANEL MOUNTING INFORMATION



## RECALIBRATION INFORMATION

### Decimal Point Jumpers

#### Decimal Jumper Selection

J4 = 1000  
J5 = 1.000  
J6 = 10.00  
J7 = 100.0

### Engineering Unit Display



No Jumper = No Unit Display

### Calibration Jumpers

If offset (zero) is 0 or  
offset (zero) is > 0 and  
gain (span) ÷ offset (zero) > 5



If offset (zero) is > 0 and  
gain (span) ÷ offset (zero) < 5



### Final Adjustment Set Up

1. Apply 4.00 mA, and adjust the ZERO pot for the desired low numeric display.
2. Apply 20.00 mA, and adjust the SPAN pot for the desired maximum numeric display.
3. Repeat steps 1 and 2 until both desired high and low readings are obtained (4-5 passes typical).

## ORDERING INFORMATION

LPI-4	3-1/2 Digit Black Panel Display
LPI-4R	3-1/2 Digit Red Panel Display
LPI-4G	3-1/2 Digit Green Panel Display
LPI-4A	3-1/2 Digit Amber Panel Display

Specify scale, range, and decimal location when ordering.

Aluminum engineering units plate will be provided upon request at no charge (2.00" x 0.75" tag with 0.125" letters).  
Available plates are % RH, AMPS, DEG C., DEG F., GPM, x10 GPM, KW, KWH, PSIG, and "W.C.

Electrical | Voice and Data | Voice and Data Plates, Housings, Jacks, and Accessories  
 | Voice and Data Outlets, Boxes, Faceplates  
 | Ivory Wall Plate, Plastic, Number of Gangs: 1, Cable Type: Blank, Keystone

Email Print

MONOPRICE

# Ivory Wall Plate, Plastic, Number of Gangs: 1, Cable Type: Blank, Keystone

Item # **14J391** Mfr. Model # **6726** Catalog Page # **350** UNSPSC # **39121704**



Web Price **\$0.62** / each

One Time Delivery  
 Auto Reorder

1

**ADD TO CART**

+ Add to List

Shipping  
 Pickup

Available for pickup  
 Thu. Aug 02  
 estimated after 9:00 AM.

FOREST PARK  
 Branch #041  
[Branch Info](#)  
 | [Change](#)



**Be the first to write a review**



360°

Shipping Weight **0.005**  
**lbs.**

How can we [improve our Product Images?](#)

Compare

Country of Origin **Varies** | *Country of Origin is subject to change.*

*Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order.* [More](#)

## TECHNICAL SPECS

Item	Wall Plate
Number of Ports	<b>1</b>
Number of Gangs	<b>1</b>
Length	<b>4.87"</b>

Color	<b>Ivory</b>
Material	<b>Plastic</b>
Cable Type	<b>Blank, Keystone</b>
Package Quantity	<b>1</b>

 How can we [improve our Technical Specifications?](#)

---

## COMPLIANCE AND RESTRICTIONS

None

---

## ALTERNATE PRODUCTS

Alternate Products may not be identical in style or function to original selection. Please compare below for more information.

[Compare](#)



Item # **14J390**

**White Wall Plate,  
Plastic, Number**

MONOPRICE

Web Price  **\$0.51** / each

---

## CUSTOMERS ALSO PURCHASED

--	--	--	--	--



**MONOPRICE  
Ivory Wall Plate,  
Plastic, Number of**

Item # **14J393**

Web Price **1**

Qty **6** / each

**MONOPRICE  
Keystone Jack,  
Green, Plastic,**

Item # **13U639**

Web Price **1**

Qty **6** / each

**MONOPRICE  
Keystone Jack,  
Red, Plastic,**

Item # **13U642**

Web Price **1**

Qty **6** / each

**MONOPRICE  
Keystone Jack,  
Orange, Plastic,**

Item # **13U641**

Web Price **1**

Qty **6** / each

**MONOPRICE  
Ivory Wall Plate,  
Plastic, Number of**

Item # **14J399**

Web Price **1**

Qty **6** / each

1

**ADD TO CART** 1

**ADD TO CART** 1

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## CUSTOMER REVIEWS

**REVIEWS**

**WRITE REVIEWS**



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# ONEBOX

universal enclosures

## description:

The OneBox universal enclosure series is perfect for your everyday indoor/outdoor applications. All enclosures have the option of a field-installed perforated subpanel. These enclosures provide protection from dust, dirt, oil and water.



prod #: ONEBOX

## features:

- large embedded cable-entry plate with neoprene seal
- standard 3-mm double-bar lock with screw driver lock feature
- rated NEMA 4
- outdoor installation compliant with IEC 62208
- foamed-in polyurethane gasket doors that guarantee water and dust tightness
- easily removable and reversible door with invisible metal hinges allowing the door to open 120°
- available with optional field-installed perforated subpanel
- UL® Listed, file # E189035
- epoxy-polyester resin finish, color RAL 7035 grey



MODEL	DESCRIPTION	DIMENSIONS H x W x D in (mm)	PERF PANEL DIMENSIONS H x W in (mm)	WT.lb (Kg)
ONEBOX161608	16X16X08 ENCLOSURE	15.6 (400) x 15.6 (400) x 7.9 (200)	---	17.6 (8.0)
ONEBOX161608P	16X16X08 ENCLOSURE W/PERF PANEL	15.6 (400) x 15.6 (400) x 7.9 (200)	13.6 (354.4) x 13.6 (354.4)	20.1 (9.1)
ONEBOX242408	24X24X08 ENCLOSURE	23.6 (600) x 23.6 (600) x 7.9 (200)	---	35.9 (16.3)
ONEBOX242408P	24X24X08 ENCLOSURE W/PERF PANEL	23.6 (600) x 23.6 (600) x 7.9 (200)	21.7 (551.2) x 21.7 (551.2)	42.1 (19.1)
ONEBOX392410	39X24X10 ENCLOSURE	39.4 (1000) x 23.6 (600) x 9.8 (250)	---	62.6 (28.4)
ONEBOX392410P	39X24X10 ENCLOSURE W/PERF PANEL	39.4 (1000) x 23.6 (600) x 9.8 (250)	37.5 (952.5) x 21.7 (551.2)	71.5 (32.4)

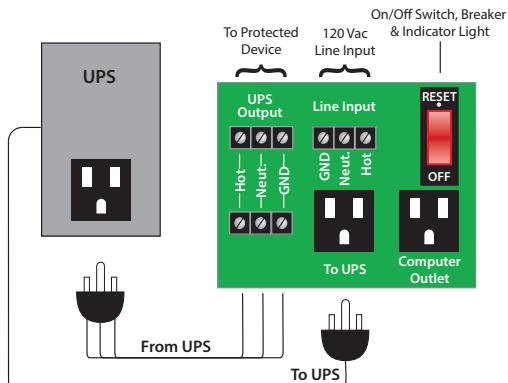
<b>Product Number</b>	<b>Product Description</b>	<b>Order Variance</b>	<b>Date:</b> 09/12/19
<b>Job Name:</b> TFC A600 Bio Threat	<b>Job Number:</b> 44OP-227505		<b>Page:</b> 1
1076CW	N/A	3	0
13U616	N/A	3	0
14J391	N/A	3	0
537-773	CABLE, 25FT MODULAR	3	0
547-100	RPM PRESSURE TAP PLATE	6	0
547-102A	RPM SM P1 +/-0.1"WC( 25 PA)0.5%FS	3	0
590-780	AIR DP SNSR, 0.4%, 0-1", CONDUIT, 4-20MA	2	0
869STR-C-AQ	INDR STRB HORN CLEAR 24 AC/DC	1	0
A14N124	N/A	1	0
GP-5132	N/A	2	0
H608	CUR SW SPLTCOR-ADJ SETPT W/LED	4	0
H623-10	N/A	2	0
LGFE851R12BAS	AIRFLOW 12 SSSL ENCL S10	2	0
LPI-4	LARGE LCD BLACK INDICATOR	2	0
LSM-FLN36.A	FLN LICENSE FOR PXC36	1	0
ONEBOX161608P	N/A	2	0
PSH600-UPS	Enclosed UPS and interface board	2	0
PXC100-PE96.A	PXC MOD, P2, TX-I/O, 96 NODE, APOGEE	1	0
PXC36-PE.A	APOGEE 36PT, P2 RS485/IP ALN	1	0
PXX-485.3	PXC MOD EXPANSION MODULE, 3 RS-485	1	0
RIBU1C	RIB 120VAC 24VAC/DC SPDT	7	0
TS-475	Non Mercury Damper End Switch	2	0
TXA1.K24	@ADDRESS KEY 1-24	1	0
TXM1.16D	16 DIGITAL INPUT MODULE	1	0
TXM1.6R-M	6 RELAY OUTPUT MODULE W/OVD	2	0
TXM1.8U-ML	8 UNIV I/O MODULE W/ OVD&LCD	1	0
TXM1.8X	8 UNIV I/O MODULE W/ 4-20MA	1	0
TXS1.12F4	24VDC SUPPLY 1200MA, 4 A FUSE	1	0



## UNINTERRUPTIBLE POWER SUPPLY KIT

### PSH600-UPS

Kit Consisting of Enclosed Power Control Center Model PSH2RB10 (10 Amp Switch / Circuit Breaker, Two (2) 120 Vac Outlets, Terminals, 120 Vac Input) with a 600 VA UPS. (No Status Contacts)



Shown  
Without  
Cover



## SPECIFICATIONS

### UPS

**UPS:** 550 or 600VA

**Backup Time:** 2.5 Min. @ Full 600 VA Load  
10 Min. @ 1/2 Load

**Power Consumption** Up to 3 Amp @120 Vac  
**Max Load:** 330 Watt

**Frequency:** 50/60 Hz

**Temperature Rating of UPS:** 32 to 104° F

**UPS Transfer Time:** 6ms

**Approvals:** UL Listed, UL1778

### PSH2RB10

**Operating Temperature:** -30 to 140° F

**Humidity Range:** 5 to 95% (noncondensing)

**Main Breaker ON/OFF:** Switch / Breaker (10 Amp)

**Approvals:** UL Listed, UL916, C-UL, CE, RoHS

**Dimensions:** 12.000" x 14.000" x 6.000"  
Metal Housing with Screw Cover

**Weight:** 12 lbs.

### **Shipping Weight:**

23.3 lbs.

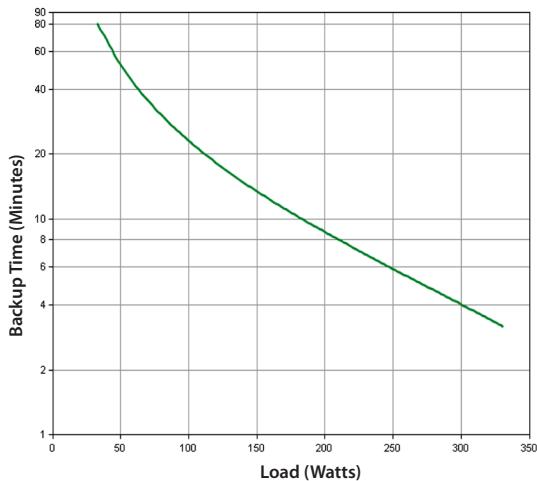
### **Product Weight:**

20.5 lbs.

### **Notes:**

- To order without UPS, so that any other commercial UPS with appropriate ratings and within housing space limitations may be used, see model PSH2RB10.
- To order interface board for replacement or for separate use, order model PSM2RB10.
- **Average battery life: 3-5 years depending on the number of discharge cycles and environmental temperature**
- UPS may change based on quality and availability

## ESTIMATED BACKUP TIME VS. LOAD



# PXC Compact Series

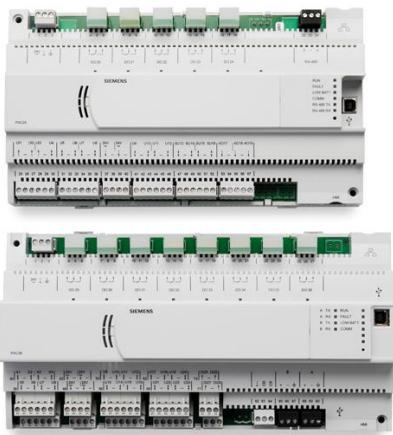


Figure 1. PXC Compact Series Controllers  
(PXC-24 and PXC-36 shown.)

## Description

The PXC Compact Series (Programmable Controller—Compact) is a high-performance Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE® Automation System.

The PXC Compact Series offers integrated I/O based on state-of-the-art TX-I/O™ Technology, which provides superior flexibility of point and signal types, and makes it an optimal solution for Air Handling Unit (AHU) control. The PXC Compact operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher-level processor.

The PXC Compact Series communicates with other field panels or workstations on a peer-to-peer Automation Level Network (ALN) and supports the following communication options:

- Ethernet TCP/IP
- P2 RS-485

The PXC Compact is available with 16, 24, or 36 point terminations. Selected models in the Compact Series provide the following options:

- Support for FLN devices.
- An extended temperature range for the control of rooftop devices.
- Support for Island Bus, which uses TX I/O modules to expand the number of point terminations.

## Features

- DIN rail mounted device with removable terminal blocks simplifies installation and servicing.
- Proven program sequences to match equipment control applications.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Message control for terminals, printers, pagers, and workstations.
- Highly configurable I/O using Siemens state-of-the-art TX-I/O™ Technology.
- HMI RS-232 port, which provides laptop connectivity for local operation and engineering.
- Extended battery backup of Real Time Clock.
- Persistent database backup and restore within the controller.
- Optional HOA (Hand/Off/Auto) module for swappable and configurable HOA capability.

- Optional extended temperature range for rooftop installation.
- Optional peer-to-peer communications over industry-standard 10Base-T/100Base-TX Ethernet networks.
- Optional support for FLN devices.
- Optional support for P1 Wireless FLN.
- Optional operation as a P1 FLN device with default applications.
- Optional support for Virtual AEM.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.

## The Compact Series

In addition to building and system management functions, the Compact Series includes several styles of controllers that flexibly meet application needs.

### PXC-16

The PXC-16 provides control of 16 points, including 8 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 5 Universal I/O (U), 2 Digital Input (DI), 3 Analog Output (AOV), and 3 Digital Output (DO).

### PXC-24

The PXC-24 provides control of 24 points, including 16 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 9 Universal I/O (U), 4 Super Universal I/O (X), 3 Analog Output (AOV), 5 Digital Output (DO).

### PXC-36

The PXC-36 provides control of 36 local points, including 24 software-configurable universal points.

Point count includes: 18 Universal I/O (U), 6 Super Universal I/O (X), 4 Digital Input (DI), and 8 Digital Output (DO).

The PXC-36 offers the flexibility of expanding the total point count through a self-forming island bus. With the addition of a TX-I/O Power Supply, up to 4 TX-I/O modules can be supported. For more information, see the *TX-I/O Product Range Technical Specification Sheet* (149-476).

## Available Options

The following options are available to match the application:

### Ethernet or RS-485 ALN

Support for APOGEE P2 ALN through TCP/IP or RS-485 networks.

### FLN Support

- The PXC-24 "F32" models support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-24 "F" models with an FLN license support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-36 with an FLN license supports up to 96 P1 FLN devices when the ALN is connected to RS-485 or TCP/IP.
- A Wireless FLN may also be used to replace the traditional P1 FLN cabling with wireless communication links that form a wireless mesh network. Additional hardware is required to implement the Wireless FLN.

For more information about FLN support, contact your local Siemens Industry representative.

### P1 FLN Operation

The PXC-16 and PXC-24 can be configured as a programmable P1 FLN device. In the P1 FLN mode, the PXC Compact functions as an equipment controller with customized programming and default applications.

### Virtual AEM Support

The Virtual AEM license allows the PXC Compact to connect an RS-485 APOGEE Automation Level Network or individual field panels to a P2 Ethernet network without additional hardware.

### Extended Temperature Operation

The "R" models of the PXC Compact Series support extended temperature operation, allowing for rooftop installations.

### Field Panel GO

The PXC-36 supports Field Panel GO.

The Field Panel GO license provides a Web-based user interface for your APOGEE® Building Automation System. It is an ideal solution for small or remote facilities with field panels on an Ethernet Automation Level Network (ALN).

# Hardware

The PXC Compact Series consists of the following major components:

- Input/Output Points
- Power Supply
- Controller Processor

## Input/Output Points

- The PXC Compact input/output points perform A/D or D/A conversion, signal processing, point command output, and communication with the controller processor. The terminal blocks are removable for easy termination of field wiring.
- The Universal and Super Universal points leverage TX-I/O™ Technology from Siemens Industry to configure an extensive variety of point types.
- Universal Input (UI) and Universal Input/Output (U) points are software-selectable to be:
  - 0-10V input
  - 4-20 mA input
  - Digital Input
  - Pulse Accumulator inputs
  - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
  - 1K Pt RTD (375 or 385 alpha) @ 32°F
  - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
  - 100K NTC Thermistor (Type 2) @ 77°F
  - 0-10V Analog Output (Universal Input/Output (U) points only)
- Super Universal (X) points (PXC-24 and PXC-36 only) are software-selectable to be:
  - 0-10V input
  - 4-20 mA input
  - Digital Input
  - Pulse Accumulator inputs
  - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
  - 1K Pt RTD (375 or 385 alpha) @ 32°F
  - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
  - 100K NTC Thermistor (Type 2) @ 77°F
  - 0-10V Analog Output
  - 4-20 mA Analog Output
  - Digital Output (using external relay)
- Dedicated Digital Input (DI) points (PXC-16 and PXC-36 only) are dry contact status sensing.

- Digital Output (DO) points are 110/220V 4 Amp (resistive) Form C relays; LEDs indicate the status of each point.
- All PXC Compact Series models support 0-10 Vdc Voltage Analog Output circuits.
- On PXC-24 and PXC-36 models, the Super Universal circuits may be defined as 4-20 mA current AO.

## Power Supply

- The 24 volt DC power supply provides regulated power to the input/output points and active sensors. The power supply is internal to the PXC Compact housing, eliminating the need for external power supply and simplifying installation and troubleshooting.
- The power supply works with the processor to ensure smooth power up and power down sequences for the equipment controlled by the I/O points, even through brownout conditions.

## Controller Processor

- The PXC Compact Series includes a microprocessor-based multi-tasking platform for program execution and communications with the I/O points and with other PXC Compacts and field panels over the ALN.
- A Human Machine Interface (HMI) port, with a quick-connect phone jack (RJ-45), uses RS-232 protocol to support operator devices (such as a local user interface or simple CRT terminal), and a phone modem for dial-in service capability.
- A USB Device port supports a generic serial interface for an HMI or Tool connection.
- The program and database information stored in the PXC Compact RAM memory is battery-backed. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure.
- The firmware, which includes the operating system, is stored in non-volatile flash ROM memory; this enables firmware upgrades in the field.
- Brownout protection and power recovery circuitry protect the controller board from power fluctuations.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.

## **Programmable Control with Application Flexibility**

The PXC Compact Series of high performance controllers provides complete flexibility, which allows the owner to customize each controller with the exact program for the application.

The control program for each PXC Compact is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a text-based programming structure like BASIC, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

## **Global Information Access**

The HMI port supports operator devices, such as a local user interface or simple CRT terminal, and a phone modem for dial-in service capability. Devices connected to the operator terminal port gain global information access.

## **Multiple Operator Access**

Multiple operators can access the network simultaneously. Multiple operator access ensures that alarms are reported to an alarm printer while an operator accesses information from a local terminal. When using the Ethernet TCP/IP ALN option, multiple operators may also access the controller through concurrent Telnet sessions and/or local operator terminal ports.

## **Menu Prompted, English Language Operator Interface**

The PXC Compact field panel includes a simple, yet powerful, menu-driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Event scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

## **Built-in Direct Digital Control Routines**

The PXC Compact provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. The controller receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available:

- Adaptive Control, an auto-adjusting closed loop control algorithm, which provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. It is superior in terms of response time and holding steady state, and at minimizing error, oscillations, and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control.
- Logical sequencing.
- Alarm detection and reporting.
- Reset schedules.

## **Built-in Energy Management Applications**

The following applications are programmed in the PXC Compact Series and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Duty cycling
- Economizer control
- Equipment scheduling, optimization and sequencing
- Event scheduling
- Holiday scheduling
- Night setback control
- Peak Demand Limiting (PDL)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Temporary schedule override

# Specifications

## Dimensions (L × W × D)

PXC-16 and PXC-24	10.7 in. × 5.9 in. × 2.45 in. (272 mm × 150 mm × 62 mm)
PXC-36	11.5 in. × 5.9 in. × 3.0 in. (293 mm × 150 mm × 77 mm)

## Processor, Battery, and Memory

Processor and Clock Speed	<i>PXC-16 and PXC-24:</i> Motorola MPC852T, 100 MHz <i>PXC-36:</i> Motorola MPC885, 133 MHz
Memory	<i>PXC-16 and PXC-24:</i> 24 MB (16 MB SDRAM, 8 MB Flash ROM) <i>PXC-16 and PXC-24 "F" and "F32":</i> 40 MB (32 MB SDRAM, 8 MB Flash ROM) <i>PXC-36:</i> 80 MB (64 MB SDRAM, 16 MB Flash ROM)
Battery backup of Synchronous Dynamic (SD) RAM (field replaceable)	<i>Non-rooftop Models:</i> 60 days (accumulated), AA (LR6) 1.5 Volt Alkaline (non-rechargeable) <i>Rooftop (Extended Temperature) Models:</i> 90 days (accumulated), AA (LR6) 3.6 Volt Lithium (non-rechargeable)
Battery backup of Real Time Clock	<i>Non-rooftop Models:</i> 10 years <i>Rooftop (Extended Temperature) Models:</i> 18 months

## Communication

A/D Resolution (analog in)	16 bits
D/A Resolution (analog out)	10 bits
Ethernet/IP Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
RS-485 Automation Level Network (ALN)	1200 bps to 115.2 Kbps
RS-485 P1 Field Level Network (FLN) <i>on selected models, license required</i>	4800 bps to 38.4 Kbps
Human-Machine Interface (HMI)	RS-232 compliant, 1200 bps to 115.2 Kbps
USB Device port (for non-smoke control applications only)	Standard 1.1 and 2.0 USB device port, Type B female connector.
USB Host port <i>on selected models</i> (for ancillary smoke control applications only)	Standard 1.1 and 2.0 USB host port, Type A female connector.

## Electrical

Power Requirements	24 Vac ±20% input @ 50/60 Hz
Power Consumption (Maximum)	<i>PXC-16:</i> 18 VA @ 24 Vac <i>PXC-24:</i> 20 VA @ 24 Vac <i>PXC-36:</i> 35 VA @ 24 Vac

AC Power and Digital Outputs	NEC Class 1 Power Limited
Communication and all other I/O	NEC Class 2
Digital Input	Contact Closure Sensing Dry Contact/Potential Free inputs only Does not support counter inputs
Digital Output	Class 1 Relay
Analog Output	0 to 10 Vdc
Universal Input (UI) and Universal Input/Output (U)	<b>Analog Input</b> Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F <b>Digital Input</b> Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz <b>Analog Output (Universal Input/Output (U) points only)</b> Voltage (0-10 Vdc)
Super Universal (X)	<b>Analog Input</b> Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F <b>Digital Input</b> Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz <b>Analog Output</b> Voltage (0-10 Vdc) Current (4-20 mA) <b>Digital Output (requires an external relay)</b> 0 to 24 Vdc, 22 mA max.

## Operating Environment

Ambient operating temperature	32°F to 122°F (0°C to 50°C)
Ambient operating temperature with rooftop (extended temperature) option	-40°F to 158°F (-40°C to 70°C)
Relative Humidity	PXC-16 and PXC-24: 5% to 95%, non-condensing PXC-36: 5% to 95%, non-condensing

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**Mounting Surface**

*PXC-16 and PXC-24:* Direct equipment mount, building wall, or structural member  
*PXC-36:* Building wall or a secure structure

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**Agency Listings**

## UL

UL864 UUKL (except rooftop models)  
UL864 UUKL7 (except rooftop models)  
CAN/ULC-S527-M8 (except rooftop models)  
UL916 PAZX (all models)  
UL916 PAZX7 (all models)

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**Agency Compliance**

FCC Compliance  
Australian EMC Framework  
European EMC Directive (CE)  
European Low Voltage Directive (LVD)  
RoHS Compliant

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**OSHPD Seismic Certification**

Product meets OSHPD Special Seismic Preapproval certification (OSH-0217-10) under California Building Code 2010 (CBC2010) and International Building Code 2009 (IBC2009) when installed within the following Siemens enclosure part numbers: PXA-ENC18, PXA-ENC19, or PXA-ENC34.

## Ordering Information

### PXC Compact Series

Product Number	Description
PXC16.2-P.A	PXC Compact, 16 point, RS-485 ALN
PXC16.2-PE.A	PXC Compact, 16 point, Ethernet/IP ALN
PXC24.2-P.A	PXC Compact, 24 point, RS-485 ALN
PXC24.2-PE.A	PXC Compact, 24 point, Ethernet/IP ALN
PXC24.2-PR.A	PXC Compact, 24 point, RS-485 ALN, rooftop option
PXC24.2-PER.A	PXC Compact, 24 point, Ethernet/IP ALN, rooftop option
PXC24.2-PEF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC24.2-PEF32.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN enabled
PXC24.2-PERF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN, rooftop option. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC36-PE.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN.
PXC36-PEF.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN, Island Bus, P1 FLN.

## Optional Licenses

Product Number	Description
LSM-FLN	License to enable FLN support on PXC-16 or PXC-24 "F" models
LSM-VAEM	License to enable Virtual AEM support when the ALN is connected to RS-485
LSM-FLN36.A	License to enable FLN support on model PXC36-PE.A
LSM-FPGO	License to enable Field Panel GO on models PXC36-PE.A and PXC36-PEF.A
LSM-IB36.A	License to enable the Island Bus on model PXC36-PE.A
LSM-36.A	License to enable both FLN and Island Bus support on model PXC36-PE.A

## Accessories

Product Number	Description
PXM10S	Controller mounted Operator Display module with point monitor and optional blue backlight
PXM10T	Controller mounted Operator Display module
PXA8-M	8-switch HOA (UL864)
PXA16-M	16-switch HOA (UL864)
PXA16-MR	16-switch HOA (extended temp, UL 916) with HMI cable
PXA-HMI.CABLEP5	Serial cable required for HOA or PXM10T/S connection to non-rooftop variants of the 16-point and 24-point Compact Series (pack of 5)
TXA1.LLT-P100	Labels for HOA and TX-I/O Modules, pack of 100, letter format

## Service Boxes and Enclosures

Product Number	Description
PXA-SB115V192VA	PX Series Service Box —115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	PX Series Service Box— 115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	PX Series Service Box— 230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	PX Series Service Box —230V, 24 Vac, 50/60 Hz, 384 VA
PXA-ENC18	18" Enclosure (Utility Cabinet) (UL Listed NEMA Type 1 Enclosure)
PXA-ENC19	19" Enclosure (UL Listed NEMA Type 1 Enclosure)
PXA-ENC34	34" Enclosure (UL Listed NEMA Type 1 Enclosure)

## Documentation

Product Number	Description
553-104	PXC Compact Series Owner's Manual
125-1896	Powers Process Control Language (PPCL) User's Manual

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# PXC Modular Series



Figure 1. PXC Modular.

## Description

The PXC Modular (Programmable Controller - Modular) is an integral part of the APOGEE® Automation System. It is a high performance, modular Direct Digital Control (DDC) supervisory field panel.

The field panel operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher level processor.

- Up to 100 modular field panels communicate on a peer-to-peer network.
- With the addition of TX-I/O modules and a TX-I/O Power Supply on a self-forming bus, the PXC Modular can directly control up to 500 points.

With the addition of an Expansion Module, the PXC Modular also provides central monitoring and control for distributed Field Level Network (FLN) devices.

## Features

- Modular hardware components match initial control requirements while providing for future expansion.
- DIN rail mounting and removable terminal blocks simplify installation and servicing.
- Proven program sequences to match equipment control applications.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control and monitoring functions.
- Support for peer-to-peer communications over Industry standard 10/100Base-T TCP/IP networks.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.

# Hardware

## PXC Modular

- The PXC Modular is a microprocessor-based multi-tasking platform for program execution and communication with other field panels. It scans field data, optimizes control parameters, and manages operator requests for data in seconds.
- The program and database information stored in the PXC Modular memory is battery-backed. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure. When battery replacement is necessary, the PXC Modular illuminates a "battery low" status LED and can send an alarm message to selected printers or terminals.
- The PXC Modular firmware, including the operating system, is stored in non-volatile flash memory.
- The PXC Modular provides both an Ethernet port as well as an RS-485 port for communication on Automation Level Networks using either TCP/IP or RS-485.
- An HMI RS-232 port is provided as a connection to a laptop computer for local operation and engineering.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.
- Two self-forming buses are an integral part of the flexibility of the PXC Modular. A self-forming bus to the right of the controller supports up to 500 points through TX-I/O™ modules. Another self-forming bus to the left of the controller supports hardware connection to subsystems through Expansion Modules.

## TX-I/O Modules

TX-I/O Modules are modular expansion I/O consisting of an electronics module and terminal base. The electronics modules perform A/D or D/A conversion, signal processing, and point monitoring and command output through communication with the PXC Modular. The terminal bases provide for termination of field wiring and connection of a self-forming bus. For more information, see *TX-I/O Technical Specification Sheet (149-476)*.

The TX-I/O Power Supply provides power for TX-I/O modules and peripheral devices. Multiple Power Modules can be used in parallel to meet the power needs of large concentrations of I/O points (Figure 2 and Figure 3). For more information, see *TX-I/O*

*Power Supplies Technical Specification Sheet (149-476).*

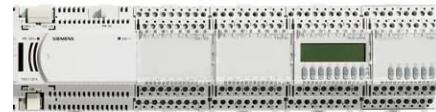


Figure 2. TX-I/O Power Supply and TX-I/O Modules.



Figure 3. PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

## PXC Modular Expansion Module

The PXC Modular Expansion Module (see Figure 4) provides the hardware connection for Field Level Network (FLN) devices. Using the Triple RS-485 Expansion Module, the PXC Modular supports up to three RS-485 networks of Field Level Network devices (see Figure 5).



Figure 4. RS-485 Expansion Module.



Figure 5. RS-485 Expansion Module and PXC Modular.

## Modular Control Panels with Application Flexibility

The PXC Modular is a high performance controller with extensive flexibility to customize each field panel with the exact hardware and program for the application. As a result, the user only purchases what is needed.

For example, in monitoring applications, the control panel can be customized with the number and type of

points to match the sensor devices. For monitoring and controlling a large number of (on-off) fans or motors, more digital points can be added (see Figure 6).



Figure 6. PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

Alternately, if no local point control is required, the PXC Modular can be used to monitor and control Field Level Network devices using the Expansion Modules (see Figure 7).



Figure 7. RS-485 Expansion Module and PXC Modular.

Of course, the PXC Modular can be used for both direct point monitoring and control **and** as a system controller for Field Level Network devices (see Figure 8).



Figure 8. RS-485 Expansion Module, PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

The control program for each field panel is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a "BASIC" type programming language, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

In a stand-alone configuration, the PXC Modular can fulfill all requirements of a supervisory network coordinator by managing operation schedules and alarms and communicating for the connected devices.

## Global Information Access

Each PXC Modular is equipped with an RS-232 port. This port supports the connection of a computer. Devices connected to the terminal port gain global information access.

## Multiple Operator Access

Multiple operators can access the network simultaneously. When using the Ethernet ALN option, multiple operators may access the controller through concurrent Telnet sessions and/or local operator terminal ports.

## Menu Prompted, English Language Operator Interface

The PXC Modular field panel includes a simple, yet powerful menu driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Equipment scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

## Built-in Direct Digital Control Routines

The PXC Modular provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. It receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available in the PXC Modular:

- Adaptive Control, an auto-adjusting closed loop control algorithm. Provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. Superior in terms of response time, holding steady state, and minimizing error, oscillations, and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control.
- Logical sequencing.
- Alarm detection and reporting.
- Reset schedules.

## Built-in Energy Management Applications

The following applications are programmed in the PXC Modular and require simple parameter input for implementation:

- Peak demand limiting
- Start-Stop time optimization
- Equipment scheduling, optimization and sequencing
- Duty cycling
- Economizer control

## Specifications

### Dimensions

PXC Modular Series	7.56 in. L x 3.54 in. W x 2.76 in. D (192 mm L x 90 mm W x 70 mm D)
Expansion Module with three P1 RS-485 FLN connections	1.26 in. L x 3.54 in. W x 2.76 in. D (32 mm L x 90 mm W x 70 mm D)
<b>Electrical, Processor, Battery, and Memory</b>	
Power Consumption	24 VA @ 24 Vac
Processor	MPC885 (PowerPC®)
Processor Clock Speed	133 MHz
Memory	72 MB (64 MB SDRAM, 8 MB Flash ROM)
Secure Digital Input/Output (SDIO) card	Expandable or removable non-volatile memory
Battery backup of SDRAM	30 days (accumulated) AA (LR6) 1.5 Volt Alkaline (non-rechargeable)
Battery backup of Real Time Clock	12 months (accumulated) Cell coin 3 Volt lithium

## Licensable Options

The following features are available on the PXC Modular P2 controllers and require a license for implementation:

- Field Panel GO
- Virtual AEM

## Communication

Ethernet Automation Level Network (EALN) port	10Base-T or 100Base-TX compliant
BACnet I/P Ethernet Automation Level Network port	
RS-485 Automation Level Network (ALN) port	1200 bps to 115.2 Kbps
Expansion Bus for support of sub-system networks	1200 bps to 115.2 Kbps
TX-I/O Self forming bus connection	115.2 Kbps
Human-Machine Interface (HMI) port	RS-232 compliant
USB Device Port	Standard 1.1 and 2.0 USB device port, full speed 12 Mbps, low speed 1.5 Mbps, Type B connector
USB Host port	Standard 1.1 and 2.0 USB host port, full speed 12 Mbps, low speed 1.5 Mbps, Type A connector

## Electrical Rating

AC Power	NEC Class 2
Communication	NEC Class 2

## Operating Environment

Ambient operating temperature	32°F to 122°F (0°C to 50°C), <95% rh, non-condensing
Ambient operating environment	Operate in a dry location, which is protected from exposure to salt spray or other corrosive elements. Exposure to flammable or explosive vapors must be prevented.
Shipping and Storage environment	-40°F to +185°F (-40°C to +85°C) <95% rh, non-condensing
Shipping environment	-13°F to 158°F (-25°C to 70°C), 5% to 95% rh, non-condensing
Mounting Surface	Building wall or structural member

## Agency Listings

UL	UL 864 UUKL Smoke Control Equipment UL 864 UUKL7 Smoke Control Equipment CAN/ULC-S527-M8 UL 916 PAZX UL 916 PAZX7
Agency Compliance	FCC Compliant Australian EMC Framework European EMC Directive (CE) – with enclosure RoHS Compliant
OSHPD Seismic Certification	Product meets OSHPD Special Seismic Preapproval certification (OSH-0217-10) under California Building Code 2010 (CBC2010) and International Building Code 2009 (IBC2009) when installed within the following Siemens enclosure part numbers: PXA-ENC18, PXA-ENC19, or PXA-ENC34.

## Product Ordering Information

Description	Product Number
PXC MOD, P2, 96 NODE, APOGEE	PXC00-PE96.A
PXC MOD, P2, TX-I/O, 96 NODE, APOGEE	PXC100-PE96.A
PXC MOD, BACnet, 96 NODE, APOGEE	PXC00-E96.A
PXC MOD, BACnet, TX-I/O, 96 NODE, APOGEE	PXC100-E96.A
Add support for TX-I/O	PXF-TXIO.A
Virtual AEM License	LSM-VAEM
Field Panel GO License	LSM-FPGO
Expansion Module, three RS-485 connections	PXX-485.3

## Accessories

Product Number	Description
PXM10S	Controller mounted Operator Display module with point monitor and optional blue backlight
PXM10T	Controller mounted Operator Display module
PXA-HMI.CABLEP5	Serial cable required for PXM10T/S connection to PXC Series controllers

## Document Ordering Information

Description	Document Number
PXC Modular Series Owner's Manual	125-3582
Powers Process Control Language (PPCL) User's Manual	125-1896

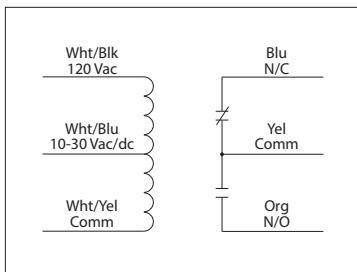
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## 10 AMP PILOT CONTROL RELAYS

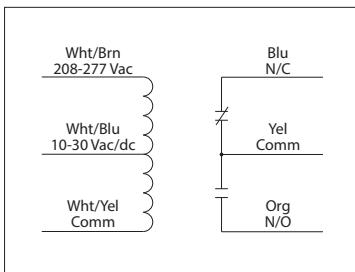
### RIBU1C

Enclosed Relay 10 Amp SPDT with  
10-30 Vac/dc/**120 Vac Coil**



### RIBH1C

Enclosed Relay 10 Amp SPDT with  
10-30 Vac/dc/**208-277 Vac Coil**



Made in USA  
Meets  
"Buy American"  
of ARRA 2009



**RIBU1C-RD**  
**RIBH1C-RD**

- Red housing



**RIBU1C-N4**  
**RIBH1C-N4**

- NEMA 4X housing,  
UL508 only

RELEYS

## SPECIFICATIONS

# Relays & Contact Type: One (1) SPDT Continuous Duty Coil

Expected Relay Life: 10 million cycles minimum mechanical

Operating Temperature: -30 to 140° F

Humidity Range: 5 to 95% (noncondensing)

Operate Time: 20ms

Relay Status: LED On = Activated

Dimensions: 1.70" x 2.80" x 1.50" with .50" NPT nipple

Wires: 16", 600V Rated

Approvals: UL Listed, UL916, UL864, C-UL California State Fire Marshal

Housing Rating: UL Accepted for Use in Plenum, NEMA 1

Gold Flash: Yes

Override Switch: No

### Contact Ratings:

10 Amp Resistive @ 277 Vac

10 Amp Resistive @ 28 Vdc

480 VA Pilot Duty @ 240-277 Vac

480 VA Ballast @ 277 Vac

*Not rated for Electronic Ballast*

600 Watt Tungsten @ 120 Vac (N/O)

240 Watt Tungsten @ 120 Vac (N/C)

1/3 HP @ 120-240 Vac (N/O)

1/6 HP @ 120-240 Vac (N/C)

1/4 HP @ 277 Vac (N/O)

1/8 HP @ 277 Vac (N/C)

### Coil Current:

33 mA @ 10 Vac

13 mA @ 10 Vdc

35 mA @ 12 Vac

15 mA @ 12 Vdc

46 mA @ 24 Vac

18 mA @ 24 Vdc

55 mA @ 30 Vac

20 mA @ 30 Vdc

28 mA @ 120 Vac (RIBU1C)

39 mA @ 208-277 Vac (RIBH1C)

### Coil Voltage Input:

10-30 Vac/dc; 120 Vac; 50-60 Hz (RIBU1C)

10-30 Vac/dc; 208-277 Vac; 50-60 Hz (RIBH1C)

Drop Out = 2.1 Vac / 2.8 Vdc

Pull In = 9 Vac / 10 Vdc



MERCURY DISPLACEMENT INDUSTRIES, INC.

Post Office Box 710 - U.S. 12 East - Edwardsburg, Michigan 49112-0710

Phone (269) 663-8574 - Fax (269) 663-2924

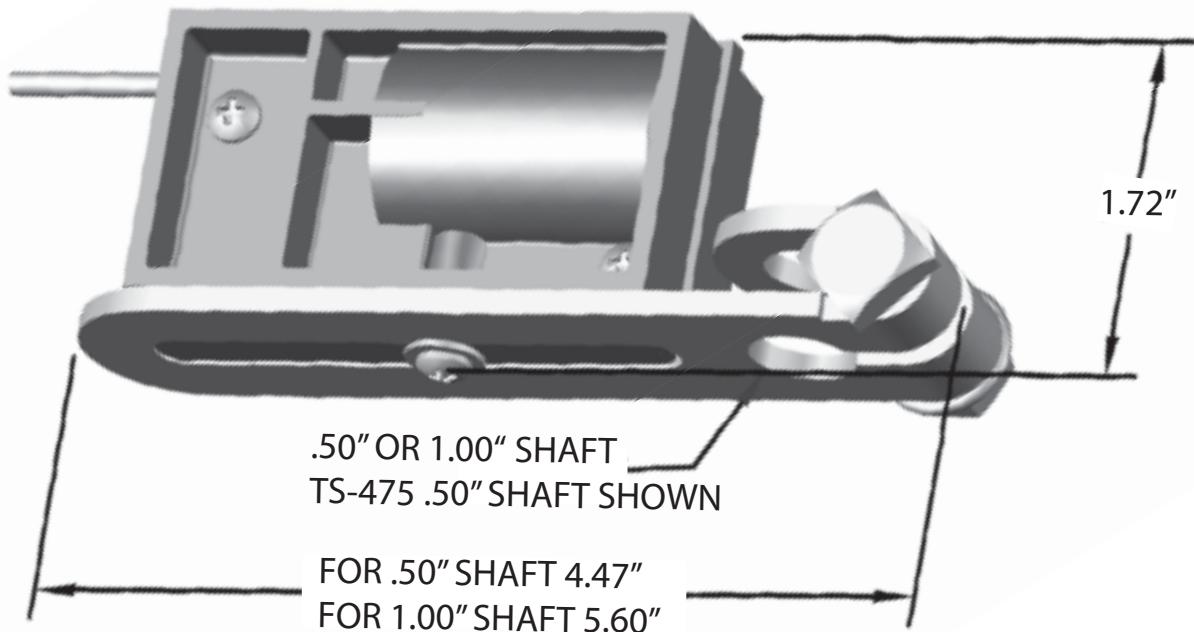
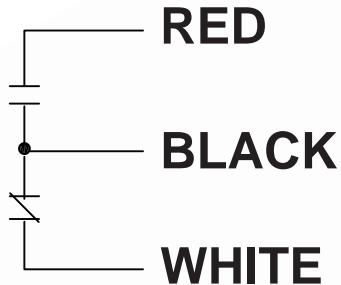
(800) 634-4077

## MECHANICAL DAMPER ARM SWITCH

### TS-475 & TS1-475

NORMALLY OPEN CONTACT  
CLOSED WHEN LEAD END OF  
SWITCH IS DOWN

NORMALLY CLOSED CONTACT  
CLOSED WHEN LEAD END OF  
SWITCH IS UP



WIRE: 18/3 CMP/CL39 PLENUM WIRE

HOUSING MAT'L: GLASS FILLED PBT

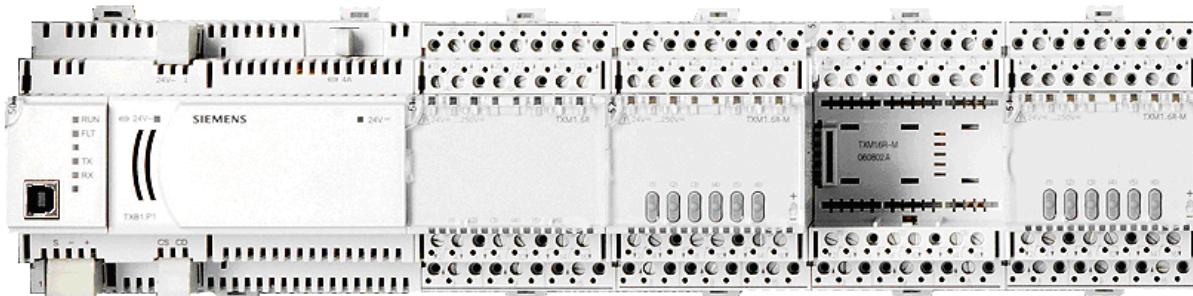
BRACKET MAT'L: PLATED STEEL

OPERATION: STEEL BALL ACTUATED SUBMINITURE SNAP ACTION SWITCH

RATINGS: 5 AMPS @ 120/240 VAC  
5 AMPS @ 30 VDC

OPERATING ANGLE 15°: CONTACTS CLOSE @ 10° ABOVE HORIZONTAL  
CONTACTS OPEN @ 5° BELOW HORIZONTAL

# TX-I/O Product Range



## Description

TX-I/O™ is a range of I/O modules, with associated power and communication modules, for use within the APOGEE Automation System. The TX-I/O product range includes the following:

- Eight types of I/O modules, which act as signal converters. The I/O modules communicate between the PXC Modular or the PXC-36 and the related devices in the building services plant.
- TX-I/O Power Supply for the TX-I/O modules.
- TX-I/O Bus Connection Module, which bridges communication and power from one DIN rail to another.
- TX-I/O Island Bus Expansion (IBE) module, which bridges communication between the primary field panel and expansion field panels.
- P1 Bus Interface Module (BIM), which connects TX-I/O modules to the P1 FLN. The P1 BIM provides power for TX-I/O modules, but it does not contain applications or perform control; the control database for the TX-I/O points resides in a field panel.

*TX-I/O Modules* provide I/O points for APOGEE based upon TX-I/O Technology. TX-I/O Technology provides flexibility of point types, tremendous flexibility of signal types and support for manual operation.

There are eight types of TX-I/O modules:

- 8 point DI module (TXM1.8D)
- 16 point DI module (TXM1.16D)
- 6 point DO with Relay module (TXM1.6R)
- 6 point DO with Relay and Manual Override module (TXM1.6R-M)
- 8 point Universal module (TXM1.8U)
- 8 point Universal with local override/identification device (LOID) module (TXM1.8U-ML)
- 8 point Super Universal module (TXM1.8X)
- 8 point Super Universal with LOID module (TXM1.8X-ML)

## Features

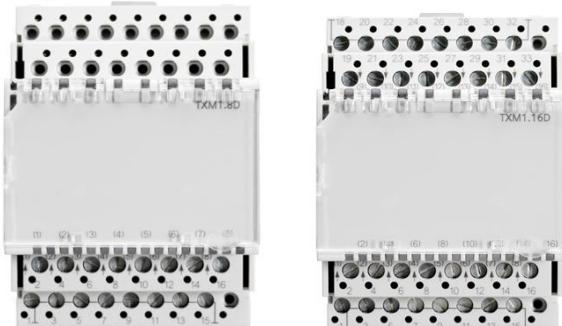
- The *self-forming TX-I/O island bus* transmits power as well as communication signals.
  - The TX-I/O island bus can be extended a maximum of 164 feet (50 meters).
  - Adding an Island Bus Expansion (IBE) module expands communication data up to an additional maximum of 200 feet (61 m) in two directions.
- *Hot-swappable electronic components* allow powered electronics to be disconnected and replaced without removing terminal wiring or disturbing the self-forming bus.

All TX-I/O modules include the following features:

- DIN rail mounting.
- High density (point count to physical dimensions).
- Hardware addressed with address keys.
- Removable label holder that allows for customized point labels.
- LEDs that provide status indication and diagnostic information for the I/O module, as well as for each point on the module.
- Separable into terminal base and plug-in I/O module electronics for:
  - Improved installation workflow, allowing field wiring to be terminated prior to installation of electronics.
  - Optimum diagnostics—connected peripheral devices can be measured without affecting or being affected by the I/O module.
  - Quick replacement of electronics for service.

## Module Introduction

### Digital Input Modules (TXM1.8D and TXM1.16D)



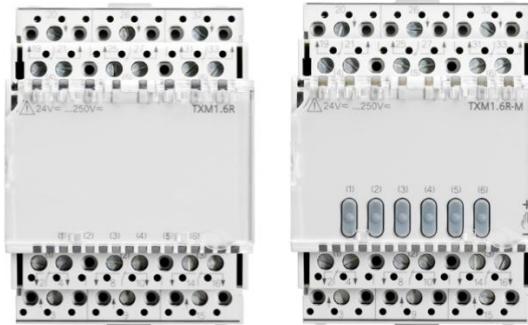
The TXM1.8D and TXM1.16D are dedicated to monitoring, respectively, 8 and 16 digital input points.

- They monitor status signals from normally open (NO) or normally closed (NC), latched voltage free/dry contacts.

- All 8 points on the TXM1.8D module, as well as 8 of the 16 points on the TXM1.16D module, may be used as pulse counters up to 10 Hz.
- Each input point has a green LED for status indication.

**NOTE:** No potential (dry contact) for all points.

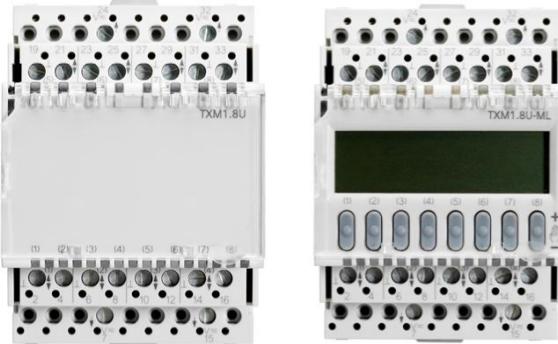
### Digital Output Modules (TXM1.6R and TXM1.6R-M)



The TXM1.6R and TXM1.6R-M Digital Output Modules provide six NO or NC (form C), maintained or pulsed, voltage free/dry contacts.

- The contacts are rated for a maximum of 250 Vac at 4A.
- Each I/O point has a green LED for status indication.
- The TXM1.6R-M module is also equipped with manual override switches. An orange LED per override switch indicates override status individually per point.

### Universal Modules (TXM1.8U and TXM1.8U-ML)



The TXM1.8U and TXM1.8U-ML Universal I/O modules provide 8 points, which can be individually software configured as digital input, analog input, or analog output to best meet the specific application needs.

All Universal I/O modules provide:

- Class 2 AC distribution voltage for peripheral devices, such as valves and actuators.

- Green LED status per I/O point that varies in intensity according to the voltage and current (directly proportional).

Digital input support includes:

- Voltage free/dry contacts
- Pulse counters up to 25 Hz

Analog input sensor support includes:

- 1K Nickel – Landis & Gyr curve
- 1K Platinum – 375 and 385 coefficient
- 10K and 100K Thermistor – Type II Curve

Active input and output support includes:

- Analog input voltage 0-10 Vdc
- Analog output voltage 0-10 Vdc

TXM1.8U-ML modules are also equipped with a local override/identification device (LOID), which includes an LCD signal display. The LCD displays the following information for each I/O point:

- Configured signal type
- Symbolic display of process value
- Notification of faulty operation, short circuit, or sensor open circuit

Orange LEDs indicate override status individually per point.

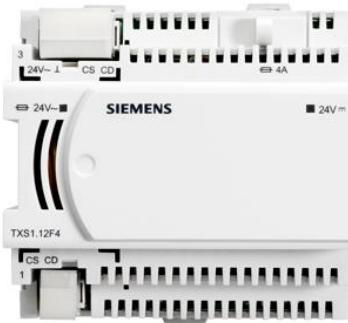
### **Super Universal Modules (TXM1.8X and TXM1.8X-ML)**



The TXM1.8X and TXM1.8X-ML Super Universal modules share all of the Universal module features, and also provide:

- Analog input current 4-20 mA
- Analog output current 4-20 mA (four current outputs maximum per module on Points 5 through 8)
- 24 Vdc distribution from power supply for sensors at a maximum of 200 mA per module

### **TX-I/O Power Supply (TXS1.12F4)**



The TX-I/O Power Supply generates 24 Vdc at 1.2A to power TX-I/O modules and peripheral devices.

- Up to 4 TX-I/O Power Supplies can be operated in parallel, with a maximum of two per DIN rail.
- It can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.

The TX-I/O Power Supply performs the following functions:

- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

### **TX-I/O Bus Connection Module (TXS1.EF4)**



The Bus Connection Module transfers DC power for TX-I/O modules and peripheral devices and transfers AC power for peripheral devices.

- It can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.

The TX-I/O Bus Connection Module performs the following functions:

- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data Signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

### **TX-I/O Island Bus Expansion Module (TXA1.IBE)**



The TX-I/O Island Bus Expansion (IBE) module increases the distance between the primary field panel and expansion field panels without affecting the TX-I/O island bus maximum distance.

- An LED provides an indication of island bus communication.
- The IBE converts the TX-I/O island bus signal on the self-forming rail to an RS-485 signal level on the connector.
  - Each IBE module supports a maximum of two RS-485 segments.
  - Each segment may extend up to 200 ft (61 m) from the primary enclosure.
  - The island bus length extended from the primary field panel is added to island bus length extended from any expansion panel. RS-485 segment length between the IBEs does not add to the island bus length.
- The IBE does not transfer power over the RS-485 segment.
- Switches set the IBE as the TX-I/O island bus master (BM) or an RS-485 end-of-line terminator.
- A programming tool is not required.
- A maximum of 5 IBEs may be installed on the island bus: one IBE in the primary enclosure plus one in each expansion enclosure (maximum of 4).

- Only one Island Bus Expansion (IBE) module per enclosure is permitted.
- Expansion enclosures must be supplied using a separate TX-I/O Power Supply. Loss of this power does not affect the primary enclosure.

### **P1 Bus Interface Module (TXB1.P1 and TXB1.P1-4)**



The P1 Bus Interface Module (P1 BIM) provides P1 FLN communication and power for TX-I/O modules. It does not contain application or control for the TX-I/O modules.

The P1 BIM provides the following features:

- Communication on the P1 FLN or MEC Expansion Bus.
- 24 Vac input.
- Generation of 24 Vdc at 600 mA to power TX-I/O modules and peripheral devices.
- Plug-in screw terminals.
- Isolates the peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Separate LEDs for module operation, FLN communication activity, 24 Vdc present on the TX-I/O island bus, and monitoring of the 24 Vac fuse.

#### **TXB1.P1**

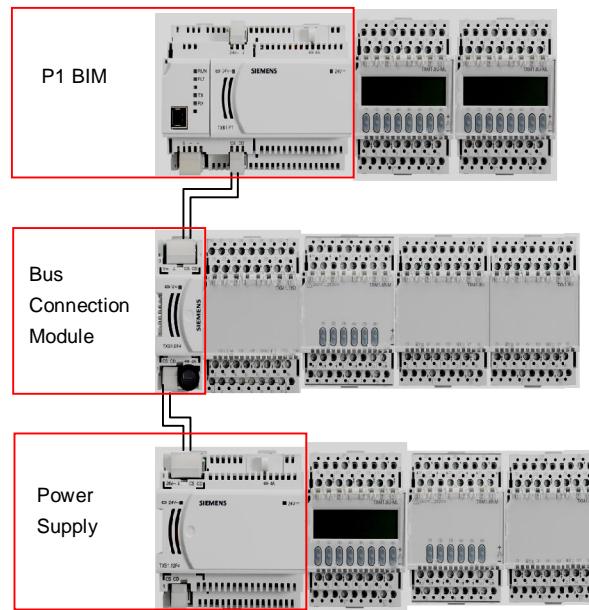
- Support for 80 TX-I/O points.
- Support for up to 10 I/O modules.
- Transfer of 24 Vac at a maximum of 4A to power peripheral devices.
- Up to three TX-I/O Power Supplies can be operated in parallel, max of 2 per DIN.

#### **TXB1.P1-4**

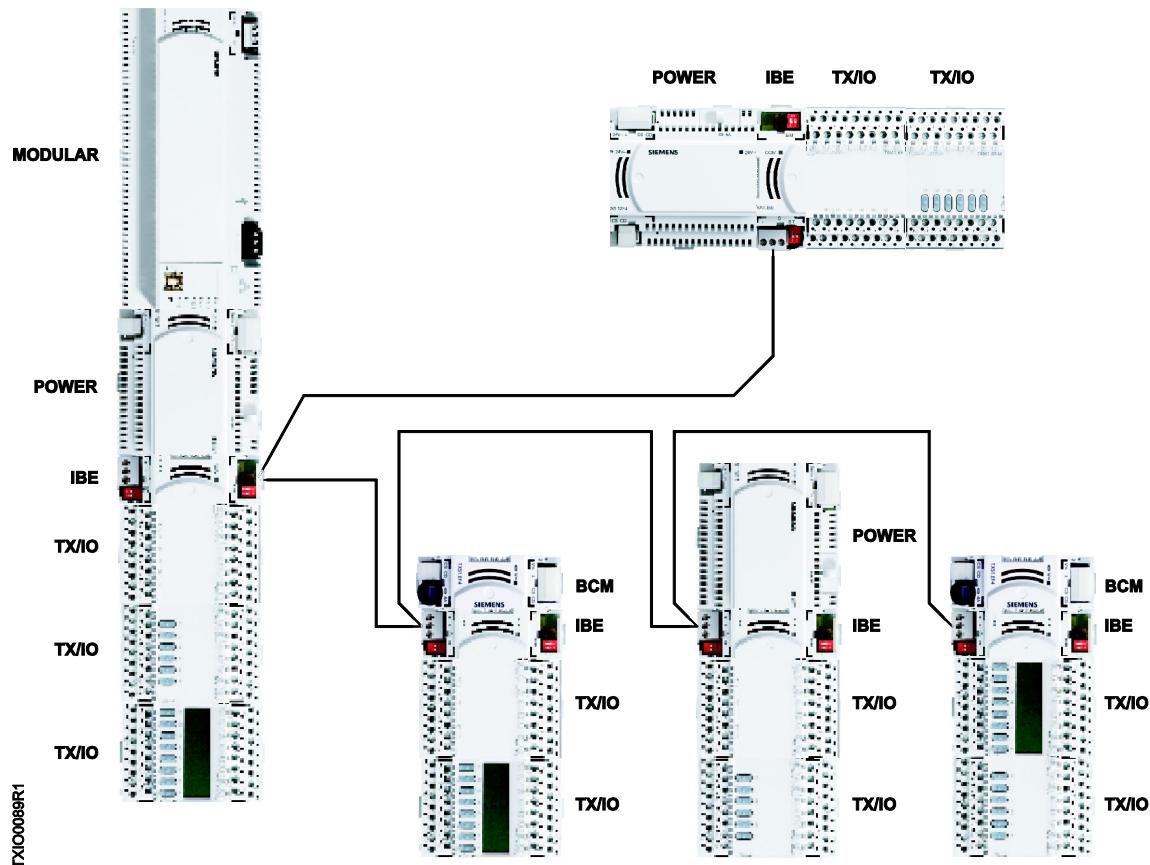
- Support for 64 TX-I/O points.
- Support for up to 4 I/O modules.

## TX-I/O island bus Extension

The following picture shows the TX-I/O island bus extended using a Bus Connection Module and TX-I/O Power Supply. This configuration allows the TX-I/O island bus to extend a maximum of 164 feet (50 meters), and may extend outside an enclosure.



The following picture shows the TX-I/O island bus expanded using five Island Bus Expansion modules.



## I/O Functions by Module

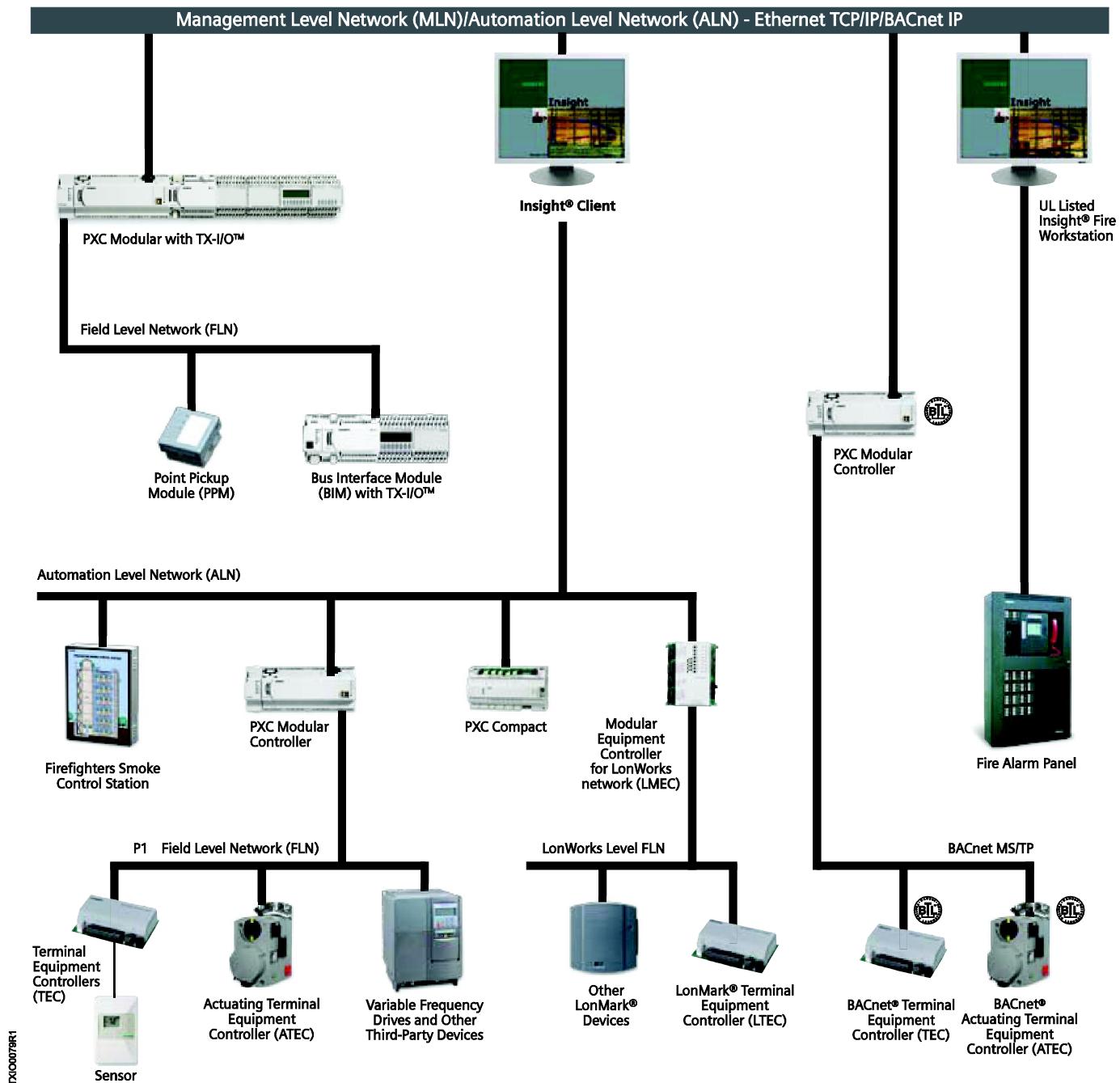
TX-I/O™ function	Description	Module type							
		TXM1.8D	TXM1.16D	TXM1.8U	TXM1.8U-ML	TXM1.8X	TXM1.8X-ML	TXM1.6R	
		Maximum number of functions per module							
<b>Digital inputs</b>									
Binary Input	Status indication, voltage-free/dry contact	8	16	8	8	8	8		
Counter	Count/accumulator, voltage-free/dry pulse contact	8	8	8	8	8	8		
<b>Analog Inputs</b>									
	Temperature LG-Ni1000			8	8	8	8		
	Temperature Pt 1000 375			8	8	8	8		
	Temperature Pt 1000 385			8	8	8	8		
	Temperature (NTC) 10 K			8	8	8	8		
	Temperature (NTC) 100 K			8	8	8	8		
	Voltage, DC 0..10V *			8	8	8	8		
	Current DC 4..20 mA *					8	8		
<b>Digital outputs</b>									
BO OnOff	Latched contact, AC/DC 250V, 4A						6	6	
BO Pulse	Pulse						6	6	
<b>Analog Outputs</b>									
	DC 0..10 V *			8	8	8	8		
	DC 4..20 mA *					4	4		

\* Active inputs and active outputs (0-10V and 4-20 mA) must be located on different modules if sensors are externally powered.

# TX-I/O Network Architecture Example

The following architecture picture shows TX-I/O modules connected to:

- A P1 BIM located on the Field Level Network.
- A PXC Modular on Ethernet TCP/IP.



## Specifications:

### Dimensions (L × W × D)

TX-I/O Modules	2.52" × 3.54" × 2.75" (64 mm × 90 mm × 70 mm)
TX-I/O P1 BIM	5" × 3.54" × 2.75" (128 mm × 90 mm × 70 mm)
TX-I/O Power Supply	3.78" × 3.54" × 2.75" (96 mm × 90 mm × 70 mm)
TX-I/O Bus Connection Module	1.26" × 3.54" × 2.75" (32 mm × 90 mm × 70 mm)
TX-I/O Island Bus Expansion (IBE) Module	1.26" × 3.54" × 2.75" (32 mm × 90 mm × 70 mm)

### Electrical

Power Requirements	24 Vac +/-20% input @ 50 or 60 Hz
Power Consumption	
Power Supply	35 VA with 96 VA pass-thru
Bus Connection Module	0 VA with 96 VA pass-thru
TX-I/O P1 BIM	20 VA with 96 VA pass-thru
With the above power consumption, the Power Supply produces 28.8 W (1.2A at 24 Vdc) and the P1 BIM provides 14.4 W (0.6A at 24 Vdc) to be used by the following:	
TXM1.8D	1.1 W
TXM1.16D	1.4 W
TXM1.8U	1.5 W
TXM1.8U-ML	1.8 W
TXM1.8X	2.2 W
TXM1.8X-ML	2.3 W
TXM1.6R	1.7 W
TXM1.6R-M	1.9 W
Island Bus Expansion Module	1.2 W
Terminations	
I/O Terminals	20-12 AWG Solid 20-14 AWG Stranded
Power Supply, BCM, P1 BIM, and IBE	2-, 3-, or 4-position screw terminal pluggable blocks
Operating Environment	32°F to 122°F (0°C to 50°C), 5 to 95% rh, non-condensing
Agency Listings	UL 864 UUKL Smoke Control Equipment ULC/ORD-C100-1992 UUKL7 Smoke Control Equipment UL 916 PAZX CSA 22.2 No. 205 PAZX7
Agency Compliance	FCC Compliance Australian EMC Framework (C-Tick) European EMC Directive (CE) European Low Voltage Directive (LVD) RoHS Compliant

## Ordering Information

### TX-I/O I/O Modules

Product Number	Description
TXM1.8D	TX-I/O Module, 8 DI points
TXM1.16D	TX-I/O Module, 16 DI points
TXM1.8U	TX-I/O Module, 8 Universal points
TXM1.8U-ML	TX-I/O Module, 8 Universal points with LOID
TXM1.8X	TX-I/O Module, 8 Super Universal points
TXM1.8X-ML	TX-I/O Module, 8 Super Universal points with LOID
TXM1.6R	TX-I/O Module, 6 DO with Relay points
TXM1.6R-M	TX-I/O Module, 6 DO with Relay points with manual override

### TX-I/O Power Supply and Bus Modules

Product Number	Description
TXS1.12F4	TX-I/O Power Supply, 1.2 A, 4A Fuse
TXS1.EF4	TX-I/O Bus Connection Module, 4A Fuse
TXA1.IBE	TX-I/O Island Bus Expansion Module with RS-485 connection.
TXB1.P1	TX-I/O Bus Interface Module, P1, 10-module
TXB1.P1-4	TX-I/O Bus Interface Module, P1, 4-module

### Accessories

Product Number	Description
TXA1.K12	One set of address keys, numbers 1-12
TXA1.K24	One set of address keys, numbers 1-24
TXA1.K-48	One set of address keys, numbers 25-48
TXA1.K-72	One set of address keys, numbers 49-72
TXA1.LLT-P100	Labels for TX-I/O 100 sheets/pack Letter format
TXA1.LH	Replacement label holders

### Regions where this Product is Sold

(US, Asia Pacific, Canada, Latin America, UK)

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# **Operation and Maintenance Manuals (For Equipment)**

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## Room Pressure Monitor

### Product Description

The Room Pressure Monitor (RPM) is designed for critical low differential pressure applications that require stringent pressure monitoring and alarming. The unit can be configured to monitor positive or negative pressure in protected environments and hospital isolation rooms per CDC guidelines.

### Contents

Qty	Description
1	Room Pressure Monitor Assembly
2	Strain relief tubing assembly
3	6-32 × 1/2" mounting screws (for connecting the monitor base to the plaster ring)

### Intended Use

The SRPM is designed for indoor use only to monitor critical environments by providing differential pressure indication. Typically, this is between a monitored room and a reference space such as a corridor or ante room. The unit also provides monitoring, alarm and communications functions.

Installation must be indoors, Pollution Degree 2, Installation Category II.

### Typical Applications

- Surgical suites
- Intensive care isolation rooms
- Research laboratories
- Pharmaceutical facilities
- Organic laboratories
- Animal research facilities

### Expected Installation Time

20 minutes

### Product Numbers

Product Number	WC	Protocol	FS
547-101A	+/- 0.05" WC (12.5 Pa)	P1	0.5%
547-102A	+/- 0.1" WC (25 Pa)	P1	0.5%
547-103A	+/- 0.25" WC (62.5 Pa)	P1	0.5%
547-104A	+/- 0.50" WC (12.5 Pa)	P1	0.5%
547-105A	+/- 1.0" WC (250 Pa)	P1	0.5%
547-106A	+/- 2.55" WC (625 Pa)	P1	0.5%
547-107A	+/- 5.0" WC (1250 Pa)	P1	0.5%
547-101B	+/- 0.05" WC (12.5 Pa)	P1	0.25%
547-102B	+/- 0.1" WC (25 Pa)	P1	0.25%
547-103B	+/- 0.25" WC (62.5 Pa)	P1	0.25%
547-104B	+/- 0.50" WC (12.5 Pa)	P1	0.25%
547-105B	+/- 1.0" WC (250 Pa)	P1	0.25%
547-106B	+/- 2.55" WC (625 Pa)	P1	0.25%
547-107B	+/- 5.0" WC (1250 Pa)	P1	0.25%
547-201A	+/- 0.05" WC (12.5 Pa)	BACnet	0.5%
547-202A	+/- 0.1" WC (25 Pa)	BACnet	0.5%
547-203A	+/- 0.25" WC (62.5 Pa)	BACnet	0.5%
547-204A	+/- 0.50" WC (12.5 Pa)	BACnet	0.5%
547-205A	+/- 1.0" WC (250 Pa)	BACnet	0.5%
547-206A	+/- 2.55" WC (625 Pa)	BACnet	0.5%
547-207A	+/- 5.0" WC (1250 Pa)	BACnet	0.5%
547-201B	+/- 0.05" WC (12.5 Pa)	BACnet	0.25%
547-202B	+/- 0.1" WC (25 Pa)	BACnet	0.25%
547-203B	+/- 0.25" WC (62.5 Pa)	BACnet	0.25%
547-204B	+/- 0.50" WC (12.5 Pa)	BACnet	0.25%
547-205B	+/- 1.0" WC (250 Pa)	BACnet	0.25%
547-206B	+/- 2.55" WC (625 Pa)	BACnet	0.25%
547-207B	+/- 5.0" WC (1250 Pa)	BACnet	0.25%

### Warning/Caution Notations

<b>WARNING:</b>		Personal injury/loss of life may occur if you do not follow the procedures as specified.
<b>CAUTION:</b>		Equipment damage, or loss of data may occur if you do not follow the procedures as specified.

## Required Tools and Components

- Flat-head screwdriver
- (1) Double gang metal electrical box with grounding stud
- (1) 4 × 4-inch metal plaster ring
- (1) Door switch SPDT or SPST, N.O., as needed

For Annunciator and Tap Plate:

- (1) Single gang electrical box

**NOTE:** Components are not included.

## Specifications

<b>Service:</b>	Air or non-conductive, non-explosive gases
<b>Accuracy:</b>	±0.5% F.S., +/-0.25% FS optional
<b>Operating Temperature Limits:</b>	32°F to 120°F (0°C to 50°C)
<b>Operating Humidity Limits:</b>	5 min. to 95% max. RH (non-condensing)
<b>Altitude:</b>	2000 meters (max.)
<b>Thermal Effects:</b>	±0.03% F.S./°F (± 0.05% F.S./°C)
<b>Overpressure:</b>	±15" WC
<b>Supply Voltage:</b>	18-32 Vac, 50-60 Hz
<b>Power Consumption (Voltage Output):</b>	5W
<b>Output:</b>	Selectable 4-20 mA (2-wire) 0-5 Vdc (3-wire), or 0-10 Vdc (3-wire)
<b>Loop Resistance (4-20 mA Output):</b>	0-510 Ω max.
<b>Electrical Connection:</b>	Removable terminal block
<b>Pressure Fittings:</b>	Barbed fittings for 1/4" O.D. tubing
<b>Housing:</b>	Fire retardant plastic (NEMA 1, IP20 rated for indoor applications)
<b>Mounting:</b>	Mounts to customer-supplied 4" × 4" plaster ring (mounts to double gang electrical box)
<b>Dimensions:</b>	8" H × 5.1" W × 1.8" D (203 mm H × 130 mm W × 46 mm D)
<b>Weight approx.:</b>	1.5 lbs (680 grams)
<b>Certifications:</b>	CE, CAN/CSA-C22.2 No. 61010-1-04
<b>Communications:</b>	BACnet MSTP ASC P1 FLN trunk

## Installation

The RPM is designed to be mounted on a standard double gang metal electrical box using a 4 × 4-inch plaster ring adapter. Remove the cover and mount the baseplate to the plaster ring adapter using four 6-32, 1/2-inch long mounting screws.

**NOTE:** The plaster ring external mounting face must be positioned flush to recessed, relative to the surface of the wall. Also note the orientation of the four mounting screws in the plaster ring, as the plaster ring is rotated 90° from conventional mounting.

In the following wiring sections, abbreviations are used, such as, J1, P3.

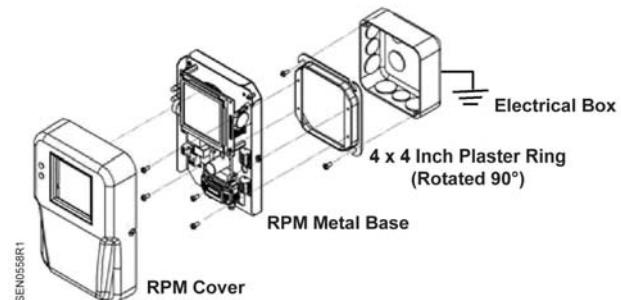


Figure 1. RPM Installation.

## Wiring Electrical Box (Rough-In)

1. Lay out the system in terms of wiring: power, annunciator, analog output, BACnet, relay output and plumbing to connect to the monitored spaces (pressure taps).
2. Bring all power, earth ground, signal, communications and analog output wiring into the 4 × 4 electrical box.
3. Bring 1/4-inch O.D. tubing for 3/6-inch barb fitting into box.

In order to conform to the CSA safety standard, the electrical installer must comply with the following earth ground instructions:

- Pre-wire the electrical box with power (24 Vac), and provide earth grounding to the electrical box.
- The safety ground path consists of four 6-32 × 1/2-inch metal screws that connect the RPM metal base to the 4-1/2 × 4-1/2-inch metal plaster ring. The plaster ring must be grounded to the 4-1/2 × 4-1/2-inch electrical box by two metal mounting screws.
- The 4-1/2 × 4-1/2-inch electrical box must be connected to the building earth ground. It is also highly recommended to use armored cable (Type AC) for all the wiring in applications where high levels of radio interference may be present.

- Power leads, analog output, door status, and annunciator wiring should be 14 to 22 AWG stranded wire.
- BACnet suggested wiring is 22 AWG stranded wire in a shielded cable, a +, -, Gnd (S) and shield should be run. This can be two twisted pairs with a separate cable shield. One twisted pair is used for communications, the second twisted pair can be used for communications ground and the shield wire can be connected to the other device shield wires.

## Plumbing (Attaching Pressure Tubing)



### CAUTION:

Always attach tubing to the RPM header and then place Header onto RPM. This will prevent overpressure from crimped or collapsed tubes.

Use the following procedure for all room types: positive, negative or neutral:

Typically a Pressure Tap Plate is installed in the monitored room. Often, stiff nylon 1/4-inch tubing is used for running pressure signals from the RPM to the monitored spaces. To prevent buckling and collapse of this stiff tubing inside the electrical box, use the supplied strain relief tubing assemblies (2) to transition from the field tubing to the pressure fittings on the RPM. The strain relief tubing assemblies are an integrated system of tubing (2-1/4-inch long), tubing nipple and over-molded spring to prevent crimping or buckling of the tubing in the field.

Attach pressure tubing as follows:

1. Connect the 1/4-inch O. D. tubing running from the Tap Plate (or other pressure connection from the monitored space) to the 4-1/2 x 4-1/2-inch electrical box for the RPM.
2. Install the barbed side of one of the strain relief tubing assemblies onto the end of the field-installed tubing.
3. Thread the tubes through the conduit opening at the bottom of the electrical box.
4. Push the open end of the strain relief tubing assembly onto the RPM pressure tube header (H1) port labeled "+".

**NOTE:** The header is an Electro-Pneumatic (EP) assembly. "+" indicates (Positive) pressure, and "-" indicates negative or reference pressure.

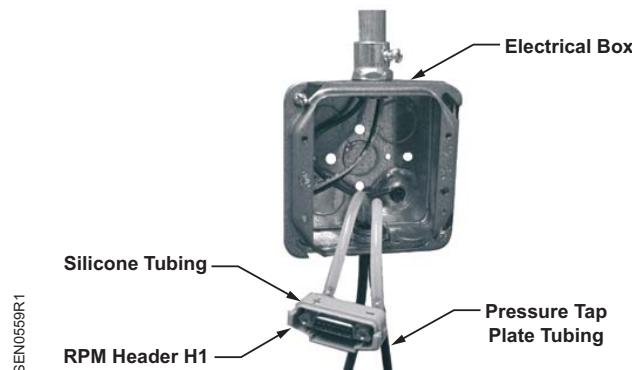


Figure 2. Plumbing Inside Electrical Box.

5. For the most pressure stable operation, a Tap Plate installed in the reference pressure area is also recommended. In this case, install the Tap Plate in a hallway or reference space:
  - a. Attach the tube to the RPM in the same way as for the + port, except attach the tube to the "-" port on the pressure tube header.
  - b. Tighten swivel fittings on the RPM Header H1 assembly if they become loose, 9 in lb. max.
  - c. Verify that the tubes are not buckled, which could close off pressure signal at end of installation.



Figure 3. Pressure Tap Plate.

## Wiring, Finish

### Alarm Relay Output

The Single Pole Single Throw (SPST) relay output can be used for remote signaling of alarm condition. A form "C" contact rated at 1A is available. Connect to J4, P1 and P4. This relay can be used as a dry contact for remote indication.

## Optional Remote Announcer Wiring

### Non-Siemens Remote Announcer

The RPM can drive annunciators that are powered by a 15V supply, 50 mA max current draw, and accept a 15V trigger. In Figure 4, the Remote Announcer connector is at left, and the RPM connector is at right:

1. On J4 of the RPM, jumper P1 to P2, this will connect the internal 15V supply to the common of the internal alarm relay.
2. Connect P2 to A1 (Located on Remote Announcer), this supplies 15V excitation to the Announcer for powering the circuit during normal conditions.
3. Connect P3 of J4 to A2 of Remote Announcer J1. This is the 15V power return.
4. Connect P4 of RPM J4 to A3 terminal of Remote Announcer J1. This is the alarm trigger.

When an alarm occurs and after the programmed alarm delay times out the internal relay will supply 15V to the Announcer circuit to actuate the audible beeper and the red LED.

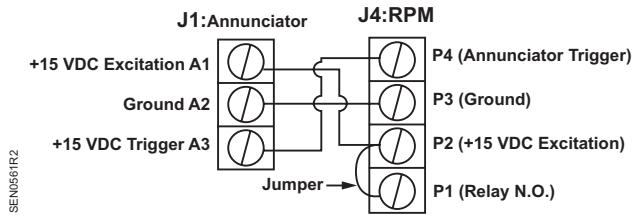


Figure 4. Remote Announcer Wiring.

### Door Status Switch Wiring

1. Install the door switch into the door jamb.
2. Wire to the normally open (N.O.) side of the door jamb contact switch. The RPM will indicate the status of door position. A contact closure indicates that the door is closed. This is a low voltage circuit (5 Vdc).
3. Run two wires from the door switch to connector J6 on the RPM (See Figure 7). The door input status function is enabled in the SETUP ALARMS menu screen.

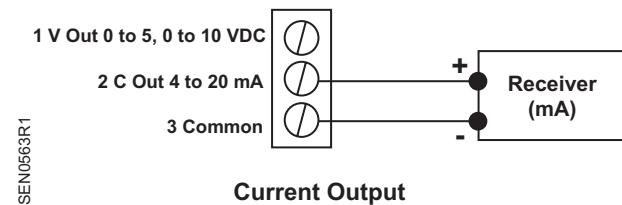
### Analog Output

The RPM can be configured to have either current (4 to 20 mA) or voltage (0 to 5 or 0 to 10 Vdc) outputs. Voltage output—pin 1; Current output—pin 2; Common—pin 3.

**NOTE:** No external excitation is required.

### Current Output

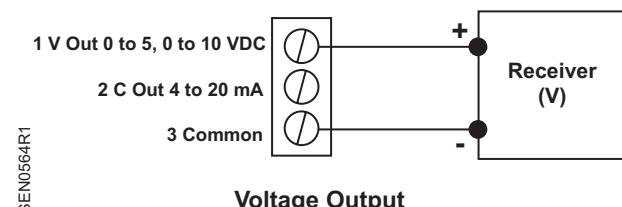
The RPM supplies its own loop power; do not wire in a separate power supply.



Current Output

Figure 5.

### Voltage Output



Voltage Output

Figure 6.

### BACnet Set-up

BACnet hardware is implemented as isolated RS485. Wire to Connector J2, labeled RS-485. Connect tx line to +(A), rx to -(B) and ground wires to S. Connect Shields together with wire nut.

Hardware configuration is done using a 5-position DIP switch (S1) located in the upper right hand section of the PCBA as well as through the touch screen interface.

Position	Function
1	MAC address enabled
2	N/C Not Connected
3	Pull up resistor
4	Termination resistor
5	Pull down resistor

Use a small, flat-blade screwdriver or pen to push the switch to the right to turn that function on; otherwise, it is off.

There is a BACnet setup screen that is enabled by pushing position 1 switch to the **ON** position. After configuration the switch must be moved to the **OFF** position.

## FLN Set-up

FLN hardware is implemented as isolated RS485. Wire to Connector J2, labeled FS-485. Connect tx line to +(A), rx to -(B) and ground wires to S. Connect Shields together with wire nut.

The installation is now complete.

## Start-up and Operation

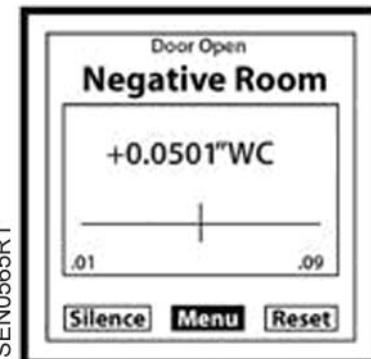
The RPM is designed with an easy-to-use, intuitive, touch screen interface. In its normal (default) state the Monitoring Screen displays the actual room static pressure, and a slider bar shows the actual pressure relative to the alarm limits. The RGB backlight is used to indicate the condition of the room. The buttons at the bottom of the screen give you access to the functions that can be performed.

## Power-Up



Apply power and observe the welcome screen and subsequent transition to the pressure monitor screen. The actual room static pressure is shown as a number in the center of the LCD and visually as a moving bar indicator operating between the preset alarm units. The vertical bar is an indicator of the pressure.

## Monitoring Screen

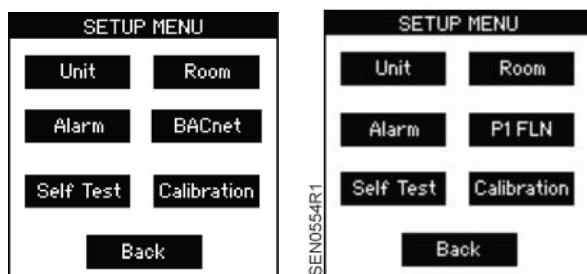


SEN0565R1

Button	Description
Silence	Shuts off alarm.
Menu	Provides access to Main Menu functions.
Reset	Resets the unit in Latched mode.

The following screens are configuration screens that can be configured so that Password protection is required to make changes. If no entry is made to the screen, the unit will return to the default screen after approximately one minute.

## Main Menu Screen



SEN0565R1

Button	Description
Unit	Sets up supervisor password, output, engineering units, and display averaging.
Room	Sets up high and low pressure limits to monitor a positive, negative, or neutral room. Operator password setup.
Alarm	Sets up latch alarm, audible alarm, door alarm input, mute time out, alarm delay, and volume.
BACnet/ P1FLN	Configures BACnet/P1FLN Communications.
Self-test	Identifies product model and software version, and serial number. Verifies memory and performs alarm test.
Calibration	Performs zero and span calibration.
Back	Returns to monitoring screen.

## Set-up Unit Operation

**SETUP UNIT**

Supervisor Password

Analog Output

Eng. Unit

Display Averaging  Secs

SEN0553R1

### Entering Data

Press (or tap) the button to select an output or engineering unit. Selected button background will change from clear to black.

### Password Protection

Lightly pressing (or tapping) the **Yes** button activates Supervisor password protection. With Supervisor password protection enabled, operators cannot access menu screens to update setup. Pressing **No** disables password protection. Pressing **Change** will open **Password Setting Screen**. To change the password, enter the present password (numeric value), followed by the new password in the **New Password** and **Confirm New Password** entry boxes, and then press **Save**. Be careful to store the password for future reference.

**NOTE:** If the password is lost, **351** can be used to reset the password to a new value.

### Analog Output

Select : 4-20, 0-5, or 0-10

### Eng. Unit

Select: WC, or Pa

### Display Averaging

Lightly pressing (or tapping) the **Display Averaging** box activates the data entry box. Enter from 0 to 60 seconds. Display averaging affects the analog output. Increase the display averaging time to smooth out the pressure readings; this will also reduce the display update rate.

Press **Save** and **Exit**.

## Data Entry Screen

**DATA ENTRY**

Lower Pressure Limit

0.01 "WC

1	2	3	4	5
6	7	8	9	0
.	-	<-	ENTER	

SEN0566R1

Enter numbers by pressing each key in sequence until the desired character is displayed in the data entry box above the keypad.

**NOTE:** The cursor will blink for one to two seconds and then stop and display the character.

Erase any mistakes by using the **BACKSPACE** (**<-**) key. When data entry is complete, press the **ENTER** key to return to **SETUP UNIT** screen.

**NOTE:** Use the eraser end of a pencil or back-end of a pen to press (or tap) box on screen to increase accuracy of inputs.

## Setup Room Screen

**SETUP ROOM**

Room Type **Positive Room**

Lower Limit	Upper Limit
+0.0000	+0.9000

Operator Password

SEN0567R1

### Setup Room Operation

Setup alarm limits for *protective* positive room static pressure, *isolating* negative room static pressure, or *neutral* (where the limits can be – to +).

## Entering Data

Lightly press or tap in the **Lower Limit** data entry box. Enter the lower limit pressure. Lightly press or tap in the **Upper Limit** data entry box. Enter the upper limit pressure. The **Room Type** box will change depending on the lower and upper limits. If both entries are positive, the room will be a Positive Room. If both are negative, the room will be a Negative Room. If the lower limit is negative and the upper limit is positive, the room will be a Neutral Room.

## Operator Password

The operator can only enable or disable the room alarms.

Lightly pressing (or tapping) **Yes** activates Operator Password Protection. With Operator Password Protection enabled, room Enabled/Disabled status cannot be changed without entering a valid operator password. Pressing **No** disables password protection. Pressing **Change** will open the **Password Setting Screen**. To change the password, enter the present password, followed by the new password in the **New Password** and **Confirm New Password** entry boxes, and then press **Save**. Be careful to save the operator password for future reference.

**NOTE:** If the password is lost, **351** can be used to reset the password to a new value.

## Setup Alarms Screen

ALARM SETUP

Latch Alarm	Yes	No	
Audible Alarm	Yes	No	
Door Alarm Input	Yes	No	
Mute Time Out	34	Secs	
Alarm Delay	23	Secs	
Volume	1	Up	Down
Save & Exit	Cancel		

SEN0568R1

From this screen you can access the following:

- **Latch Alarm** - Requires the pressure to return to normal and the alarm to be acknowledged before the alarm can be silenced and reset.
- **Audible Alarm** - Enable by selecting **Yes**, or use visual only alarm by selecting **No**.

- **Door Alarm Input** - Provide a “door open” warning visual indication. When a door jamb contact switch is used and this button is activated by pressing **Yes**, the door status “open” condition is indicated by the touch screen display turning from green to yellow, and door open indicated on the monitoring (default) screen.
- **Mute Time Out** - Set the time (in seconds) that the alarm can be silenced in the Latched Alarm mode before the alarm resumes. This assumes that the room static pressure is still outside the normal or set operating limits. The Mute Time Out can be set from 0 to 9999 seconds.
- **Alarm Delay** - Set the Alarm Delay (in seconds) from the time that the room pressure goes out of the preset limits until the alarm activates. The alarm delay may be set from 0 to 9999 seconds.
- **Volume** - Set the alarm volume or sound level. Using the **Up** and **Down** keys, the volume can be set at level 1 to 4. Level 4 alarm volume is the loudest and corresponds to a sound level of 85 dB at a distance of 4 inches.

## Alarm Setup Operation

Lightly press (or tap) the button to select **Yes** or **No** for Latch Alarm, Audible Alarm, or Door Alarm Inputs. Selected box background will change from clear to black when selected.

## Mute Time Out/Alarm Delay

Pressing (or tapping) the **Mute Time Out** or **Alarm Delay** box activates the Data Entry screen to set the time delay duration.

## Self Test Screen

SELF TEST

Product Model  
547-XXXX

Version No. XXXX

Serial No.

SEN0555R1

Alarm Test	Cancel Test
Self Test	Exit

This screen identifies the Product Model Part Number and Software Version.

You can also perform a self-test of the unit to verify that the data in the protected area of the EEPROM memory hasn't been corrupted, and test the alarm to verify the sound level and alarm setup.

Press the **Self Test** button to initiate an EEPROM memory checksum test sequence.

Press **Alarm Test** to test beeper, visual Red LED Alarm, and relay output. This can be used to verify the system in Alarm Mode.

Press **Cancel Test** to stop the alarm test.

Press **Exit** to return to the Main Menu.

### BACnet Setup Screen

**BACnet Setup**

MAC Address

Device Inst.

Baud Rate

9600    19200  
 38400    76800

**Save & Exit**   **Cancel**

1. Enable the **MAC address** enable switch (S1) on the DIP switch by pushing it to the right.
2. Set **Device Address** – Enter the address of the device
3. **Select Baud Rate** – Press the correct baud rate button (9600 to 76800).
4. Press **Save & Exit** to save settings, or **Cancel** to cancel the setting changes.
5. When complete, disable the BACnet setup by moving the DIP switch position 1 to **Off** (left) position.
6. If the unit will be at the end of the line, the pull up resistor can be enabled by pushing position 3 to **On**.
7. The termination resistor can be inserted by pushing position 4 switch to **On**.
8. The pull down resistor can be enabled by turning position 5 to **On**.
9. Press **Save & Exit**. After the unit returns to the Main Menu screen, disconnect the power to the unit, then reconnect to boot-up with the proper **MAC Address** and **Device Instance**.

DIP Switch Position	Function
1	MAC address enabled
2	Not Used
3	Pull Up Resistor
4	Termination Resistor
5	Pull Down Resistor

Contact Siemens Industry, Inc. for information on Point list and PICS and BIBBS statements.

### FLN Setup Screen

**FLN Setup**

Device Address

Baud Rate

4800    9600  
 19200

**Save & Exit**   **Cancel**

To set up FLN communications:

1. Set **Device Address** – Enter the address of the device.
2. Select **Baud Rate** – Press the correct baud rate button (4800 to 19200).
3. Press **Save & Exit** to save settings, or **Cancel** to cancel the setting changes.

### Pressure Monitoring Screens

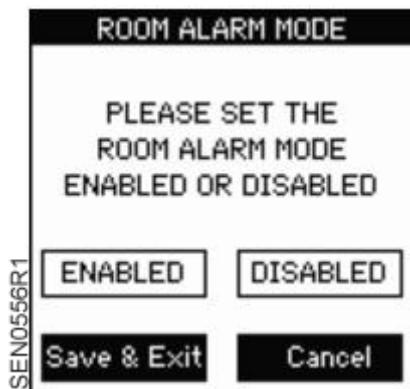
Door Open  
**Negative Room**

+0.0501''WC

.01                    .09

**Silence**   **Menu**   **Reset**

## Changing Room Alarm Modes



The Room Pressure Monitor can be quickly changed from Enabled monitor and alarming to Disabled (or unoccupied). To do this, touch the room mode indicator at the top of the pressure monitoring screen.

### Enabled/Disabled

Use these buttons to quickly change the room to **ENABLED** or **DISABLED** status. If **DISABLED** is used there will be no alarms generated if the room is outside pressure limits.

Press **Save & Exit**.

## Calibration Screen



The device is designed to operate without routine calibration. However, it should be periodically re-zeroed as follows:

1. Open the device cover.
2. Disconnect the electro-pneumatic Header H1 so that room pressures are not applied to the pressure sensor.
3. On the Calibration screen, lightly press (or tap) the **ZERO** button.

4. Reconnect the electro-pneumatic Header H1 and close the cover.

If a sufficiently accurate pressure calibrator is available, then span calibration can also be performed. The calibration unit needs to be more accurate than the RPM, depending on the facility's calibration requirements. The **WC** and **FS** columns in the *Product Numbers* table on the first page of this document the water column and full scale accuracy of each RPM.

To calibrate the span:

1. Open the device cover.
2. Apply a steady full-scale pressure signal to the + on the header fitting and press (or tap) the **SPAN** button.
3. Reconnect the room pressure tube and calibration is complete. Calibration must be within  $\pm 5\%$  of original calibration for this to occur; otherwise, an error message will occur.

To restore the original factory pressure calibration, press the **Restore Factory Calib** button.

## Maintenance

The Room Pressure Monitor is designed to operate in an indoor environment, and monitor clean, dry air.

Upon final installation of the Room Pressure Monitor, no routine maintenance is required. A periodic check of system calibration is recommended, as described in the *Calibration Screen* section. The unit is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact Customer Service to receive a return goods authorization number before shipping.

## Cleaning

### CAUTION:



Do not blow into the pressure tubing or fittings with mouth, compressed air, or canned air. Such actions may permanently damage the pressure sensor.

Do not clean or wash-down the unit with industrial cleaners or solvents. The housing may be wiped down with soap and water or isopropyl alcohol. The LCD may only be cleaned with isopropyl alcohol. Do not immerse unit.

SEN0571R2

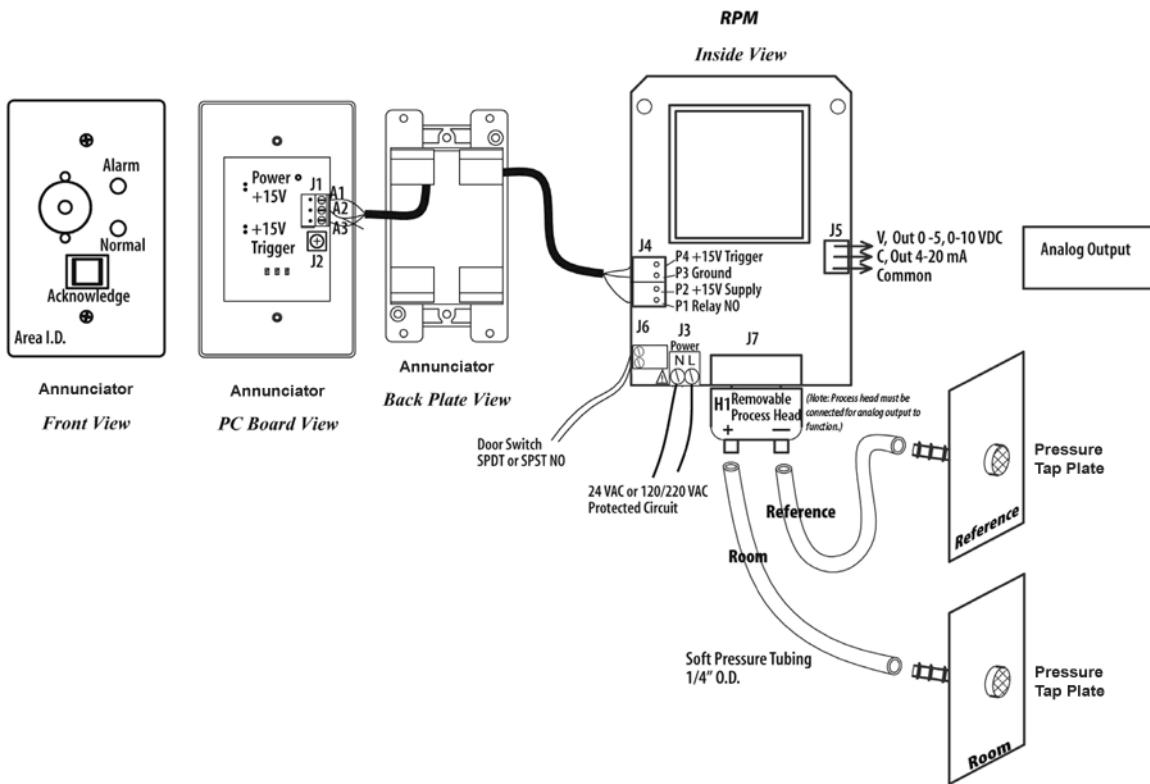


Figure 7.

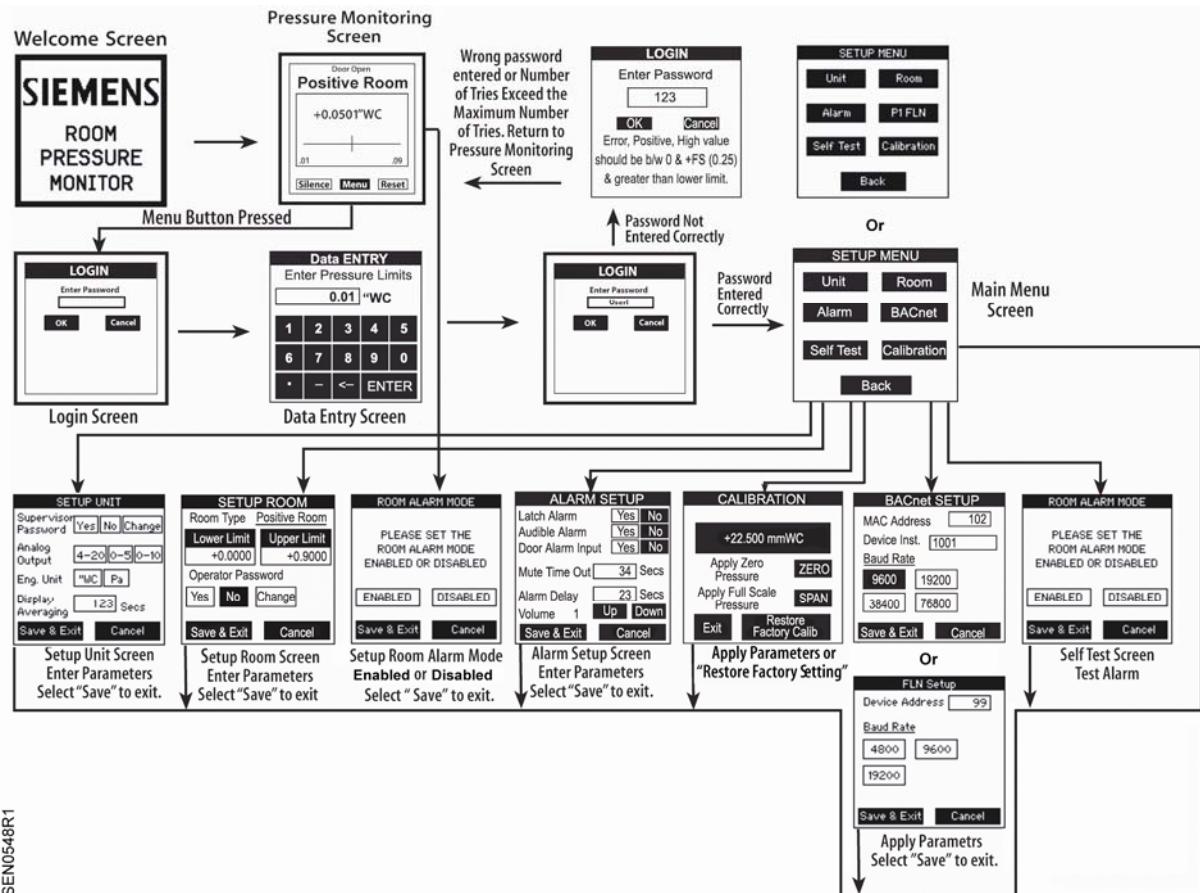


Figure 8. Menu Tree.

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Product or company names mentioned herein may be the trademarks of their respective owners. © 2013 Siemens Industry, Inc.

## 590 Series Differential Pressure Sensor

### Product Description

The Series 590 Differential Pressure Sensors convert differential pressure to a proportional electronic output signal. They can be used with any device that accepts a 0 to 10 Vdc or 4 to 20 mA input.

### Product Numbers

Product Number	Percent Accuracy	Pressure Range Inches WC (Water Column)	In Conduit Box
590-501	1% FS	5	No
590-502		2	
590-503		1	
590-505		± 0.25	
590-506	1% FS	5	Yes
590-507		2	
590-508		1	
590-510		± 0.25	
590-780	0.4% FS	1	
590-781		0.65	
590-782		0.5	

### Caution Notations

<b>CAUTION:</b>		Equipment damage or loss of data may occur if you do not follow the procedures as specified.
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### Required Tools

- Wire strippers
- 1/8-inch flat-blade screwdriver
- 1/4-inch nut driver

### Expected Installation Time

20 minutes

### Prerequisites

- Select a suitable location for mounting the sensor.
- Install field wiring, conduit to the sensor location.
- All wiring must be Class 2 and comply with National Electric Code (NEC) and local regulations.

### Media Compatibility

590 Series sensors are designed to be used with air or non-conducting gases.



#### CAUTION:

Use with liquids or corrosive gases will damage the unit.

### Environment

The operating and compensated temperature limits are 0°F to 150°F (-18°C to 65°C).

### Pressure Fittings

This unit has two factory-installed 1/4-inch OD pressure fittings for the pressure signal connection and typically installed with 1/4-inch push-on tubing. Both the positive (high) pressure port and the reference (low) pressure port are located on the front of the unit, labeled HIGH and LOW, respectively. For best results (shortest response times), follow these guidelines:

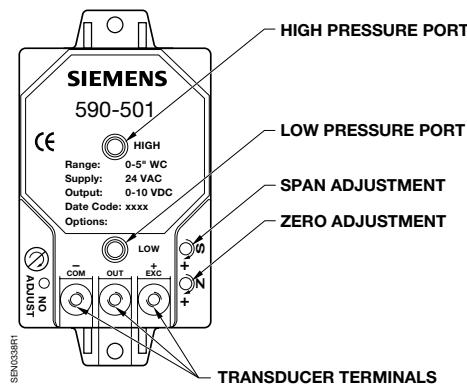
Length in Feet (Meters)	Tubing
<100 (30)	3/16-inch ID
<300 (91)	1/4-inch ID
<900 (274)	3/8-inch ID

## Installation

1. Remove the shroud from the mounting bracket by squeezing the shroud and lifting it straight off (conduit-mount only).
2. Mount the bracket to a wall, cabinet, etc. using self-tapping screws (not provided). Anchors may be required for concrete and cinder block wall mounting.
3. Do one of the following:
  - For conduit-mount installation: Attach the conduit to the mounting bracket with a coupling (not provided). Feed the field wiring through the conduit to the sensor.
  - For non-conduit-mount installation: Run the field wiring to the sensor and provide strain relief.
4. Connect the field wiring to the sensor terminals. See Table 1 and Figure 1.
5. For conduit-mount installations, provide strain relief by securing the wiring to the mounting bracket and reinstall the shroud. See Figure 1.

**Table 1. Wiring Connections (Voltage).**

Sensor Terminal	Connection
+EXC	24 Vac
COM	Neutral
OUT	0 to 10 Vdc (Signal +)
COM	Signal/Feedback Negative (-)

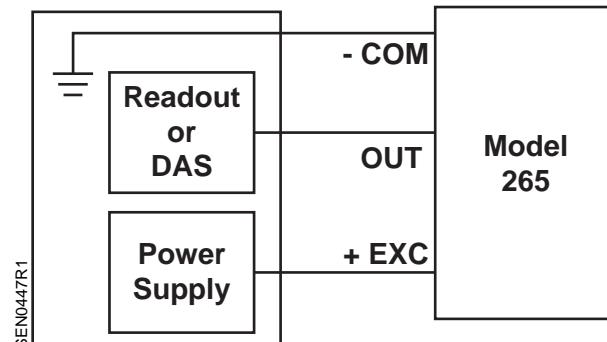


**Figure 1.**

## Voltage Output Units

The voltage output version has a three-wire circuit with three wiring terminals (COM, OUT and EXC). See Figure 1.

The Excitation and Output are commoned on the circuit. The voltage output can operate from 9 to 30 Vdc or 12 to 30 Vac excitation, with 0 to 10 Vdc output. See Figure 2.

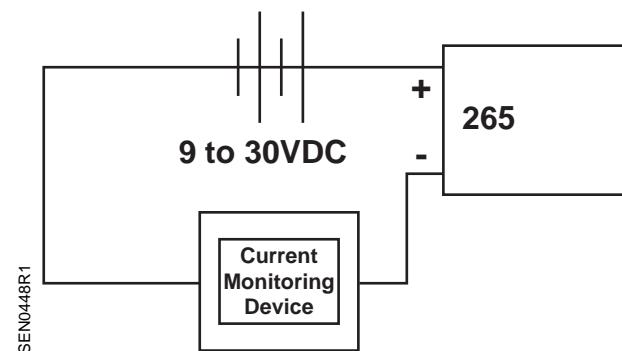


- +EXC Connected to the positive terminal of the power supply.
- COM Connected as the reference for power supply and output signal.
- OUT Connected to the positive terminal of control or pressure monitor.

**Figure 2.**

## Current Output Units

The 4 to 20mA current output version is a two-wire loop-powered unit. The current flows into + terminal and returns back to the power supply through the - terminal. The power supply must be a DC voltage source with a voltage range between 9 and 30V measured between the positive and negative terminals. The unit is calibrated at the factory with a 24 Vdc loop supply voltage and a 250 ohm load. See Figure 3.



**Figure 3.**

## Calibration

**The unit is factory-calibrated and should require no field adjustment.** Generally, the mounting position will have a zero shift effect on ranges below one inch WC. If possible, any zero and/or span offsets should be corrected by software adjustment in the user's control system. However, both zero and span adjustments are accessible either on the front of the unit or by removing the optional conduit enclosure. The sensor is calibrated in the vertical position at the factory.

### Zero Adjustment

While monitoring the voltage between the positive output (OUT) and common (COM), and with both pressure ports open to atmosphere, the zero may be adjusted by turning the zero adjustment screw. (See Figure 1.) For 0 to 10 Vdc output units, the factory

settings are 0.0 Vdc ( $\pm 100$  mV) for unidirectional pressure ranges, and 5Vdc ( $\pm 100$  mV) for bi-directional pressure ranges.

### Span Adjustment

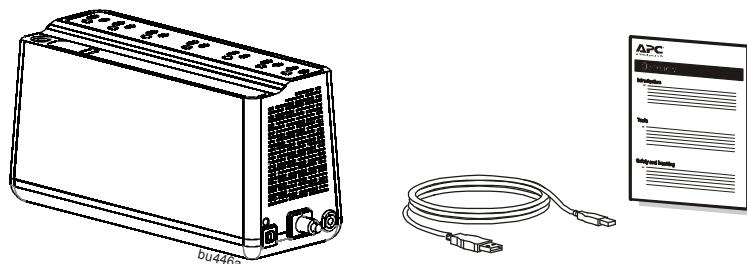
**NOTE:** Complete the zero adjustment before setting span.

To adjust span or full-scale output, use only an accurate pressure standard (such as an electronic manometer or digital pressure gauge) with at least twice the accuracy to this unit ( $<\pm 0.5\%$  FS). With full range pressure applied to the high pressure port (reference port open to atmosphere), adjust the span by turning the SPAN adjustment screw. (See Figure 1.) For 0 to 10 Vdc output units, the factory settings are 10 Vdc ( $\pm 100$  mV) for unidirectional and bi-directional ranges.

The installation is now complete.

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## Inventory



## Safety and General Information



**SAVE THESE INSTRUCTIONS - This section contains important instructions that should be followed during installation and maintenance of the UPS and batteries.**

- This UPS is intended for indoor use only.
- Connect the Back-UPS power cable directly to a wall outlet. Do not use surge protectors or extension cords.
- Replace batteries only with APC by Schneider Electric approved batteries (see *Replace Battery* section for details)
- When grounding cannot be verified, disconnect the equipment from the utility power outlet before installing or connecting to other equipment. Reconnect the power cord only after all connections are made.

### CAUTION

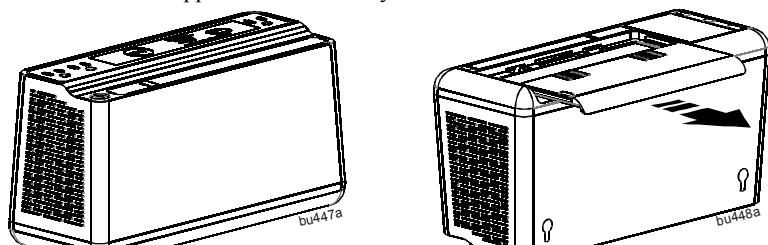
- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- Before replacing batteries, remove conductive jewelry such as chains, wrist watches, and rings. High energy through conductive materials could cause severe burns.

## Specifications

Model	BE600M1	BN650M1/ BN650M1-CA	BN675M1
<b>Input</b>	Voltage	120 Vac Nominal	
	Frequency	50/60 Hz ± 3Hz auto-sensing	
	Brownout Transfers	92 Vac Typical	
	Over-voltage Transfer	139 Vac Typical	
<b>Output</b>	UPS Capacity	600 VA, 330 W	675 VA, 360 W
	Total Amperage (AC outlets)	5.0A	5.42A
	Voltage - On Battery	115 Vac ± 8%	
	Frequency - On Battery	50/60 Hz ± 1	
<b>USB Port</b>	Transfer Time	6 ms Typical, 10 ms maximum	
	* Charging Current	1.5A	
	Charger compatibility	USB Battery Charging Specification 1.2	
* Power output is dependent power drawn by the connected device. Check your device manufacturer to understand the maximum charging current for a given USB spec.			
<b>Protection and Filtering</b>	AC Surge Protection	Full time, 490 Joules	
	EMI/RFI Filter	Full time	
	AC Input	Resettable circuit breaker	
<b>Battery</b>	Type	Sealed, maintenance-free, lead acid 12V	
	Average Life	3 - 5 years, the number of discharge cycles and environmental temperature	
	Charging Time	10 hours. Using the USB ports while charging the battery will increase the amount of time required.	
<b>Physical</b>	Net Weight	7.7 lb (3.5 kg)	
	Dimensions LxWxH	10.8 in x 4.1 in x 5.5 in 27.4 cm x 10.5 cm x 13.9 cm	
	Operating Temperature	32° F to 104° F (0° C to 40° C)	
	Storage Temperature	5° F to 113° F (-15° C to 45° C)	
	Operating Relative Humidity	0 to 95% non-condensing humidity	
	Operating Elevation	0 to 10,000 ft (0 to 3000 m)	

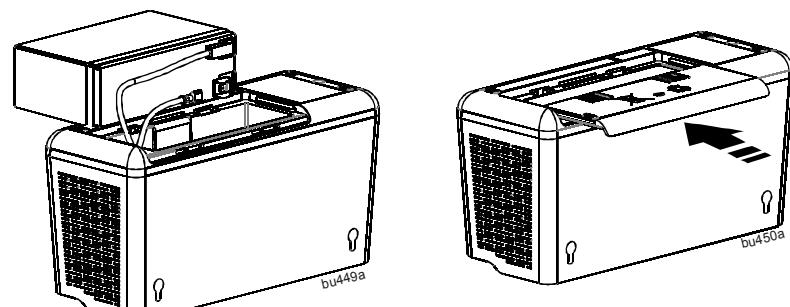
## Connect the Battery

The Back-UPS is shipped with one battery cable disconnected.



① Remove the "Stop! Connect the Battery" label that covers the outlets.

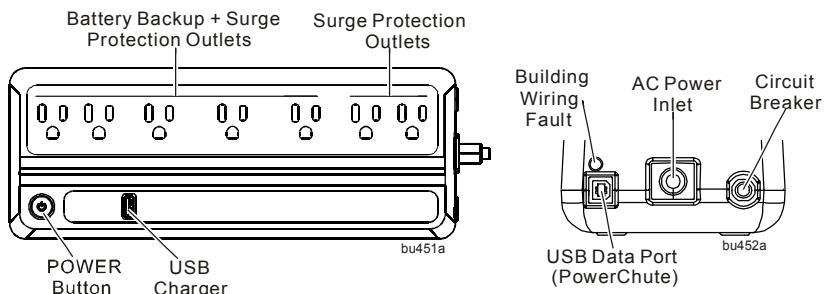
② Press the battery compartment cover release tabs located on the underside of the unit. Slide the battery cover off.



③ Connect the battery cable securely to the battery terminal. It is normal for small sparks to be seen when the battery cable is connected to the battery terminal.

④ Reinstall the battery compartment cover. Be sure that the release tabs lock into place.

## Connect Equipment



### Battery Backup + Surge Protection Outlets

Battery backup outlets provide protection to connected equipment when the Back-UPS is turned on and connected to AC power. Battery backup outlets receive power from the battery for a limited period of time when a power outage, or brownout condition occurs. Battery backup outlets provide protection from power surges or spikes. Connect a computer, monitor and other peripheral devices to these outlets.

### Surge Protection Outlets

Surge protection outlets provide protection to connected equipment when the Back-UPS is connected to AC power, and is switched on or off. Surge protection outlets provide protection from power surges or spikes. Connect peripheral devices (such as printer, scanner, etc.) that do not need to remain on during power outages or AC problems to the surge protection outlets.

### USB charging port

The USB port provides a maximum of 1.5A DC power. The USB port will provide power when the unit is on AC and on battery.

## Turn On the Back-UPS

Press the POWER button located on the top of the Back-UPS. The POWER button will illuminate green and a single short beep will indicate that the Back-UPS is on and providing protection for connected equipment.

The Back-UPS battery charges fully during the first 24 hours while connected to AC power. The Back-UPS battery will charge regardless of whether the Back-UPS is switched on or off as long as it is connected to AC power. The UPS will have full runtime capability after the initial 24 hour charging period.

If the red Building Wiring Fault indicator (located on the end near the power cord) is lit, your building wiring may present a shock hazard that should be corrected by a qualified electrician.

## Turn Off the Back-UPS

To turn off the Back-UPS, press the POWER button for at least 2 seconds. At the first beep, release the button and the UPS will turn off. A 2 second delay has been added to mitigate unintentional contact with the POWER button.

### Quick Mute

The Back-UPS is able to temporarily mute user correctable alarms such as: On Battery, Battery Disconnected and Overload.

During such alarms, a short press (less than 2 seconds) of the POWER button will temporarily mute the alarm until the condition has been reset. A short double beep will confirm that Quick Mute has been activated. Pressing the POWER button for more than 2 seconds will turn off the UPS.

Other critical events such as Battery replacement and Charger notification can not be temporarily muted. The unit in these cases must be turned off.

## On Battery Indicator Modes

This Back-UPS has 3 On Battery Indicator modes provided that the UPS is turned on. To configure an On Battery Indicator mode, hold down the POWER button and wait for the third beep. At the third beep the POWER button will cycle red / green. Release the POWER button and its color will indicate the mode the UPS is in. Press the POWER button to cycle through each mode. See the table below for the mode selection colors. Once the mode has been selected, wait 5 seconds and the setting will be committed to the UPS.

Mode	Visual Indicator	Audible Indicator	Mode Selection Color
Quiet Alarm (default)	The POWER button is solid green and flashes twice every 2 seconds.	No alarm until Low Battery notification where the alarm beeps twice every 30 seconds.	Flashing green
No Alarm	No alarm while the UPS is On Battery		Flashing red
Full Alarm	Alarm sounds 4 beeps every 30 seconds until Low Battery notification where the alarm beeps every half second. As the UPS shuts down it sounds one beep every 4 seconds.		Flashing amber

## PowerChute™ Personal Edition Software

### Overview

Use PowerChute Personal Edition software to configure the UPS settings. Protect your computer and other equipment during a power outage. During a power outage, PowerChute will save any open files on your computer and shut it down. When power is restored, it will restart the computer.

**Note:** PowerChute is only compatible with a Windows operating system. If you are using Mac OSX, use the native shutdown feature to protect your system. See the documentation provided with your computer.

### Installation

Use a USB cable to connect the Data port on the rear panel of the UPS to the USB port on your computer. On the computer, go to [www.apc.com/tools/download](http://www.apc.com/tools/download). Select "Software Upgrades - PowerChute Personal Edition" in the "Filter by Software/Firmware" drop down menu. Select the appropriate operating system. Follow directions to download the software.

## Status Indicators

Status	Power Button illumination	Audible Indicator On	Audible Indicator Terminates
<b>Power On</b> The Back-UPS is supplying AC power to connected equipment.	Solid green	None	N/A
<b>On Battery</b> Back-UPS supplying battery power to battery backup outlets.	Solid green and flashes twice every 2 seconds.		Beeping stops when AC power is restored or the Back-UPS is turned off. Applies only to modes where the on battery alarm is audible.
<b>Low Battery notification</b> The Back-UPS is supplying battery power to the battery backup outlets and the battery is near a total discharge state.	Flashes green in rapid succession.	The audible alarm depends on the On Battery Indicator mode setting. See the <i>On Battery Indicator Modes</i> section for full details.	
<b>Low Battery shutdown</b> The battery has been completely discharged while the Back-UPS is on battery, the UPS will shut down.	None		- AC power is restored - AC is not restored within 32 seconds - The Back-UPS is turned off.
<b>Sleep Mode</b> The UPS has shut down and will "awaken" once AC power is restored	None	None	N/A
<b>Replace Battery</b> • The battery is disconnected. • The battery needs to be charged, or replaced.	• Flashes red only. • Alternates green-red	• Constant tone • Constant tone	Back-UPS is turned off
<b>Overload Shutdown</b> An overload condition has occurred in one or more of the battery backup outlets while the Back-UPS is operating on battery power.	None	Constant tone	Back-UPS is turned off
<b>USB Detected Fault</b> A short circuit has been detected or an error has occurred.	Alternates green-amber	None	N/A

## Voltage Sensitivity Adjustment (optional)

The Back-UPS detects and reacts to line voltage distortions by transferring to battery backup power to protect connected equipment. In situations where either the Back-UPS or the connected equipment is too sensitive for the input voltage level it is necessary to adjust the transfer voltage.

1. Turn off the UPS while connected to a wall outlet.
2. Press and hold the **ON/OFF** button for 10 seconds. The POWER button will alternate green-red to indicate that the Back-UPS is in **Program** mode.
3. The POWER button will flash either green, amber, or red to indicate the current sensitivity level. Refer to the table for an explanation of the transfer voltage sensitivity levels.
4. To exit **Program** mode wait five seconds and all LED indicators will extinguish. **Program** mode is no longer active.

LED Flashes	Sensitivity Setting	Input Voltage Range (AC Operation)	Recommended Use
Green	LOW	88 Vac to 142 Vac	Use this setting with equipment that is less sensitive to fluctuations in voltage or waveform distortions.
Red	MEDIUM	92 Vac to 139 Vac	Factory default setting. Use this setting under normal conditions.
Amber	HIGH	96 Vac to 136 Vac	Use this setting when connected equipment is sensitive to voltage and waveform fluctuations.

## Service

If the unit requires service, do not return it to the dealer. Follow these steps:

1. Review the **Troubleshooting** section of the manual to eliminate common problems.
2. If the problem persists, contact Schneider Electric IT (SEIT) Customer Support through the APC by Schneider Electric Web site, [www.apc.com](http://www.apc.com).
  - a. Note the model number and serial number and the date of purchase. The model and serial numbers are located on the rear panel of the unit and are available through the LCD display on select models.
  - b. Call SEIT Customer Support and a technician will attempt to solve the problem over the phone. If this is not possible, the technician will issue a Returned Material Authorization Number (RMA#).
  - c. If the unit is under warranty, the repairs are free.
  - d. Service procedures and returns may vary internationally. Refer to the APC by Schneider Electric Web site for country specific instructions.
3. Pack the unit in the original packaging whenever possible to avoid damage in transit. Never use foam beads for packaging. Damage sustained in transit is not covered under warranty.
4. **Always DISCONNECT THE UPS BATTERIES before shipping. The United States Department of Transportation (DOT), and the International Air Transport Association (IATA) regulations require that UPS batteries be disconnected before shipping.** The internal batteries may remain in the UPS.
5. Write the RMA# provided by Customer Support on the outside of the package.
6. Return the unit by insured, pre-paid carrier to the address provided by Customer Support

## Replace Battery

Deliver the used battery to a recycling facility.



Replace the used battery with an APC by Schneider Electric approved battery. Replacement batteries can be ordered through the APC by Schneider Electric Web site, [www.apc.com](http://www.apc.com). Battery replacement part for Back-UPS BE600M1 / BN650M1 / BN650M1-CA / BN675M1 is **APCRBC154**.

## APC by Schneider Electric IT Customer Support Worldwide

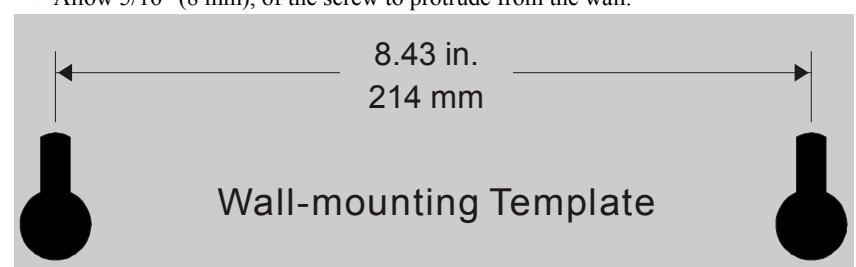
For country specific customer support, go to the APC by Schneider Electric Web site, [www.apc.com](http://www.apc.com).

## Troubleshooting

Problem and Possible Cause	Solution
<b>The Back-UPS will not turn on</b>	
The Back-UPS has not been turned on.	Press the POWER button.
The Back-UPS is not connected to AC power, there is no AC power available at the wall outlet, or the AC power is experiencing a brownout or over voltage condition.	Make sure the power cord is securely connected to the wall outlet, and that there is AC power available at the wall outlet. Where applicable, check that the wall outlet is switched on.
<b>The Back-UPS is on, the POWER button flashes red and the unit emits a constant tone</b>	
The battery is disconnected.	Refer to the <i>Connect the Battery</i> on page 1.
<b>Connected equipment loses power</b>	
A Back-UPS overload condition has occurred.	Remove all nonessential equipment connected to the outlets. One at a time reconnect equipment to the Back-UPS. Charge the battery for 24 hours to make sure it is fully charged. If the overload condition still occurs, replace the battery.
The Back-UPS battery is completely discharged.	Connect the Back-UPS to AC power and allow the battery to recharge for ten hours.
PowerChute software has performed a shutdown due to a power outage.	This is normal Back-UPS operation.
Connected equipment does not accept the step-approximated sine waveform from the Back-UPS.	The output waveform is intended for computers and peripheral devices. It is not intended for use with motor driven equipment.
The Back-UPS may require service.	Contact Schneider Electric Technical Support for more in depth troubleshooting.
<b>The POWER button is green and flashes twice every 2 seconds.</b>	
The Back-UPS is operating on battery power.	The Back-UPS is operating normally on battery power. At this point the user should save all open files, and shutdown the computer. When AC power is restored the battery will recharge.
<b>The POWER button flashes green in rapid succession.</b>	
The Back-UPS battery has approximately two minutes of remaining runtime.	The Back-UPS battery is near a total discharge state. At this point the user should save all open files, and shutdown the computer. When AC power is restored the battery will recharge.
<b>The Building Wiring Fault LED is red</b>	
The building wiring presents a shock hazard that must be corrected by a qualified electrical.	Do not operate the Back-UPS. Call a qualified electrician to correct the building wiring fault.
<b>The Back-UPS has an inadequate battery runtime</b>	
The battery is not fully charged. The battery is near the end of useful life and should be replaced.	Leave the Back-UPS connected to AC power for ten hours while the battery charges to full capacity. As a battery ages, the runtime capability decreases. Contact APC by Schneider Electric at the Web site <a href="http://www.apc.com">www.apc.com</a> , to order replacement batteries.
<b>USB charging is slow</b>	
Charging a device using the UPS's USB charger is slower than the device's original USB charger	The amount of power a device draws depends on its compatibility with the USB Battery Charging Specification 1.2. Compatible devices can draw more power than devices that are less compatible.
<b>USB charging stops and the Power On LED alternately illuminates green-amber</b>	
The USB ports has detected a short circuit or has detected a fault.	Disconnect cable and device from the USB port. USB charging will resume when the POWER button turns green. Contact SEIT Technical Support if the POWER button remains green-amber.
<b>The UPS and outlets are off but the UPS keeps beeping twice every 30 seconds (Quiet Alarm mode) or keeps beeping once every 4 seconds (Full Alarm mode)</b>	
In this situation the voltage is not low enough to shutdown the UPS but not high enough to start the UPS and power the outlets. There is however enough voltage to charge the UPS.	Use Quick Mute to mute the alarm. The UPS will return to normal operation once the AC input voltage has returned to a normal range

## Wall Mount Installation

- Horizontal installation, use 2 screws 8.43" (214 mm) apart.
- Allow 5/16" (8 mm), of the screw to protrude from the wall.



## Warranty

Register your product on-line. <http://warranty.apc.com>

The standard warranty is three (3) years from the date of purchase. Schneider Electric IT (SEIT) standard procedure is to replace the original unit with a factory reconditioned unit. Customers who must have the original unit back due to the assignment of asset tags and set depreciation schedules must declare such a need at first contact with an SEIT Technical Support representative. SEIT will ship the replacement unit once the defective unit has been received by the repair department, or cross ship upon the receipt of a valid credit card number. The customer pays for shipping the unit to SEIT. SEIT pays ground freight transportation costs to ship the replacement unit to the customer.

## EMC Compliance

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.



Select models are ENERGY STAR® qualified.

For more information go to [www.apc.com/site/recycle/index.cfm/energy-efficiency/energy-star/](http://www.apc.com/site/recycle/index.cfm/energy-efficiency/energy-star/).

This UPS is certified to comply with California Battery Charger System regulations. For more information go to [www.apc.com/site/recycle/index.cfm/energy-efficiency/cec-battery-charger/](http://www.apc.com/site/recycle/index.cfm/energy-efficiency/cec-battery-charger/)

# **SIEMENS**



## **PXC Modular Series Owner's Manual**

# Copyright Notice

## Notice

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## Warning

This equipment generates, uses, and can radiate radio frequency energy. If equipment is not installed and used in accordance with the instructions manual, it may cause interference to radio communications. Equipment has been tested and found to comply within the limits for a Class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. Residential area equipment users are required to take whatever measures necessary to correct the interference at their own expense.

## Service Statement

Control devices are combined to make a system. Each control device is mechanical in nature and all mechanical components must be regularly serviced to optimize their operation. Siemens Industry, Inc. branch offices and authorized distributors offer Technical Support Programs that will ensure continuous, trouble-free system performance.

For further information, contact your nearest Siemens Industry, Inc. representative.

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## FCC Regulations

The manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

*NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- *Reorient or relocate the receiving antenna.*

- 
- *Increase the separation between the equipment and receiver.*
  - *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
  - *Consult the dealer or an experienced radio/TV technician for help.*

## To the Reader

Your feedback is important to us. If you have comments about this manual, please submit them to: [mailto:Sbt\\_technical.editor.us.sbt@siemens.com](mailto:Sbt_technical.editor.us.sbt@siemens.com)

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Printed in USA



# Table of Contents

	<b>How to Use This Manual .....</b>	<b>8</b>
<b>1</b>	<b>Chapter 1—Introduction .....</b>	<b>11</b>
1.1	Modular Product Overview .....	11
	1.1.1    Ordering Information .....	11
1.2	Compatibility with the APOGEE Automation System.....	13
	1.2.1    BACnet Protocol Compatibility.....	13
	1.2.2    TCP/IP Protocol Compatibility .....	14
1.3	Principles of Field Panel Operation.....	15
	1.3.1    Gathering and Processing Field Inputs.....	15
	1.3.2    Executing Control Programs.....	16
	1.3.3    System Program .....	16
	License Manager .....	17
1.4	APOGEE Automation Networking .....	18
	1.4.1    Management Level Network .....	18
	1.4.2    Automation Level Network .....	18
	1.4.3    Field Level Network .....	25
<b>2</b>	<b>Chapter 2—Hardware Features.....</b>	<b>26</b>
	PXC Modular Product Diagram.....	26
	Expansion Module Product Diagram.....	28
2.1	Memory.....	28
	2.1.1    Flash Read-Only Memory (Flash ROM) .....	28
	2.1.2    Random Access Memory (RAM) .....	30
2.2	Communication Connections .....	30
	2.2.1    HMI and Tool Ports .....	31
	2.2.2    10B/100B Ethernet Port .....	32
	2.2.3    RS-485 Port .....	32
	2.2.4    Expansion Module Overview .....	33
	2.2.5    TX-I/O Island Bus.....	34
	Modular Series Smoke Control Application Requirements .....	34
	Example ALN Configuration for Smoke Control Applications.....	35
	PXM10S/T Product Overview and Description .....	36
	Product Features .....	37
	Requirements.....	38
	Application Menus.....	38
	Operator Display Layout .....	39
	Operator Display Menu Tree.....	41
	Main Menu Structure.....	41
	Login and Logoff .....	42
	Viewing, Commanding, and Releasing Points.....	48
	Configuring Point Monitor .....	52

	Configuring Settings.....	55
2.3	TX-I/O Product Range Overview.....	58
2.3.1	TX-I/O Module Overview.....	58
	TX-I/O Power Supply and Bus Modules .....	62
2.4	PX Series Enclosures and Service Boxes.....	65
2.4.1	PX Series Service Box Features.....	65
2.4.2	Product Numbers .....	67
2.4.3	PX Series Enclosure Specifications.....	68
2.4.4	PX Series Service Box Specifications.....	69
2.4.5	PX Series Enclosure Placement .....	69
	<b>Chapter 3—Applications.....</b>	<b>72</b>
	Operator Interface .....	72
	Field Panel GO.....	72
	Field Panel Web Server.....	73
	Powers Process Control Language (PPCL) Control Program and Point Database	74
	Control Programs .....	74
	Point Database.....	75
	Applications .....	75
	Adaptive Control.....	75
	Alarm Management.....	76
	Daylight Saving Time .....	76
	Equipment Scheduling .....	76
	Loop/Loop Tuning .....	76
	Start-Stop Time Optimization (SSTO).....	76
	Time and Calendar.....	77
	Trend Data Collection .....	77
	User Access and Privileges .....	77
	Customized Applications .....	78
	SNMP .....	78
<b>3</b>	<b>Chapter 4—Troubleshooting.....</b>	<b>79</b>
3.1	Service Information.....	79
3.1.1	Electrostatic Discharge .....	80
3.1.2	Error Status Messages.....	80
3.1.3	Ordering Replacement Parts .....	80
3.1.4	Replacing the Batteries .....	80
3.1.5	Reinstalling the Mounting Tabs.....	81
3.2	Troubleshooting Modular Field Panels.....	82
3.2.1	BATT LOW LED .....	82
3.2.2	RUN LED .....	83
3.2.3	TX and RX LEDs.....	83
3.2.4	Communication .....	83
3.2.5	Display.....	83
3.2.6	Errors.....	84

Troubleshooting the TX-I/O Island Bus .....	84
<b>Glossary .....</b>	<b>86</b>
<b>Index .....</b>	<b>90</b>

# How to Use This Manual

## About This Manual

This manual is written for the owner and user of the PXC Modular Series. It is designed to help you become familiar with the PXC Modular and its applications.

This section covers manual organization, document conventions and symbols used in the manual, how to access help, related publications, and any other information that will help you use this manual.

## Document Organization

This manual contains the following chapters:

- *Chapter 1—Introduction*, describes each section in this manual and presents an overview of PXC Modular operation.
- *Chapter 2—Hardware Features*, describes the PXC Modular hardware components and their functions.
- *Chapter 3—Applications*, describes the operating system and applications available with the PXC Modular.
- *Chapter 4—Troubleshooting*, describes basic corrective measures you should take if you encounter a problem when using a PXC Modular.



### NOTE:

The troubleshooting section is not meant to be a full diagnostic guide, but is designed to help you address basic troubleshooting issues. If you encounter a problem not covered in this section or require further assistance, consult your Siemens Industry representative.

- 
- A *Glossary* describes the terms and acronyms used in this manual.
  - An *Index* is provided to assist you in finding information presented in this manual.

## Prerequisites

In addition to reading this owner's manual, you should also become familiar with the following technical documentation. Each document has been written to help you get the most out of your PXC Modular Series hardware.

These manuals, along with information about other Siemens Industry products, technical training classes, and services can be obtained from your local Siemens Industry representative.

- *Powers Process Control Language (PPCL) User's Manual* (125-1896). This manual describes Powers Process Control Language (PPCL), the language used to write the control programs for the PXC Modular.
- *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020). This manual describes the operator interface program used to communicate with APOGEE field panels. It contains information on defining the PXC Modular database, including slopes and intercepts.

## For Smoke Control Applications

*Smoke Control Systems Application and Engineering Manual* (125-1806). This manual is a comprehensive reference on smoke control applications for APOGEE equipment. It contains all of the various agency requirements and recommended practices of organizations that are widely-recognized in composing standards and testing equipment involved in life safety applications.

## When Using Insight Software

*Insight 3.x Documentation*. To view Insight 3.x documentation, see the Insight Online Documentation window, which you can access from the Insight Main Menu or the Insight program group.

## Document Conventions

The following table lists conventions to help you use this manual in a quick and efficient manner.

Convention	Examples
Numbered Lists (1, 2, 3...) indicate a procedure with sequential steps.	1. Turn OFF power to the field panel. 2. Turn ON power to the field panel. 3. Contact the local Siemens Industry representative.
Conditions that must be completed or met before beginning a task are designated with a <b>&gt;</b> .  Intermediate results (what will happen following the execution of a step), are designated with a <b>⇒</b> .  Results, which inform the user that a task was completed successfully, are designated with a <b>⇒</b> .	<b>&gt;</b> Composer software is properly installed. <b>&gt;</b> A Valid license is available. 1. Select <b>Start &gt; Programs &gt; Siemens &gt; GMS &gt; Composer</b> . ⇒The Project Management window displays. 2. Open an existing project or create a new one. ⇒The project window displays.
Actions that should be performed are specified in boldface font.	Type <b>F</b> for Field panels. Click <b>OK</b> to save changes and close the dialog box.
Error and system messages are displayed in Courier New font.	The message <b>Report Definition successfully renamed</b> displays in the status bar.
New terms appearing for the first time are italicized.	The field panel continuously executes a user-defined set of instructions called the <i>control program</i> .
	This symbol signifies Notes. Notes provide additional information or helpful hints.
Cross references to other information are indicated with an arrow and the page number, enclosed in brackets: [→92]	For more information on creating flowcharts, see Flowcharts [→92].

## Safety Symbols

The following table lists the safety symbols used in this manual to draw attention to important information.

Symbol	Meaning	Description
<b>NOTICE</b>	CAUTION	Equipment damage may occur if a procedure or instruction is not followed as specified. (For online documentation, the NOTICE displays in white with a blue background.)
	CAUTION	Minor or moderate injury may occur if you do not perform a procedure as specified.
	WARNING	Personal injury or property damage may occur if you do not perform a procedure as specified.
	DANGER	Electric shock, death, or severe property damage may occur if you do not perform a procedure as specified.

## Getting Help

For more information about APOGEE products, contact your local Siemens Industry representative.

# 1 Chapter 1—Introduction

Chapter 1 provides an introduction to the PXC Modular Series and how it is integrated with the APOGEE Automation System. The following topics are discussed:

- PXC Modular Series Product Overview
- Compatibility with the APOGEE Automation System
  - BACnet Protocol Compatibility
  - TCP/IP Protocol Compatibility
- Principles of PXC Modular Operation
  - Gathering and Processing Field Inputs
  - Executing Control Programs
  - System Program
- APOGEE Automation Networking
  - Management Level Network
  - Automation Level Network
  - Field Level Network

## 1.1 Modular Product Overview

The PXC Modular is an integral part of the APOGEE Automation System. It is a high performance, modular Direct Digital Control (DDC) supervisory field panel.

The field panel operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher level processor.

- Up to 100 PXC Modular field panels communicate on a peer-to-peer network.
- With the addition of TX-I/O modules and a TX-I/O Power Supply on a self-forming bus, the PXC Modular can directly control up to 500 points.



See the *APOGEE Wiring Guidelines for Field Panels and Equipment Controllers* (125-3002) for information on setting up this configuration.

- With the addition of an Expansion Module, the PXC Modular also provides central monitoring and control for distributed wireless or wired Field Level Network (FLN) devices.

### 1.1.1 Ordering Information

Product Number	Description
PXC00-E96.A	PXC Modular, BACnet/IP or MS/TP ALN, P1 or MS/TP FLN. PXX-485.3 is also required as the connection to the FLN devices.
PXC00-PE96.A	PXC Modular, Ethernet/IP or RS-485 ALN, P1 FLN. PXX-485.3 is also required as the connection to the FLN devices.
PXC100-E96.A	PXC Modular, BACnet/IP or MS/TP ALN, P1 or MS/TP FLN, self-forming TX-I/O Island Bus. PXX-485.3 is also required as the connection to the FLN devices.

Product Number	Description
PXC100-PE96.A	PXC Modular, Ethernet/IP or RS-485 ALN, P1 FLN, self-forming TX-I/O Island Bus. PXX-485.3 is also required as the connection to the FLN devices.
PXX-485.3	Provides FLN support for the PXC Modular. Includes three RS-485 P1 FLN connections or one MS/TP FLN connection; maximum of 96 devices supported.

### Optional Licenses

Product Number	Description
PXF-TXIO.A	License to enable the Island Bus on PXC00-E96.A and PXC00-PE96.A.
LSM-FPGO	License to enable Field Panel GO
LSM-SNMP	License to enable SNMP Agent on Siemens Modular or Compact hardware with BACnet Firmware Revision 3.2.3
LSM-VAEM	License to enable Virtual AEM support when the P2 ALN is connected to RS-485
LSM-FPWEB	License to enable BACnet Web Server (PXC-36) or Web Services (PXC-16/24)

### TX-I/O I/O Modules

Product Number	Description
TXM1.8D	TX-I/O Module, 8 DI points
TXM1.16D	TX-I/O Module, 16 DI points
TXM1.8U	TX-I/O Module, 8 Universal points
TXM1.8U-ML	TX-I/O Module, 8 Universal points with LOID
TXM1.8X	TX-I/O Module, 8 Super Universal points
TXM1.8X-ML	TX-I/O Module, 8 Super Universal points with LOID
TXM1.6R	TX-I/O Module, 6 DO with Relay points
TXM1.6R-M	TX-I/O Module, 6 DO with Relay points with manual override

### TX-I/O Power Supply and Bus Modules

Product Number	Description
TXS1.12F4	TX-I/O Power Supply, 1.2A, 4A Fuse
TXS1.EF4	TX-I/O Bus Connection Module, 4A Fuse
TXA1.IBE	TXIO Island Bus Expansion module with RS-485 connection.
TXB1.P1	TX-I/O Bus Interface Module, P1 (10-module)
TXB1.P1-4	TX-I/O Bus Interface Module, P1 (4-module)

### Accessories

Product Number	Description
TXA1.K12	One set of address keys, numbers 1 - 12.
TXA1.K24	One set of address keys, numbers 1 - 24.
TXA1.K-48	One set of address keys, numbers 25 - 48.

Product Number	Description
TXA1.K-72	One set of address keys, numbers 49 - 72.
TXA1.LLT-P100	Labels for TX-I/O, 100 sheets/pack, letter format.
TXA1.LH	Replacement label holders.

## 1.2 Compatibility with the APOGEE Automation System

The PXC Modular Series is fully compatible with, and will communicate with, all the APOGEE or pre-APOGEE products in your facility.

For more information on compatibility of products, contact your Siemens Industry representative.

	<b>CAUTION</b> <p>When working on a network with multiple firmware revisions, always connect to the operator interface at the field panel with the newest firmware revision. Otherwise, you will not be able to view features in newer firmware revisions, or you may coldstart the field panel.</p>
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### 1.2.1 BACnet Protocol Compatibility

APOGEE BACnet is compatible with the BACnet/IP protocol.

	<b>CAUTION</b> <p>When sharing data values from APOGEE P2 (proprietary) field panels to BACnet devices, the Cross-Trunk Service does not support requests originating from BACnet devices to access points (objects) that reside in APOGEE P2 field panels. If you plan to share data values from APOGEE P2 field panels with BACnet devices (field panels), you must do one of the following:</p> <ul style="list-style-type: none"> <li>• Install and enable the Insight BACnet Server Option.</li> <li>• Use PPCL in the APOGEE P2 field panels to command values in the BACnet devices through the Insight Cross-Trunk service.</li> </ul>
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### APOGEE P2 and BACnet Product Features Order of Implementation

The APOGEE field panel firmware supports the BACnet protocol as follows:

- If both the BACnet and APOGEE protocols have a function, the BACnet function is implemented.
- If APOGEE provides a function that the BACnet protocol does not support, the APOGEE function is retained.

This approach to BACnet implementation retains the APOGEE feature set while providing compatibility with standard BACnet/IP protocol.

## 1.2.2 TCP/IP Protocol Compatibility

PXC Modular Series controllers with BACnet/IP or Ethernet TCP/IP (P2) ALN provide the following:

- 100% compatibility with the TCP/IP protocol suite.
- Support of Dynamic Host Configuration Protocol (DHCP) and Domain Name Servers (DNS).
- Support and auto detection of 10Base-T and 100Base-TX Ethernet.

### 1.2.2.1 Required IP Addresses

APOGEE BACnet/IP or Ethernet TCP/IP (P2) ALN uses:

- One IP address per device (field panel or Insight workstation).
- One additional shared IP address per ALN for the multicast group (when using multicast optimization).

### 1.2.2.2 Device Registration

Devices register with the DHCP server and Domain Name Server, if either is present.

### 1.2.2.3 Address Assignment

IP addresses are dynamically assigned by the DHCP server.

If an address changes or is not recognized, the field panel firmware lets you release the dynamically assigned IP address and then reconnect the field panel to the DHCP server, accepting a new IP address assignment in the process.

If there is no DHCP server at the site, you must manually assign static IP addresses as part of the startup system configuration.

#### Physical Addressing

Each device on the BACnet/IP or Ethernet TCP/IP (P2) ALN has a hard-wired MAC address, which is printed on the product label.

#### Port Numbers

The default TCP/IP port number for APOGEE BACnet/IP or Ethernet TCP/IP (P2) ALN communications is **5033**. You can change the TCP/IP port number if necessary.



#### NOTE:

All devices on the network must use the same TCP/IP port number.

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The default TCP/IP port number for Virtual AEM communications is **3001**.

You must specify a UDP port number when using multicast optimization. The default UDP port number is **8**.

## Network Bandwidth

BACnet/IP or Ethernet TCP/IP (P2) ALN does not add significantly to your network overhead. Burst conditions for this product occur during:

- Database downloading after coldstart.
- Database uploading.
- Trend data uploading.
- Burst of alarms or COVs.

## Data Exchange

BACnet/IP or Ethernet TCP/IP (P2) ALN sends and receives APOGEE data in TCP/IP packets.

BACnet/IP or Ethernet TCP/IP (P2) ALN synchronizes global data between all devices. Each device runs a global data replication engine that communicates with peer devices to:

- Exchange new and changed global data.
- Resolve conflicts when data does not match.

## Device Naming Conventions

Field panel DNS node names are limited to 30 characters and cannot contain spaces.

## Network Security

BACnet/IP or Ethernet TCP/IP (P2) ALN uses your intranet security within the firewall and a username/password combination to restrict access outside the firewall. You can use VLAN to improve internal security.

# 1.3 Principles of Field Panel Operation

The PXC Modular Series gathers information about the environment of your facility, as well as the equipment it monitors and controls. The PXC Modular receives updated information, stores information, executes control programs, handles operator commands and requests, and makes control management decisions. At the same time, the PXC Modular also translates decisions into actions and allows the operator to observe those actions. The operator can also override and modify the decisions made by the PXC Modular.

## 1.3.1 Gathering and Processing Field Inputs

The PXC Modular samples the information at all field inputs, or points, approximately once each second, and stores numerical representations of the sampled values.

Under certain conditions, some points require additional handling. The PXC Modular initiates required actions after these points are checked against previously-entered configuration data.

### Example

A log entry might be required in a point history file every 20 samples, or notification of an alarm condition could be sent to the operator as a point crossed the alarm threshold.

### 1.3.2 Executing Control Programs

The PXC Modular continuously executes a user-defined set of instructions called the control program. This program uses the most recent point values and the most recent clock time. The control program does the following:

- Evaluates control strategies.
- Uses an internal calendar and time clock for time-based functions.
- Updates point values and commands field points according to the program results.
- Sends messages or reports to proper terminal locations as needed.

#### Example

During occupied hours (7:00 A.M. through 5:00 P.M.) a fan:

- Turns ON if the room temperature rises above 80°F (27°C).
- Turns OFF when the temperature drops below 73°F (23°C).

Between 5:00 P.M. and 7:00 A.M. the fan turns OFF regardless of the room temperature.

If the temperature rises to 85°F (29°C) at any time, the PXC Modular sends an alarm message to an alarm printer.

These specifications can be met by:

1. Connecting a room temperature sensor/transmitter and fan starter output to the PXC Modular.
2. Defining the room temperature sensor with a high alarm limit of 85°F (29°C) and the fan points in the PXC Modular database.
3. Writing a short control program that defines your control strategy.
4. Enabling the execution for that portion of the control program.

To perform this control strategy, the PXC Modular:

- Continuously executes the control program.
- Samples a current or voltage signal representing the room temperature and updates the value associated with that temperature in its memory.
  - If the temperature rises to 85°F (29°C), then the PXC Modular sends an alarm message to the printer.
- Checks the current time once per second.
  - Between 5:00 P.M. and 7:00 A.M., the fan remains OFF.
  - Between 7:00 A.M. and 5:00 P.M., the control program checks the current value of the temperature and sends the appropriate ON or OFF command to the fan starter.

If the ON command is issued, the PXC Modular updates the value of the starter point in its memory to reflect the current state of the fan.

### 1.3.3 System Program

The PXC Modular contains a non-volatile system program called firmware, which can be upgraded in the field. The firmware is stored in Flash ROM memory, which keeps it

virtually immune to all forms of power fluctuations or failure, including battery failure. For more information on Flash ROM memory, see Memory [→ 28].

General functionality of the firmware includes:

- Executing control programs.
- Communicating between other field panels and the Insight workstation.
- Monitoring points.
- Managing point-related information.
- Keeping track of real time (both clock and calendar time).
- Executing self-test and error detection in the PXC Modular.

## License Manager

License Manager adds applications or functionality to a field panel without the need to replace the hardware or perform a firmware flash. Field panels with Firmware Revision 2.8.2/3.0.1 or later support the License Management attribute.

Contact your Siemens Industry representative for more information on applications and functionality that can be activated through License Manager.

### License Manager Definitions

- A *feature* is an application or additional functionality that can be added to a field panel without the need to replace the hardware. Some features require a firmware flash.
- A *license* is the code provided by Siemens Industry to unlock a feature.
- The *ID\_STRING* is a unique identifier that distinguishes an individual piece of hardware. It is composed of the panel's part number, revision, year and week of manufacture, and serial number. Therefore, a license for one field panel will not work on another field panel.

## How does License Manager Work?

Field panels can either be ordered with licensed features and functionality pre-loaded, for example, FLN or TX-I/O island bus support, or upgraded to add special features, for example, integration drivers, Field Panel GO, and Virtual AEM.



#### NOTE:

The installation of some features and licenses require that the field panel be coldstarted, while others do not. For example, Field Panel GO requires the creation of Web server folders and therefore requires that the field panel be coldstarted. However, TX-I/O module installation does not.

Any or all of the licensed features can be activated at any time using licenses acquired from Siemens.

When the field panel is powered, the firmware reviews the inventory of installed features, comparing that list to the License Vault, where all installed licenses are stored. Every feature with a corresponding license is initiated and run. Because licenses are loaded into non-volatile memory, powering down the field panel will not erase them.

## 1.4 APOGEE Automation Networking

The following levels of networking provide varying levels of system integration in the APOGEE Automation System.

- Management Level Network (MLN)
- Automation Level Network (ALN)
- Remote Automation Level Network
- Field Level Network (FLN)

These systems also use a number of network protocols that add functionality or provide support for third-party devices.

### 1.4.1 Management Level Network

The Management Level Network (MLN) is the communications connection between individual Insight workstations. It allows multiple Insight users to access the entire APOGEE Automation System.

- An MLN is a TCP/IP Server-client network, and usually resides on the corporate LAN.
- APOGEE Automation Systems without an Insight workstation do not have a Management Level Network.

### 1.4.2 Automation Level Network

The APOGEE Automation Level Network (ALN) provides field panel-to-field panel and Insight workstation-to-field panel communication. The ALN types are:

- P2 RS-485 ALN
- Ethernet TCP/IP ALN
- Remote ALN (Auto-dial and AEM)
- BACnet/IP ALN
- BACnet Master-Slave/Token Passing (MS/TP) ALN

#### 1.4.2.1 Simultaneous ALN Access

More than one operator or field panel can access the network at one time. For example, as one operator accesses the system, another operator can access the system at another terminal (or from a remote site using a modem). This ensures that field panels can send alarm information to the alarm printer even as an operator accesses other information.

#### 1.4.2.2 How Information Moves Through the Network

When an operator issues a command over the ALN network through a field panel, that field panel validates the command, determines where to send it, and then passes the command to the destination over the network.

##### Example

In the figure *Commanding Over an Automation Level Network*, the operator at the Insight workstation, located in the lower level of the building, issues a command to control the main air-handling unit (AHU) of the building. This command is sent by the communication network to the field panel located on the top floor.

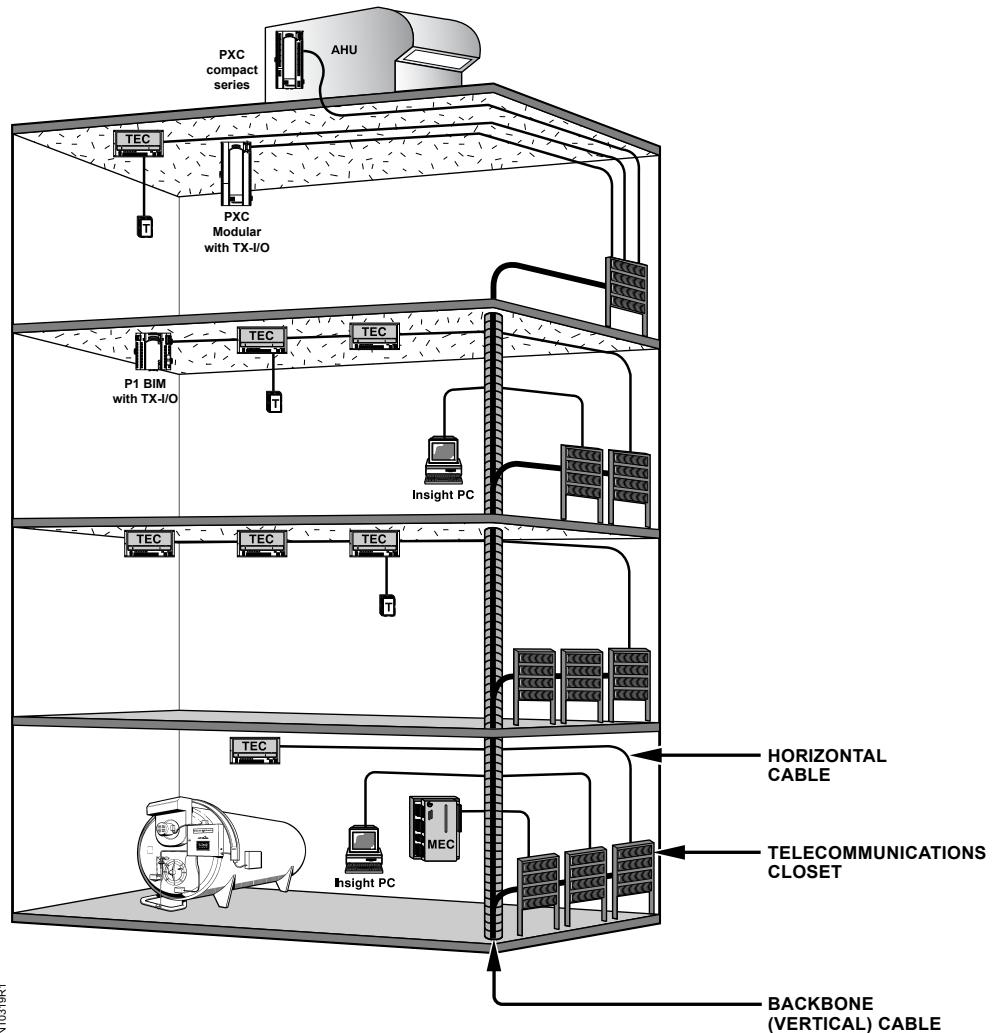


Figure 1: Figure. Commanding Over an Automation Level Network.

#### 1.4.2.3 RS-485 P2 Automation Level Network

The RS-485 ALN is a proprietary token-passing network that communicates over RS-485 cabling. It is Protocol 3 (P3) at and above 38,400 bps, and Protocol 2 (P2) below 38,400 bps.

- An Insight workstation is optional with this ALN.
- Up to 100 field panels (99 with an Insight workstation) can be connected and can communicate by means of an RS-485 peer-to-peer network.
- Information can be sent and retrieved across the RS-485 ALN from any connected field panel.

## Media

The RS-485 ALN can communicate over one or more of the following:

- Physical wire (RS-485 cabling)
- Dedicated telephone lines
- Leased-line modems
- Line drivers
- Trunk Isolator Extenders (TIE)
- Fiber Optic Interfaces

The trunk system provides connections within buildings or between buildings for multiple field panels and operator workstations.

The following figure shows a possible implementation of an RS-485 ALN network.

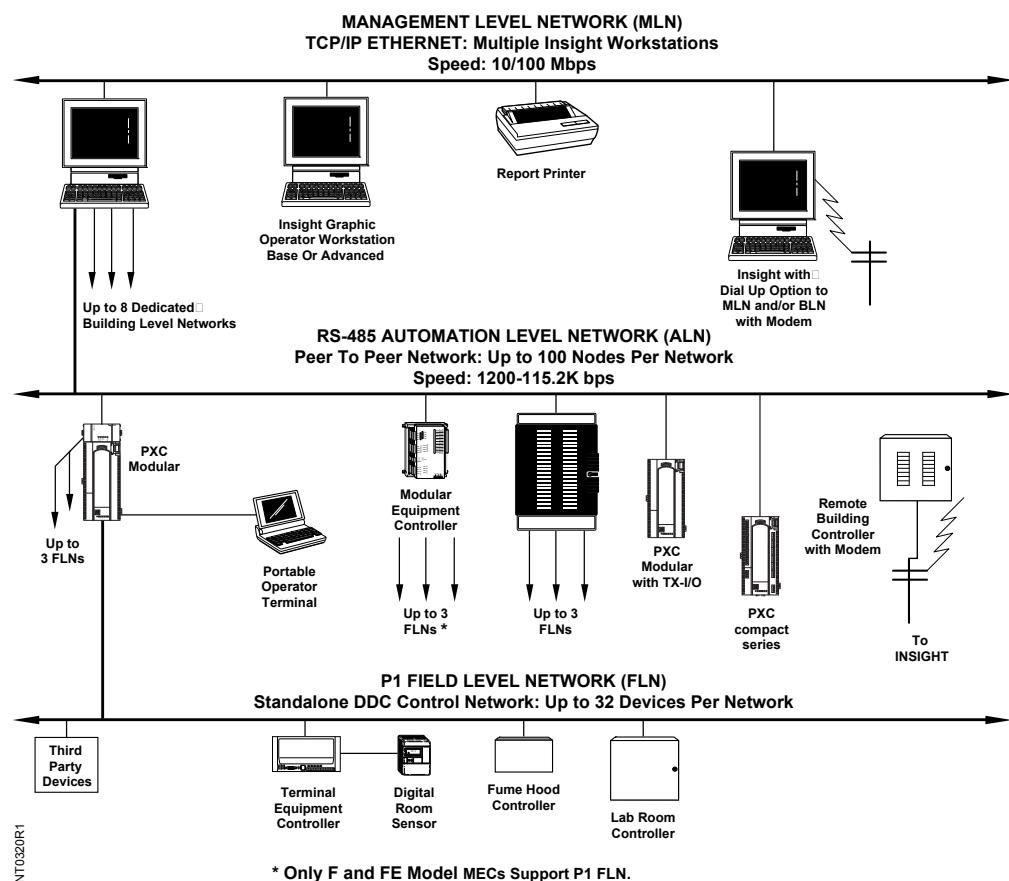


Figure 2: MLN, RS-485 ALN, and P1 FLN network example.

### 1.4.2.4 Ethernet TCP/IP Automation Level Network

The Ethernet Automation Level Network (EALN) uses TCP/IP-based communication over a customers Ethernet cabling and IP network to reduce overall system and maintenance costs. Otherwise, system operation is identical to RS-485 ALN installations.

- An Insight workstation is optional with this ALN.

- When an Insight workstation is used, multiple Insight workstations can be defined on the MLN.
- A maximum of 1000 Ethernet field panels can be defined for each Insight workstation on the MLN.
- Each Insight workstation can host up to 64 EALNs.
- The Insight workstation counts as a node on every EALN to which it is connected.

Information can be sent and retrieved across the EALN from any Ethernet capable field panel. The following figure shows a possible implementation of EALN over a corporate IP network. In this example, the MBCs contain Power Open Processors with Ethernet ALN.

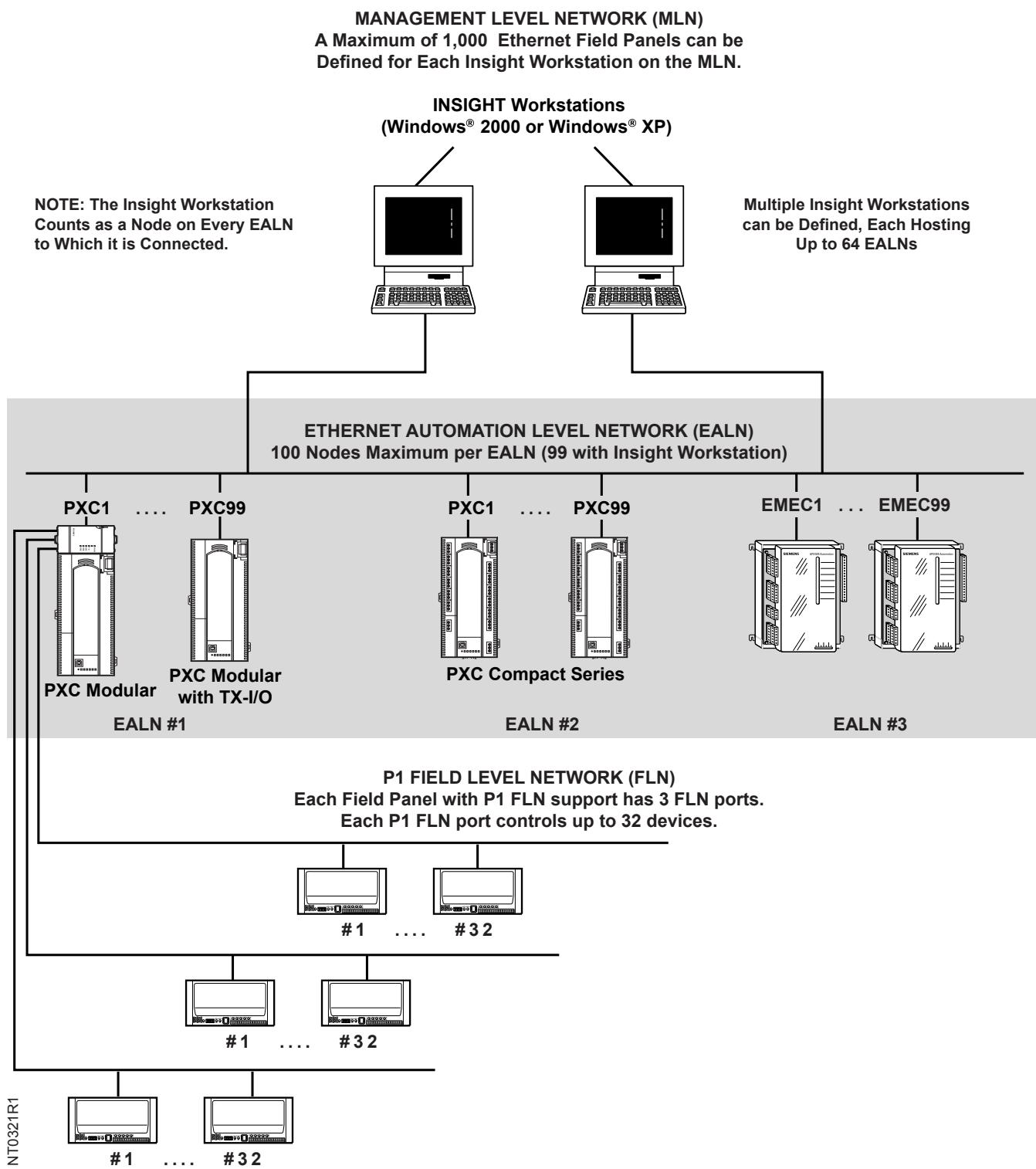


Figure 3: MLN, Ethernet ALN, and P1 FLN network example.

#### 1.4.2.5 Remote Automation Level Network (Single Field Panel Remote Sites)

One PXC Modular can act as a stand-alone field panel. A stand-alone field panel is generally used in remote sites where only one field panel is needed to control the equipment for that site. Communications with the remote site are achieved by using modems or the Virtual APOGEE Ethernet Microserver (AEM).

The remote site PXC Modular can initiate a telephone call to a device such as a personal computer running Insight software, a dumb terminal, or a printer. Once the remote site connects to the device, an alarm or other user-defined event is issued. When the remote site no longer requires the connection to the device, the remote site disconnects. The remote site can also receive telephone calls from a device running Insight software to allow for centralized access of a local network's database.

The Virtual APOGEE Ethernet Microserver (AEM) allows an Automation Level Network (ALN) to be connected directly to an Ethernet network at all times (versus a modem, which connects when necessary). The ALN can consist of a single remote field panel or a maximum of 32 field panels.

For local access, operators can communicate with the remote site by physically connecting to the field panel via an operator's terminal. When an operator issues a command, the field panel validates the command and sends it to the appropriate device.

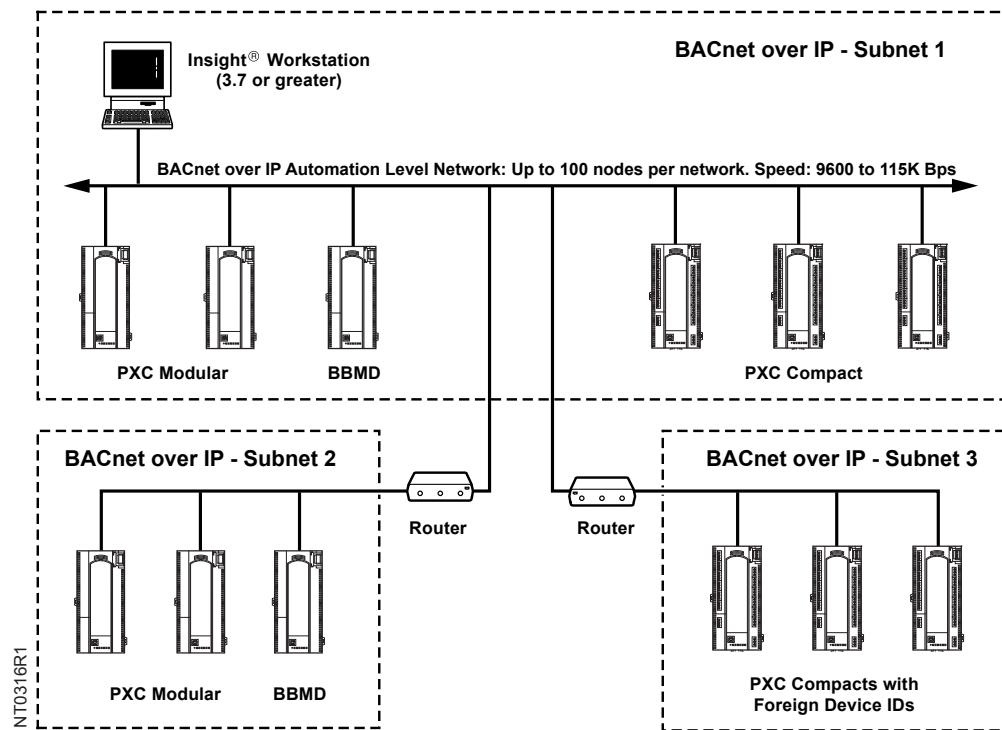
For more information about remote site field panels, contact your Siemens Industry representative.

#### 1.4.2.6 BACnet/IP Automation Level Network

BACnet field panels communicate over a customer's Ethernet cabling and IP network using the ASHRAE Building Automation and Control Networking (BACnet) protocol.

- One Insight workstation can administer up to 64 Ethernet-based BACnet/IP ALNs.
- Up to 100 BACnet/IP or Ethernet TCP/IP (P2) field panels can reside on a BACnet/IP network (1000 maximum per Insight workstation).
- Because they use different networking protocols, APOGEE P2 Ethernet TCP/IP and BACnet/IP field panels cannot communicate directly with each other, even on the same physical network.

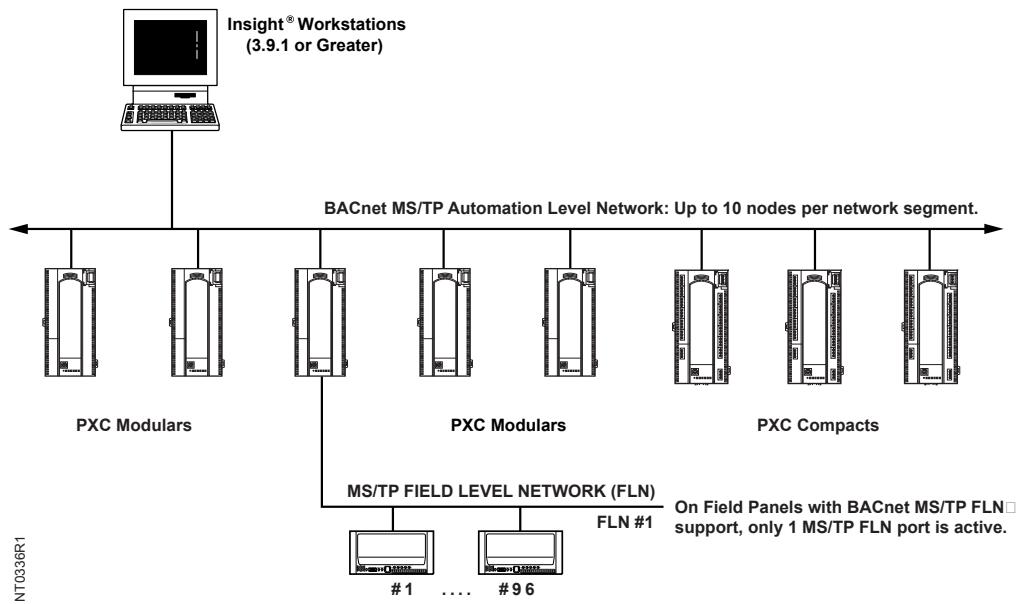
The following figure shows a possible implementation of APOGEE P2 Ethernet ALN and BACnet/IP ALN over a corporate IP network.



#### 1.4.2.7 BACnet MS/TP Automation Level Network

BACnet field panels communicate over a customer's Ethernet cabling and IP network using the ASHRAE Building Automation and Control Networking (BACnet) MS/TP protocol.

- One Insight workstation can administer up to 64 Ethernet based MS/TP ALNs.
- Up to 10 BACnet MS/TP ALN field panels can reside on an MS/TP network segment (1000 maximum per Insight workstation). Network segments must be physically separated.
- BACnet devices (field panels or Insight workstations) can be set up as one of the following:
  - A standard BACnet MS/TP device
  - A BACnet Broadcast Management Device (BBMD)
  - A foreign device



### 1.4.3 Field Level Network

The APOGEE Field Level Network (FLN) is a data communications network that passes information between an FLN device or devices and an Automation Level Network (ALN) device, usually within one building. FLNs consist of devices that communicate using RS-485 P1 or MS/TP.

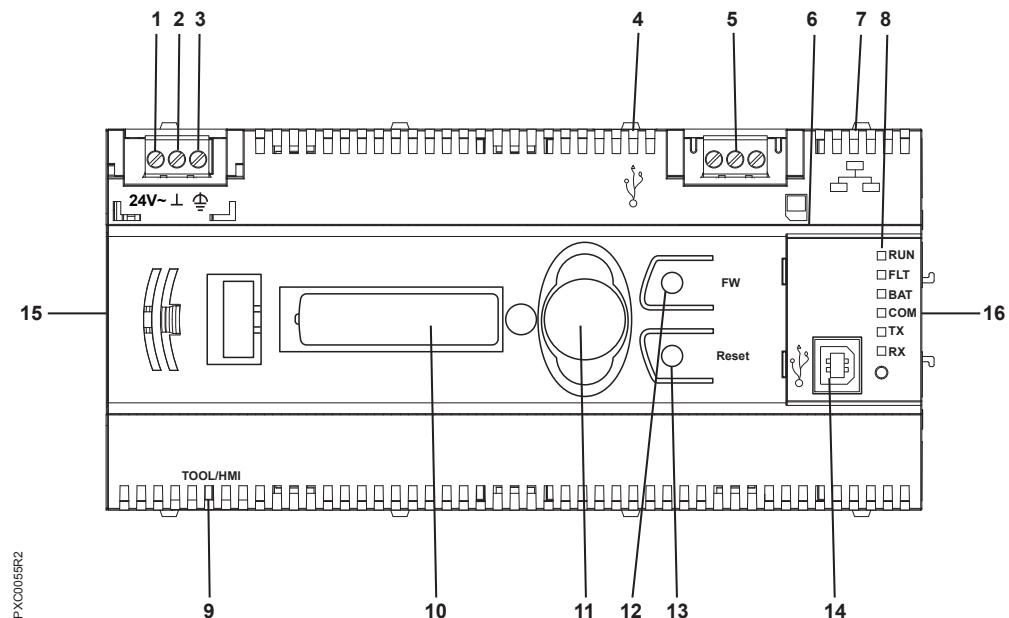
- P1 devices can include Terminal Equipment Controllers (TEC), Fume Hood Controllers (FHC) and other vendor equipment, such as ABB Speed Drives, which contain Protocol 1.
- Selected models of APOGEE field panels can communicate with other vendor protocols on the FLN, such as McQuay, Lumisys, EST IRC-3, and Allen Bradley. Contact your Siemens Industry representative for information on devices that can communicate with other vendor protocols.

## 2 Chapter 2—Hardware Features

Chapter 2 describes the PXC Modular Series components and functions, as well as the enclosure used for the PXC field panel series. The following topics are discussed:

- Product Diagrams
- Backup Batteries
- Memory
- Communication Connections
- PXC Modular Series Specifications
- Modular Series Smoke Control Application Requirements
- TX-I/O Product Range
- PX Series Enclosures and Service Boxes

### PXC Modular Product Diagram

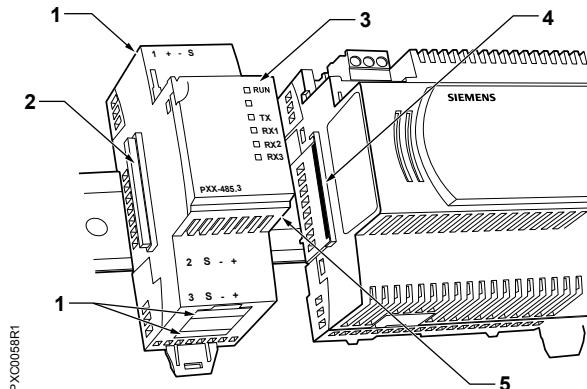


**Modular Series Features, Symbols, and Status LEDs.**

Label	LED, Symbol, or Feature	Status	Indication
1	24V~	-	Supply voltage, 24 Vac input.
2	⊥	-	System neutral.
3	⏚	-	Functional earth ground.
4	USB	-	USB Host port. (Ancillary smoke control applications only.)
5	S - +	-	RS-485 P2 or BACnet MS/TP Automation Level Network (ALN) port.

Modular Series Features, Symbols, and Status LEDs.			
Label	LED, Symbol, or Feature	Status	Indication
6		-	Secure Digital (SD) memory card slot. (For future use.)
7		-	BACnet/IP or Ethernet TCP/IP (P2) Automation Level Network (ALN) port.
8	RUN (green)	ON	Normal operation. 24 Vac power is ON and the application firmware has booted.
		OFF	Error. - 24 Vac input is not present. - Power is ON, but the application firmware has not booted.
	FLT (red) (for future use)	-	-
	BAT (red)	ON	Error. Backup battery is low. Replace the battery.
		OFF	Normal operation.
	COM (yellow) (Ethernet only)	ON	Linked to Ethernet hub.
		OFF	No link to Ethernet hub.
		Flashing	Linked to Ethernet hub and communicating.
	TX (yellow) and RX (yellow) (RS-485 only)	Flashing	Normal operation. Transmitting (TX) or receiving (RX) over the RS-485 ALN trunk.
		OFF or Flashing	Error. No device, no connection, or bad connection.
9	Tool/HMI	-	Human-Machine Interface port (RJ-45, service only).
10	AA alkaline battery	-	SDRAM backup battery. See BAT LED in this table for related indication.
11	Coin cell battery	-	Real Time Clock backup battery.
12	FW (for future use)	-	Firmware reset button.
13	Reset	-	Hardware reset button. Coldstarts the PXC Modular.
14		-	USB Device port. For non-smoke control applications only.
15	Expansion port	-	Connection for an RS-485 Expansion Module or future expansion devices.
16	TX-I/O bus connector (male)	-	Connection for a TX-I/O Power Supply or Bus Connection Module, which powers TX-I/O Modules.

## Expansion Module Product Diagram



	LED, Symbol, or Feature	Status	Indication
1	S - +	--	RS-485 P1 or MS/TP Field Level Network (FLN) ports.
2	Expansion connector	--	Connection for future expansion devices.
3	RUN (green)	ON	Normal operation. 24 Vac power is ON and the module firmware has booted.
		OFF	Error. <ul style="list-style-type: none"><li>● 24 Vac input is not present.</li><li>● Power is ON, but the module firmware has not booted.</li></ul>
4	TX (yellow) and RX (yellow)	Flashing	Normal operation. Transmitting (TX) or receiving (RX) over the RS-485 ALN trunk.
		OFF or ON solid	Error. No device, no connection, or bad connection.
5	PXC Modular Expansion port	--	PXC Modular connection for an RS-485 Expansion Module or future expansion devices.
5	Expansion connector	--	Connection to the PXC Modular.

## 2.1 Memory

The APOGEE firmware (program), its point database, PPCL program, trend data, and other information reside in the field panel memory. Memory consists of two areas: Flash Read-Only Memory (Flash ROM) and Random Access Memory (RAM).

### 2.1.1 Flash Read-Only Memory (Flash ROM)

Flash Read-Only Memory (Flash ROM) is the non-volatile, permanent memory of the PXC Modular, which stores the operating system, the APOGEE firmware, and the language files. A limited amount of secondary storage is provided in Electrically Erasable Programmable Read-Only Memory (EEPROM) for the field panel address or name, communication speeds, and other set-up parameters. In the event of a power surge, a power loss, or failure of the battery backup, the Flash ROM and EEPROM contents stay intact.

PXC Modular Flash ROM size cannot be upgraded in the field.

### 2.1.1.1 Compressed ROM

The PXC Modular has a large amount of high performance RAM. To allow for future features and to provide high system performance, the APOGEE firmware is stored in ROM in a compressed state; it is de-compressed into RAM on system power-up. As a result, the entire onboard RAM is not available for the point database, the PPCL program, and trend data.

### 2.1.1.2 Auto-Restore and Database Backup to Flash

APOGEE Firmware Revision 2.8.4/3.1 and later supports Auto-Restore and Database Backup to Flash.

- Database Backup to Flash allows the user to manually save a copy of the database in flash memory of the controller.
- The field panel may also be configured to automatically restore the database from flash memory after a coldstart.
  - When auto-restore is enabled, a coldstart does not result in the same downtime as with earlier revisions of APOGEE Firmware. Because there is no waiting on a full download from the backup system, the database is restored from flash so quickly that there is little to no down time. However, the accumulated trend data is deleted from memory.
  - Database restoration from flash is disabled by default.
  - When P1 Mode is selected for the PXC Compact, database restoration from flash is automatically enabled and 128K of memory is reserved for ISB files.

For procedures on using Auto-Restore and Database Backup to Flash, see the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

## Auto Save

This feature allows the database to be backed up automatically whenever database is changed, instead of being an operator selected function. It does not provide any safeguard and or protection against power loss while the process is underway. However, this feature sends messages to HMI that the auto save operation is in progress or finished.

The feature may be turned on or off using a prompt similar to the existing Autorestore prompt. See the APOGEE BACnet ALN Field Panel User's Manual (125-3020) for more information.

## File System Operations

File System Operations provide many features and works on three drives of a field panel.

The following is a list of supported features:

- List Drives — list the drives on the field panel where **A**: is the RAM drive, **B**: is the USB drive if attached, **IFD**: is the internal Flash Drive.
- Set\_drive — identifies the drive that you desire to perform other functions on.

- `listDirectory` — lists the Files and folders contained on the selected drive.
- `Change_dir` — changes the current directory to allow you to view the contents of subfolders on the drive.
- `File_ops` — opens up the file control menu which allows you to copy, rename, delete and move files in the panel. These functions work on the drive that was selected by the `Set_drive` function.
- `File_ops/Copy_file` — allows you to copy files within a drive or to another drive.
- `File_ops/Rename_file` — allows you to rename a file.
- `File_ops/Move_file` — allows you to move a file within a drive or to another drive.
- `File_ops/Delete_file` — allows you to delete a file.

### USB Media Support

- Support for USB mass storage devices (Memory sticks or USB hard drives).
- Backup of database, storage for graphics, Web Server upgrades

## 2.1.2 Random Access Memory (RAM)

Synchronous Dynamic Random Access Memory (SDRAM) is the working memory of the PXC Modular. When the PXC Modular has booted and is operating normally, the APOGEE firmware, the PPCL control program, the point database, and trend data have been transferred from Flash ROM. Information stored in RAM, such as the point database or PPCL, may be viewed, modified, deleted, activated, or deactivated from an operator terminal by any high-level authorized user. In the event of a power loss, the contents of RAM are kept intact by a backup battery.

PXC Modular RAM size cannot be upgraded in the field.

The program length, number of database points, and number of trend entries is limited only by available memory.

## 2.2 Communication Connections

The PXC Modular Series operates on the Automation Level Network (ALN) or the Field Level Network (FLN).

- When connected to the ALN, the PXC Modular uses a logical point firmware database to communicate directly with PXC Compacts, MBCs, RBCs, MECs, SCUs, and other nodes on the network.
- When connected to the MS/TP FLN, the PXC Modular operates as a third-party BACnet device.

The PXC Modular provides the following communication connections:

- HMI and Tools
- Network
  - 10B/100B Ethernet port
  - RS-485 port
  - USB Host port
- PXC Modular Expansion Module
- TX-I/O Bus

The following connections and features are available when communicating on a BACnet/IP Automation Level Network:

- Ethernet port
- RS-485 Port
- USB Host port
- Web Server support: Web-based Graphical User Interface (GUI) compatible with BACnet® networks. Ideal for small or remote facilities to monitor and control the Building Automation System.

The following connections and features are available when communicating on an Ethernet TCP/IP Automation Level Network:

- Ethernet port
- USB Host port
- Field Panel GO, a Web-based graphical user interface for the APOGEE System. Field Panel GO is suited for sites with up to six field panels on the Ethernet ALN. (Additional license required.)

The PXC Modular hardware can be changed between RS-485 P2 and Ethernet ALN through the HMI. The factory default is Ethernet ALN.



**NOTE:**

Changing the ALN type coldstarts the field panel.



**NOTE:**

In Ethernet ALN mode, RS-485 P2 parameters are displayed and may be entered as a selection. However, when in RS-485 P2 ALN mode, Ethernet ALN parameters are not an available selection.

### 2.2.1 HMI and Tool Ports

- The HMI port provides a connection to a laptop computer for local operation and engineering.
- The USB Device port supports a generic serial interface for an HMI or Tool connection.

#### Human-Machine Interface (HMI)/Tool Port

The Human-Machine Interface (HMI)/Tool port provides RS-232 compliant communications through a quick-connect RJ-45 jack. The HMI port supports the following functionality:

- Connecting a machine interface device, such as an operator terminal or a text-based operator terminal, to the PXC Modular.
- Executing firmware flash upgrades.
- 1200 bps to 115.2 Kbps communication is supported.

**NOTE:**

The communication speed of the port must match the communication speed of the device connected to it.

### USB Device Port

The USB Device port supports a generic serial interface for an HMI or Tool device. The USB Device port does not support firmware flash upgrades.

#### 2.2.2 10B/100B Ethernet Port

The 10B/100B Ethernet port provides a path for commands and information transmitted between field panels inside a firewall. This port provides both full- and half-duplex 10Base-T or 100Base-TX compliant communications over a BACnet/IP or Ethernet TCP/IP (P2) Automation Level Network (ALN). The highest possible communication speed is automatically detected and selected.

#### 2.2.3 RS-485 Port

The RS-485 port provides a path for commands and information transmitted between field panels. This port provides communications over a RS-485 P2 or BACnet MS/TP Automation Level Network (ALN). The communication speed is set during startup.

The RS-485 port provides half-duplex, asynchronous serial RS-485 communications over shielded twisted pair cable. The RS-485 connector is labeled + – ↓ to indicate the positive and negative connections. ↓ is a reference pin.

The following features are available when communicating on an RS-485 Automation Level Network:

- RS-485 port
- Virtual AEM

Without additional hardware, the Virtual AEM connects an RS-485 APOGEE Automation Level Network (ALN) or individual RS-485 field panels to a P2 Ethernet network.

- An additional license is required.
- FLN support is not available when a Virtual AEM license is installed.

##### 2.2.3.1 FLN Support

The Siemens Industry Field Level Network (FLN) can consist of devices that communicate over an RS-485 connection using either MS/TP or Protocol 1 (P1).

- BACnet/IP ALN networks support application-specific control devices that communicate using MS/TP or P1.
- Ethernet TCP/IP and RS-485 ALN networks only support application-specific control devices that communicate using P1.

PXC Modular Series FLN Support.				
ALN Protocol	FLN Protocol Supported	Firmware Revision	Number of FLN Devices <sup>1</sup>	Drop Number Range
BACnet/IP	MS/TP or P1 (RS-485)	3.1 and later	Up to 96 devices per FLN connection	0 to 254
Ethernet TCP/IP or RS-485	P1 (RS-485)	2.8.5 and later	Up to 96 devices per FLN connection	0 to 254
		2.8.4 and earlier	32 devices per FLN connection	0 to 31 if networked 0 to 99 if stand-alone

<sup>1</sup> Each field panel supports a total of 96 FLN devices. With Firmware Revisions 2.8.5 and later, the devices may be grouped in any combination on the FLN ports as long as the total number of FLN devices on the field panel does not exceed 96.

## 2.2.4 Expansion Module Overview

The Expansion Module provides the hardware connection for Field Level Network (FLN) devices including:

- Siemens Industry FLN
- Communications Drivers to Non-Siemens Networks
- Wireless P1 FLN

### 2.2.4.1 Siemens Industry FLN

Using the Triple RS-485 Expansion Module, the PXC Modular supports up to three RS-485 networks of P1 Field Level Network devices, or one RS-485 network of BACnet MS/TP devices.

### 2.2.4.2 Communication Drivers to Non-Siemens Networks

As an option, the PXC Modular can communicate to related building system controllers, such as boilers, chillers, rooftop units, Programmable Logic Controllers (PLCs), power meters, lighting panels, fire alarm and life safety systems, and access control systems.

### 2.2.4.3 Wireless P1 FLN

Wireless P1 FLN replaces the traditional FLN cabling with wireless communication links that form a wireless mesh network. The Wireless FLN is enabled through the PXC Modular HMI.



#### NOTE:

A P1 FLN license must be installed in order to use Wireless FLN.

### 2.2.5 TX-I/O Island Bus

The PXC-36 offers the flexibility of expanding the total point count through a self-forming island bus. With the addition of TX-I/O modules and a TX-I/O Power Supply, up to 32 points (or four TX-I/O modules) can be supported.

An additional license may be required to enable the Island Bus.

## Modular Series Smoke Control Application Requirements

- The controller must be located at the bottom of the enclosure.
- The controller may be oriented either horizontally or vertically. See the following figures.

For Ethernet communications, the UL Listed surge protector (Ditek model DTK-MRJ45C5E) is required for BACnet/IP or Ethernet TCP/IP (P2) networks. The surge protector must be located in the same enclosure as the controller.

### Modem Requirements

- The UL864 Listed surge protector (538-600) is required.
- Devices connected between the USB port and the UL Listed surge protector must be located within the same room.
- A USB-to-RS-232 adaptor may be needed for UL Listed modems or UL Listed printers that are not configured for USB communication.
- The modem may be located inside the PX Series enclosure.

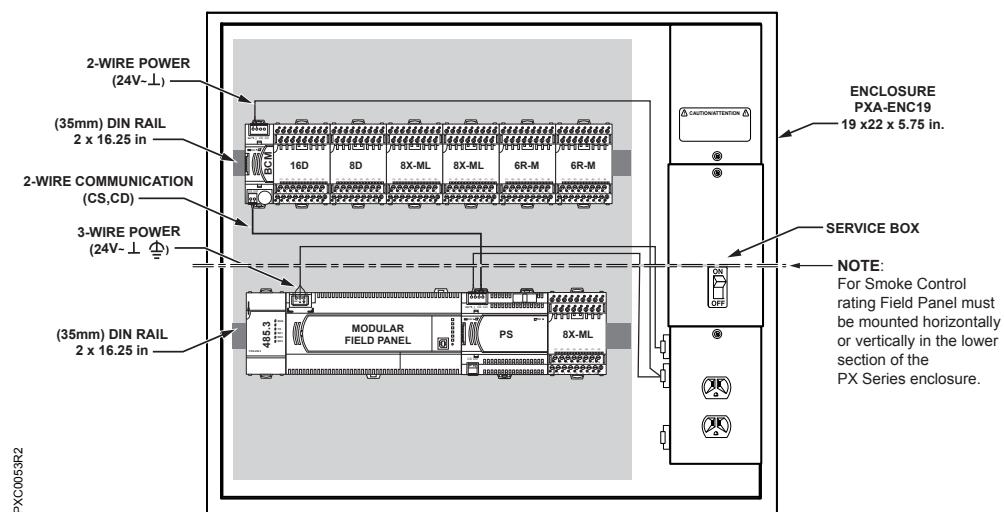


Figure 4:

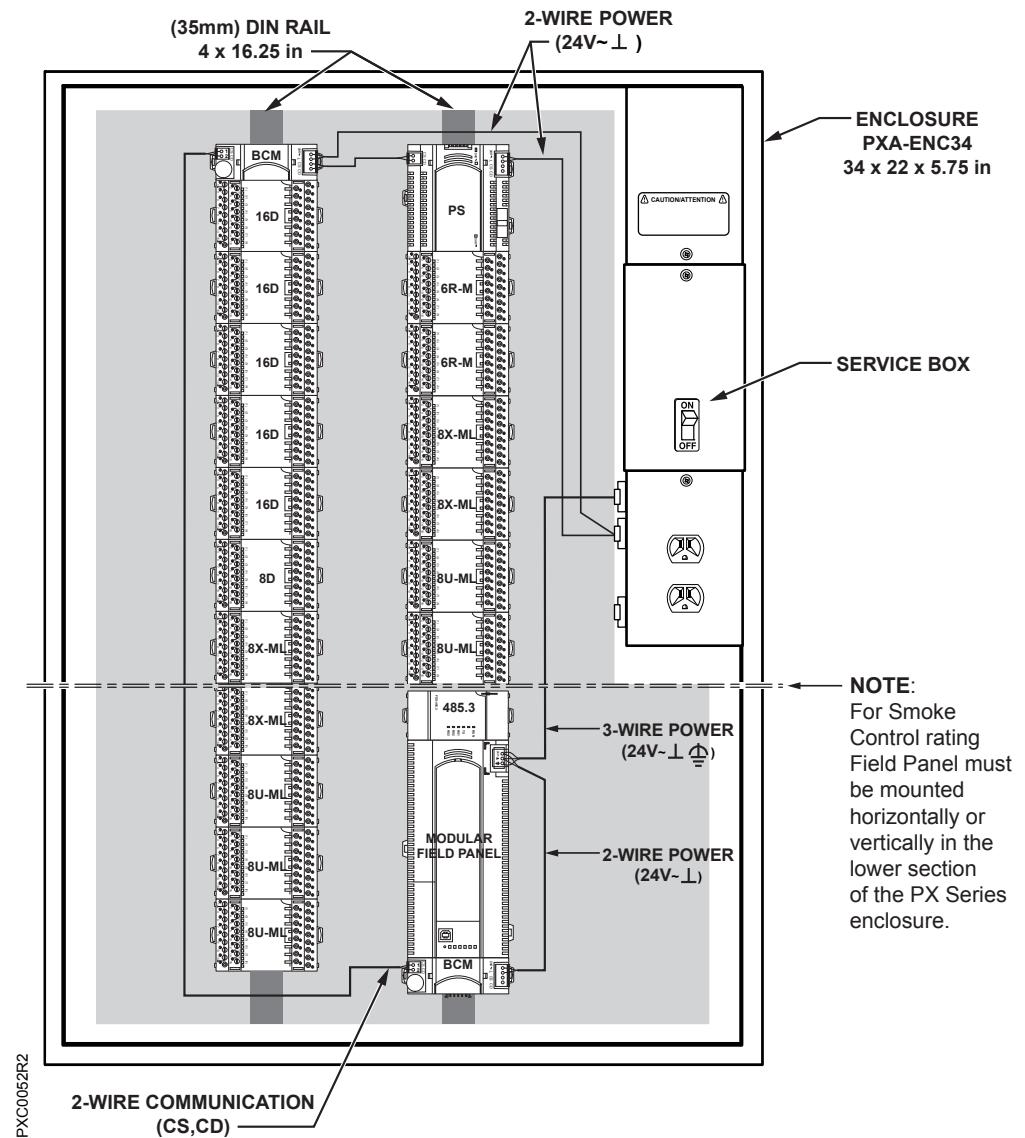


Figure 5:

## Example ALN Configuration for Smoke Control Applications

The RS-485 ALN does not have the same restrictions as the Ethernet ALN for smoke control. Namely, Ethernet requires UL listed switches and routers.

The following figure displays a possible ALN configuration for smoke control.

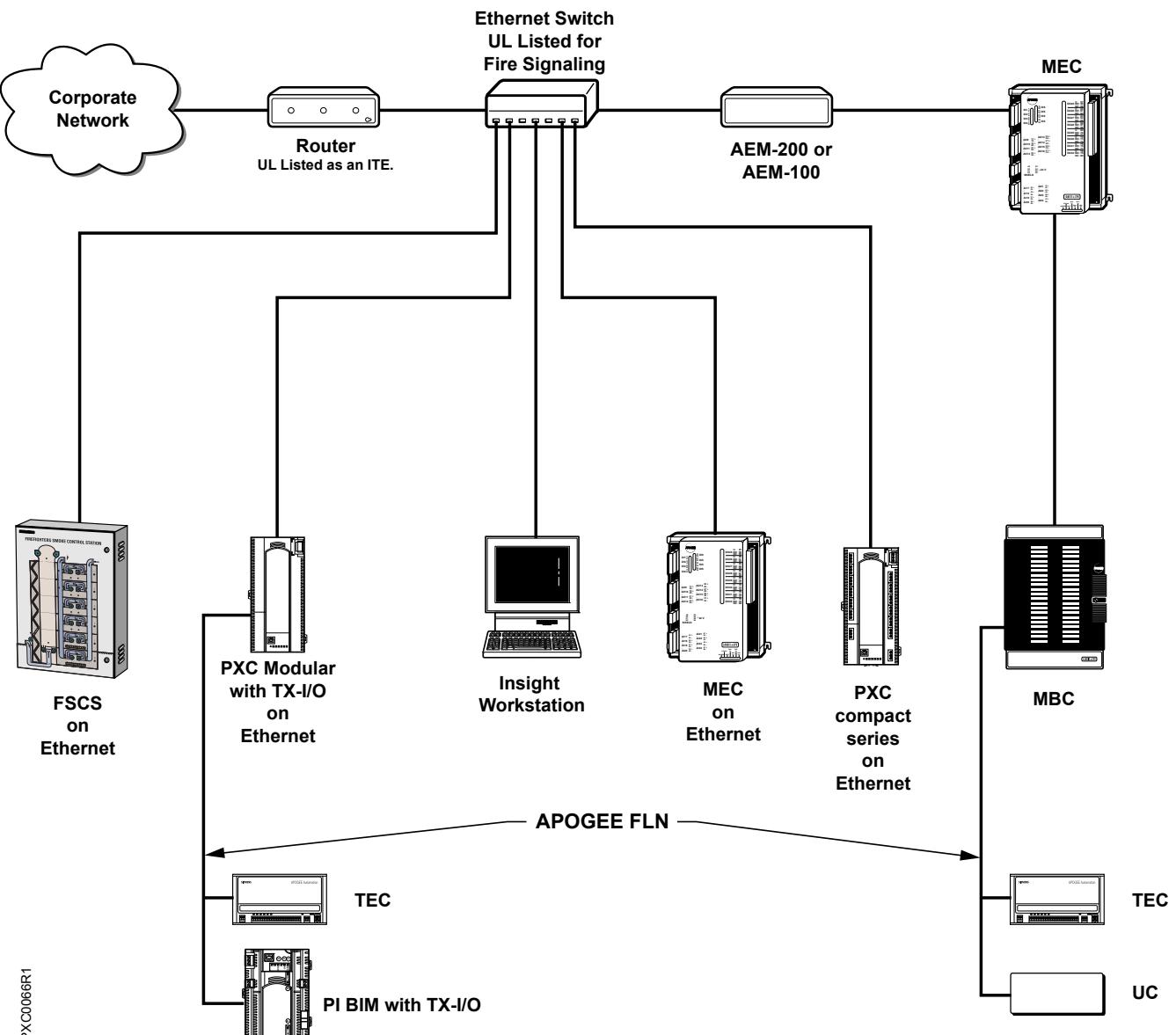


Figure 6: Example ALN Configuration for Smoke Control.

## PXM10S/T Product Overview and Description



### NOTE:

All figures show the BACnet version of the PXM10S and PXM10T. The appearance of the proprietary version may differ slightly.

PXM10S and PXM10T are optional controller mounted Operator Display modules that provide a password protected user interface. This interface allows you to interact with the existing field panel database and its immediate sub-networked Siemens (FLN) devices. (Optional remote enclosure door mount kit also available.)

**NOTE:**

All unacknowledged alarms are viewable even if you are not logged into the module.

## Product Description

The PXM10S and PXM10T modules are available as an upgrade for use with all Siemens Compact and Modular Series field panels to provide additional local operator capabilities. The PXM10S and PXM10T modules are field mounted and replace the field panel covers.

There are three dedicated buttons, ALARM, INFO, ESC and one push DIAL. These buttons, the push dial, and LCD display screen allow for interactive feedback at the field panel controller.

The PXM10S and PXM10T modules support all the languages loaded in the host field panel.

There are two versions of the modules as follows:

- PXM10S has all available options, including Point Monitor and optional blue backlight color.
- PXM10T does not include the Point Monitor or the optional blue backlight color.

Language selection and user account timeout settings are configurable using an operator workstation or HyperTerminal at the field panel's HMI.

All PXM10S/T preferences are panel-specific and stored in the local panel configuration data.

**NOTE:**

For more information on creating and configuring user accounts, see the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

## Product Features

The PXM10S and PXM10T modules provide the following features:

- Plug and Play - Upon connection to the host field panel, the device is recognized and fully functional.
- Hot Swappable – The module can be installed or removed without powering down the controller and interrupting facility operations.
- User-friendly navigation and menu structure.
- Push DIAL for easy operation.
- Alarm button with red LED indicator for local alarm annunciations.
- INFO button provides one touch access to detailed system information for points.
- Manual and automatic login option for enhanced security or easy access.
- View point information and status, view and acknowledge alarms, and command/release local field panel points.
- Point Monitor – Can customize a group of points to continuously display and refresh with updated values (PXM10S only).
- Multi-language (English, Simplified Chinese, French, and Korean) support.

- The PXM10S and PXM10T modules can also be mounted on the inside or outside of an enclosure door, using an optional accessory sold separately.

## Communication Connections

A field panel fully powered and running Firmware Revision 2.8.6/3.2.2 or later, recognizes the PXM10S and PXM10T modules within approximately 5 seconds of connection. Prior to that, the Operator Display is not operational.

If a field panel is coldstarted or it's the first time the panel is powered up, it takes approximately 15 to 30 seconds after connection before the PXM10S and PXM10T module is operational.

## Requirements

### System Requirements

The PXM10S and PXM10T modules can be used with Compact platforms (PXC-36, PXC-24, and PXC-16) as well as the PXC Modular field panels.

- All hardware must be installed.
- Power must be available to all devices.
- System components must be installed, running, and checked out by an appropriate system representative.

### Hardware Platform

The PXM10T and PXM10S modules can be used on all Siemens Compact and Modular series controllers. An additional connecting ribbon cable (part number PXA-HMI.CABLEP5) is required when mounting to a PXC16 or PXC24.

### Firmware Platform

The PXM10T and PXM10S modules are compatible with all Siemens Compact and Modular series controllers using Firmware Revision 2.8.6/3.2.2 or later (proprietary protocol/BACnet).

## Application Menus

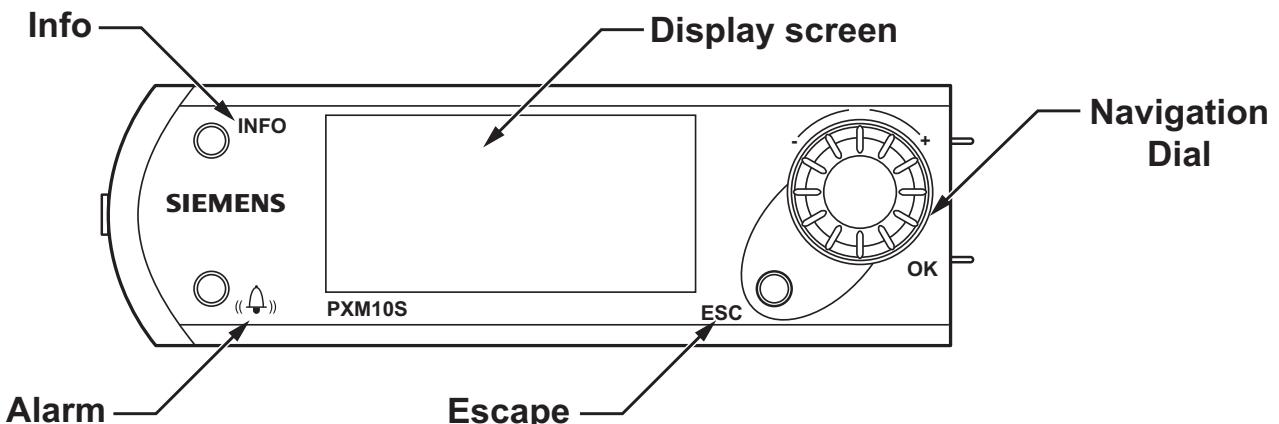
The following application menus are provided with the PXM10S and PXM10T modules.

- Login
- Alarms
- Points (Command and Release)
- Point Monitor
- Logoff
- Settings

**NOTE:**

You must have sufficient operator access permissions to the Alarms, Points, and Point Monitor applications to fully use all features and corresponding submenus.

## Operator Display Layout



**Display screen** – Displays splash screen with either PXM10S or PXM10T module, device Firmware Revision, field panel Firmware Revision number, and Cimetrics BACstac revision number. Cursor position is indicated by either a right-angled bracket (>) or inverted text color, depending on field panel type and revision.

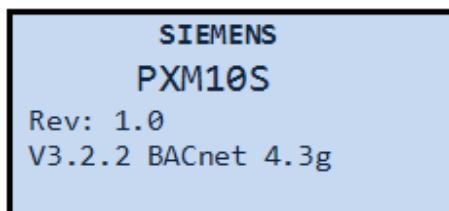


Figure 7: Splash Screen

**NOTE:**

If text information is too long for the display screen, the text scrolls horizontally across the screen, in a marquee style. If a high-priority task (such as a back-up) is being performed, the horizontal scrolling may be erratic.

**NOTE:**

The list of objects (once it is created) that displays for the Alarms, Points, and Point Monitor menus is static, however, the point information (current value, status, priority, etc.) is dynamic. You must leave the menu/page and return to it in order to view any updated information.

**Navigation Push DIAL** – Rotate clockwise or counter clockwise to highlight menu options (up or down). Press the dial to enter a menu or to make a selection. Rotate the dial to change a value. Pressing the dial is equivalent to selecting **OK**.

**ESC button** – Press once to return to previous menu/page or backspace during text/value editing.

**INFO button** – Press once to navigate to the window containing all available information about the point on selected line.

### Alarm Window

There are two ways to view alarms, both of which display the alarm list with the point system name and status:

- **Alarm button.** Provides direct access to the list of unacknowledged alarms.
- **Alarm menu.** Displays any point in alarm, regardless if it has been acknowledged or not and provides three generic filters:
  - Unacknowledged Alarms filter allows you to filter all alarms and lists only unacknowledged alarms in local system.
  - All Alarms filter allows you to view all acknowledged and unacknowledged alarms in the system.
  - Failures/Faults filter allows you to view all failures/faults in the system for which alarming has been enabled.

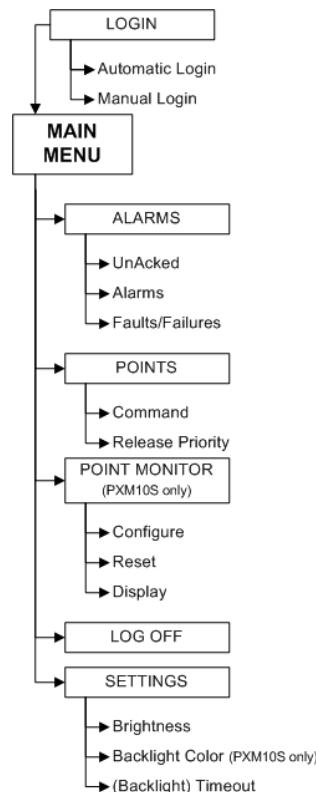
Pressing the **INFO** button for point information displays:

U8	
System Name	U8
Ack Pendi	Ack Pendi
OFFNORMAL	Enabled
Time	09:46:45

*Figure 8: INFO for Alarms*

Press **ESC** to close alarm window without affecting the alarm.

## Operator Display Menu Tree



## Main Menu Structure

All menu screen captures in this manual reflect the PXM10S module. Not all menu options/features shown are available with the PXM10T module.



### NOTE:

A solid DOWN arrow in the top right corner of the display screen indicates more menu options are available and a solid UP arrow indicates more items are available after the last highlighted item.

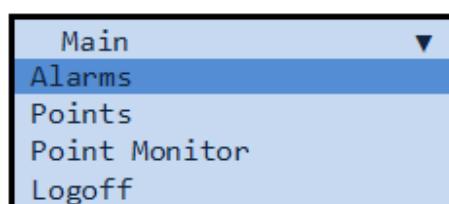


Figure 9: Main Menu

**Alarms** - Allows you to view and acknowledge alarms and failures/faults. However, you must be logged in with sufficient permissions (at least Command or Edit/Configure level access) to acknowledge an alarm.

**Points** - Allows you to view, command, and release the host field panel's onboard points and sub network points (FLN devices). To command and release points, you must have Command or Edit/Configure level access permissions.

**Point Monitor** - Displays a submenu, which allows an operator to configure and display a custom grouping of point and their values. The values are refreshed every four seconds. To configure points, you must have Edit/Configure level access permissions.

**LogOff** - Displays screen for confirming logoff.

**Settings** - Displays a submenu and screens that allow you to customize the LCD's display settings.

## Login and Logoff

You must have at least Read Only level access permission to login to the PXM10S or PXM10T module. If you log in and you have no access level permissions, the system will immediately log you off the module.

After three failed login attempts, the user account will be locked. An administrator must use the HMI to unlock the user accounts by modifying that particular user account. Also, you can only change your password for the PXM10S or PXM10T modules from the HMI.

## Logging In

### Automatic Login

The PXM10S or PXM10T automatic login feature must be configured using the host field panel's HMI port. Only one user account can be flagged as the automatic login account.



#### NOTE:

Default user account login information for PXM10S or PXM10T is on a per ALN account basis.

---

If your network contains an assortment of field panels with Firmware Revisions earlier than 2.8.6/3.2.2, the AutoLogin account is not replicated or passed onto other field panels. For more information about workstation user accounts, see the *Insight Online Help* system.

### Configuring AutoLogin at the HMI with HyperTerminal

Complete the following steps to configure an automatic login using HyperTerminal at the host field panel's HMI.

You must be logged into the field panel with an account that has Edit level access permission to the users access group.

To configure automatic login, complete the following steps:

HMI	S, U, A, E, A (System, Users, Accounts, Edit, Add)
-----	--

Prompt/Field	Option/Entry	Description
User initials		Type the new user's initials.
Account name		Type the account name.
Password		Type a password for the user.
Verify password		Retype the password.
System, User namespace	S	View System point names.
	U	View User point names. (default setting)
Access group(s)	All groups	(default setting)
	A single access group	Valid value 1 through 30.
	Multiple access groups	Valid values 1 through 30 separated by commas, or use two periods to indicate a range (for example, 1..4,7,9,12..20).
Privilege <b>NOTE:</b> Auto User accounts need access to Point and Alarm ONLY.	Point	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Alarm	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Trend	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Application	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	PPCL	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	FLN devices	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Equipment Scheduler	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	System	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Diagnostics	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Users	<b>N</b> (No_access) <b>R</b> (Read_only)

		<b>C</b> (Command) <b>E</b> (Edit) (default setting)
	Hardware	<b>N</b> (No_access) <b>R</b> (Read_only) <b>C</b> (Command) <b>E</b> (Edit) (default setting)
Language ID	Language	Default
	Particular language	Language ID, ? displays all available languages. <b>NOTE:</b> You can also enter nothing, to display all available languages.
Time format	(HH:MM:SS)	Default
	Particular format	Time format; ? displays all available formats. <b>NOTE:</b> You can also enter nothing, to display all available Time formats.
Date format	(MM/DD/YYYY)	Default
	Particular format	Date format; ? displays all available formats. <b>NOTE:</b> You can also enter nothing, to display all available Date formats.
AutoLogoff enabled (Y/N)	Y	Enable automatic logoff.
	AutoLogoff delay	1 to 1440 minutes
	N	Disable automatic logoff.
Password Expire Limit		0 to 365 days
Use for PXM10Tiny AutoLogin (Y/N)	Y	Enable automatic login.
	N	Disable automatic login.

**Example**

```

>User initials : tiny
>Account name : PXM10TINY-----
---
>Password : 55555-----
>Verify password : 55555-----
>System, User namespace : U
>Access group(s) : 1..30-----
-----
>Point privilege - No_access, Read_only, Command, Edit: E
>Alarm privilege - No_access, Read_only, Command, Edit: E
>Trend privilege - No_access, Read_only, Command, Edit: E
>Application privilege - No_access, Read_only, Command, Edit: E
>PPCL privilege - No_access, Read_only, Command, Edit: E
>FLN devices privilege - No_access, Read_only, Command, Edit: E
>Equipment Scheduler privilege - No_access, Read_only, Command, Edit: E
>System privilege - No_access, Read_only, Command, Edit: E
>Diagnostics privilege - No_access, Read_only, Command, Edit: E
>Users privilege - No_access, Read_only, Command, Edit: E

```

```

>Hardware privilege - No_access, Read_only, Command, Edit: E
>Language ID : 0409
>Time format : HH:MM:SS---
>Date format : MM/DD/YYYY-
>AutoLogoff enabled (Y/N) : Y
>AutoLogoff delay : 5---
>Password Expire Limit : 30-
>Use for PXM10Tiny AutoLogin (Y/N): Y
User account <tiny> added

```

**NOTE:**

For more information on creating and configuring user accounts, see the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

Do the following to automatically log in to the PXM10S or PXM10T module.

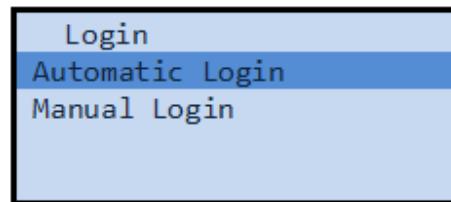


Figure 10: Automatic Login Submenu

Menu/Submenu	Step	Description
Splash screen/logo	Press the dial.	
	Rotate the dial to highlight <b>Automatic Login</b> .	Login menu displays.
Login	Press the dial to select <b>Automatic Login</b> .	System logs you into the Main menu of the module.



Figure 11: Main Menu

### Manual Login

Do the following to manually log in to the PXM10S or PXM10T module. The default language for manual login is U.S. English.

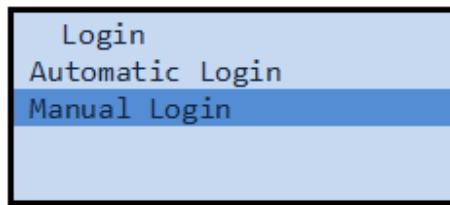


Figure 12: Manual Login Submenu

Menu/Submenu	Step	Description
Splash screen/logo	Press the dial.	
	Rotate the dial to highlight <b>Manual Login</b> .	Login menu displays.
Login	Press the dial to select <b>Manual Login</b> .	Displays the Manual Login submenu.
Manual Login	USR **** PWD *****	Enter your user name (up to 4 characters) and password (3 to 15 characters). A one character username is allowed. <b>NOTE:</b> You can only use capital letters A through Z for user name and passwords.
	For <b>USR</b> , rotate the dial to highlight each character.	
	Press the dial to select each character. Repeat until you enter the complete user name.	<b>NOTE:</b> If you make a mistake selecting a character, press <b>ESC</b> to return to the previous character.
	Press the dial twice to move to the PWD fields.	
	For <b>PWD</b> , rotate the dial highlight each character.	
	Press the dial to select a character. Repeat until you enter the complete password.	<b>NOTE:</b> If you need to return to the previous editable field, for example from PWD fields back to USR fields, press <b>ESC</b> . To proceed to the next field, press the dial.
	Press the dial to confirm USR and PWD.	System logs you into the Main menu of the module.

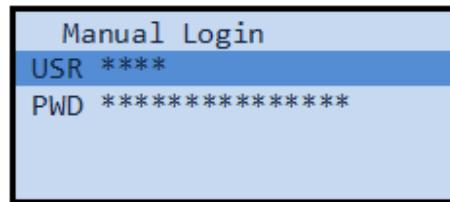


Figure 13: Manual Login Screen

## Logging Off

There are three ways to log off.

- Automatic logoff – Occurs when the module interface has been idle for the amount of time defined in the user account settings. The timer feature is configured when a user account is created at the field panel.
- Manual logoff – Select **Logoff** on the screen – Prompts you to confirm logoff.
- Press **ESC** on the Main menu screen – Prompts you to confirm logoff.



**NOTE:**

When you log off the module, the screen may go blank for approximately two seconds.

Do the following to manually log off the PXM10S or PXM10T module.

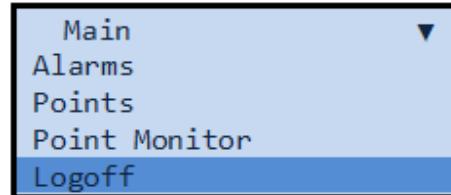


Figure 14: Logoff Menu

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Logoff</b> .	
	Press <b>DIAL/OK</b> to and select <b>Logoff</b> .	Displays the Logoff submenu.
Confirm Logoff Are you sure?	Rotate <b>DIAL</b> to highlight <b>Yes</b> or <b>No</b> .	
	Press <b>DIAL/OK</b> to make selection.	Confirms logoff and returns to splash screen. <b>NOTE:</b> If you press <b>ESC</b> , you are prompted with the same Confirm Logoff screen.

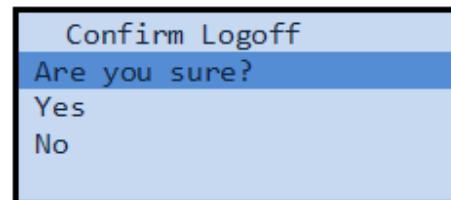


Figure 15: Confirm Logoff Submenu

## Viewing, Commanding, and Releasing Points

### Viewing Points

All points displayed on the screen are listed alphabetically, by system name.

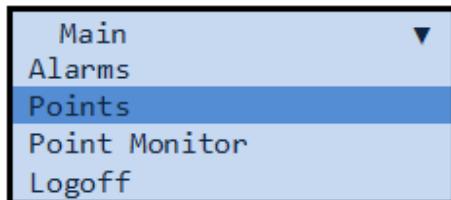


**NOTE:**

Only four lines (excluding the title) of points are listed at a time for the English and French language.

Only three lines (excluding the title) of points are listed for the Chinese and Korean language.

Do the following to view and scroll to the next series of points in the field panel.



*Figure 16: Points*

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Points</b> .	
	Press <b>DIAL/OK</b> to select <b>Points</b> .	Displays the Points menu.
Points	Press <b>DIAL/OK</b> to highlight desired point.	
	Press <b>DIAL/OK</b> to select point.	
	Rotate <b>DIAL</b> to highlight the last point (bottom of screen), and then rotate <b>DIAL</b> once more.	Refreshes the screen and displays the previous screens last highlighted point, as well as the next series of points.
	Repeat steps until you reach the end of the point list.	The number of points you can enter is dependent on the number of points stored at the host's field panel database, and sub network devices connected/configured to the host's field panel you are connected to.
	Press <b>ESC</b> .	Returns you the Points menu.
	Press <b>INFO</b> .	Displays detailed point information of selected point.

Points	
stName:Address	41943
U7	5.01
U8	7.51
X5	5.00

Points	
U7	5.01
U8	7.51
X5	5.00
X6	7.50

#### Scrolling the List of Points

The point name is displayed in the left column and values in the right column.

The PXM10Tiny on proprietary firmware will display point status as well as value. BACnet firmware will display value only.

For TECs, the prefix is the TEC name; and the exposed point in the Points menu is the DAY.NGT subpoint. To see a complete list of the device's subpoints, highlight the DAY.NGT point, and then press DIAL/OK.

Points	
EUT:Address	41943
t1:DAY.NGT	DAY
U7	N
U8	N

t1	
APPLICATION	2092
ROOM TEMP	74.00
RM STPT DIAL	74.00
AUX TEMP	74.00

#### TEC Subpoints Menu with List of Device Subpoints



#### NOTE:

Based on FLN speed and network traffic, there may be a delay in displaying a full point database.

#### Commanding Points

Do the following to change the point value and command the points in the field panel. These steps also apply to commanding TEC subpoints.

Point Action	
Command	
Release Priority	

Figure 17: Point Action Command Submenu

Menu/Submenu	Step	Description
Main	Rotate DIAL to highlight Points.	
	Press DIAL/OK to select Points.	Displays the Points menu.

Menu/Submenu	Step	Description
Points	Press <b>DIAL/OK</b> to highlight desired point.	Displays the Point Action Command submenu.
Point Action	Rotate <b>DIAL</b> to highlight <b>Command</b> .	
	Press <b>DIAL/OK</b> to select <b>Command</b> .	Displays the point name in title. Lists the selected point's current value, edit (highlighted) and priority fields.
[selected point name]	With <b>Edit</b> field highlighted, rotate <b>DIAL</b> to each numeric character and decimal, and press <b>DIAL/OK</b> after each numeric increment, including decimal character, until you enter the new value.	Changes the specified point value.
	Press <b>DIAL/OK</b> .	Confirms the point value change and moves to the Priority field.
	With <b>Priority</b> field highlighted, repeat steps to change priority of selected point. <b>NOTE:</b> This field is BACnet-specific. P2 firmware always commands at a priority of OPER.	Confirms the point priority change and returns you to the Points menu.
	Press <b>ESC</b> .	Returns you to the previous menu without changing the point value or priority.

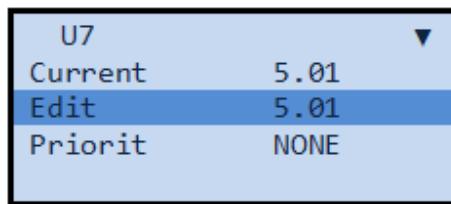


Figure 18: Command Point Value Submenu

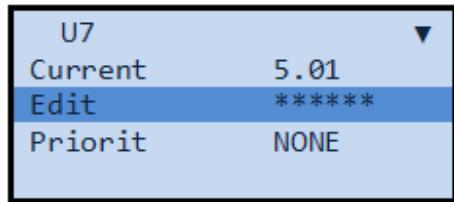


Figure 19: Edit Command Point Value Submenu

## Releasing Points

Do the following to change a point priority and release a point.

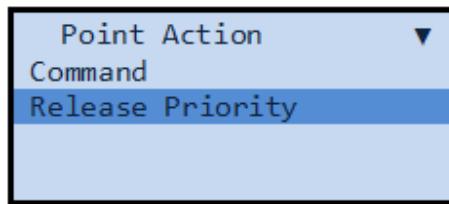


Figure 20: Point Action Release Priority Submenu

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Points</b> .	
	Press <b>DIAL/OK</b> to select <b>Points</b> .	Displays the Points menu.
Points	Rotate <b>DIAL</b> to highlight desired point.	
	Press <b>DIAL/OK</b> to select point.	Displays the Point Action Release Priority submenu.
BACnet Point Action	Rotate <b>DIAL</b> to highlight <b>Release Priority</b> .	
	Press <b>DIAL/OK</b> to select <b>Release Priority</b> .	<b>NOTE:</b> BACnet point priorities cannot be commanded lower than a priority value of 8.
	Rotate <b>DIAL</b> to change the numeric value of the point priority.	
	Press <b>DIAL/OK</b> to edit point priority.	
	Rotate <b>DIAL</b> to change point priority value.	
	Press <b>DIAL/OK</b> to confirm change.	Releases BACnet point priority.
	Press <b>ESC</b> .	Returns you to the previous menu without changing the point priority.
P2 Point Action:	Rotate <b>DIAL</b> to highlight <b>Release Priority</b> .	
	Press <b>DIAL/OK</b> to select <b>Release Priority</b> .	
	Rotate <b>DIAL</b> to select Yes or No. Press <b>DIAL/OK</b> .	This releases the priority to NONE.
	Press <b>ESC</b> .	Returns you to the previous menu without changing the point priority.

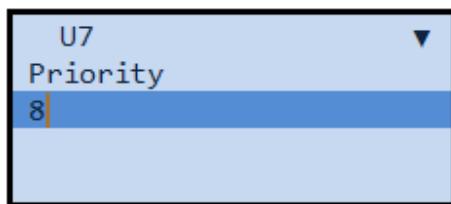


Figure 21: Release Priority Value Submenu

## Configuring Point Monitor



**NOTE:**

This application and its sub-features are only available with the PXM10S module.

The Point Monitor allows you to select the points you frequently need to monitor and allows quick access to view a point status. This concept is similar to a Favorites list. The maximum number of points listed and stored in Point Monitor is 10. You cannot add more points to the Point Monitor once you reach the maximum number. Reset/clear the Point Monitor of stored points and then add the desired set of 10 or fewer points you want to monitor.



**NOTE:**

Depending on user access rights, previously added points (by other users) to the Point Monitor may not be visible. In this situation you can't see or add any points in Point Monitor. If this happens, you must first reset the Point Monitor to purge the old information. This affects all users. While Point Monitor information can't be retrieved, the field panel database is not affected.

## Configuring Points for Point Monitor

Do the following to configure the host field panel's points for monitoring in Point Monitor after logging in.



Figure 22: Point Monitor

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Point Monitor</b> .	
	Press <b>DIAL/OK</b> to select <b>Point Monitor</b> .	Displays the Point Monitor menu.

Menu/Submenu	Step	Description
Point Monitor	Rotate <b>DIAL</b> to highlight <b>Configure</b> .	Displays all available points at the field panel.
	Press <b>DIAL/OK</b> to select <b>Configure</b> .	
Edit Pt Monitor	Rotate <b>DIAL</b> to highlight desired point.	Displays black background, allowing you to edit field.
	Press <b>DIAL/OK</b> to select point.	
	Press <b>DIAL/OK</b> to select <b>Y</b> or <b>N</b> .	<b>Y</b> =Yes; point is monitored. <b>N</b> =No; point is not monitored. (This is the default setting.)
	Press <b>DIAL/OK</b> to select <b>Y</b> or <b>N</b> .	
	Press <b>ESC</b> .	Returns you to the Monitor menu.

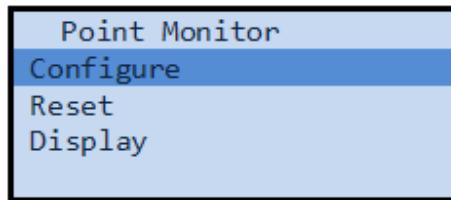


Figure 23: Configure Submenu

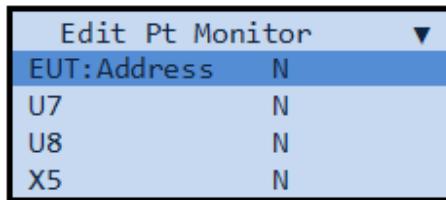


Figure 24: Edit Point Monitor Submenu

Do the following to configure bundled points in Point Monitor.

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Point Monitor</b> .	
	Press <b>DIAL/OK</b> to select <b>Point Monitor</b> .	Displays the Point Monitor menu.
Point Monitor	Rotate <b>DIAL/OK</b> to highlight <b>Configure</b> .	Displays all available points at the field panel.
	Press <b>DIAL/OK</b> to select <b>Configure</b> .	
Edit Pt Monitor	Rotate <b>DIAL</b> to select desired point.	Displays all available points and subpoints at the field panel.
Subpoints	Rotate <b>DIAL</b> to select subpoint.	Displays a list of subpoints associated with the selected point.

Menu/Submenu	Step	Description
	Press <b>DIAL/OK</b> to select <b>Y</b> or <b>N</b> .	Y=Yes; point is monitored. N=No; point is not monitored. (This is the default setting.)
	Press <b>ESC</b> .	Returns you to the Point Monitor menu.

### Resetting Point Monitor

Do the following to reset points in Point Monitor.

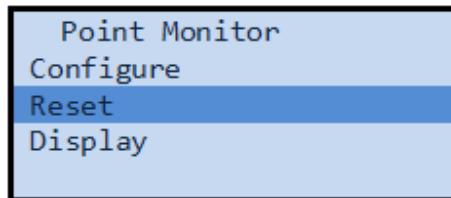


Figure 25: Reset Submenu

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Point Monitor</b> .	
	Press <b>DIAL/OK</b> to select <b>Point Monitor</b> .	Displays the Point Monitor menu.
Point Monitor	Rotate <b>DIAL</b> to highlight <b>Reset</b> .	
	Press <b>DIAL/OK</b> to select <b>Reset</b> .	Displays the Remove Monitor submenu.
Remove Monitor	Rotate <b>DIAL</b> to highlight point.	
	Press <b>DIAL/OK</b> to make select point.	
Remove Monitor Are you sure?	Rotate <b>DIAL</b> to highlight <b>Yes</b> or <b>No</b> .	Confirms you want to remove a point(s) from being monitored.
	Press <b>DIAL/OK</b> to make selection.	
	Press <b>ESC</b> .	Returns you to the Monitor menu.

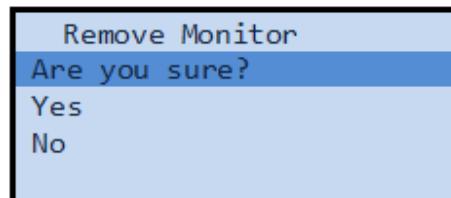
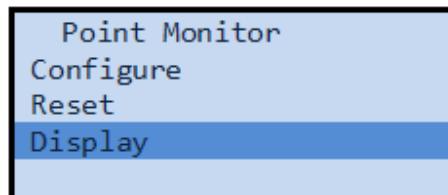


Figure 26: Remove Monitor Submenu

### Displaying Monitored Points

Automatic logoff occurs after a predetermined amount of inactivity, however:

- The Point Monitor continues to display points and refreshes the Display screen every four seconds.
  - You can scroll the Point Monitor but the function keys (INFO, ESC, Alarm) are disabled.
  - If you press any of the key functions, the login splash screen prompts you to login.
- Do the following to display monitored points.



*Figure 27: Display Submenu*

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Point Monitor</b> .	
	Press <b>DIAL/OK</b> to select <b>Point Monitor</b> .	Displays the Point Monitor menu.
Point Monitor	Rotate <b>DIAL</b> to highlight <b>Display</b> .	
	Press <b>DIAL/OK</b> to select <b>Display</b> .	Displays the Display submenu.
Display		Displays the monitored points; one point and its value per line. Up to 10 points can be added the Point Monitor list.
	Press <b>ESC</b> .	Returns you to the Monitor menu.

## Configuring Settings

### Brightness

Do the following to modify the Brightness feature.



*Figure 28: Settings Menu*

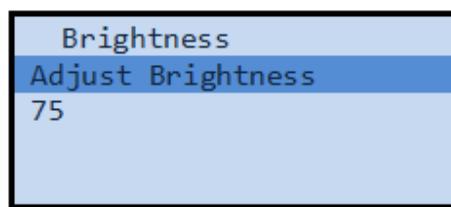


Figure 29: Adjust Brightness Submenu

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Settings</b> .	
	Press <b>DIAL/OK</b> to select.	Displays the Settings menu.
Settings	Press <b>DIAL/OK</b> to highlight <b>Brightness</b> .	
	Press <b>DIAL/OK</b> to select <b>Brightness</b> .	Displays the Brightness submenu.
Brightness	Rotate <b>DIAL</b> to highlight <b>Adjust Brightness</b> .	
	Press <b>DIAL/OK</b> to select <b>Adjust Brightness</b> .	
	Rotate <b>DIAL</b> to select a value.	Valid brightness values are 0 through 100.
	Press <b>DIAL/OK</b> to make selection.	Applies the value and returns you to the previous menu.
	Press <b>ESC</b> .	Returns you to the Settings menu without applying the new value.

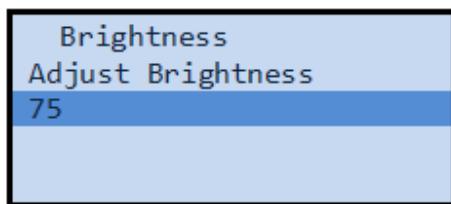


Figure 30: Brightness Submenu

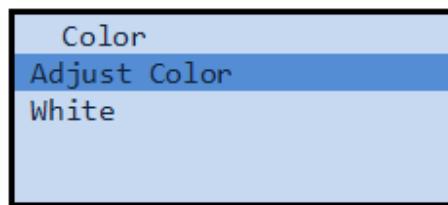
## Color



### NOTE:

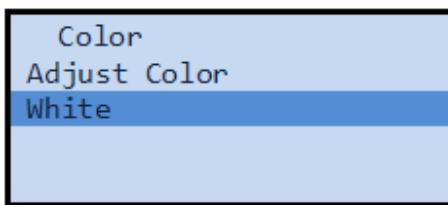
The Color feature is available only for the PXM10S module.

Do the following to modify the Color feature.



*Figure 31: Adjust Color Submenu*

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Settings</b> .	
	Press <b>DIAL/OK</b> to select.	Displays the Settings menu.
Settings	Press <b>DIAL/OK</b> to highlight and select <b>Color</b> .	Displays the Color submenu.
Color	Rotate <b>DIAL</b> to highlights and select <b>Adjust Color</b> .	
	Rotate <b>DIAL</b> to toggle between Blue and White color.	Displays the backlight color you choose.
	Press <b>DIAL/OK</b> to select.	Applies the value and returns you to the previous menu.
	Press <b>ESC</b> .	Returns you to the Settings menu without applying the new color.

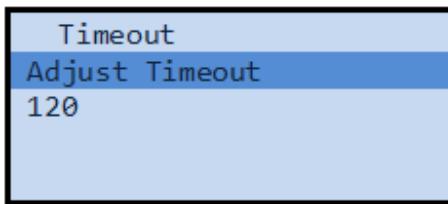


*Figure 32: Color Submenu*

### Timeout

The PXM10S and PXM10T modules automatically turn off the backlight on the Display screen after a predetermined amount of inactivity. However, when you press any key, the backlight turns on again. If Point Monitor was active on the screen during this time, the point list is saved, even if you are logged off.

Do the following to modify the Timeout feature:



*Figure 33: Adjust Timeout Submenu*

Menu/Submenu	Step	Description
Main	Rotate <b>DIAL</b> to highlight <b>Settings</b> .	
	Press <b>DIAL/OK</b> to select.	Displays settings menu.
Settings	Press <b>DIAL/OK</b> to highlight and select <b>Timeout</b> .	Displays the Timeout submenu.
Timeout	Rotate <b>DIAL</b> to highlight and select <b>Adjust Timeout</b> .	
	Rotate <b>DIAL</b> to select a value.	Valid Timeout values are 0 through 240 seconds.
	Press <b>DIAL/OK</b> to select.	Applies the value and returns you to the previous menu.
	Press <b>ESC</b> .	Returns you to the Settings menu without applying the new value.

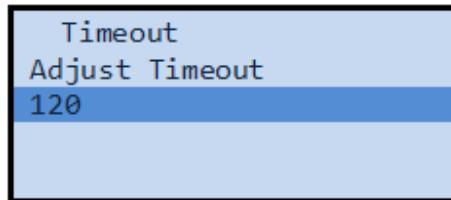


Figure 34: Timeout Submenu

## 2.3 TX-I/O Product Range Overview

*TX-I/O* is a range of I/O modules, with associated power and communication modules, for use within the APOGEE System. The I/O modules communicate between the PXC Modular or the PXC-36 and the related devices in the building services plant.

The TX-I/O product range includes the following:

- Eight types of I/O modules, which act as signal converters.
- TX-I/O Power Supply for the TX-I/O modules.
- TX-I/O Bus Connection Module, which bridges communication and power from one DIN rail to another.
- TX-I/O Island Bus Expansion (IBE) module, which increases the distance between the primary field panel and expansion field panels on the island bus.
- P1 Bus Interface Module (BIM), which connects TX-I/O modules to the P1 FLN. The P1 BIM provides power for TX-I/O modules, but it does not contain applications or perform control; the control database for the TX-I/O points resides in a field panel.

### 2.3.1 TX-I/O Module Overview

TX-I/O Modules are modular expansion I/O consisting of an electronics module and a terminal base; they receive power from a TX-I/O Power Supply, Bus Connection Module, or P1 BIM.

- The electronics module performs A/D or D/A conversion, signal processing, point monitoring, and command output.
- The terminal base provides for termination of field wiring and connection of the self-forming TX-I/O island bus.

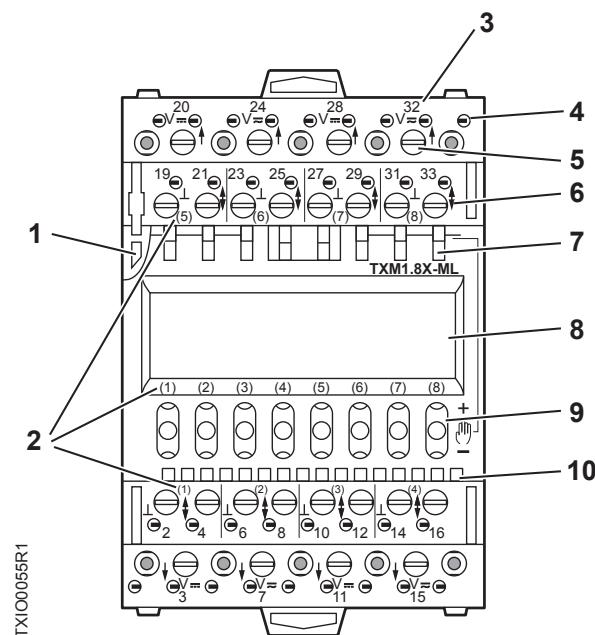
All TX-I/O modules provide the following features:

- DIN rail mounting.
- High density point count (compared to physical dimensions).
- Hardware addressed with address keys.

The design of the TX-I/O Modules provides optimum diagnostics and results in a more efficient installation and maintenance workflow.

- Field wiring may be terminated prior to installation of electronics.
- Connected peripheral devices can be measured without affecting or being affected by the I/O module.
- Hot-swappable electronic components allow powered electronics to be disconnected and replaced without removing terminal wiring or disturbing the self-forming bus.

### 2.3.1.1 TX-I/O Module Product Diagram



TXM10055R1

TX-I/O Module Symbols and Status LEDs

	LED, Symbol, or Feature	LED or Symbol	Indication
1	Address key and module status LED (green)	-	Module status as a whole (as opposed to the I/O points).
		ON	Normal operation. 24 Vac (supply voltage) input present; fuse is intact.
		OFF	Error. - No 24 Vac (supply voltage) input. - Fuse is blown.

TX-I/O Module Symbols and Status LEDs			
	LED, Symbol, or Feature	LED or Symbol	Indication
		Flashing or pulsing	- Fault indication - No address key - Remote override
2	I/O point numbers	-	-
3	Terminal number	-	-
4	Test terminal	-	
5	Connection terminals	-	
6		-	System neutral.
		-	Configurable point.
		-	Output (arrow pointing OUT from center of module).
		-	Input (arrow pointing IN toward center module).
		-	24 Vdc output (field supply).
		-	24 Vac output (field supply).
7	Override status LEDs (yellow)	ON	Manual operation; a local override is active.
		OFF	No voltage or manual operation off.
		Flashing or pulsing	- Override action - Remote override - Output: Local override is off, operation is not possible. - Input: Operation is not possible.
8	LCD signal panel	-	Only on a TX-I/O modules with -ML suffix.
9	Local override switch	-	Only on a TX-I/O with -M or -ML suffix.
10	I/O status LEDs (green)	-	Status of the inputs and outputs (peripheral devices). LEDs are labeled with the I/O point number.
		ON	Binary value indication.
		OFF	No voltage or binary value indication.
		Flashing or pulsing	- Fault indication - Activity of field devices - Module unconfigured, no address key - Analog value indication

### 2.3.1.2 TX-I/O Module LCD Symbol Chart

The TX-I/O module LCD displays a symbol to indicate each point type and its current value.

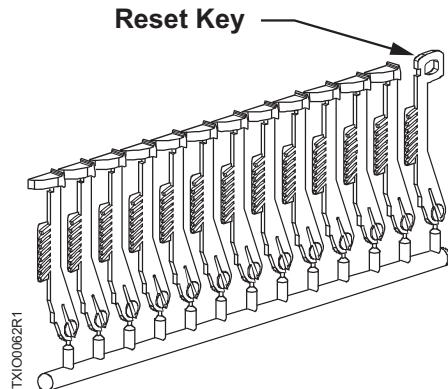
TX-I/O Module LCD Panel for Errors and Reminders (Displays in LCD Top Row)	
	Value above range limit
	Value below range limit

TX-I/O Module LCD Panel for Errors and Reminders (Displays in LCD Top Row)	
	Open circuit
	Short circuit
	Point type invalid for use with manual override
	No sensor (current)
	No output signal
	24 Vdc supply < 22 Vdc
	Inactive point
	Invalid value
	No voltage
	Unconfigured point

TX-I/O LCD Panel by Point Type.			
Point Type (Displays in LCD Bottom Row)	Normal Operation (Displays in LCD Top Row)		
Analog Input, Current 			Low or high value
Analog Input, Resistance 			Temperature
Analog Input, Voltage 			Low or high value
Analog Output, Current 			Low or high value
Analog Output, Voltage 			Low or high value
Digital Input, Counter 			Step indicator
Digital Input, N/C Contact 		Inactive	
Digital Input, N/O Contact 		Inactive	

### 2.3.1.3 Address Keys

The P1 Bus Interface Module (BIM) (10-module) and I/O modules are addressed using a TX-I/O address key.



*Figure 35: TX-I/O Module Keys.*

The keys are available in sets of 24, up to a maximum value of 72 (2 sets of 12, 1-24, 25-48, and 49-72).

- The I/O module address is mechanically encoded in the address key.
  - Without an address key, the module is inactive.
  - With an address key inserted, the module has full functionality.
- Based on the address, the PXC Modular, PXC-36, or P1 BIM configures the I/O module, indicates which field devices are connected to this module, and which function is required for the field devices.

When replacing the plug-in I/O module, the address key must first be swiveled outward. This switches the load off but values remain saved in the PXC Modular, PXC-36, or P1 BIM. The key remains plugged into the terminal base so that the PXC Modular, PXC-36, or P1 BIM can communicate the required function to the new I/O module.

#### Reset Key

The reset key sets the module back to the factory settings (default function on each of the I/O points):

- The reset key is inserted in place of the address key and then swiveled out again.
- The module indicates the reset by briefly lighting all its I/O status LEDs.
- Note that a reset is only possible when the module is supplied with 24 Vdc.

## TX-I/O Power Supply and Bus Modules

The TX-I/O Power Supply and Bus Modules provide power, communications, and expansion options for the TX-I/O Island Bus.

### Power and Communication Modules

The TX-I/O Power Supply and Bus Connection Module provide the following functions for the island bus:

Product	Function		
	TX-I/O Bus Communication	24 Vdc power	24 Vac power
TX-I/O Power Supply (TXS1.12F4)	Signal pass-thru	Output 28.8 W (1.2A at 24 Vdc)	<ul style="list-style-type: none"> <li>● NEC Class 2 Output , 96 VA max., fused at 4A</li> <li>● Class 1 Power Limited Input, 150 VA max.</li> </ul>
Bus Connection Module (TXS1.EF4)	<ul style="list-style-type: none"> <li>● Signal pass-thru</li> <li>● Allows for external connection of I/O signals.</li> </ul>	Pass-thru	<ul style="list-style-type: none"> <li>● NEC Class 2 Output, 96 VA max., fused at 4A</li> <li>● Class 1 Power Limited Input, 96 VA max.</li> </ul>

The P1 Bus Interface Module (BIM) provides the following functions for the island bus:

Product	Function		
	TX-I/O Bus Communication	24 Vdc power	24 Vac power
P1 Bus Interface Module (10-module) (TXB1.P1)	Protocol translation	14.4 W (0.6A at 24 Vdc)	<ul style="list-style-type: none"> <li>● NEC Class 2 Output, 96 VA max., fused at 4A</li> <li>● Class 1 Power Limited Input, 125 VA max.</li> </ul>
P1 Bus Interface Module (4-module) (TXB1.P1-4)	Protocol translation	14.4 W (0.6A at 24 Vdc)	<ul style="list-style-type: none"> <li>● NEC Class 2 Output, 96 VA max., fused at 4A</li> <li>● Class 1 Power Limited Input, 125 VA max.</li> </ul>

### Island Bus Expansion Module

The Island Bus Expansion (IBE) module provides the following functions for the island bus:

Product	TX-I/O Bus Communication	Function
Island Bus Expansion Module (TXA1.IBE)	<ul style="list-style-type: none"> <li>● Signal pass-thru of Communication Data (CD)</li> <li>● Allows for external connection of the I/O signals</li> <li>● RS-485 interface</li> </ul>	Increases the distance between the primary field panel and expansion field panels on the island bus

### TX-I/O Power Supply Overview

The TX-I/O Power Supply bridges communication and power from one DIN rail to another and generates 28.8 W (1.2A at 24 Vdc) to power TX-I/O modules and peripheral devices.

- An LED provides an indication of 24 Vdc on the TX-I/O bus.
- Up to 4 TX-I/O Power Supplies can be operated in parallel, with a maximum of two per DIN rail.
- It can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.

The TX-I/O Power Supply performs the following functions:

- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Provides an input point for 24 Vac to power additional peripheral devices.
  - Isolates the 24 Vac peripheral device supply in case of overload or short-circuit.
  - The replaceable AC fuse can be accessed from an installed module.
  - Indicates the AC fuse status with an LED for easy diagnostics.
- Routes the bus signal between DIN rails (+24 Vdc Communication Supply (CS) and Communication Data (CD) signals).

### **Supply Terminal Connections**

- 24 Vac supply terminals are fused (replaceable) for Class 2 (24 Vac at 50/60 Hz) through the TX-I/O Power Supply.
- 24 Vdc supply terminals are connected in the I/O module, not in the terminal base. 24 Vdc is supplied and overload protected in the TX-I/O Power Supply.

## **Bus Connection Module Overview**

The Bus Connection Module bridges communication and power from one DIN rail to another. It provides the bus signal, module supply voltage, and field device supply voltage to TX-I/O Modules on an additional DIN rail.

The Bus Connection Module performs the following functions:

- Passes 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Provides an input point for 24 Vac to power additional peripheral devices.
  - Isolates the 24 Vac peripheral device supply in case of overload or short-circuit.
  - The replaceable AC fuse can be accessed from an installed module.
  - Indicates the AC fuse status with an LED for easy diagnostics.
- Routes the bus signal between DIN rails (+24 Vdc Communication Supply (CS) and Communication Data (CD) signals).

### **Supply Terminal Connections**

- 24 Vdc is supplied to terminals one and four (CS) and to both ends of the TX-I/O bus connector for distribution to connected TX-I/O modules and external devices.
- 24 Vac is passed through an internal fuse from terminals three and four (system neutral) to the male TX-I/O bus connector.
- External devices draw power from the 24 Vdc, 24 Vac, and system neutral terminals on the TX-I/O modules.
- 24 Vdc supply terminals are connected in the I/O module, not in the terminal base. 24 Vdc is current-limited in the Bus Connection Module.

## **Island Bus Expansion Module Overview**

The TX-I/O Island Bus Expansion (IBE) module increases the distance between the primary field panel and expansion field panels on the island bus. Up to 4 expansion enclosures may be connected to the primary enclosure using IBEs, for a maximum of five IBEs on the island bus.

- Each IBE supports two segments of up to 200 ft (61 m) each.

- All expansion field panels must be connected to the same building approved earth ground as the primary field panel.
- Each IBE must be installed on the male bus connector of the TX-I/O Power Supply or a Bus Connection Module which is connected to a TX-I/O Power Supply.
- An LED provides an indication of island bus communication.
- A programming tool is not required.

For information on expanding an island bus with the IBE, contact your local Siemens Industry representative.

## 2.4 PX Series Enclosures and Service Boxes

PX Series enclosures house both electronic and pneumatic components. The enclosures include a perforated backplane for mounting PXC Series field panels or other electronic or pneumatic components.

General features of the enclosures includes:

- Availability in three sizes to match installation needs: 18-, 19-, and 34-inch.
- Sturdy construction, which accommodates secure conduit fittings and protects components against incidental contact and falling dirt.
- UL Smoke Control listed for indoor use (19- and 34-inch enclosures only).
- Multiple knockouts along the top and bottom.
- Perforated backplane, which extends wall-to-wall for mounting of additional equipment.
- Spacious interior for easy routing and termination of wiring.

The 18-inch enclosure is a pull-box type utility cabinet for low cost installations. It is equipped with the following:

- Factory-installed 16" × 12" perforated panel
- DIN rail and wire tie bar kit

The 19- or 34-inch PX series enclosures are equipped with the following:

- Factory-installed backplane assembly, which includes wire tie down rails and DIN rails
- Label pouch
- Hinged door and key lock
- Conduit knockouts and venting

### 2.4.1 PX Series Service Box Features

The PX Series Service Box Assemblies transform either 115 Vac or 230 Vac to 24 Vac sized for either 192 VA or 384 VA.

- The 192 VA service boxes mount directly inside a 19- or 34-inch PX Series Enclosure.
- The 384 VA service boxes provide additional power for larger systems and mount only in the 34-inch PX Series Enclosure.

The service boxes provide protection against electrical transients and are Smoke Control and Energy Management listed when installed according to the *Service Box Assemblies Installation Instructions* (553-131).

The service box assemblies consist of the following:

- Chassis for mounting inside enclosure.
- ON/OFF circuit breaker for transformer.
- Two Class 1 power limited 24 Vac outputs, which include one terminal for earth ground for use inside enclosure only.
- One Class 2 output with circuit breaker to distribute up to 96 VA for use outside the enclosure.
- Wire cover for field connections.
- Duplex Service Outlet (115 Vac models only).
- Optional sidewall kits PXA-SW192VA and PXA-SW384VA may be used for installation in third-party enclosures, such as motor control cabinets.

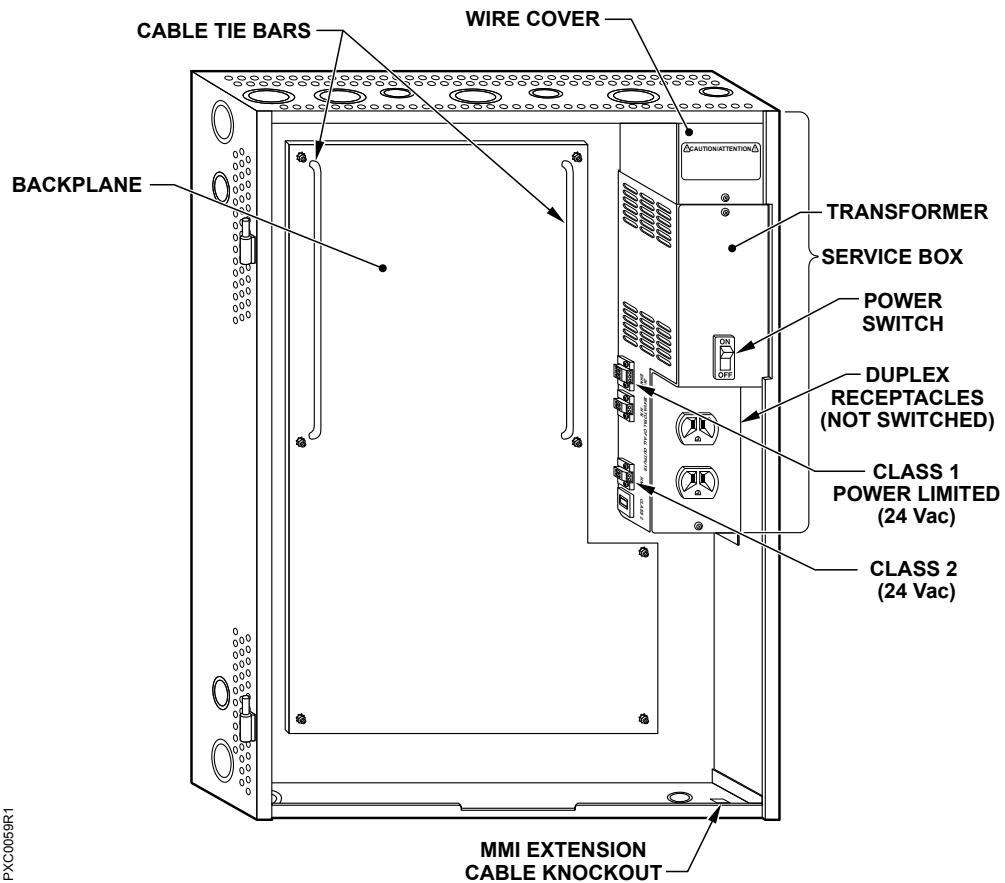


Figure 36: PX Series Service Box (115V), 34-inch enclosure.

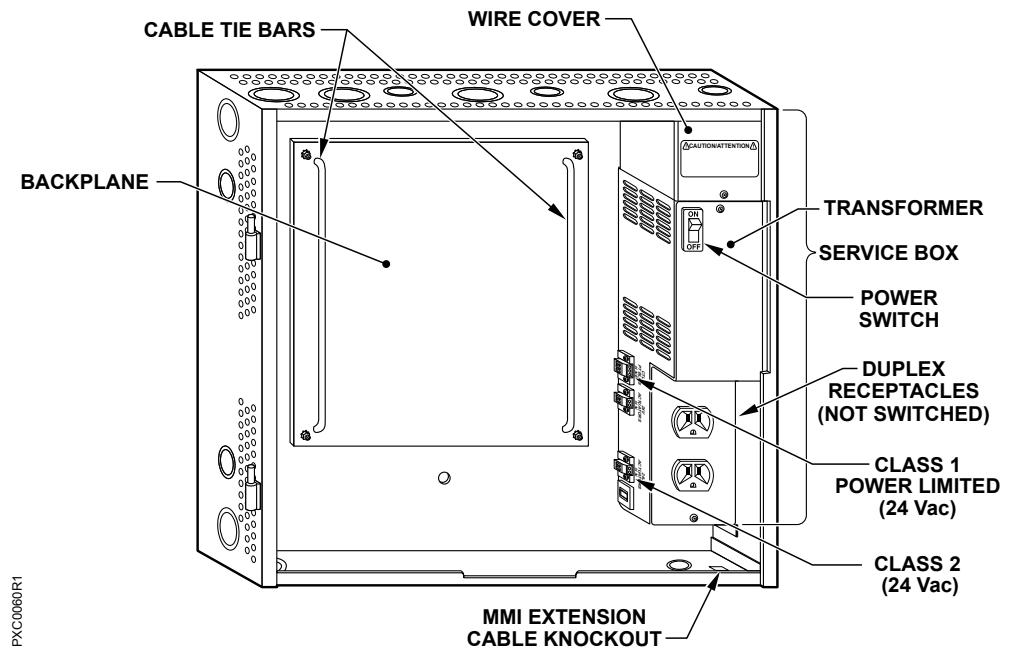


Figure 37: PX Series Service Box (115V), 19-inch enclosure.

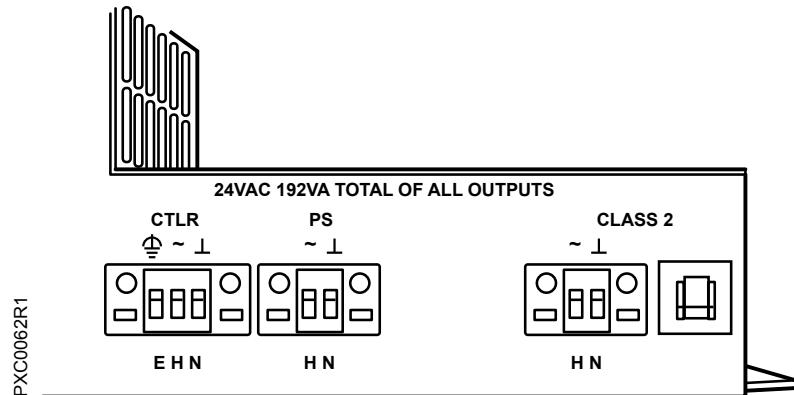


Figure 38: PX Series Service Box Connectors.

- Each Service Box distributes the total 24 Vac power provided to the plug-in terminations on the left side.
  - Two Class 1 power-limited terminations distribute up to the total power to controllers and power supplies inside the same enclosure.
  - Earth ground is provided on the CTRLR termination.
  - One Class 2 termination distributes up to 96 VA to auxiliary devices outside of the enclosure.
- Each 115VAC Service Box has a duplex outlet on the front to power accessory devices such as modems and Portable Operator's Terminals.

## 2.4.2 Product Numbers

Product Number	Description
PXA-SB115V192VA	PX Series Service Box—115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	PX Series Service Box—115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	PX Series Service Box—230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	PX Series Service Box—230V, 24 Vac, 50/60 Hz, 384 VA
PXA-ENC18	18" Enclosure (Utility Cabinet) (UL Listed NEMA Type 1 Enclosure)
PXA-ENC19	19" Enclosure (UL Listed NEMA Type 1 Enclosure)
PXA-ENC34	34" Enclosure (UL Listed NEMA Type 1 Enclosure)

### 2.4.3 PX Series Enclosure Specifications

#### PX Series 18" Enclosure Specifications

##### Dimensions (H × W × D)

PXA-ENC18

18" × 14" × 6"  
(457.2 mm × 355.6 mm × 152.4 mm)  
UL Listed NEMA Type 1 Enclosure, Pull-box style

##### Operating Environment

Ambient operating environment

+32°F to +122°F (0°C to +50°C), 95% rh (Non-condensing)

Mounting Surface

Building wall or structural member (Do not mount on HVAC components or any other vibrating surface)

##### Agency Listings

Agency Compliance

UL 508A (acceptable for UL 916 applications)  
FCC Compliance

#### PX Series 19" and 34" Enclosure Specifications

##### Dimensions (H × W × D)

PXA-ENC19

19" × 22" × 5.75"  
(482.6 mm × 558.8 mm × 146.05 mm)  
UL Listed NEMA Type 1 Enclosure, Hinged Door with lock

PXA-ENC34

34" × 22" × 5.75"  
(863.6 mm × 558.8 mm × 146.05 mm)  
UL Listed NEMA Type 1 Enclosure, Hinged Door with lock

##### Operating Environment

Ambient operating environment

+32°F to +122°F (0°C to +50°C), 95% rh (Non-condensing)

Mounting Surface

Building wall or structural member (Do not mount on HVAC components or any other vibrating surface.)

##### Agency Listings

UL

UL 864 UUKL Smoke Control Equipment  
ULC-C100 UUKL7  
UL 916 PAZX  
UL 508A

Agency Compliance

FCC Compliance  
Australian EMC Framework - with metal enclosure, maximum opening size is 34"  
European EMC Directive (CE) - with metal enclosure, maximum opening size is 34"

European Low Voltage Directive (LVD)

## 2.4.4 PX Series Service Box Specifications

Power Requirements for 115 Vac Service Boxes

**PXA-SB115V192VA**

Input: 115 Vac +/- 15%, 50/60 Hz +/- 5%, 220 VA maximum, 2A CB  
Output: 24 Vac +/- 20%, 50/60 Hz +/- 5%, 192 VA maximum

**PXA-SB115V384VA**

Input: 115 Vac +/- 15%, 50/60 Hz +/- 5%, 440 VA maximum, 4A CB  
Output: 24Vac +/- 20%, 50/60 Hz +/- 5%, 384 VA maximum

115 Vac models also have a duplex outlet, which is protected by Mains 20A or 15A CB for use internal to enclosure to power laptop and peripheral devices.

Power Requirements for 230 Vac Service Boxes

**PXA-SB230V192VA**

Input: 230 Vac +/- 15%, 50/60 Hz +/- 5%, 220 VA maximum, 1A CB  
Output: 24 Vac +/- 20%, 50/60 Hz +/- 5%, 192 VA maximum

**PXA-SB230V384VA**

Input: 230 Vac +/- 15%, 50/60 Hz +/- 5%, 440 VA maximum, 2A CB  
Output: 24 Vac +/- 20%, 50/60 Hz +/- 5%, 384 VA maximum

Service Box Output Jacks

One 3-terminal and one 2-terminal NEC Class 1 output jack for use internal to enclosure to power system components.

One 2-terminal NEC Class 2 output jack with 4A CB for use external to enclosure to power actuators.

## 2.4.5 PX Series Enclosure Placement



### CAUTION

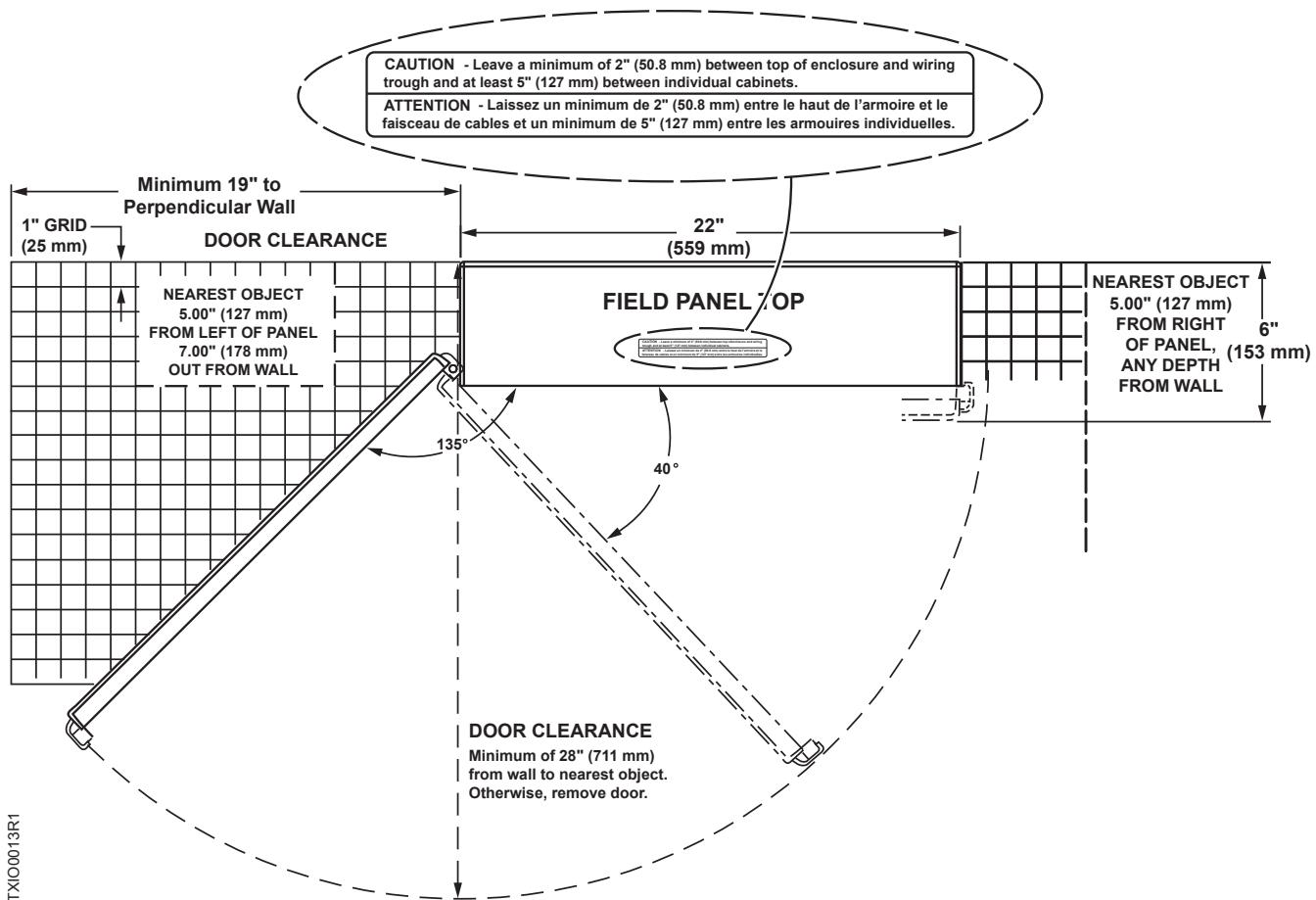
Do not mount the enclosure on ductwork, HVAC components, or any other vibrating surface.

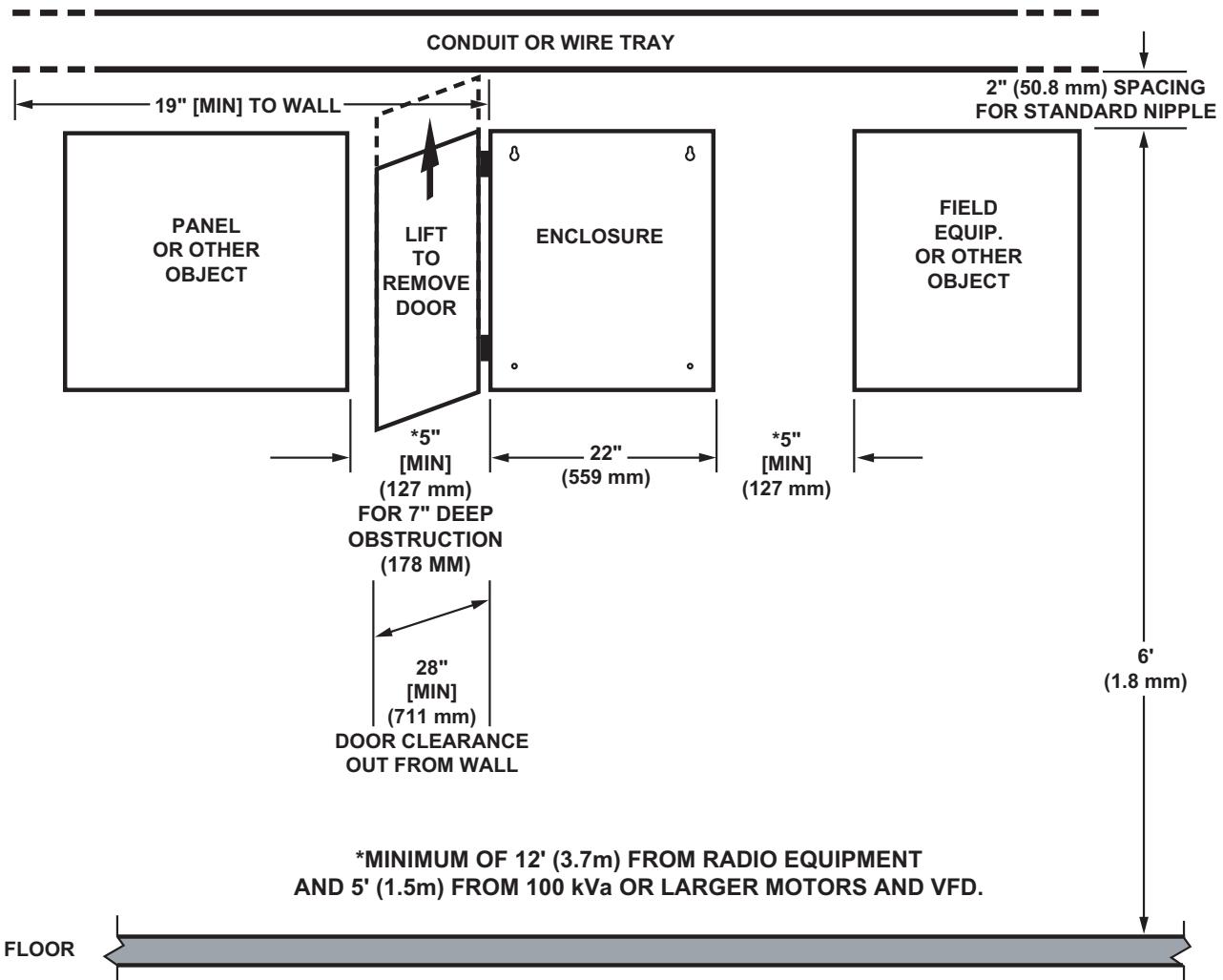
- Mount the enclosure at least 12 feet (3.7 m) away from devices that can generate Radio Frequency Interference (RFI), such as Electro-pneumatic devices (EPs), relays, and walkie-talkies.
- Mount the enclosure at least 5 feet (1.5 m) away from 100 kVa or larger motors and variable frequency drives (VFD).



### CAUTION

If the enclosure is mounted under a wire trough or any other obstruction, provide a minimum vertical clearance of 2 inches (50.8 mm) to allow for installation and removal of the enclosure door.





TXIO0014R3

- Space between door panel and opening obstruction must be at least 11 inches (279.4 mm) to allow for door removal at 40 degrees, or 28 inches (711 mm) with a cabinet mounting at least 19 inches (483 mm) from the left side wall to allow door to completely open at 135 degrees.
- 5 inches (127 mm) minimum horizontal distance between the enclosure and any obstruction to the left and right.
- 7 inches (178 mm) minimum depth out from the wall on the left (hinged) side for door clearance.

## Chapter 3—Applications

Chapter 3 describes the program and applications provided with or available for the PXC Modular Series. The following topics are discussed in this chapter:

- Operator Interface
  - Field Panel GO
- Powers Process Control Language (PPCL) Point Database and Control Program
  - Control Programs
  - Point Database
- Applications
- Customized Applications

## Operator Interface

An operator issues commands or requests to the PXC Modular using an operator terminal and the operator interface. The operator interface is the software that allows the operator to communicate interactively with the PXC Modular Series. The operator interface does the following:

- Interprets and processes commands entered from operator terminals.
- Formats and sends all output directed to the operator.
- Provides levels of operator access that control an operator's authority to perform certain functions.

The operator interface is described in detail in the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020). This manual is designed to help you become familiar with and use the operator interface. It describes the functions necessary for everyday operation of your system, plus the higher-level functions for commanding, displaying, editing, scheduling, networking, alarm management, and others.

## Field Panel GO

The Field Panel GO license provides a Web-based user interface for your APOGEE® Building Automation System. It is an ideal solution for small or remote facilities with field panels on an Ethernet TCP/IP Automation Level Network (ALN).

A Field Panel GO Web Server-enabled controller can accommodate an unlimited number of user accounts, with up to two concurrent operator sessions. And each user account can be defined with customized levels of access and privileges to the system.

Field Panel GO encompasses the following operator applications:

- Alarm Status and acknowledgement
- Graphical Monitoring and Control
- Point Commander
- Schedule Overrides
- Status Reporting
- Historical Data Reporting
- Setup and Customization

Contact your local Siemens Industry representative for more information on Field Panel GO.

## Field Panel Web Server

The Web Server resides on a TCP/IP-based BACnet PXC Compact 36 and/or PXC Modular controller. This means that the same field panel can serve as an automation controller, with full building automation and I/O features, and a host for the Web Server application. This eliminates the high cost of a separate “Web appliance” or dedicated Web server, which competitive solutions require be added to a building automation network.

The Web Server allows system-wide access through a single log-in. Web pages can be populated with data from any BACnet IP-enabled PXC controller and associated FLN devices. The Web Server will automatically connect and display data from BACnet PXC Modular or PXC Compact controllers that have the Web Services license enabled.

Any client device running Microsoft Internet Explorer 6.0 (IE6) or later, or Firefox 3.6 or later can be used to access the Field Panel Web Server. A Web Server-enabled controller can accommodate an unlimited number of user accounts. Each user account can be defined with customized levels of privileges and access to the system.

See the *Field Panel Web Server User Guide* (125-3584) for more detailed information.

The Field Panel Web Server encompasses the following operator applications:

- Graphical Monitoring and Control
- Network Layout
- System Status Bar
- Alarm Status and Acknowledgement
- Point Commanding
- Scheduling
- Graphical Trend Display
- Reporting
- Configuration and Customization
- Remote Notification

### Graphics

- Customized system graphics
- Live animation of equipment
- Real-time point values and status updates

### Network Layout

- View network layout
- Navigate to other Web-enabled panels
- Search database for individual points

### System Status Bar

- Visual indication of new alarms and unacknowledged alarms
- Visual indication of out of service, faults, and failed devices

- Ability to view, filter, and acknowledge system alarms from a single page

**Point Commanding**

- Change point values
- Place points “Out of Service”
- Command BACnet MS/TP and P1 FLN points

**Scheduler**

- View schedules in a daily, weekly, or monthly view
- Add and delete schedules
- Create exceptions for existing schedules

**Reporting**

- Generate Point Log Report with multiple filters

**Graphical Trend Display**

- View one or more trends on a single display
- View raw data values and export to CSV file
- Print trend graph to network printers
- Display points with current values

**Configuration and Customization**

- Custom Welcome Page
- Translators user interface to any browser-supported language
- Customize font sizes and display colors

## Powers Process Control Language (PPCL) Control Program and Point Database

The control programs and point database are stored in RAM. This information can also be saved or loaded into the PXC Modular using APOGEE Datamate software or Insight software.

### Control Programs

The control programs define all user-defined control logic, calculations, applications, and so on for the PXC Modular. PPCL is written in an English-based programming language called Powers Process Control Language (PPCL). It is a powerful programming language developed specifically for controlling Heating, Ventilating, and Air Conditioning (HVAC) equipment. Multiple PPCL programs can be run simultaneously to provide instructions for the PXC Modular to operate equipment, control system loads, and optimize the system operation.

For a complete description of PPCL and how to use it, see the *APOGEE Powers Process Control Language (PPCL) User's Manual* (125-1896). This manual is available from your local Siemens Industry representative.

## Point Database

The PXC Modular Series has the basic capabilities required to control and monitor a facility. However, the operator (or the installer) must program specific instructions into the PXC Modular and create databases that are customized for your particular facility. The databases contain information, such as point names, addresses, schedules, and alarm information for the equipment being supervised by the PXC Modular.

The PXC Modular uses information from the point database to define each point so that the firmware and the software know how to evaluate or command the point.

Among the items kept in the point database are the following:

- Location, or address of field inputs/outputs
- Logical point names and descriptions of points
- Point type
- Alarm information
- Current value of a point
- Information to convert analog signals to engineering units (slope and intercept constants)

The point database is described in detail in the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* or (125-3020).

## Applications

Applications are an important part of the energy management capabilities of your system. The applications that you can incorporate into the operation of your system include:

- Adaptive Control
- Alarm Management
- Daylight Saving Time
- Equipment Scheduling
- Loop/Loop Tuning
- Start/Stop Time Optimization (SSTO)
- Time and Calendar (schedules, Daylight Saving Time)
- Trend Data Collection
- User Access and Privileges

## Adaptive Control

Adaptive control is a closed loop control algorithm that auto-adjusts to compensate for mechanical system/load/seasonal changes. It is designed to eliminate the compromises of traditional Proportional, Integral, Derivative (PID) control. When compared to traditional PID control, adaptive control provides more efficient, robust, fast, and stable control. Adaptive control achieves superior performance in a dynamic, non-linear system in terms of response time and holding steady state, while minimizing error, oscillations, and actuator repositioning.

## Alarm Management

An alarm is a status that indicates whether a point value or state is above or below a defined value. Alarm management is the strategy used to define, route, acknowledge, and resolve those alarms.

Points are defined as alarmable for the following reasons:

- **To prevent critical problems.** Points that affect human safety or can cause a severe problem in building operation should be defined as alarmable. For example, an alarm that notifies you that the temperature of a heating coil is too low and action must be taken before it freezes.
- **To notify you when equipment is not functioning properly.** Sometimes problems may occur and go unnoticed. Alarming is a useful tool to identify equipment that is not working properly and to prevent other devices from becoming damaged.
- **To announce scheduled maintenance.** For example, an alarm can notify you when it is time to change air filters.

## Daylight Saving Time

The Daylight Saving Time (DST) functionality adjusts the system time to match the daylight saving time change-over. If your area uses daylight saving time, this feature offers a convenient method to automatically adjust the system clock.

## Equipment Scheduling

Equipment Scheduling is designed to provide 365-day, time-based control of a space in a facility. The basic design of this application begins with a definition of the space, called a zone. The state of the zone dictates how the field panel controls the points associated to that space. The state of the zone is known as the mode (in this document it is referred to as the current mode value of the zone).

## Loop/Loop Tuning

The loop application is the PPCL Proportional, Integral, Derivative (PID) control loop algorithm. The loop tuning application evaluates and calculates gains and sample times for existing LOOP statements in PPCL. This feature calculates appropriate Proportional, Integral and Derivative (PID) gains and sample time for a selected control loop, based on specific building and control information defined in the LOOP statement. When complete, you decide how to apply the newly calculated variables.

## Start-Stop Time Optimization (SSTO)

*Start/Stop Time Optimization (SSTO)* is an optional, self-adjusting routine that affects the start and stop times of various occupancy modes. SSTO can help conserve energy by starting a heating or cooling process, prior to occupancy, as late as possible. SSTO can also stop heating or cooling a zone as early as possible, prior to vacancy.

For example, a meeting in August occurs at 1:00 P.M. and lasts until 4:00 P.M. Based on the information provided in SSTO parameters, the equipment scheduling application calculates the latest possible time cooling can start and still reach the cooling setpoint.

Also, calculations are made to determine the earliest time cooling can stop without affecting comfort limits.

## Time and Calendar

Calendar dates (in the form of day shifts and replacement days) are entries used to supplement the Equipment Scheduling application.

Time functions compensate for Daylight Savings Time (DST) and provide time-based control for building equipment.

## Trend Data Collection

Trending is a function that records point data over time. Trend data is either collected when the current point value changes by a specified amount (the trend COV limit), or point values are recorded after the system waits a specific amount of time and then the process is repeated.

Trend data can be uploaded from the field panel to the Insight workstation for storage and reporting, and the data can be converted to several spreadsheet formats for further analysis and reporting.

## User Access and Privileges

A user issues commands or requests to the PXC Modular Series using an operator terminal and the operator interface program that resides in the PXC Modular Series. The operations that a particular user can perform depend on the access level assigned to each field panel function in their user account.

User accounts are used to manage access and security for field panels on a specified Automation Level Network (ALN). By creating individual accounts, a system administrator can control each user's access to objects and functions residing in field panels on a specified ALN.

Specifically, a system administrator can perform the following tasks:

- Define the users that can access an ALN
- Assign access to access groups
- Assign privileges to field panel functions residing on an ALN

## Controlling User Access to Field Panel Functions

The following four access levels can be assigned to any field panel function for any user.

- **No Access** – Users cannot see the function.
- **Read Only** – Users can only view the value or status of objects.
- **Command** – Users can command or display the value or status of objects.
- **Edit** – Users can add, delete, command, modify, and view objects.

### Example

If a user has a Command access level for the Point Editing function, then only the functionality required to command a point is available to them. They do not see or have access to the prompts required to add, modify, or delete a point definition.

For more information on user accounts and privileges, see the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

## Customized Applications

Some PXC Modular Series applications are created in the Powers Process Control Language (PPCL). These applications use PPCL statements and additional hardware to perform customized operations or functions in your system. Examples of applications created in PPCL include:

- Duty Cycling
- Enthalpy and Dry Bulb Economizer Control
- Peak Demand Limiting (PDL)

Information on how to customize these applications for your facility is included in the APOGEE Powers Process Control Language (PPCL) User's Manual (125-1896) and the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020). These manuals are available from your Siemens Industry representative.

## SNMP

The Simple Network Management Protocol (SNMP) Agent is a firmware feature that has been added to BACnet Firmware Revision 3.2.3 and later. The SNMP Agent allows points in the field panel to communicate with an SNMP manager over Ethernet.

SNMP is an application layer protocol that facilitates the exchange of management information between network devices. It is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) suite. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

Three versions of SNMP exist: SNMP version 1 (SNMPv1), SNMP version 2 (SNMPv2), and SNMP version 3 (SNMPv3). All three versions have a number of features in common, but SNMPv2 offers enhancements such as additional protocol operations. SNMPv3 offers additional enhancements to Internet security and communities.



SNMP users UDP ports 161 and 162, which must be opened within the firewall settings.



The panel may coldstart after the SNMP license is loaded.

For more information, see the *SNMP Agent Quick Start Guide* (140-0891).

## 3 Chapter 4—Troubleshooting



**NOTE:**

The following information is for qualified service personnel only.

Chapter 4 describes corrective measures you can take if you encounter a problem with a PXC Modular Series controller. If you encounter a symptom or a problem not covered in this manual, contact your Siemens Industry representative. The following topics are discussed in this chapter:

- Service Information
  - Electrostatic Discharge Requirements
  - Error Status Messages
  - Ordering Replacement Parts
  - Replacing the Batteries
  - Reinstalling the Mounting Tabs
- Troubleshooting the PXC Modular and TX-I/O Island Bus

### 3.1 Service Information

This section describes corrective measures you can take if you encounter a problem with a PXC Modular Series controller.

If you encounter a symptom or a problem not covered in this manual, contact your Siemens Industry representative.



**NOTE:**

When removing power to a controller to perform maintenance or service, make sure that the person in charge of the facility is aware of this and that appropriate steps are taken to keep the building in control.



**NOTE:**

When troubleshooting, record the problem and what actions were performed immediately before the problem occurred. Being able to describe the problem in detail is important should you need assistance from your local Siemens Industry representative.

To view the status of the PXC Modular and to call up reports for troubleshooting, you can use an operator's terminal and the operator interface or an Insight workstation. For more information, see the following documentation:

- *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).
- *Insight Revision 3.x Documentation*. To view this documentation, see the Insight Online Documentation window, which you can access from the Insight Main Menu or the Insight program group.

It is good practice to back up the PXC Modular database routinely and whenever changes are made to the database or new equipment is added.

While performing the troubleshooting procedures outlined in this manual, you may wish to refer to the APOGEE Wiring Guidelines for Field Panels and Equipment Controllers (125-3002).

### **3.1.1 Electrostatic Discharge**

An electrostatic discharge (ESD) wrist strap is generally not required when installing or servicing a PXC Modular. However, if the field panel is installed in a very dry environment where a high static discharge is likely, an ESD wrist strap is recommended.

### **3.1.2 Error Status Messages**

For error status message descriptions, see the *APOGEE P2 ALN Field Panel User's Manual* (125-3019) or *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

### **3.1.3 Ordering Replacement Parts**

If a PXC Modular Series is not operating correctly, it should be replaced.

### **3.1.4 Replacing the Batteries**



#### **CAUTION**

AC power must be ON during battery replacement. Otherwise, data loss will occur.



#### **NOTE:**

The battery is taped in the tray to secure it during shipping. The tape does not need to be replaced.

1. Pull the release tab on the curved side of the battery compartment cover.
2. Remove the battery compartment cover.
3. Remove the failed battery, and place a fresh battery in the tray with the positive (+) and negative (-) ends properly aligned.
  - For the AA battery, make sure the positive (+) and negative (-) ends are properly aligned.
  - For the coin cell battery, make sure the positive (+) side is facing up.
4. Replace the battery compartment cover.



**NOTE:**

The LOW BATT LED remains ON if an alkaline battery is used in Compact models with extended temperature range operation.

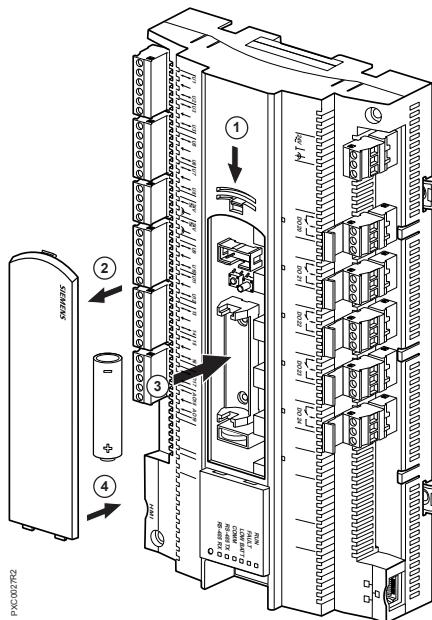


Figure 39: Replacing the AA Battery.

### 3.1.5 Reinstalling the Mounting Tabs

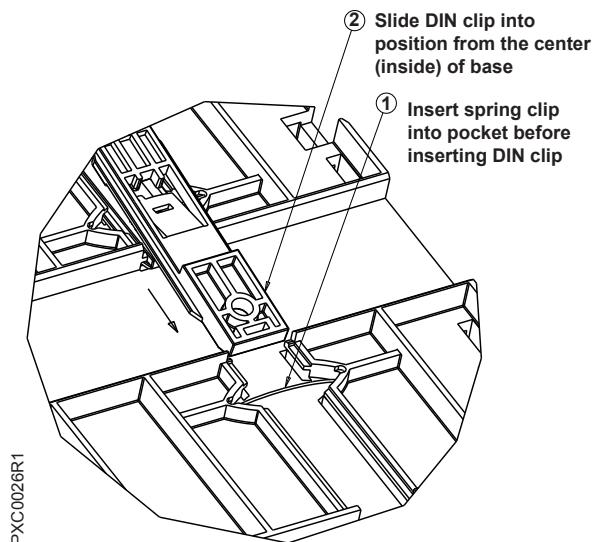
Do the following to reinstall a DIN mounting tab:

1. Place the wire spring clip into the pocket in the channel for the mounting tab.
2. Make sure the mounting tab is face down.
3. Working from the center (inside) of the base, slide the mounting tab into the channel. (See the following figure.)



**NOTE:**

The end with the screw hole slides into the channel first.



*Figure 40: Reinstalling a DIN Mounting Tab.*

## 3.2 Troubleshooting Modular Field Panels

Find the symptom below that best describes the problem and perform the corrective action that follows.

If the problem persists or other symptoms are present, contact your Siemens Industry representative.



### CAUTION

Before performing any RS-485 Expansion Module troubleshooting procedures, complete a successful check-out of the PXC Modular.

### 3.2.1 BATT LOW LED

**The BATT LOW LED is on or the battery low warning is displayed at the operator's terminal.**



### CAUTION

If you do not have a current backup, save the database before continuing.

1. Check that the mylar insert was removed from the AA (LR6) battery holder.
2. Check for polarity (+ to +) and (- to -).
3. Check that the battery is properly seated in the battery holder.
4. Replace the battery.

### 3.2.2 RUN LED

**The RUN LED is on solid.**

- The RUN LED is steadily lit during normal operation to indicate that 24 Vac power is ON and the application firmware has booted.

**The RUN LED is off.**

1. Verify that power is connected.
2. Check the service box and transformer ON switches.
3. If power is ON, verify that the application firmware has booted.
4. Measure voltage on **24V~** and **L** (Terminals 1 and 2).

**The RS-485 Expansion Module RUN LED is off.**

1. Check that the Expansion Module is properly seated on the DIN rail.
2. Verify the connection between the RS-485 Expansion Module and the PXC Modular.

### 3.2.3 TX and RX LEDs

### 3.2.4 Communication

**Points cannot be read or commanded from the operator's terminal.**

1. Verify that failed points have been properly addressed.
2. Verify the status of the points at the operator's terminal. Verify that points are not under Operator priority.

**No communication over the FLN trunk.**

1. Verify the FLN address and communication speed.
2. Verify the FLN trunk is connected to the correct FLN port.

### 3.2.5 Display



**NOTE:**

In USE FW REV TABLE ALN mode, RS-485 parameters are displayed and may be entered as a selection. However, when in RS-485 ALN mode, USE FW REV TABLE ALN parameters are not an available selection.

**PXC Modular defaults to Ethernet ALN but continues to display parameters for RS-485 P2 ALN.**

1. Generate the Field Panel Configuration report by entering the following at the HMI: **S, H, F, D** (System, Hardware, Fieldpanels, Display).
2. Verify the field panel settings on the Field Panel Configuration report (such as the ALN baud rate for P2 ALN or an IP address for Ethernet TCP/IP ALN).
3. Verify the current ALN type on the Field Panel Configuration report.



**NOTE:**

Changing the ALN type coldstarts the field panel.

4. If needed, change the ALN type by entering the following at the HMI: **S, H, F, C, E, M** (System, Hardware, Fieldpanels, Config, nEtype, Modify). (**S, H, F, C, S, T** for Firmware Revision 2.8.3 and earlier.)

### 3.2.6 Errors

**PXC Modular program and database are not down-line loading properly.**

- Verify that the Insight software is at least Revision 3.8.1 (P2) or 3.9.1 (BACnet).

## Troubleshooting the TX-I/O Island Bus

**The 24 Vac LED on the TX-I/O Power Supply or the P1 Bus Interface Module (BIM) is OFF.**

1. Check for 24 Vac input.
2. Replace the fuse (4A, 5 × 20 mm, 250V, medium-acting, ceramic fuse).

**All points on the TX-I/O island bus are failed.**

- Verify all three signals, System Neutral (L), Communication Data (CD), and Communication Supply (CS) are connected throughout the entire TX-I/O island bus.

**The I/O module status LED (under the address key) is flashing or the I/O point status LED is flashing on an open point. All points are operating normally.**



**⚠ CAUTION**

The TX-I/O™ island bus must extend from the male bus connector of the TX-I/O Power Supply or Bus Connection Module.

- The TX-I/O Power Supply and Bus Connection Module only supply 24 Vac to I/O modules on the male bus connector.
- I/O modules on the female bus connector of the TX-I/O Power Supply or Bus Connection Module do not receive power and have a fault condition.

**A point is failed or the point type displayed does not correspond to the point type defined in the database.**

1. Using the job drawing or TX-I/O Island Bus layout sheet, verify that the address keys are in the correct module.
2. Reset the module to factory settings.
  - Verify that the module is supplied with 24 Vdc.
  - Remove keys that are in the wrong module.
  - Insert and then remove the reset key.
  - Cycle power to the module.
  - Insert the correct address key.

**A current point on a Super Universal Module is failed.**

- Verify that the sensor supply wire is connected to the DC terminal (3, 11, 20, or 28).

# Glossary

The glossary contains terms and acronyms that are used in this manual.

## 1

**100Base-TX:** Fast Ethernet network implementation. 100Base-TX stands for 10Mbps baseband twisted-pair cable. The “X” stands for 100Base-X, the IEEE identifier for the media system used by 100Base-TX.

**10Base-T:** Ethernet network implementation. 10Base-T stands for 10Mbps baseband twisted-pair cable.

## A

**Adaptive Control:** Closed loop control algorithm that auto-adjusts to compensate for mechanical system/load/seasonal changes.

**AEM/AEM100/AEM200:** Devices that allow APOGEE field panel networks to communicate with the Insight workstation across an Ethernet network. The APOGEE Ethernet Microserver (AEM) operates on a 10Base-Tconnection, but can also be routed across low speed networks (for example, across Frame Relay). The AEM100 supports auto-sensing 10Base-T and 100Base-TX Ethernet communication. The AEM200 adds a second serial port, allowing MMI access without disconnecting from the Insight network.

**alarm priority:** Ranking of a point alarm.

**Automation Level Network (ALN) Devices:** Extends Protocol 2 networks, leased line Modem, TI-2, Fiber Optic TIs, and TIE.

**analog input-electric:** Analog input point that receives either a current, voltage, or resistance input signal.

**analog output-pneumatic:** Analog output point that outputs a pneumatic signal.

**AO-V point:** Physical analog output point that generates a voltage signal.

**Automation Level Network (ALN):** The level in the communication hierarchy that consists of automation stations, automation devices, Application-Specific Controllers (ASCs), etc.

## B

**BACnet:** A data communication protocol for Building Automation and Control Networks, ANSI/ASHRAE Standard 135-2004. BACnet allows devices from multiple manufacturers to work together on a network.

**BACnet Broadcast Message Device (BBMD):** BBMDs pass BACnet Broadcast Messages to other BBMDs on the network, allowing these messages to reach BACnet devices on the other side of a subnet router.

**BACnet Encoded Name:** A numeric representation of an object name that exceeds the APOGEE standard of 30 alphanumeric characters or less per name.

**BACnet/IP:** BACnet over IP protocol.

**BBMD:** See *BACnet Broadcast Message Device*.

**broadcast:** Destination IP address that represents all interfaces on all hosts. Usually, this is restricted to all hosts on the local subnet.

**C**

**command priority:** Ranking of a point command.

**current value:** Last commanded or sensed value of a logical point.

**D**

**Device ID:** Uniquely identifies a device object on the BACnet Inter network.

**Device Instance Number:** A number assigned to a BACnet device (for example, a BACnet field panel) that uniquely identifies it on the BACnet/IP network.

**Device port:** A USB Device port supports a generic serial interface for an HMI or Tool connection.

**Device Specific Name:** A textual representation of a BACnet object name that meets the APOGEE naming standard of 30 alphanumeric characters or less.

**digitized value:** Integer value used by the field panel to determine the logical value, state, and condition of logical points.

**Domain Name Server (DNS):** Common method of assigning computer names in UNIX-based networks. A DNS server maintains a list of host names and IP addresses, allowing computers that query them to find remote computers by specifying host names rather than IP addresses. DNS is a distributed database; therefore, DNS servers can be configured to use a sequence of name servers, based on the domain in the name being looked for.

**Dynamic Host Configuration Protocol (DHCP):** Protocol used for automatic TCP/IP configuration of nodes across a network. DHCP dynamically assigns addresses to nodes and allows for central administration of addresses.

**dynamic point information:** Information stored in the point database that may change during system operation and is not part of the data entered when defining points.

**E**

**enclosure:** Metal case that houses the field panel components.

**English units:** The foot-pound-second system of units for weights and measurements.

**enhanced alarming:** Application that allows floating alarms and alarm segregation.

**Ethernet ready:** Any device that communicates over Ethernet cabling. For example, both Ethernet ALN and BACnet/IP field panels are Ethernet ready, even though they use different communication protocols.

**F**

**Field Level Network (FLN):** A data communications link that passes information between an FLN device and an Automation Level Network (ALN) device. Terminal Equipment Controllers (TEC) are examples of FLN devices.

**H**

**HAND-OFF-AUTO (HOA) switches:** Manually operated control switches located on the face of HOA-equipped controllers that enable digital output points to be manually placed into HAND (ON), OFF, or AUTO control. Analog outputs can be placed into AUTO or multiple manual control positions.

**Host port:** A USB Host port provides support for USB modems and line printers.

**Human-Machine Interface (HMI) port:** Interfaces of various hardware and/or software units allowing the operator to transfer information to a technical system and/or receive information from the same.

## I

**Instance ID:** The identifying number for objects (for example, points) within a BACnet device. Instance IDs can be assigned manually or automatically within the range set for the host device.

**Internet Protocol (IP):** A connection-less protocol that allows a packet to travel across multiple networks on its way to its destination. IP is the network layer of TCP/IP suite.

**Intrinsic Alarming:** BACnet alarming that incorporates alarm destinations (via Notification Classes) within a single alarm message.

## M

**multicast:** Destination IP address that represents one or more interfaces. IP datagrams sent to a multicast address will be sent to all hosts participating in this multicast group.

## N

**notification class:** Notification Class supports enable/disable based on the day of week and time of day and the alarm priority for all points associated with it.

## P

**Plain Old Telephone Service (POTS):** Acronym for the standard telephone service that is used in most homes. Communication speed is generally restricted to 52K bps.

**point condition:** State of a point such as normal, alarm, alarm-by-command, failed, operator disabled, or proofing.

## R

**Read Only Memory (ROM):** Non-volatile, permanent, but field-programmable memory that stores the operating system of the field panel. ROM stays intact even in the event of a power surge, a power loss, or failure of the battery backup.

**Remote Automation Level Network (ALN):** Automation Level Network (ALN) hosted by a remote field panel. The ALN is only seen at the remote site and at a centrally located Insight workstation.

**remote field panel:** Field panel not directly connected to the Insight ALN. Remote field panels connect over the telephone lines using a dial-up modem, or over an Ethernet network using an AEM/AEM100/AEM200.

## S

**service box:** Component that receives the line power and converts it to 24 Vac for the field panel.

## T

**telnet:** Program that runs on top of TCP/IP, it is the Internet standard protocol for remote login.

**text-based terminal:** Operator terminal that displays and accepts text only.

**To-Fault:** A BACnet event indicating that the BACnet object (point) has transitioned to the Fault state from some other state for the recipient or device. A BACnet object may not require acknowledgement of this event by a user.

**To-Normal:** A BACnet event indicating that the BACnet object (point) has transitioned to the Normal state from some other state for the recipient or device. A BACnet object may not require acknowledgement of this event by a user.

**To-OffNormal:** A BACnet event indicating that the BACnet object (point) has transitioned to the OffNormal state from some other state for the recipient or device. OffNormal states in BACnet are: OffNormal, high-limit, low-limit, and life-safety-alarm. A BACnet object may or may not require acknowledgement of this event by a user.

**tombstone:** Remnant or memento of a deleted record that is retained for a finite amount of time in a node's replication database. Tombstones are used to keep track of locally deleted records that must be deleted from replication partners during future global data replication sessions.

**totalized value:** Sum of information (in hours or minutes) about logical points such as run time, total volume, and degree days.

**Transmission Control Protocol/Internet Protocol (TCP/IP):** Protocol suite developed by the U.S. Department of Defense to link dissimilar computers across different kinds of networks. TCP/IP is the transport protocol employed by the Internet and is commonly used on Ethernet networks.

## U

**unbundle:** Describes the action of entering a point that resides in an equipment controller's database into the field panel's database so that it can be monitored and controlled from the field panel.

**Unicast:** Destination IP address that represents a single interface to a single system. IP datagrams sent to a unicast address are sent to a single interface on a single IP host.

**User Datagram Protocol (UDP):** TCP/IP protocol that provides simple datagram services. UDP is a connection-less mode protocol that is layered on top of IP. UDP does not guarantee delivery and is not used for applications that require acknowledgements or re-transmission.

## V

**Virtual AEM:** Without additional hardware, the Virtual AEM connects an RS-485 APOGEE Automation Level Network or individual field panels to a P2 Ethernet network. (Additional license required.)

# Index

## Numerics

10B/100B Ethernet port, 32

## A

Adaptive Control, 75

alarm management, 76

**APOGEE automation networking**

Ethernet TCP/IP ALN, 20

Field Level Network (FLN), 25

P2 Ethernet and BACnet/IP ALN over an IP network, 23

remote ALN, 23

RS-485 P2 ALN, 19

Virtual AEM, 23

**APOGEE automation networking:Automation Level Network (ALN)**, 18

**APOGEE Ethernet Microserver (AEM)**, 14

**applications**

Adaptive Control, 75

alarm management, 76

calendar dates, 77

customized applications, 78

Daylight Saving Time (DST), 76

Equipment Scheduling, 76

loop/loop tuning, 76

Start-Stop Time Optimization (SSTO), 76

time functions, 77

trend data collection, 77

user access and privileges, 77

**Automation Level Network (ALN)**, 18

10B/100B Ethernet port, 32

BACnet MS/TP ALN, 24

BACnet/IP, 23

HMI and Tool ports, 31

simultaneous ALN access, 18

**Auto-Restore of database**, 29

## B

**backup batteries**

replacing, 80

**BACnet**

product features order of implementation, 13

**BACnet MS/TP ALN**

number of field panels supported, 24

**BACnet protocol**, 13

**BACnet/IP ALN**

number of field panels supported, 23

**bus connection module**, 62

## C

**calendar dates**, 77

**communication ports**

10B/100B Ethernet, 32

HMI and Tool, 31

**compatibility**

BACnet product features order of implementation, 13

BACnet protocol, 13

sharing APOGEE P2 values with BACnet devices, 13

TCP/IP protocol, 14

**customized applications**, 78

## D

**Database Backup to Flash**, 29

**Daylight Saving Time (DST)**, 76

**DHCP server**, 14, 14

**DNS node name format**, 15

**Domain Name Server**, 14

## E

**electrostatic discharge (ESD)**, 80

**Equipment Scheduling**, 76

**Ethernet TCP/IP ALN**

number of field panels supported, 20

**F**

- Field Level Network (FLN)**, 25
- Flash Read-Only Memory (Flash ROM)**, 28

**H**

- Human-Machine Interface (HMI)/Tool port**, 31

**I**

- IP addresses**, 14
  - assignment, 14
- island bus expansion (IBE) module**, 62

**L**

- loop/loop tuning**, 76

**M**

- Management Level Network (MLN)**, 18
- memory**
  - compressed ROM, 29
  - Flash Read-Only Memory (ROM), 28
  - Random Access Memory (RAM), 30

**O**

- operator interface**, 72

**P**

- P1 bus interface module (BIM)**, 62
- power supply module**, 62
- Powers Process Control Language (PPCL)**, 74

**R**

- Random Access Memory (RAM)**, 30

**remote ALN**

- number of field panels supported, 23

**RS-485 P2 ALN**

- number of field panels supported, 19

**S**

- service information**, 79
  - electrostatic discharge (ESD), 80
  - reinstalling the mounting tabs, 81
  - replacing the batteries, 80
- Start-Stop Time Optimization (SSTO)**, 76

**T**

- TCP/IP protocol**
  - address assignment, 14
  - compatibility, 14
  - default TCP/IP port number, 14
  - default UDP port number, 14
  - device registration, 14
  - DNS node name format, 15
  - network bandwidth, 15
  - network security, 15
  - required IP addresses, 14
  - Virtual AEM, 14

**time functions**, 77**trend data collection**, 77**troubleshooting**

- 24 Vac LED, 84
- BATT LOW LED, 82
- I/O module status LED, 84
- RUN LED, 83, 83, 83

**TX-I/O Product Range**

- power and bus modules, 62
- TX-I/O island bus, 34

**TX-I/O product range**, 58**U**

- UDP port number**, 14
- USB Device port**, 32
- user access and privileges**, 77
- user accounts**, 77

**V**

- Virtual AEM**, 23
  - default TCP/IP port number, 14

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