Simplex

4010ES IDNAC Fire Alarm System Installation Guide

579-1150 Rev M

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1 Cautions, Warnings, and Regulatory Information

READ AND SAVE THESE INSTRUCTIONS Follow the instructions in this installation manual. These instructions must be followed to avoid damage to this product and associated equipment. Product operation and reliability depend upon proper installation.



DO NOT INSTALL ANY SIMPLEX™ PRODUCT THAT APPEARS DAMAGED Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify an authorized Simplex product supplier.



ELECTRICAL HAZARD Disconnect electrical field power when making any internal adjustments or repairs. All repairs should be performed by a representative or an authorized agent of your local Simplex product supplier.



STATIC HAZARD Static electricity can damage components. Handle as follows:

- Ground yourself before opening or installing components.
- Prior to installation, keep components wrapped in anti-static material at all times.



EYE SAFETY HAZARD Under certain fibreoptic application conditions, the optical output of this device may exceed eye safety limits. Do not use magnification (such as a microscope or other focusing equipment) when viewing the output of this device.

FCC RULES AND REGULATIONS – PART 15. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

SYSTEM REACCEPTANCE TEST AFTER SOFTWARE CHANGES To ensure proper system operation, this product must be tested in accordance with NFPA72® after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

NFPA 72® is a registered trademark of the National Fire Protection Association.

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2 Overview

The 4010ES panel is an expandable fire alarm panel that can be used either as a standalone system or can be networked with the following other panels to create a larger network:

- 4002
- 4010
- 4020
- 4100
- 4100U
- 4100ES
- 4010ES
- 4007ES
- 4190 TrueSite Workstation
- 4190 TrueSite Incident Commander
- 4190 Network System Integrator

It comes with basic system components already installed. This chapter provides an overview of the standalone and network 4010ES panel concepts:

Standalone. Comprised of one 4010ES Fire Alarm Control Unit (FACU) and its assorted notification appliances, initiating devices, and signaling line circuit devices.

Network. Multi-FACU systems connected by 4120 network cards or ES Net network cards. Each panel maintains the status and control of its own circuit points while monitoring and controlling activity at other locations. Network nodes may perform similar tasks, or may be dedicated to specific functions.

2.1 Standalone configuration

The standalone version of the 4010ES is used for smaller or single-building applications. A standalone system is ideally placed into a small building that requires a limited number of notification appliances and initiating devices.

If a small building is being expanded, or if other buildings are being constructed in the same general area (as in a campus application), the standalone 4010ES can be upgraded to a network system as described in the introduction to this chapter.

Note: You must order and install the 4010-9902 and the 4010-9922 network card into the standalone system to enable 4120 network functionality. For ES Net network functionality, you must order and install the 4010-6310 network card.

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2.1.1 Standalone system layout

Figure 1 shows the layout of the 4010ES standalone configuration.

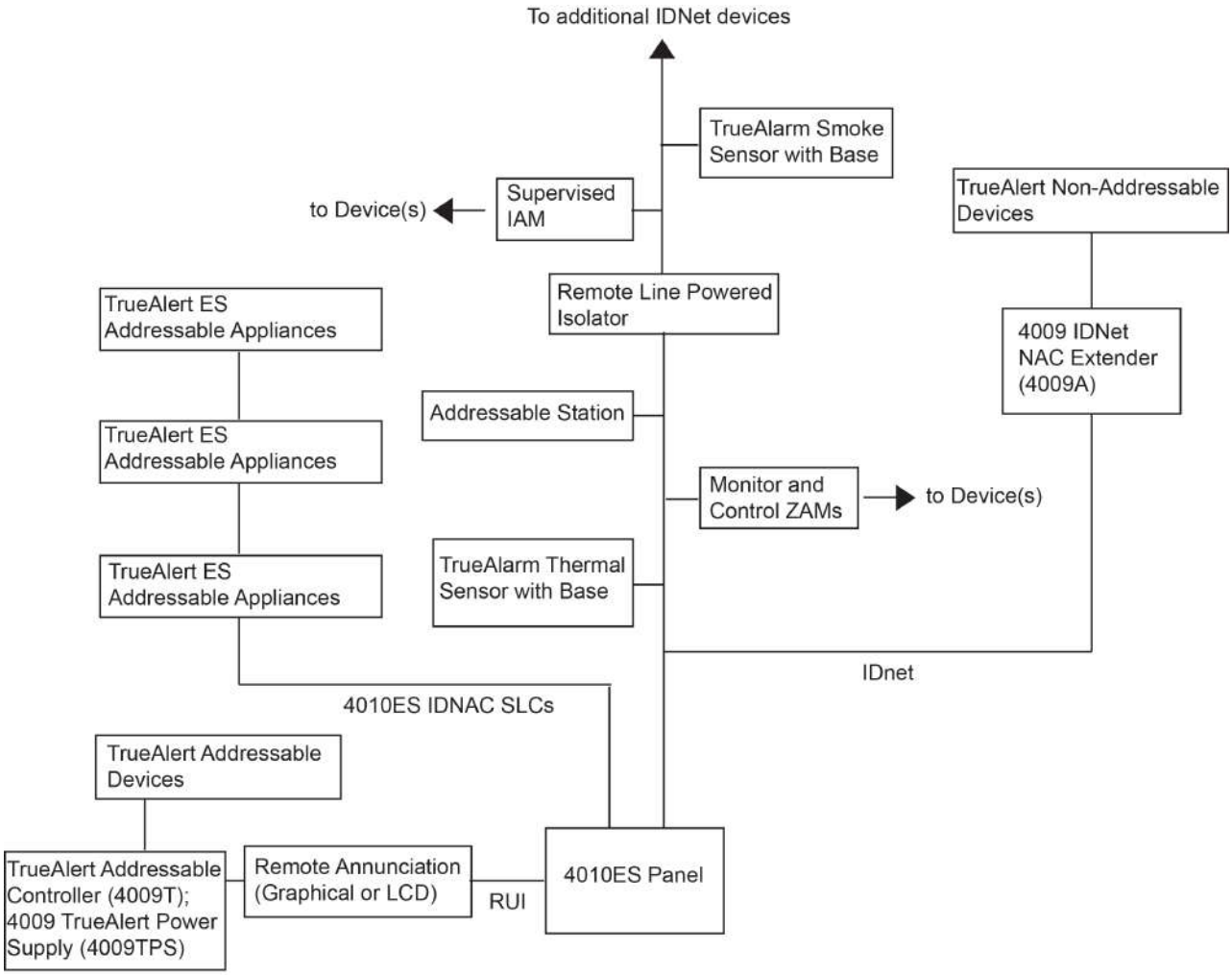


Figure 1: Standalone 4010ES system

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2.2 Network configuration

The 4010ES can be expanded to a network system by using the 4010-9902 and the 4010-9922 network interface card (NICs) for a 4120 network or by using the 4010-6310 ES Net Network Interface Cards (NICs) for an ES Net network. When a NIC is installed into a 4010ES host panel, it is used to connect to up to 98 other network nodes. Nodes may consist of other host 4010ES panels, or they may be completely different: 4100ES FACUs, 4007ES FACUs, and TrueSite Workstation (TSW) are examples of what could be used as nodes. A node is a self-sufficient FACU that controls appliances and devices, which also has the capability of controlling and communicating with other nodes.

The 4120 network configuration supports two prevalent architectures or wiring configurations: **hub** (or *ring*), or **star**. A networked system can also use a combination of the two.

The ES Net network configuration supports a ring topology and also a linear topology (Class B).

Ring and star configurations (4120 network only)

The hub configuration consists of a main loop with nodes connected in a radial manner. The star configuration consists of several nodes connected directly to one common node. Physical bridge cards are used for the star configuration. Physical bridges reduce the amount of wire that would otherwise be needed to connect all nodes in a loop. A combination of the two styles is illustrated in Figure 2.

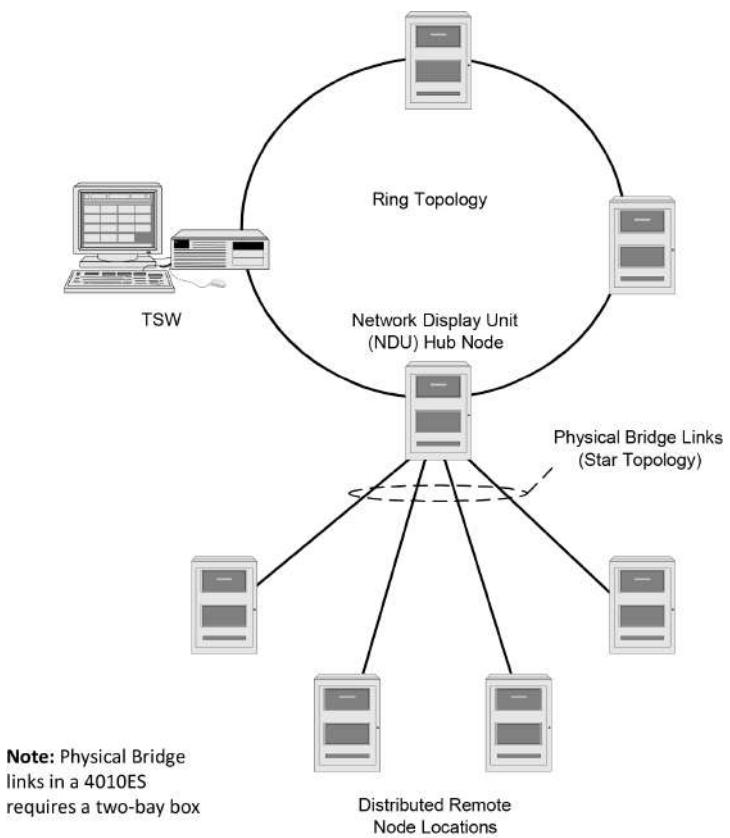


Figure 2: Hub/ring configuration

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2.2.1 Connecting network loops (4120 network only)

Network loops can be joined via physical bridge cards. There may be no more than two Class X network loops (two hub configurations) connected in tandem. For every two loops that are interconnected (using one physical bridge), there can be a maximum of three physical bridges used in a star configuration. See Figure 3.

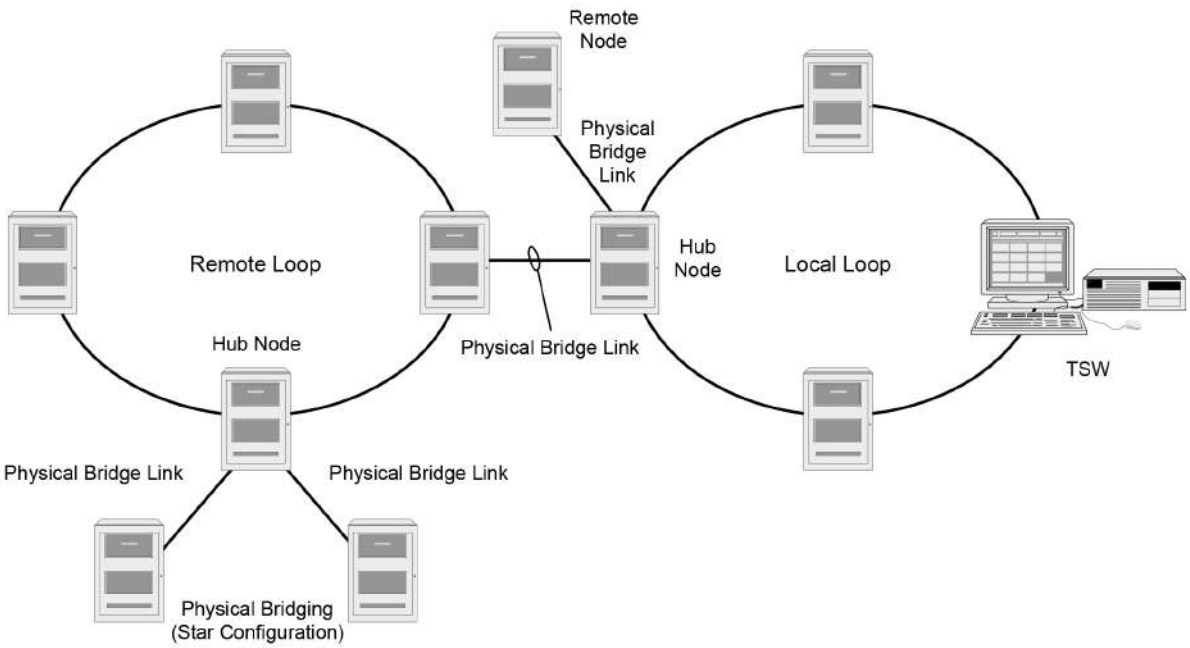


Figure 3: 4120 Interconnected loop configuration

2.2.2 ES Net Network configurations

The ES Net Network supports multiple topologies, allowing diverse interconnections between ES Net Nodes. These connections may be used to create bridged rings, spurs or hub/star topologies. The only limitations to these connections are the maximum number of bridged rings (four) and the available fire ports on the ES Net NIC card (six). The ring configuration, as shown in Figure 4, consists of nodes that are connected to each other to form a closed loop (Class X). The hub/star configuration, as shown in Figure 5, consists of several nodes connected directly to one common node. This configuration can be redundant (Class X) as two links can be set up between the common node and each of the remote nodes. This configuration can also be non-redundant (Class B) with a single link set up between the common node and the remote node. The Class B configuration provides no alternate communication path between two nodes, therefore, a single fault in the network could segment the network. A multi-ring network with two bridged rings and a single panel connected through a fire spur is shown in Figure 6.

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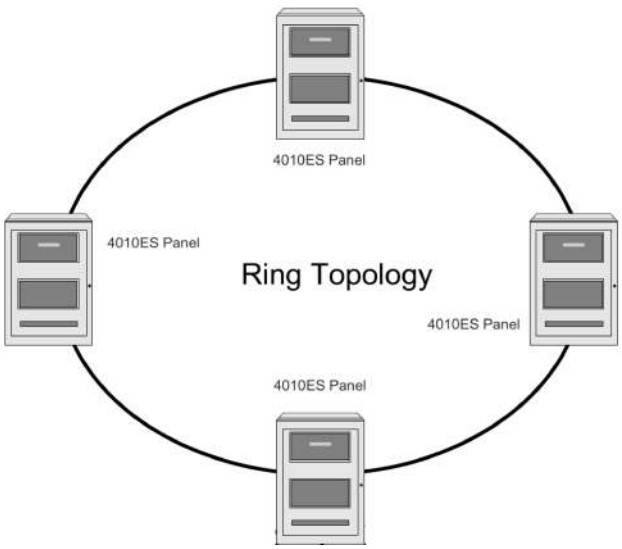


Figure 4: ES Net ring configuration

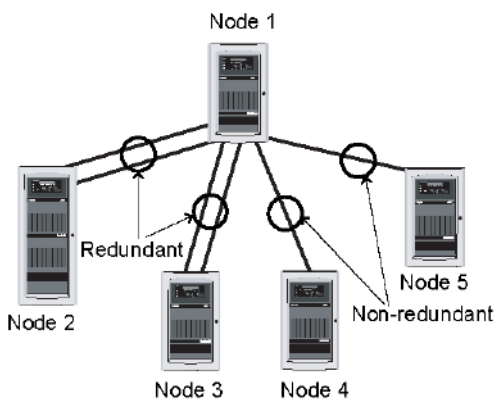


Figure 5: ES Net hub or star configuration

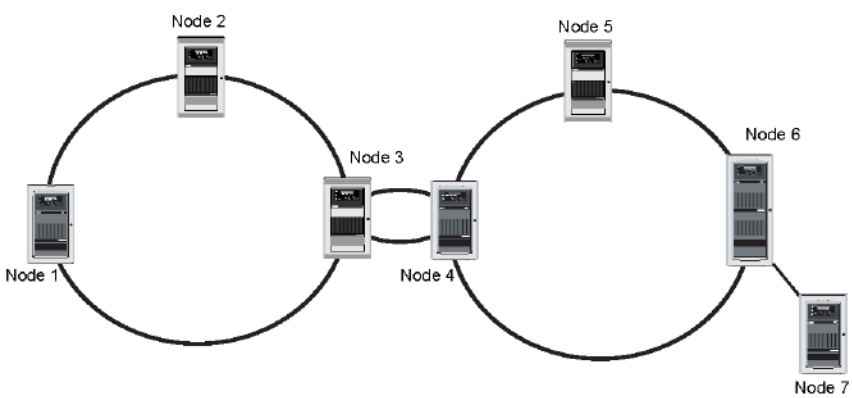


Figure 6: ES Net seven node multi-ring network

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2.2.3 4120 Network communication

Network communication is achieved via the 4010-9902 and the 4010-9922 NICs. Each network node requires a NIC. Once the FACU is a network node, it may be programmed to be fully in control of other nodes, or to be fully passive, or anywhere in between.

The 4010-9902 and the 4010-9922 NICs are option cards that use a PDI connector to communicate with the CPU. The NICs allow for communication between each panel via fiber or twisted shielded pair wire in a Class B or Class X wiring configuration.

The NICs are designed to be connected in a point-to-point arrangement, so that one wire fault does not cause the entire system to fail. The point-to-point arrangement provides the most secure and fault-tolerant wiring possible.

Two types of media cards can be used with the NICs.

- The Dual Fiber-Optic Media (4010-9819) card or the Duplex Fiber Optic Media cards (4010-6301, 4010-6302, 4010-6303, 4010-6304) can be used for electrically noisy environments or for connecting externally to other buildings.
- The Wired Media Card (4010-9818) is used in all other types of applications.

Up to two media cards can be plugged into each NIC. The same NIC can use a combination of different types of media boards (for example, a NIC may have a Wired Media card connected to the left port, a Fiber-Optic Media card connected to the right port).

For setup and installation of a physical bridge card, refer to document 579-184: *4100/4120/4010-Series Physical Bridges and Media Modules.*

For setup and installation of network interface cards, refer to document 579-956: *4010ES Network Interface and Media Card Installation Instructions.*

2.2.4 ES Net network communication

ES Net Network communication is achieved using the 4010-6310 ES Net NIC. Each network node requires an ES Net NIC. Once the FACU is a network node, it may be programmed to be fully in control of other nodes, to be fully passive, or anywhere in between.

The 4010-6310 ES Net NIC is an option cards that communicates with the master controller CPU using an Ethernet port. The ES Net NICs allow for communication between each panel using Ethernet, DSL, or fiber connections in a Class X or Class B wiring configuration.

The NICs are designed to be connected in a point-to-point arrangement, so that one wire fault does not cause the entire system to fail. The point-to-point arrangement provides a secure and fault-tolerant wiring arrangement.

Network connection is available directly on the ES Net NIC using Ethernet cables and up to 2 media cards can be used for additional connection requirements (Fiber, Ethernet or DSL). A mix of different media card type is also supported.

The following media cards are compatible with the ES Net NIC:

- 4010-6306 ES Net Dual Channel Ethernet media card
- 4010-6307 ES Net Dual Channel DSL media card
- 4010-6308 ES Net Dual Channel Single-mode Fiber-Optic media card
- 4010-6309 ES Net Dual Channel Multi-mode Fiber-optic media card

For more information about installing the 4010-6310 flat type ES Net NIC, see Flat Type ES Net NIC Installation Instructions (579-1257).

For more information about installing the optional media cards, see ES Net Dual Channel Fiber, Ethernet, and DSL Media Card Installation Instructions (579-1258).

Note: A network is either a 4120 Network or an ES Net Network and it cannot be a mix of both.

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3 Basic hardware

The 4010ES FACUs are one-bay or two-bay back boxes with a dead front and glass door, containing a set of pre-installed basic system components:

- Dead front-mounted CPU (2 x 40 character LCD or InfoAlarm)
- Operator interface
- Extended system supply (ESS) providing IDNAC addressable appliance control and system power with IDNet2
- 48-LED Module (for some 4010ES configurations)
- IDNet2 (2 Bay systems)
- PDI Blocks for optional modules

In addition to the basic modules, optional modules can be installed inside the one-bay or two-bay 4010ES panels. The types of modules available depend on the panel configuration as well as the accessibility and availability of the power distribution interface (PDI) blocks. The number of available PDI blocks depends on the system ordered. See Panel configurations.

3.1 CPU

The CPU card (Figure 7 and Figure 8) is the main decision maker in the 4010ES FACU. It holds all job information, current system status and communicates to all slaves connected to the 4010ES panel. A 4010ES CPU contains the following features:

- **2 x 40 LCD display and piezo (non-InfoAlarm systems only)** - Annunciation for supervisory, trouble, priority 2 and fire alarm signals.
- **Compact Flash Socket (card pre-installed)** - Alternate Exec and Job storage.
- **Ethernet Service port** - PC connection used by Simplex service personnel.
- **Serial Service port** - Interface for service equipment or Simplex service personnel.
- **Class A/B Remote Unit Interface** - Remote connection to system components not located within 4010ES box.

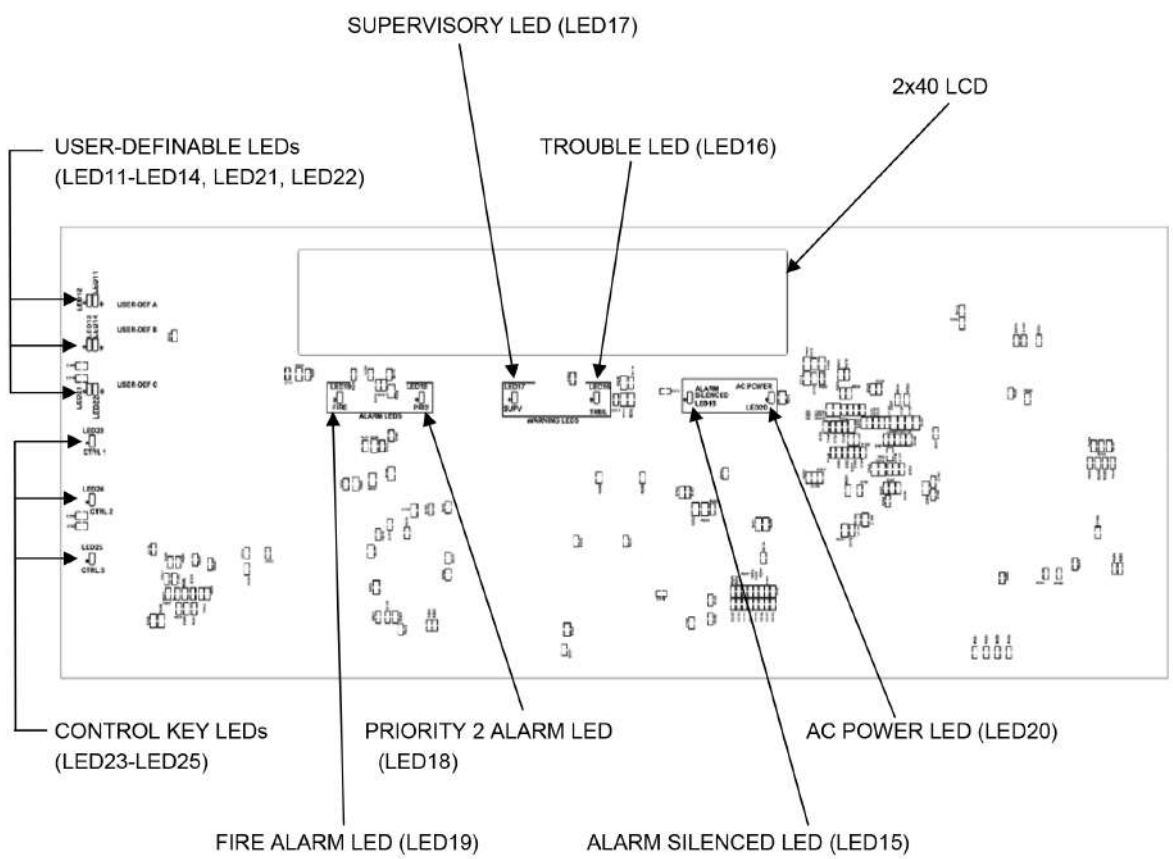


Figure 7: Dead front mounted CPU with a 2 x 40 display (front view)

Note: All LEDs on the front side of the board are used for standard fire alarm functions and are visible through the dead front membrane.

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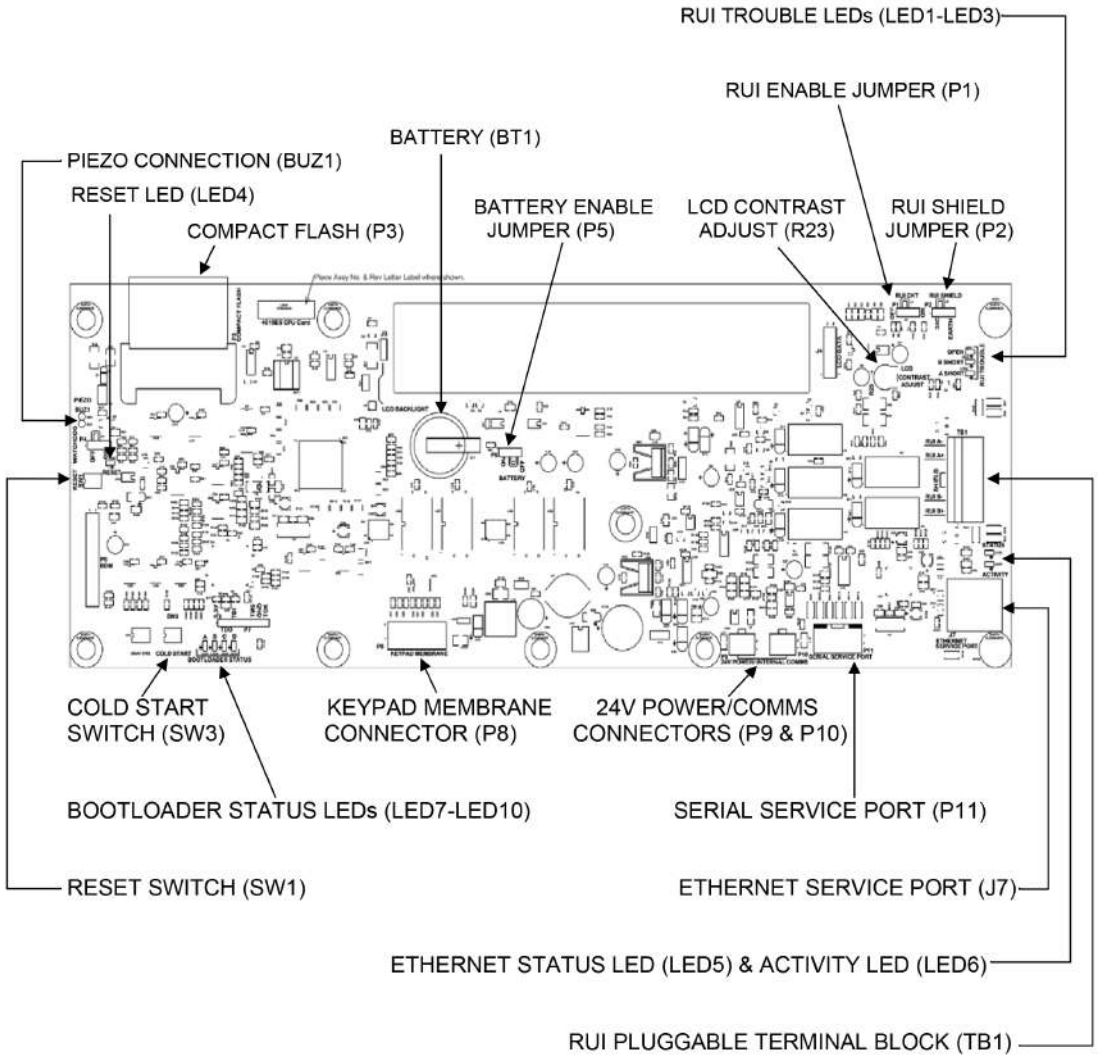


Figure 8: Dead front mounted CPU with a 2 x 40 display (back view)

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3.1.1 CPU LEDs

The tables below outline the functions of the LEDs on the CPU card.

Table 1: Reset LED

Reference designator	Silkscreen name	Color	Status
LED4	RESET	Yellow	ON = CPU is in reset FLASHING = Board is unable to come out of reset. Possibly corrupt CFIG or board needs to be replaced. OFF = CPU is running normally

Table 2: Ethernet LEDs

Reference designator	Silkscreen name	Color	Status
LED5	STATUS	Green	ON = Cable connected
LED6	ACTIVITY	Red	FLASHING = Ethernet activity

Table 3: RUI trouble LEDs

Reference designator	Silkscreen name	Color	Status
LED1	OPEN	Yellow	ON = Class A fault (open-circuit) or a short
LED2	B SHORT	Yellow	ON = Short-circuit on the Primary side
LED3	A SHORT	Yellow	ON = Short-circuit on the Secondary side

Table 4: Front panel LEDs

Reference designator	Silkscreen name	Color	Status
LED11	USER-DEF A	Red	ON = User-definable key A active (Note)
LED12		Yellow	ON = User-definable key A active (Note)
LED13	USER-DEF B	Yellow	ON = User-definable key B active (Note)
LED14		Red	ON = User-definable key B active (Note)
LED15	ALARM SILENCED	Yellow	ON = Alarm silenced
LED16	TRBL	Yellow	ON = Trouble
LED17	SUPV	Yellow	ON = Supervisory
LED18	PRI2	Red	ON = Priority 2 alarm
LED19	FIRE	Red	ON = Alarm
LED20	AC POWER	Green	ON = System power is functioning properly
LED21	USER-DEF C	Yellow	ON = User-definable key C active (Note)
LED22		Green	ON = User-definable key C active (Note)
LED23	CTRL 1	Yellow	ON = Control key 1 active
LED24	CTRL 2	Yellow	ON = Control key 2 active
LED25	CTRL 3	Yellow	ON = Control key 3 active

Note: Only one LED in each user-definable pair will be on at a time, never both.

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Table 5: Bootloader status LEDs

	Reference designator	LED7	LED8	LED9	LED10
	Silkscreen name	A	B	C	D
	Color	Green	Green	Green	Green
Status	Bootloader Initialization	On (0.25 s) Off (0.25 s)	On (0.25 s) Off (0.25 s)	On (0.25 s) Off (0.25 s)	On (0.25 s) Off (0.25 s)
	Bad Master CRC or No Master Present	Off	Off	Off	On
	Diagnostic Fail - RAM	On	Off	Off	On
	Diagnostic Fail - Bootloader CRC	Off	On	Off	On
	Downloading Master	On	On	Off	On
	Downloading CFIG	Off	Off	On	On
	Downloading MsgLib	On	Off	On	On
	Downloading Bootloader	Off	On	On	On
	Download Successful	On	On	On	On

3.1.2 CPU Jumper Settings

Table 6: CPU settings

Reference designator	Silkscreen name	Position	Function
P5	BATTERY	1-2	Enable RAM Battery Backup
		2-3 (default)	Disable RAM Battery Backup
P1	RUI CKT	1-2 (default)	Disable RUI
		2-3	Enable RUI
P2	RUI SHIELD	1-2 (default)	RUI shield tied to 24C (Note)
		2-3	RUI shield tied to Earth

Note: Some devices that connect to RUI have inherently grounded shield terminals, in which case, 24C cannot be used. If 24C is used, a Negative Earth Fault will occur.

3.1.3 CPU Switches

Table 7: Switches

Reference designator	Silkscreen name	Function
SW1	RESET	Short press (< 3 seconds) to activate a software-controlled reset (warm start). Press and hold (> 3 seconds) to force a hardware reset (also a warm start). Generally, unless the CPU card appears to be locked up, you should always use the software-controlled reset. A warm start preserves the logs and the disabled status of any points that are in the disabled state.
SW3	COLD START	During startup, press and hold this button to clear all history logs and enable any points that were previously disabled.

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3.1.4 CPU connectors/ports/terminal block

Table 8: Connectors/ports/terminal block

Reference designator	Silkscreen name	Function
P3	COMPACT FLASH	Used for alternative job/exec storage.
P8	KEYPAD MEMBRANE	Used to communicate user inputs from the keypad membrane to the CPU card.
P9 & P10	24 V POWER / INTERNAL COMMS	Used to provide the necessary connections to daisy chain 4100 Comms and 24 VDC card power in an in-out fashion. 24 VDC card power originates from the ESS. 4100 Comms originates from the CPU card.
P11	SERIAL SERVICE PORT	Used to connect the CPU card to the Remote Service Gateway. It may also be used as a service port if the Ethernet Service Port is not available.
J7	ETHERNET SERVICE PORT	Used to connect the panel to a local PC (through the Front Panel Ethernet connection board or 4010-9914 BNIC or 4010-6310 ES Net NIC).
TB1	RUI A-, RUI A+, SHIELD, RUI B-, RUI B+	Remote user interface (RUI) used for communication between the CPU and remote slaves.

3.1.5 CPU card specifications

Table 9 shows the battery current draw for the CPU card.

Table 9: Battery standby (24V)

Configuration	Supervisory current draw	Alarm current draw
RUI Disabled	124 mA	173 mA
RUI Enabled - No Load	149 mA	198 mA
RUI Enabled - Full Load	176 mA	225 mA

Table 10 shows the maximum draw over the voltage range.

Table 10: Maximum draw over voltage range

Configuration	Supervisory current draw	Alarm current draw
RUI Disabled	144 mA	208 mA
RUI Enabled - No Load	167 mA	226 mA
RUI Enabled - Full Load	186 mA	248 mA

Note: CPU InfoAlarm supervisory and alarm current draws are both the same as the supervisory current draw.

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3.2 Operator interface

Shown is the interface for the 4010ES.

The operator interface is used to obtain fire alarm, priority 2, supervisory, trouble, and other statuses via the display and LEDs. Control functions are accessed using dedicated and user-programmable keys.

Figure 9 is the standard 2 x 40 LCD operator interface. This model includes a 2 line by 40 character liquid crystal display. The membrane is available in both English and French.

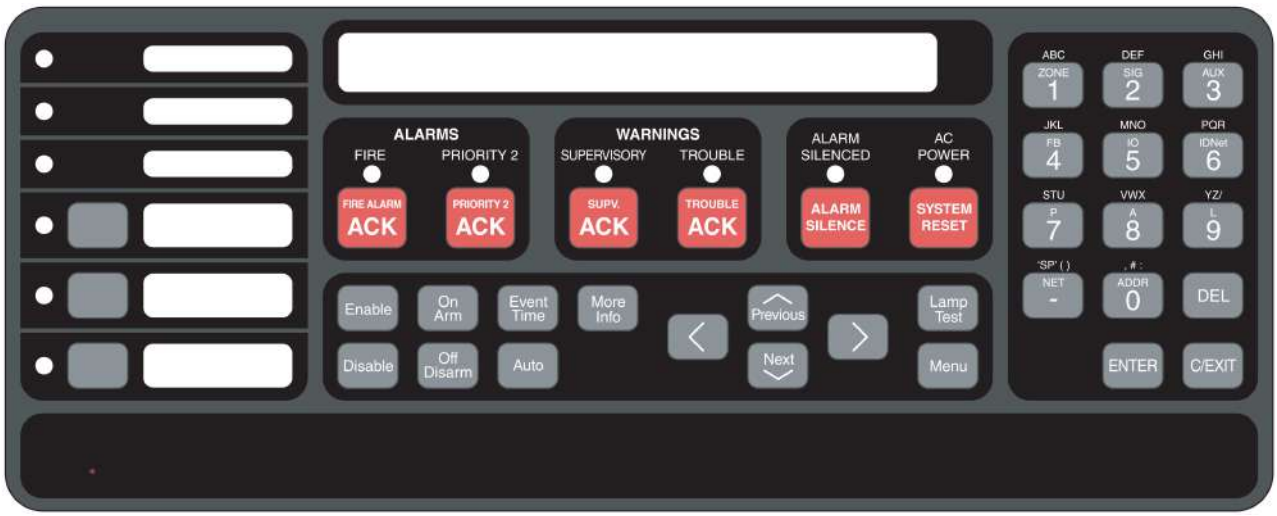


Figure 9: Standard operator interface

Figure 10 is the InfoAlarm operator interface. This model includes a larger graphical display, which can display more information simultaneously.

Note: The InfoAlarm operator interface can only be installed on two-bay 4010ES panels. See Panel configurations for details on two-bay panels.

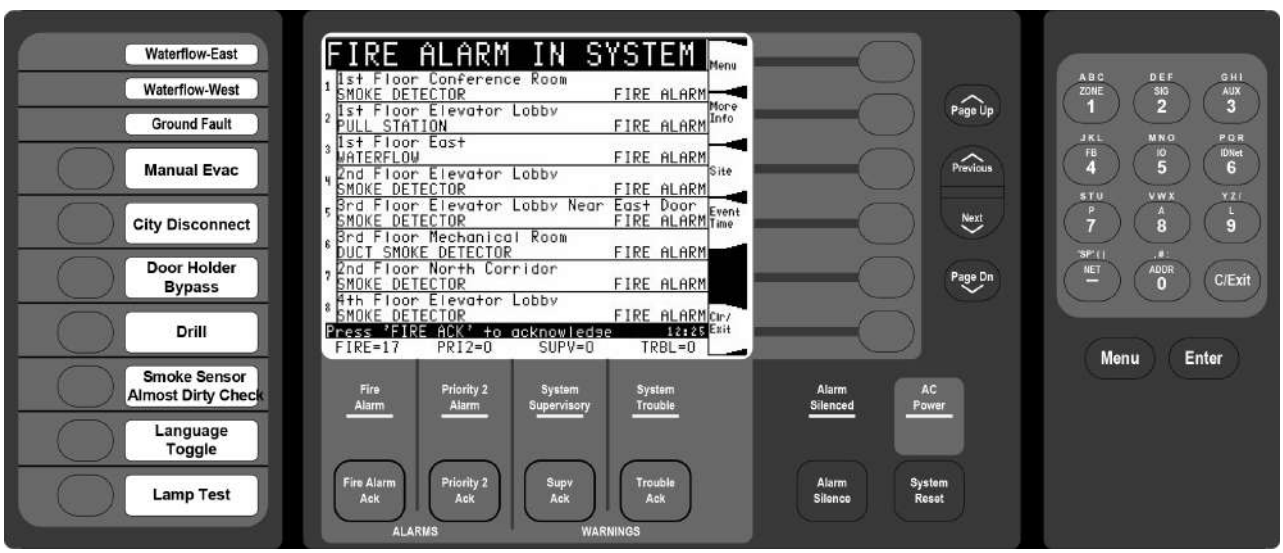


Figure 10: InfoAlarm operator interface

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3.3 Extended system supply

The ESS is the FACU's power source and arrives installed in the cabinet. The ESS provides the following:

- 24 VDC card power
- 6 A of available IDNAC SLC current
- Battery charger

Note: The 4010ES can hold a maximum of 33 Ah batteries in the one-bay box and 50 Ah in the two-bay box. The ESS charger is listed for 110 Ah UL and 50Ah ULC.

- 1 AUX Relay (2 A, 32 V)
- 1 AUX Power / Simple NAC Tap (2 A)
- 2 IDNAC Channels
- 1 IDNet 2 Channel with 2 Isolated Loops

The ESS also performs standard fire alarm functions, such as brownout detect, battery transfer, battery recharge, earth fault detection and power limiting per UL 864. Figure 11 and Figure 12 illustrate the 4010ES ESS.

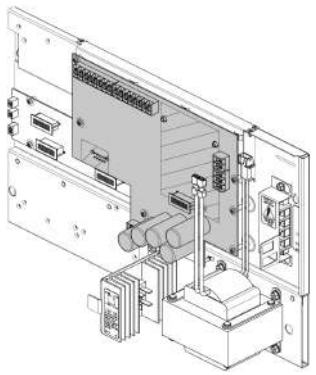


Figure 11: ESS position in a 4010ES bay

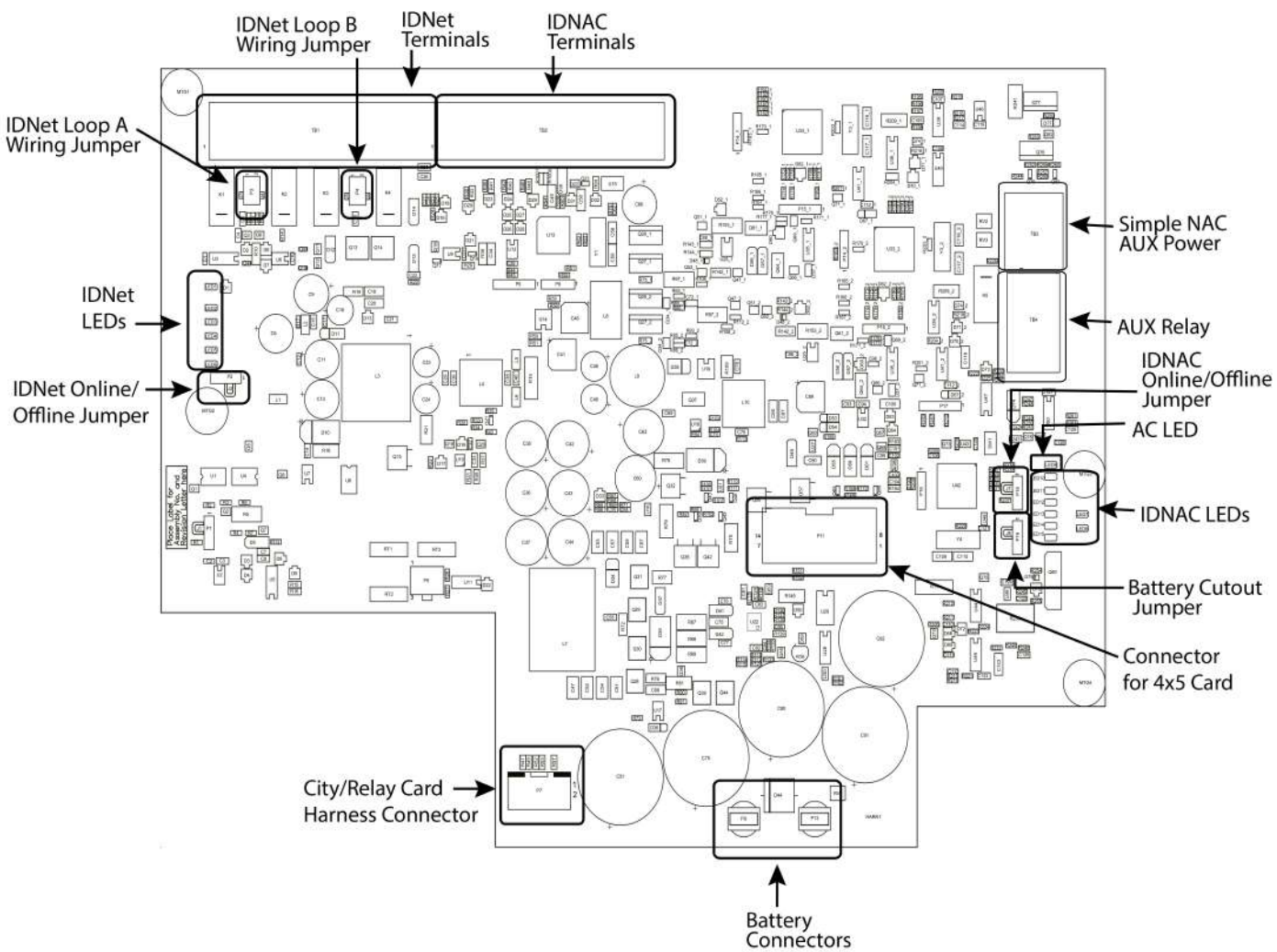


Figure 12: ESS card layout

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3.3.1 ESS LEDs

The ESS card is equipped with LEDs that help the user diagnose the card and system troubles.

Table 11: ESS LED identification and definition

LED number	Identification	Status
LED1	IDNet negative earth	On = IDNet negative terminal is connected to earth.*
LED2	IDNet positive earth	On = IDNet positive terminal is connected to earth.*
LED3	IDNet trouble	Steady = No devices are detected. Blink = Short circuit trouble.
LED4	IDNet 4100 communications	On = Communication loss.
LED5	IDNet loop A	On = Class A/Open trouble.
LED6	IDNet loop B	On = Class B/Open trouble.
LED7	IDNAC 1 fault	On = There is a fault on IDNAC SLC 1 circuit.
LED8	IDNAC 2 fault	On = There is a fault on IDNAC SLC 2 circuit.
LED9	AC power	On = ESS is connected to the main AC power.
LED10	Communication loss	On = Communication with the FACU is lost.
LED11	E	These 5 LEDs are used to signal various trouble conditions on the ESS and its SLC. See Table 12 for the LED system codes.
LED12	D	
LED13	C	
LED14	B	
LED15	A	
*The IDNet circuit on the ESS is electrically isolated and has its own earth fault detection circuit. The IDNet earth fault detection circuit detects a 10 KOhms (or less) stray impedance to earth ground.		

The ESS system trouble LED codes are indicated by LEDs A to E.

Table 12: System trouble LED codes

A	B	C	D	E	Description:
OFF	OFF	OFF	OFF	OFF	**No Trouble:** There are no troubles detected on the system.
ON	OFF	OFF	OFF	OFF	**AC Fail:** The AC power is disconnected but the battery is working.
OFF	ON	OFF	OFF	OFF	**Low Battery:** The battery charge is under 22V.
ON	ON	OFF	OFF	OFF	**Battery Cutout:** The battery charge is below 20V. At this point if jumper P19 is set to **"battery disconnect when depleted"** the system will shut down.
OFF	OFF	ON	OFF	OFF	**Depleted/Missing Battery:** If jumper P19 is not set to **"battery disconnect when depleted"** this trouble will appear when the battery charge is below 20V. This code will also appear if the system cannot detect the battery.
ON	OFF	ON	OFF	OFF	**Charger Trouble:** There is a trouble with the battery charger.
OFF	ON	ON	OFF	OFF	**Card Overcurrent:** The ESS module or another system card is drawing too much current.
ON	ON	ON	OFF	OFF	**Negative Earth:** The circuit is shorted to ground on the negative wire.
OFF	OFF	OFF	ON	OFF	**Positive Earth:** The circuit is shorted to ground on the positive wire.
ON	ON	OFF	ON	OFF	**City Circuit 1 Trouble:** The trouble configured on the City Card's circuit one has been triggered.
OFF	OFF	ON	ON	OFF	**City Circuit 2 Trouble:** The trouble configured on the City Card's circuit two has been triggered.
ON	OFF	ON	ON	OFF	**AuxNAC Open:** Depending on the chosen configuration, either the Aux circuit or the NAC circuit is open.
OFF	ON	ON	ON	OFF	**AuxNAC Short:** Depending on the chosen configuration, either the Aux circuit or the NAC circuit is experiencing a short circuit.
ON	ON	ON	ON	OFF	**AuxNAC Overcurrent:** Depending on the chosen configuration, either the Aux circuit or the NAC circuit is drawing too much current.
OFF	OFF	OFF	OFF	ON	**Unassigned.**
ON	ON	ON	ON	ON	**Unassigned.**

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3.3.2 ESS Jumpers

The ESS card is equipped with jumpers that allow the user to configure certain elements of the ESS card. Table 13 explains the jumpers.

Table 13: ESS jumper functions

Jumper number	Identification	Position
P2	IDNet online/offline	Enable: Position 1-2 (default) Disable: Position 2-3
P3	IDNet circuit B	Class B *: Position 1-3, 2-4 Class A: Position 3-5, 4-6 (default)
P4	IDNet circuit A	Class B *: Position 1-3, 2-4 Class A: Position 3-5, 4-6 (default)
P18	IDNAC online/offline	Enable: Position 1-2 (default) Disable: Position 2-3
P19	Low battery disconnect	Disable: Position 1-2 (default) Enable (Canada): Position 2-3
*When the jumpers for the IDNet and IDNAC circuits are set to Class B, each terminal is rated for 2 identical wires. This allows up to 4 Class B T-tap circuits to stem from each terminal block.		

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3.3.3 Specifications

Table 14 lists the specifications for the ESS.

Table 14: Input and output specifications

Operating conditions	32 °F to 120 °F (0 °C to 49 °C) Up to 93% relative humidity at 90 °F (32 °C), non-condensing.
AC input specifications	
ESS in 120V FACU	4 A maximum, 120 VAC @ 60 Hz, nominal
ESS in 220/240V FACU	2 A maximum, 220/230/240 VAC @ 50 or 60 Hz
The ESS detects a low or missing AC input and switches to batteries automatically. The system returns to AC when it has detected the presence of acceptable AC levels for a minimum of 30 seconds. AC wiring has to run from a dedicated AC branch circuit and the breaker/wiring sized according to local codes.	
DC output specifications	
IDNAC SLC	29.5 VDC 3A per circuit, 6 A total*
AUX power/simple NAC	Minimum: 19.9 VDC (special applications) Maximum: 31.1 VDC Ripple: 2 VDC p-p @ full load (2 A)
IDNet output	30V or 35V**
Note: *Any current consumed by other sources beyond the ESS, CPU, and display (AUX/simple NAC, card power, sig power, etc.) subtracts from available IDNAC current. See Table 15. **Note:** **When a large numbers of output devices are activated on IDNet peripherals (such as piezo sounders), the output voltage is increased to 35V to provide sufficient voltage at the end of line to activate the piezo. The higher voltage state is an alarm condition for the purpose of standby battery calculation. The 30V output is the normal condition and is used to prolong battery standby. The CPU will activate the boost feature when 10 LED, piezo or other outputs are activated.	
Battery charger specifications	
Input voltage range	21-33 VDC
Output float voltage	27.4 VDC @ 20 °C, temperature compensated at -24 mV/°C
High voltage output	29.1 V @ 3.3 A
Output current limit	1.65 A (for 6.2 - 18 Ah battery) 3.3 A (default; for 18-50 Ah battery- Canadian; for 18-110 Ah battery - U.S.)
The battery circuit is supervised for low battery and missing/depleted battery.	

Table 15 lists the relationship between current consumed by sources beyond the ESS, CPU and display, and the available total IDNAC current.

Table 15: Total IDNAC current vs other current

Other current	Available Total IDNAC current
0.25 A	5.81 A
0.5 A	5.63 A
0.75 A	5.44 A
1 A	5.25 A
1.5 A	4.88 A
2 A	4.50 A
3 A	3.75 A
5 A	2.25 A

Table 16 lists the battery current draw for the ESS. The assumed voltage is 24 VDC, which is rated battery voltage for lead-acid type batteries.

Table 16: ESS current specifications

Standby conditions*	Current (battery 24V)
No alarms (NACs normal); IDNet LED on, no IDNet devices connected	160 mA
Add to base for each additional set of 50 IDNet devices in standby	40 mA
Add to base for each additional set of 50 IDNAC appliances in standby	40 mA

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Table 16: ESS current specifications

Standby conditions*	**Current (battery 24V)**
Total current for fully loaded IDNAC and IDNet channels (254 and 250 devices respectively) in standby	563 mA
**Additional standby conditions: Auxillary relay activated, power trouble LED on, battery charger off, auxiliary power load = 0 mA.*	
Alarm conditions**	**Current (battery 24V)**
Alarm, IDNet LED ON, no IDNet devices connected	275 mA
Add to base for each additional set of 50 IDNet devices in alarm	50 mA
Total current for a fully loaded IDNet channel in alarm (20 LEDs on)	565 mA***
***Additional alarm conditions: Auxillary relay activated, power trouble LED on, battery charger off, auxiliary power load = 0 mA, IDNAC alarm load = 0 mA, IDNet = 35 V.*	
****Notification power must also be taken into account for alarm current. Consult the notification appliance's installation manual to determine the current draw for each appliance used.*	

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3.4 48-LED Module

The 48-LED Module (Figure 13) comes pre-installed inside some base configurations of the 4010ES panel. Each LED can be associated with a point, or group of points. By default, the module is supplied with red LEDs, except for the last column which has yellow LEDs. All of them can be replaced by different color LEDs. Refer to Available panels and devices for a list of LED kits. Refer to Installing 4010ES systems for instructions on replacing LEDs.

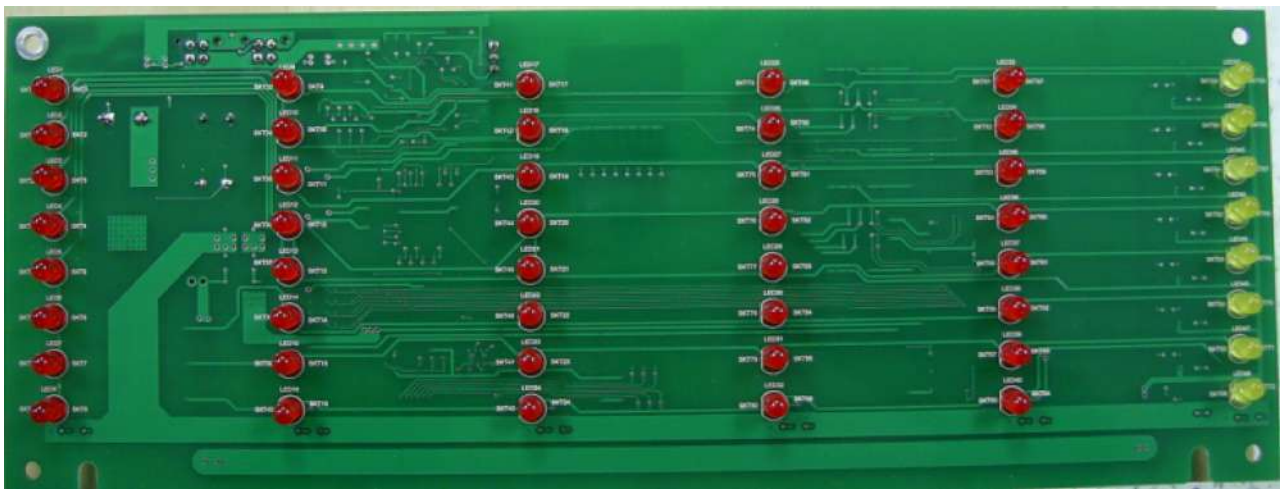


Figure 13: 48-LED Module (front view)

Figure 13 outlines what the different LEDs, jumpers and switches represent.

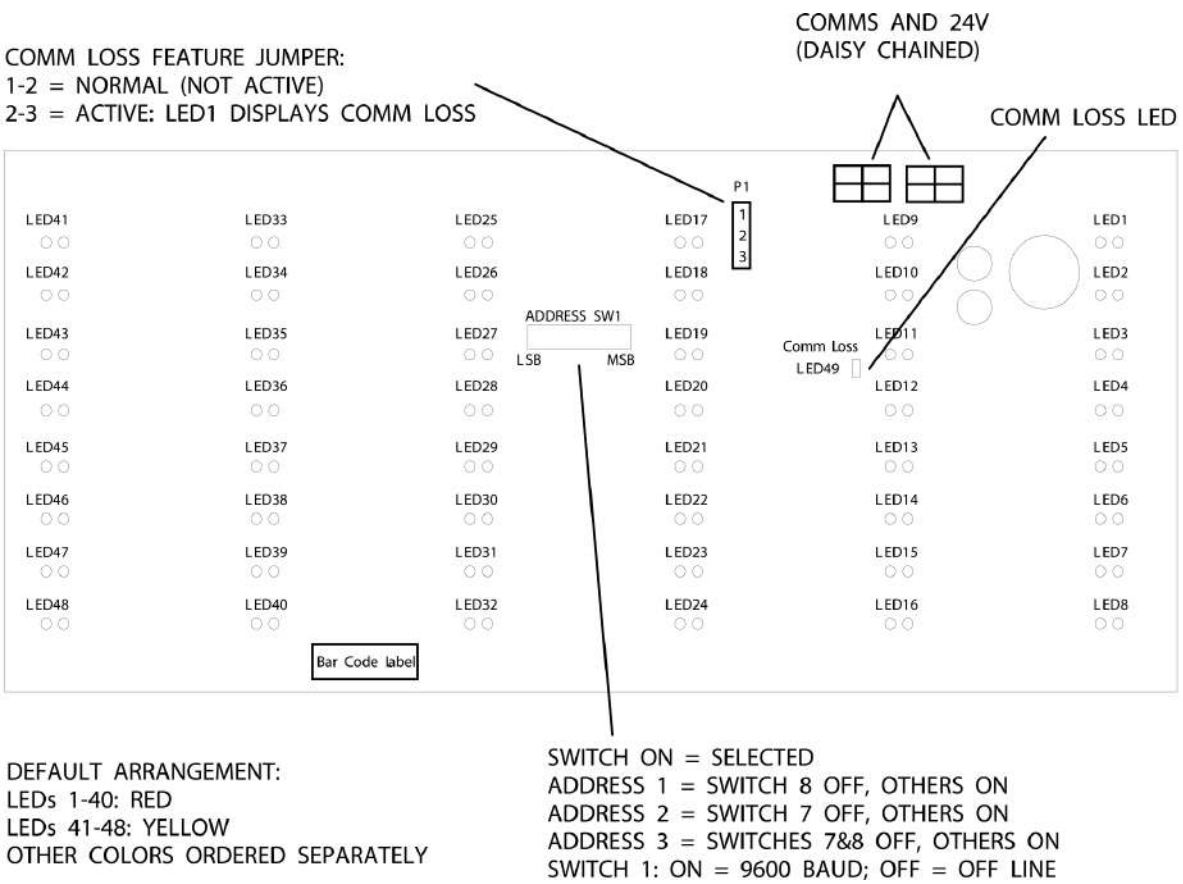


Figure 14: 48-LED Module LEDs, jumpers and switches (rear view)

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3.4.1 48-LED Module specifications

Table 17: 48-LED Module current specifications

Standby current	**Current**
LED controller circuit	20 mA
Add to above for each additional LED that is on	1.89 mA
Total current for fully loaded 48-LED Module	111 mA
Maximum alarm current)	**Current**
LED controller circuit	20 mA
Add to above for each additional LED that is on	2.39 mA
Total current for fully loaded 48-LED Module	135 mA

3.5 System power

Main system power

The 4010ES FACU is powered primarily by the ESS. The ESS draws power from the main power line, via an AC block, a transformer and a rectifier. In the case of main power failure, backup power is provided by backup batteries.

3.5.1 Backup batteries

A pair of 12V sealed lead acid batteries are used as a backup power source in the event of AC failure. The backup batteries are ordered and shipped separately from the 4010ES system. They are installed at the bottom of the 4010ES back box.

Batteries larger than 33 Ah for a one-bay 4010ES and 50 Ah for a two-bay 4010ES can be used. However, they must be accepted and installed per UL and local authority requirements using 4100-5128 Battery Distribution Terminal Block. The connection from the battery box to the 4010ES panel must be within 20 feet and in conduit.

For 50 Ah external batteries with a one-bay box, use box 2081-9282 Remote Battery Cabinet (Red). For 110 Ah external batteries with a one or two-bay box, use box 2081-9280 Remote Battery Cabinet (Red).

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4 Panel configurations

The 4010ES comes in either in a one-bay or a two-bay configuration. Each of these can be ordered in a variety of base systems to satisfy various market needs.

4.1 One-bay 4010ES Panels

The basic components are shipped pre-assembled inside the 4010ES panel. The optional components need to be ordered and installed separately.

The one-bay 4010ES panel comes in multiple configurations. of lists the basic components that are shipped with each configuration.

Note: The dead front on a one-bay 4010ES panel is different for 48-LED Module configurations, as seen in Figure 15. See Figure 16 for detailed diagrams of one-bay 4010ES panels.

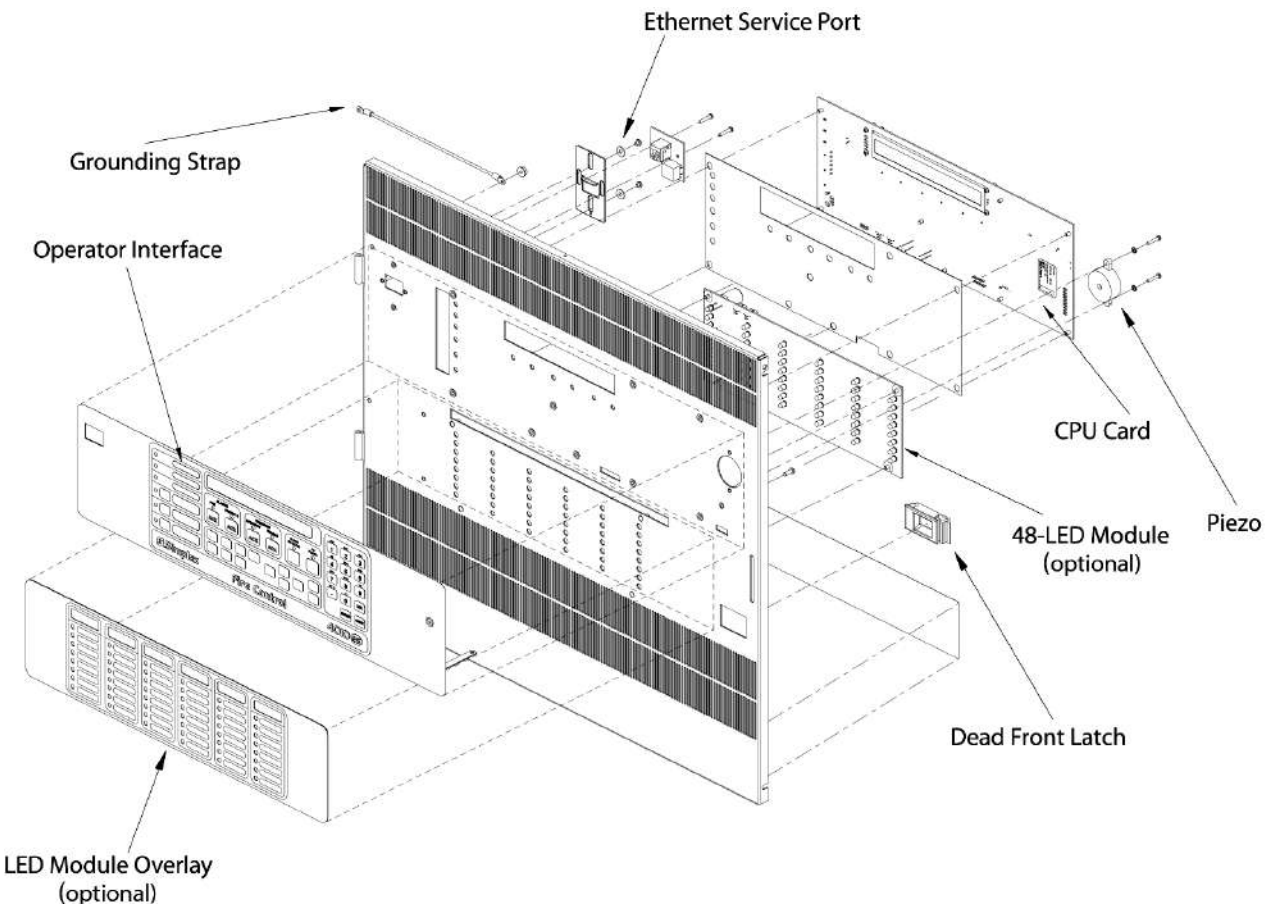


Figure 15: One-bay dead front with optional 48-LED Module

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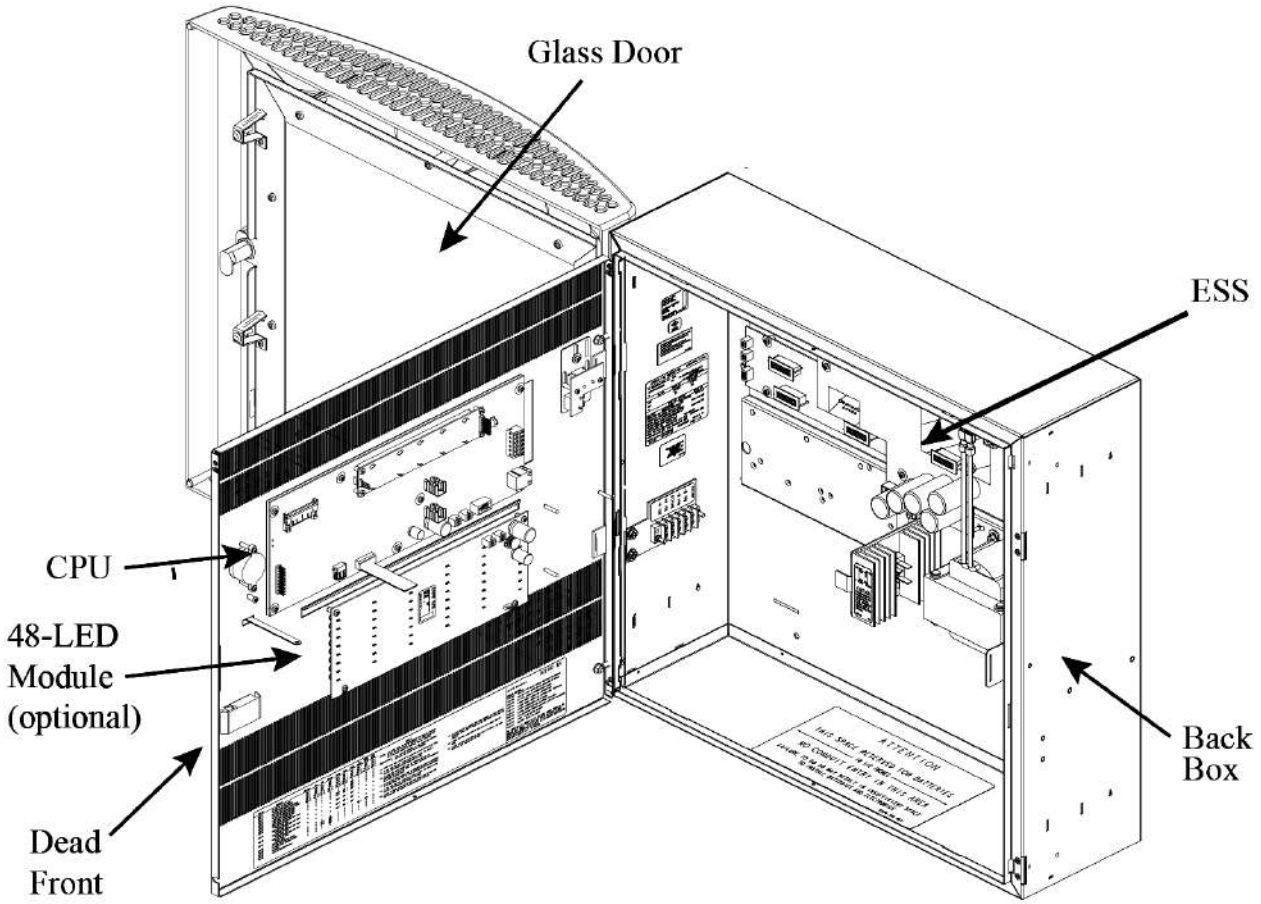


Figure 16: One-bay 4010ES panel (shown with optional LED module)

4.1.1 Optional modules

In addition to the basic modules, optional modules can be installed inside the one-bay 4010ES panels. The types of modules available depend on the panel configuration as well as the accessibility and availability of the power distribution interface (PDI) blocks.

Note: Out of four PDI blocks in the top-bay PDI card, three are available since the ESS card utilizes one (Figure 11). A block has been made available on the ESS card for the placement of a Dual Class A Isolator (DCAI).

Table 18 lists the optional modules that can be installed inside the different configurations of the 4010ES panels. Refer to the user manual associated with each card for specifications and installation instructions. The list of these manuals is available in Table 23.

Table 18: Optional modules

Optional modules	Description	Blocks
4010-9818	Network Media Card Wired (Mounts on 4010-9902 and 4010-9922)	none
4010-9819	Network Media Card Dual Fiber Optic (Mounts on 4010-9902 and 4010-9922)	none
4010-6301	4120 SM-L Duplex Fiber Media (Mounts on 4010-9902 and 4010-9922)	none
4010-6302	4120 SM-R Duplex Fiber Media (Mounts on 4010-9902 and 4010-9922)	none
4010-6303	4120 MM-L Duplex Fiber Media (Mounts on 4010-9902 and 4010-9922)	none
4010-6304	4120 MM-R Duplex Fiber Media (Mounts on 4010-9902 and 4010-9922)	none
4010-9901	VESDA Interface Card	1
4010-9902 and 4010-9922	4120 Network Interface Card	2
4010-9903 and 4010-9924 (Note 2)	4120 Network Interface w/ Modem physical Bridge Class B	2
4010-9904 and 4010-9925 (Note 2)	4120 Network Interface w/ Modem physical Bridge Class X	2

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Table 18: Optional modules

Optional modules	Description	Blocks
4010-9905 and 4010-9926 (Note 2)	4120 Network Interface TCP/IP physical Bridge Class B	3
4010-9906 and 4010-9927 (Note 2)	4120 Network Interface TCP/IP physical Bridge Class X	3
4010-9908	4-Point Flat AUX Relay (2 A)	1
4010-9909	City Connect Card with Disconnect Switches	none
4010-9910	City Connect Card without Disconnect Switches	none
4010-9911	Alarm Relay Card (Bridge Rectifier Mounted)	none
4010-9912	SDACT Card (Mounts in Top Bay Block D Only)	1
4010-9913	SafeLinc Internet Interface (FPII) Card	2
4010-9914	Building Network Interface Card (BNIC)	2
4010-9916	25 VDC Voltage Regulator Card	1
4010-9917	MX Digital Loop Card (international models only)	2
4010-9918	Dual RS232 Card	1
4010-9919	TrueInsight Remote Service Gateway (Perle) (Mounts on Dead Front)	none
4010-9920	8 Zone Initiating Device Circuit, Class B	2
4010-9921	8 Zone Initiating Device Circuit, Class A	2
4010-9929	4010 IDNet 2+2 Module	1
4010-9930 (Note 3)	Dual Class A Isolator	none
4010-6306	ES Net Dual Channel Ethernet Media Card	none
4010-6307	ES Net Dual Channel DSL Media Card	none
4010-6308	ES Net Dual Channel Single-mode Fiber Media Card	none
4010-6309	ES Net Dual Channel Multi-mode Fiber Media Card	none
4010-6310	ES Net Network Interface Card -Flat	2
4010-9931	IP Communicator Module	1
4010-6400	IP Gateway Cellular Module, Verizon	none
4010-6401	IP Gateway GSM Cellular Module, AT&T	none
4010-6402	IP Gateway Cellular Module for External Box, Verizon	none
4010-6403	IP Gateway GSM Cellular Module for External Box, AT&T/Rogers	none
4010-2501	Simple Power Over Ethernet Switch	1

Note:

1. Consult your local sales office to determine which modules are available in your area.
2. Physical Bridge cards must also be installed with a network interface card. Therefore, the 4010ES one-bay systems do not have enough option card space left to install a physical bridge after a NIC is added.
3. The 4010-9929 Dual Class A Isolator mounts on the ESS and therefore does not consume any PDI block space.

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4.1.2 Back box mechanical specifications

Back boxes come shipped with the panel and can only be ordered separately as a service part. Table 19 lists the specifications for the one-bay back boxes.

Table 19: Back box specifications

PID number	Height	Width	Depth	Depth with door
699-467 (Platinum) 699-466 (Red)	22 in. (559 mm)	24 in. (610 mm)	6-15/16 in. (176 mm)	11-11/16 in. (297 mm)

4.2 Two-bay 4010ES Panels

A two-bay system is used when more option card space is required than is given in a one-bay system.

The basic components of the two-bay panels are the same as for the one-bay panels and are pre-installed in the top bay. The expansion bay contains another PDI card with eight available blocks. Those can be used to connect optional modules to the 4010ES panels. The Expansion Bay PDI card comes pre-installed inside the two-bay panel.

See Figure 18 and Figure 19 for two-bay 4010ES diagrams.

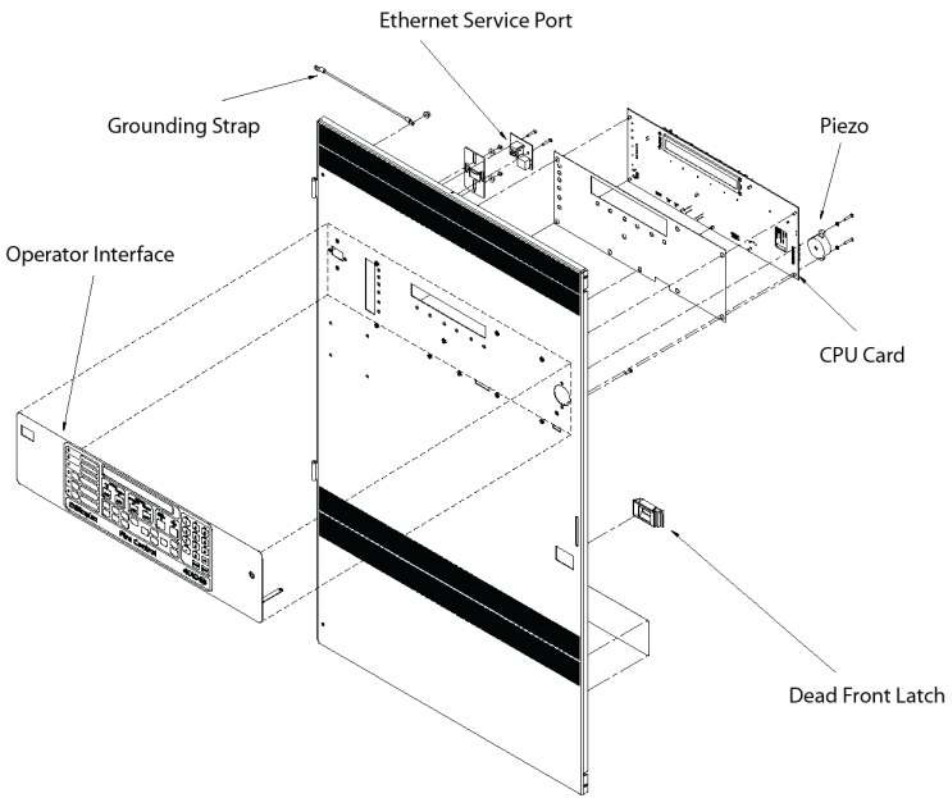


Figure 17: Two-bay standard dead front

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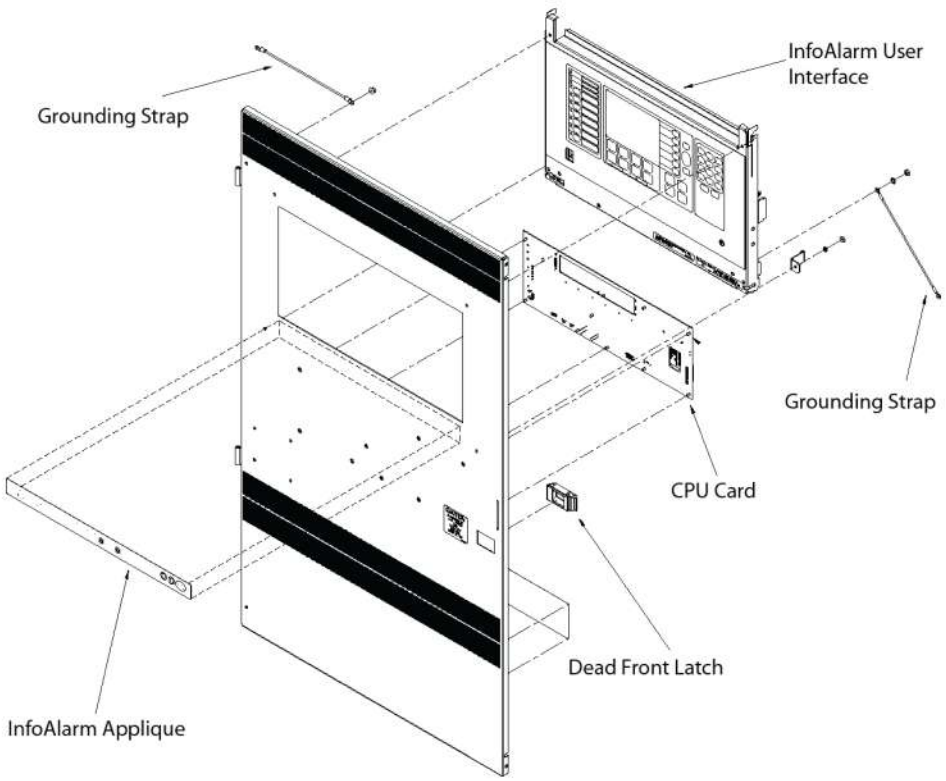


Figure 18: Two-bay InfoAlarm dead front

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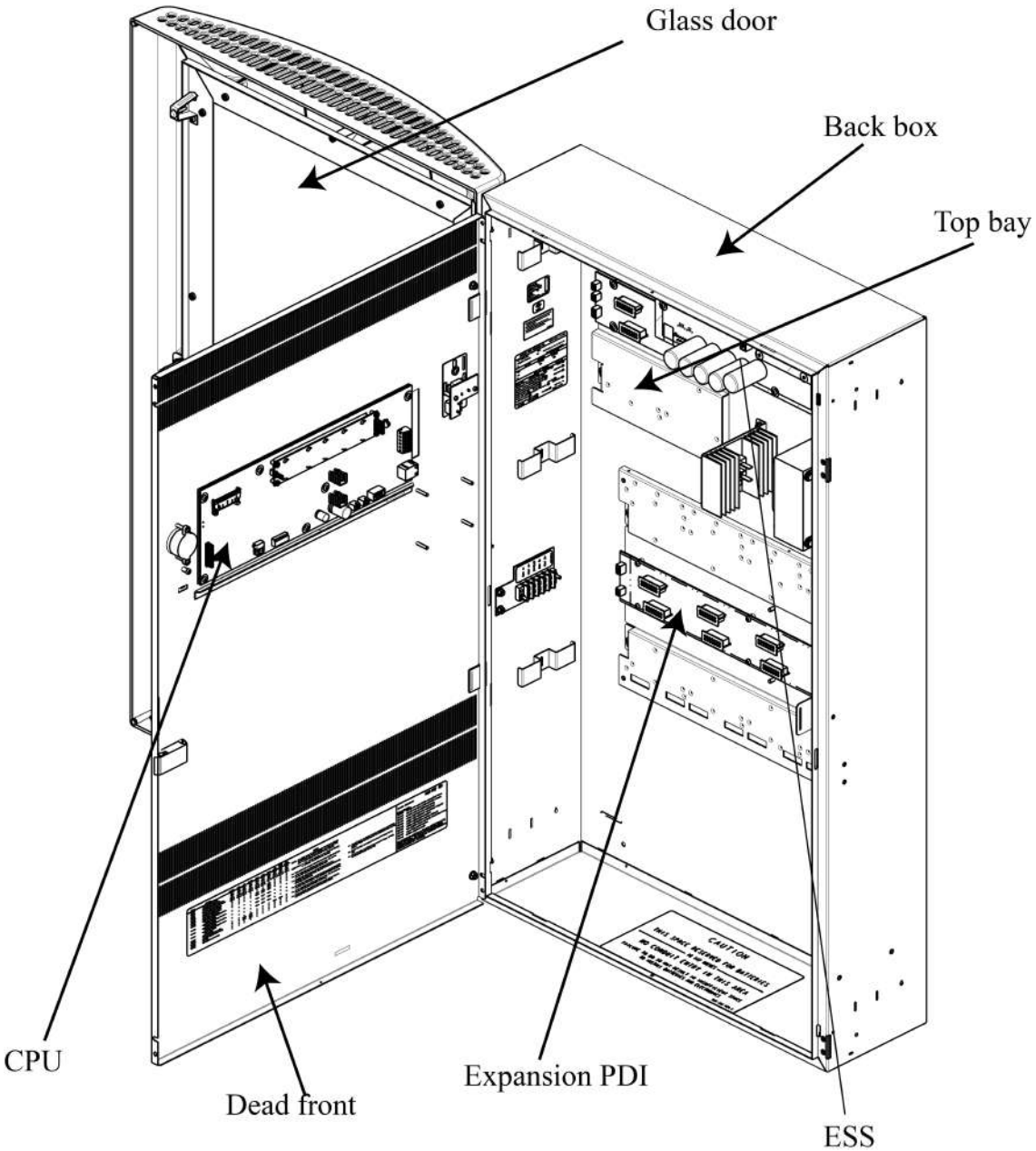


Figure 19: Two-bay 4010ES Panel with standard user interface

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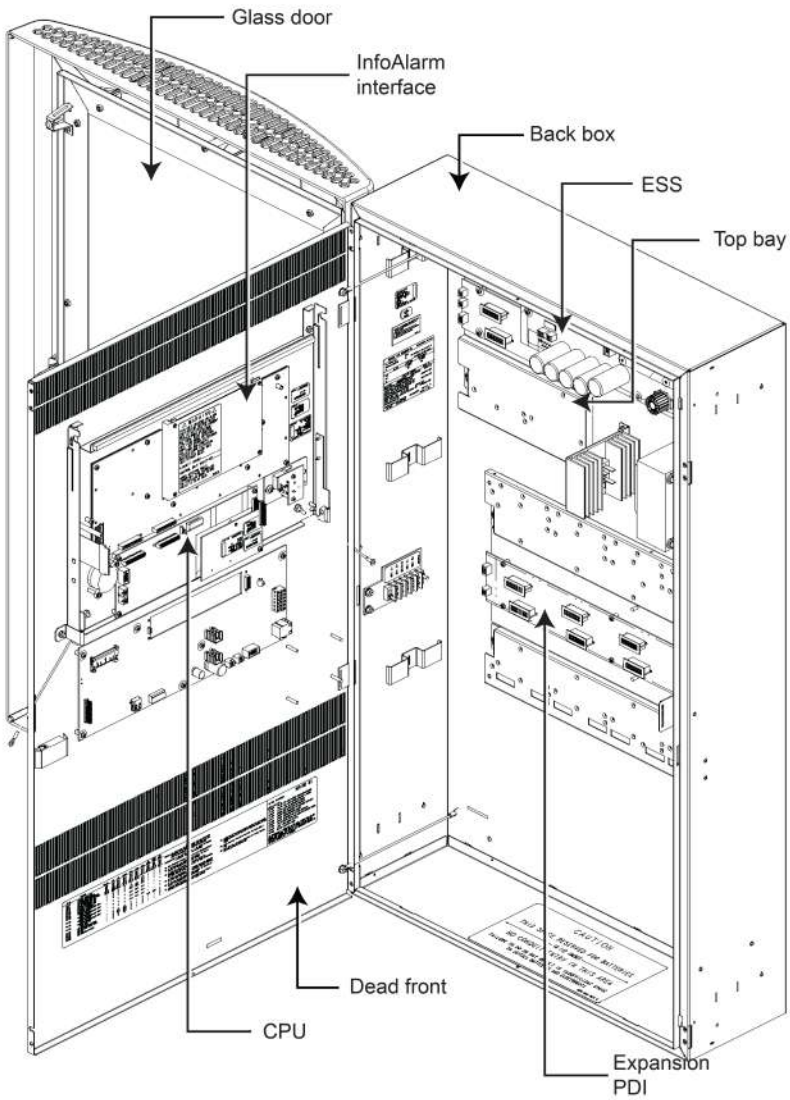


Figure 20: Two-bay 4010ES Panel with InfoAlarm interface

4.2.1 Optional modules

The same optional modules can be used with the two-bay panels as with the one-bay panels. For a complete list of optional components, see Available panels and devices.

4.2.2 Back box mechanical specifications

Table 20 lists the specifications for the two-bay back boxes.

Table 20: Back box specifications

PID number	Height	Width	Depth	Depth with door
699-465 (Platinum) 699-464 (Red)	40.0 in. (1016 mm)	24 in. (610 mm)	6-15/16 in. (176 mm)	11-11/16 in. (297 mm)

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5 Available panels and devices

The following chapter lists the 4010ES panels and optional modules that can be ordered. It also lists the installation manuals that are associated with each optional device.

5.1 Panels

Table 21: One-bay 4010ES systems

Panel PIDs	Panel color	Panel language and AC voltage	Panel components
4010-9601	Red	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks
4010-9602	Platinum	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks
4010-9701	Red	English 220V-240V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks
4010-9702	Platinum	English 220V-240V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks
4010-9603	Red	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks • 48-LED Module (door-mounted)
4010-9604	Platinum	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks • 48-LED Module (door-mounted)
4010-9606	Platinum	French 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • Three free option blocks • 48-LED Module (door-mounted)

Table 22: Two-bay 4010ES systems

Panel PIDs	Panel color	Panel language and AC voltage	Panel components
4010-9609	Red	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card 48 LED Module (door mounted)
4010-9610	Platinum	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card 48 LED Module (door mounted)
4010-9608	Platinum	French 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card 48 LED Module (door mounted)

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Table 22: Two-bay 4010ES systems

Panel PIDs	Panel color	Panel language and AC voltage	Panel components
4010-9621	Red	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9622	Platinum	English 120V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9623	Red	English 120V	• CPU with Piezo • InfoAlarm operator interface (English) • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9624	Platinum	English 120V	• CPU with Piezo • InfoAlarm operator interface (English) • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9711	Red	English 220V - 240V	• CPU with Piezo • InfoAlarm operator interface (international) • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9712	Platinum	English 220V - 240V	• CPU with Piezo • InfoAlarm operator interface (international) • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9721	Red	English 220V - 240V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card
4010-9722	Platinum	English 220V - 240V	• CPU with a 2 x 40 display and a piezo • Standard operator interface • 10 free option blocks • One extra 4010 IDNet 2+2 card

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5.2 Optional modules

5.2.1 Local optional modules

Table 23: Local optional modules installation instructions

PID	Description	Installation instructions
4010-9818	Network Media Card Wired	579-956
4010-9819	Network Media Card Dual Fiber Optic	579-956
4010-6301	4120 SM-L Duplex Fiber Media	579-956
4010-6302	4120 SM-R Duplex Fiber Media	579-956
4010-6303	4120 MM-L Duplex Fiber Media	579-956
4010-6304	4120 MM-R Duplex Fiber Media	579-956
4010-9901	4010ES/4100/4120-Series VESDA Card	579-963
4010-9902 and 4010-9922	4120 Network Interface Card	579-956 574-041
4010-9903 and 4010-9924	4120 Network Interface w/ Modem physical Bridge Class B	579-818 579-184 574-041
4010-9904 and 4010-9925	4120 Network Interface w/ Modem physical Bridge Class X	579-818 579-184 574-041
4010-9905 and 4010-9926	4120 Network Interface TCP/IP physical Bridge Class B	579-818 579-184 574-041
4010-9906 and 4010-9927	4120 Network Interface TCP/IP physical Bridge Class X	579-818 579-184 574-041
4010-9908	4-Point Flat AUX Relay (2 A)	579-220
4010-9909	City Connect Card with Disconnect Switches	579-955
4010-9910	City Connect Card without Disconnect Switches	579-955
4010-9911	Alarm Relay Card	579-955
4010-9912	SDACT Card	579-954
4010-9913	SafeLinc Internet Interface (FPII) Card	579-349
4010-9914	Building Network Interface Card (BNIC)	579-949
4010-9916	25 VDC Voltage Regulator Card (International Only)	579-812
4010-9917	MX Digital Loop Card (International Only)	579-833
4010-9918	Dual RS232 Card	574-910
4010-9919	TrueInsight Remote Service Gateway (Perle)	579-953
4010-9920	8 Zone Initiating Device Circuit, Class B	579-205
4010-9921	8 Zone Initiating Device Circuit, Class A	579-991
4010-9929	4010 IDNet 2+2 Module	579-1170
4010-9930	Dual Class A Isolator	579-1180
4010-6306	ES Net Dual Channel Ethernet Media Card	579-1258
4010-6307	ES Net Dual Channel DSL Media Card	579-1258
4010-6308	ES Net Dual Channel Single-mode Fiber Media Card	579-1258
4010-6309	ES Net Dual Channel Multi-mode Fiber Media Card	579-1258
4010-6310	ES Net Network Interface Card -Flat	579-1257
4010-6400	IP Gateway Cellular Module, Verizon	579-1248
4010-6401	IP Gateway GSM Cellular Module, AT&T/Rogers	579-1248
4010-6402	IP Gateway Cellular Module for External Box, Verizon	579-1248
4010-6403	IP Gateway GSM Cellular Module for External Box, AT&T/Rogers	579-1248
4010-9931	IP Communicator Module	579-1296
4010-2501	Simple Power Over Ethernet Switch Installation Guide	579-1250

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5.2.2 Remote devices

Table 24: Remote power and notification devices installation instructions

PID	Description	Installation instructions
4009-9401	4009T TrueAlert Controller	574-762
4081-9306	4100U External Battery Charger 120 V (With Cabinet; Holds 11 Ah Batteries)	579-268
4009-9201	4009A 120 V	574-181
4009-9202CA	4009A 120 V ULC-listed Model	574-181
4009-9301	4009A 240 V	574-181
4009-9601 4009-9602	4009 IDNAC Repeater	579-1019
4009 Remote TrueAlert Power Supply (TPS)		
4009-9813	Transponder Interface Card (TIC)	579-875
4100-5120	120 V Domestic TPS	579-875
4100-5121	120 V Canadian TPS	579-875
4100-5122	220-240 V International TPS	579-875

Table 25: Remote display and annunciation devices installation instructions

PID	Description	Installation instructions
4100-9401	Remote InfoAlarm - Red	579-687
4100-9402	Remote InfoAlarm - Beige	579-687
4100-9421	Remote InfoAlarm (French) - Red	579-687
4100-9422	4100-9422 Remote InfoAlarm (French) - Beige	579-687
4100-9441	Remote InfoAlarm (International) - Red	579-687
4100-9442	Remote InfoAlarm (International) - Beige	579-687
4100-7401	24-Point I/O Graphic Module (Requires Mounting Cabinet)	574-348
4606-9102	4010ES RUI LCD Annunciator	579-977

5.2.3 Adjunct features

Table 26: Adjunct features

PID	Description	Installation instructions
4081-9308	4100U External Battery Charger 220/230/240 V (With Cabinet. Holds 110 Ah Batteries)	579-268
4190-9021	Red Fiber Modem Expansion Cabinet with Left Port Modem – Single Mode	579-831
4190-9022	Beige Fiber Modem Exp Cabinet with Left Port Modem - Single Mode	579-831
4190-9023	Right Port Modem for Exp Cabinet – Single Mode	579-831
4190-9024	Red Fiber Modem Exp Cabinet with Left Port Modem – Multimode	579-831
4190-9025	Beige Fiber Modem Exp Cabinet with Left Port Modem - Multimode	579-831
4190-9026	Right Port Modem for Expansion Cabinet – Single Mode	579-831
2975-9234	IP Gateway External Box, Red	579-1249
2975-9235	IP Gateway External Box, Platinum	579-1249
2975-9236	IP Gateway External Box, Beige	579-1249

5.2.4 End user programming tools

Table 27: End user programming tools

PID	Description
4100-0292	Custom Label Editing (USB Dongle)
4100-0295	Port Vectoring Setup and Control (USB Dongle)
4100-0296	User Group/Passcode Editing (USB Dongle)
4100-0298	Walktest Configuration Setup and Control (USB Dongle)
4100-8802	Programming Unit Software

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5.2.5 LED kits for the 48-LED module

Table 28: LED kits for the 48-LED Module

PID	Description
4100-9843	8 Yellow LEDs
4100-9844	8 Green LEDs
4100-9845	8 Red LEDs
4100-9855	8 Blue LEDs

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6 Installing 4010ES systems

This chapter describes how to mount the 4010ES back boxes to a wall, and install basic system components into the boxes.

Before beginning the installation, review this chapter to get a sense of the types of bays and modules that make up the FACU.

Important: Verify ES Panel Programmer, Executive, and Slave Software compatibility when installing or replacing system components. Refer to the technical support website for up-to-date compatibility information.

6.1 Mounting the panel

6.1.1 Installing the back box

Store the system electronics containers in a safe, clean, and dry location until the back box installation is completed, and you are ready to install additional modules. Make certain that you have the necessary hardware before you begin the installation procedure.

Install the back box as shown in Figure 21. Use the holes in the back box to secure it to the wall.

Note:

- Conductor entrance and routing restrictions apply to power-limited systems only.
- While the pre-installed system components may be left in the backbox during installation, due to the danger of metal fragments falling into electronics, it is recommended to remove the dead front and any bay pans in the system.
- For surface or flush mounting to a wooden wall structure, the back box must be attached with four 1-½-inch-long (38 mm) lag bolts and four ½-inch-diameter (13 mm) washers.
- For surface mounting, secure the box to the wall using the tear-drop mounting holes on the back surface. For flush and semi-flush mounting, secure the box to the wall studs using the indicated areas (dents in the metal) on the sides of the box. Note that the front surface of the back box must protrude at least three inches from the wall surface for semi-flush installations.
- Power-limited systems have entrance and routing restrictions for field wiring. See Figure 27 for more details.

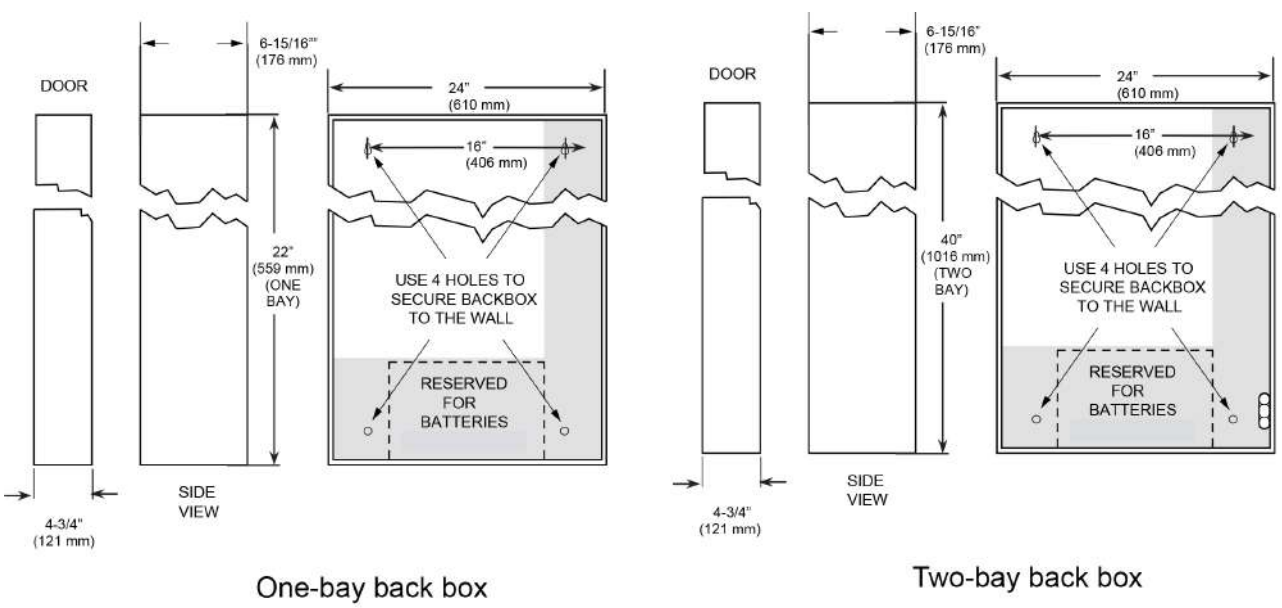


Figure 21: Back box installation

Note:

1. Use suitable punch when conduit is required. Cut conduit entrance holes on-site to ensure proper location.
2. Minimum distance between boxes is 3 1/4 inches (83mm) to ensure proper door opening.

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6.1.2 Attaching the dead front

To attach the 4010ES panel dead fronts containing the operator interface and the 48-LED Module (where applicable), follow the steps below:

1. Align the dead front hinges with the hinge pins on the back box, and slide the door down onto the hinge pins.
2. Attach the two grounding straps to the back box with the #6 hex flange nuts (Figure 24). The grounding straps should already be attached to the dead front.

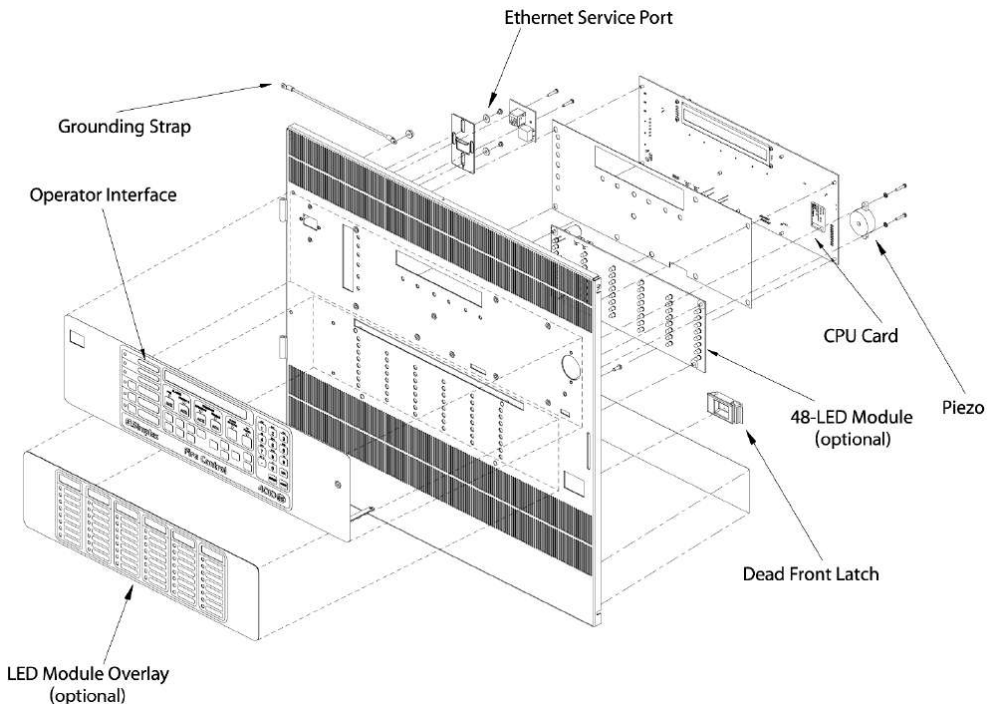


Figure 22: 4010ES 1 bay dead front

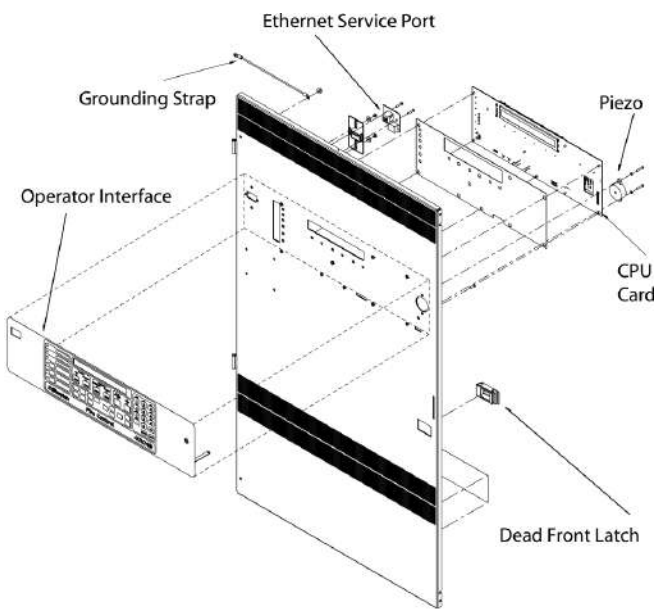


Figure 23: 4010ES 2 bay dead front

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6.1.3 Dead front grounding straps



Figure 24: Dead front grounding straps - top



Figure 25: Dead front grounding straps - bottom

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6.1.4 Attaching doors

To attach the glass doors (Figure 26) to the cabinet, follow the steps below:

1. Align the door hinges with the hinge pins on the back box, and slide the door down onto the hinge pins.
2. Attach the two grounding straps to the back box with the #6 hex flange nuts. The grounding straps should already be attached to the door.

Note: The hinge pins for the glass door are located higher and further to the side than the dead front hinge pins.

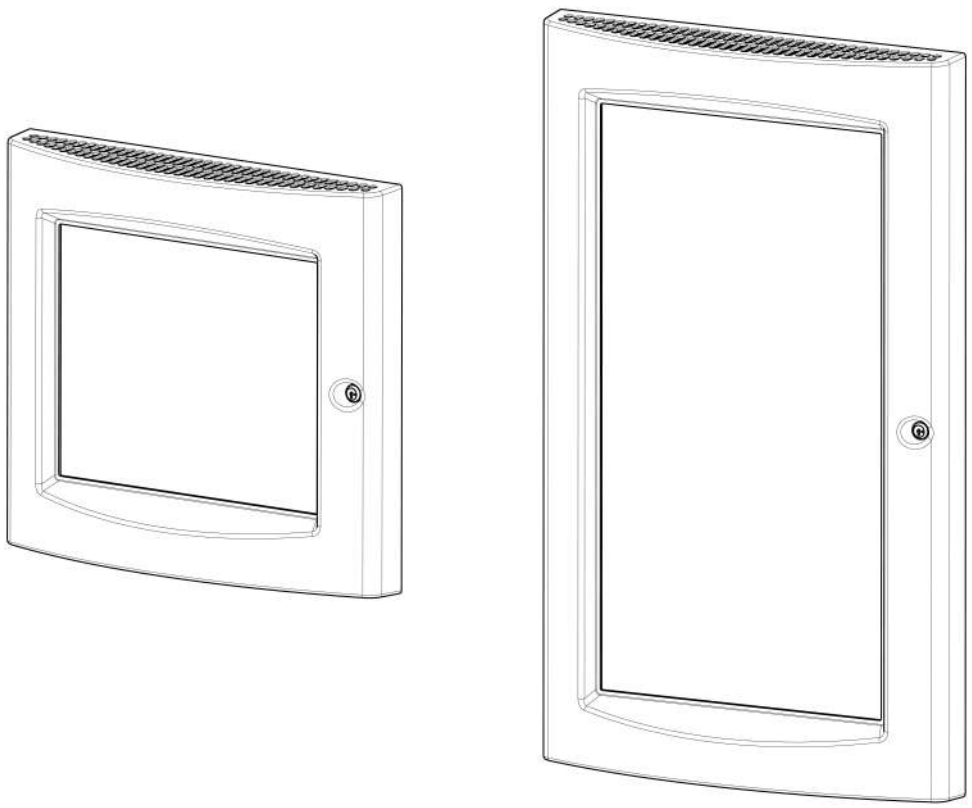


Figure 26: One-bay and Two-bay glass doors

6.2 General field wiring guidelines

Power-limited guidelines

For wiring guidelines, see the applicable installation documentation or contact your authorized Simplex Product supplier. Make sure these guidelines are accounted for before wiring for power-limited systems:

- Non-power limited field wiring (AC power, batteries, city connection) must be installed and routed in the shaded areas shown in Figure 27.
- Power-limited field wiring must be installed and routed in the non-shaded areas shown in Figure 27, with the exception of city wiring.
- Excess slack should be kept to a minimum inside the back box enclosure. The wiring should be neatly dressed and bundled together using wire ties.

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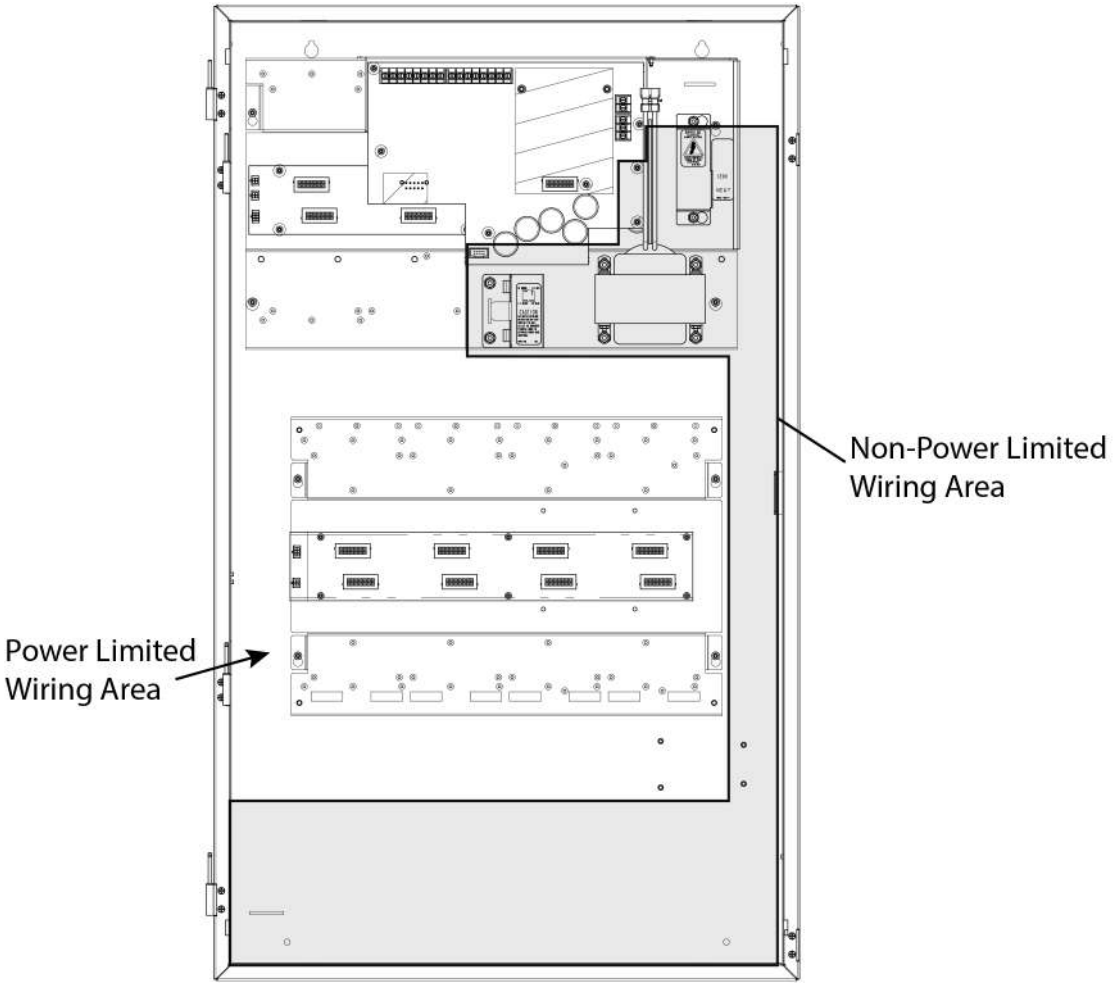


Figure 27: Field wiring guidelines

- Tie the wiring located between bays to the internal wiring troughs, if applicable.
- When powering remote units or switching power through relay contacts, power for these circuits must be provided by a power-limited power supply listed for fire-protective signaling use. An EOL relay must be used to supervise the auxiliary power circuit.
- Auxiliary power only: Supervision must be provided if the auxiliary power circuit is to be wired as a power-limited circuit. In order to connect a circuit using power-limited wiring, the devices being powered must all be addressable, or a UL Listed EOL relay must be used to supervise the circuit. Refer to Figure 28 for wiring directions for the EOL relay.

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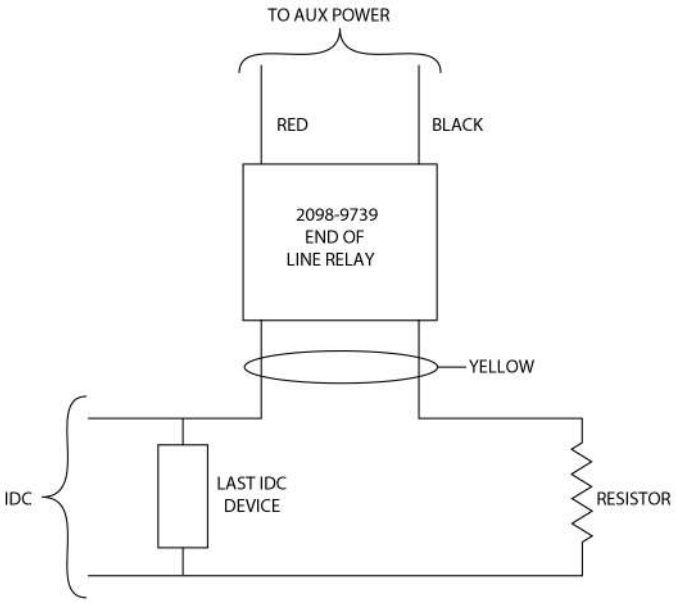


Figure 28: The EOL relay

Note: The 2098-9739 Relay is used as an example. Other UL Listed 24VDC EOL relays can be used, depending on the application.

6.3 Connecting 4010ES basic components

6.3.1 Connecting the CPU and the operator interface

Note:

All the basic components come pre-installed with the system. The connections are shown for reference purposes.

To connect the CPU and the operator interface, follow the steps below:

1. Place the white spacer on the dead front.
2. Attach the CPU card and the piezo to the dead front, using metal screws provided.
3. Attach the **Keypad Membrane** cable of the operator interface to port P8 on the CPU card (Figure 29). To do so:
   a. Slide down the keypad connector shroud on the CPU card.
   b. Insert the **Keypad Membrane** cable into the connector. Do not twist the flat cable.
   c. Slide the shroud back up into the connector while holding the flat cable in place.
4. Attach the Ethernet connection board using the 734-232 RJ45 cable.
5. Attach the Perle box using the 734-229 cable.
6. Connect port **P9** or **P10** of the CPU card to the **dead front connection (P1)** port on the top-bay power distribution interface (PDI) card (Figure 29 and Figure 30). Use the 734-008 4-pin connector harness provided.

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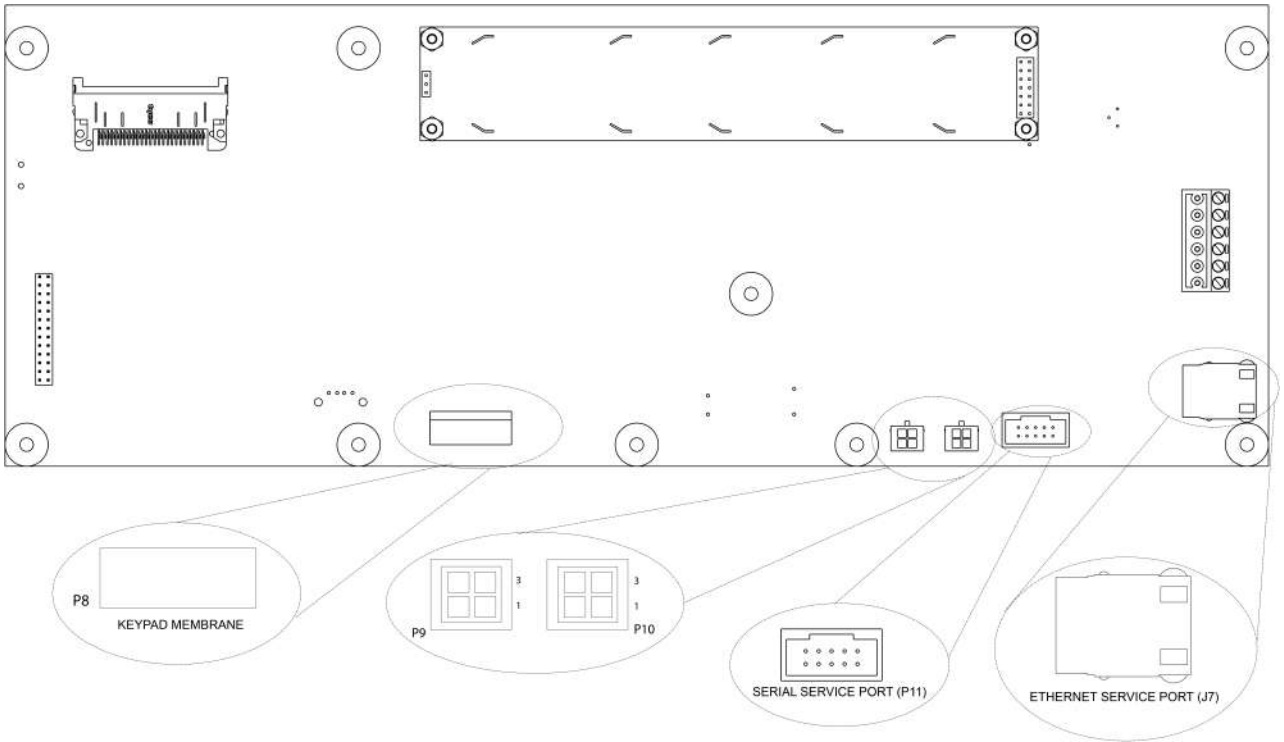


Figure 29: CPU Card rear view

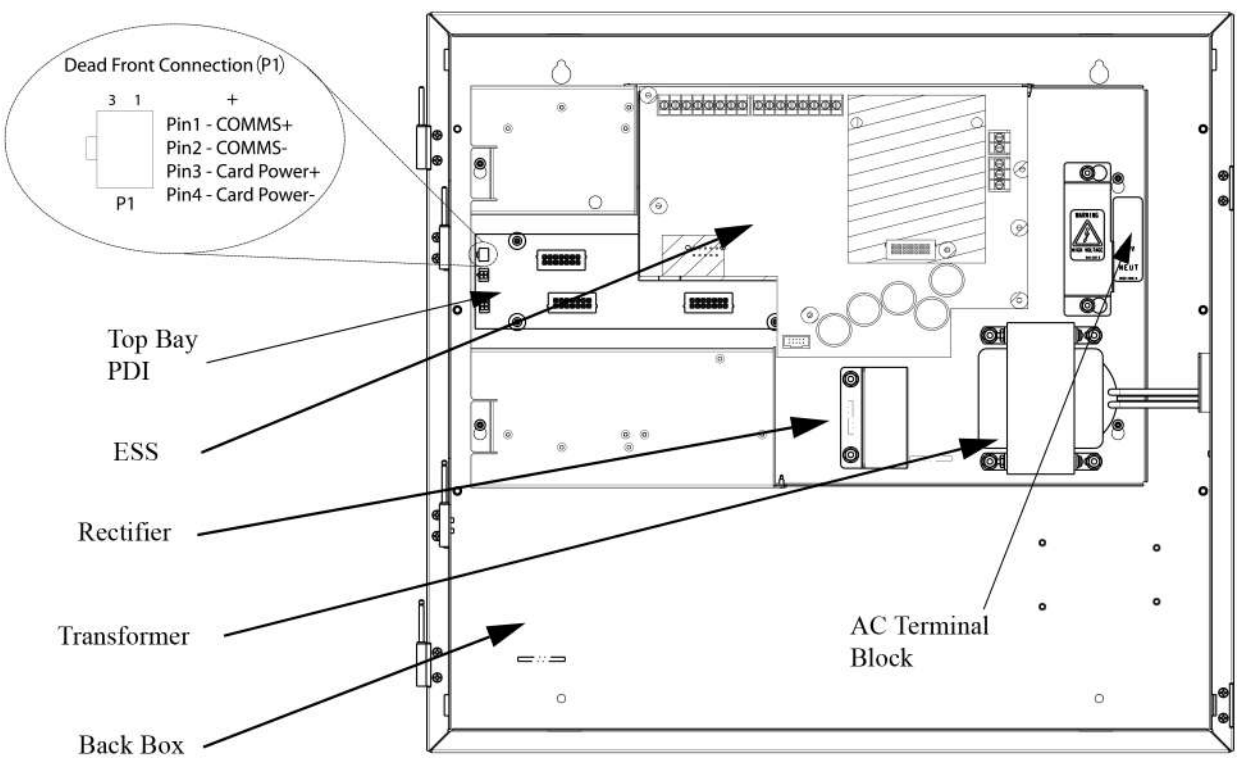


Figure 30: Top bay

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6.3.2 Connecting the ESS

Follow the steps below:

1. Connect the ESS to the **ESS (Block C)** connector on the Top Bay PDI.
2. Attach the ESS to the back box using metal screws and standoffs.
3. Connect the rectifier to the **Bridge HARN1** connectors on the ESS (Figure 31). The red wire connects to the tab labeled “+” on the bridge. The black wire connects to the tab labeled “-” on the rectifier. See Figure 30 for the location of the rectifier.
4. Connect the backup batteries to the **Battery** connectors on the ESS. The red wire connects to the tab labeled "RED" on the ESS, the black wire connects to the “BLK” tab. The backup batteries must be wired in series such that you have 24V. Use the white wire provided to bridge the batteries together. The batteries can be placed on the bottom of the 4010ES back box.

   Note:

   a. A fused harness is required to connect the backup batteries. That harness is shipped with the panel. The mating spade lug on the battery should be 0.250 inch x 0.032 inches. If another size is needed, you will need to replace the battery terminal connectors on the supplied battery harness.
   b. One-bay system back boxes support up to 33 Ah batteries. Two-bay system back boxes support up to 50 Ah batteries. If 50 Ah batteries are used, you must also order the 4100-0650 Battery Shelf.
   c. To minimize the power losses due to wiring from the battery box to the 4010ES, use at least a 12 AWG wire and keep the battery box at the minimum distance possible from the 4010ES.

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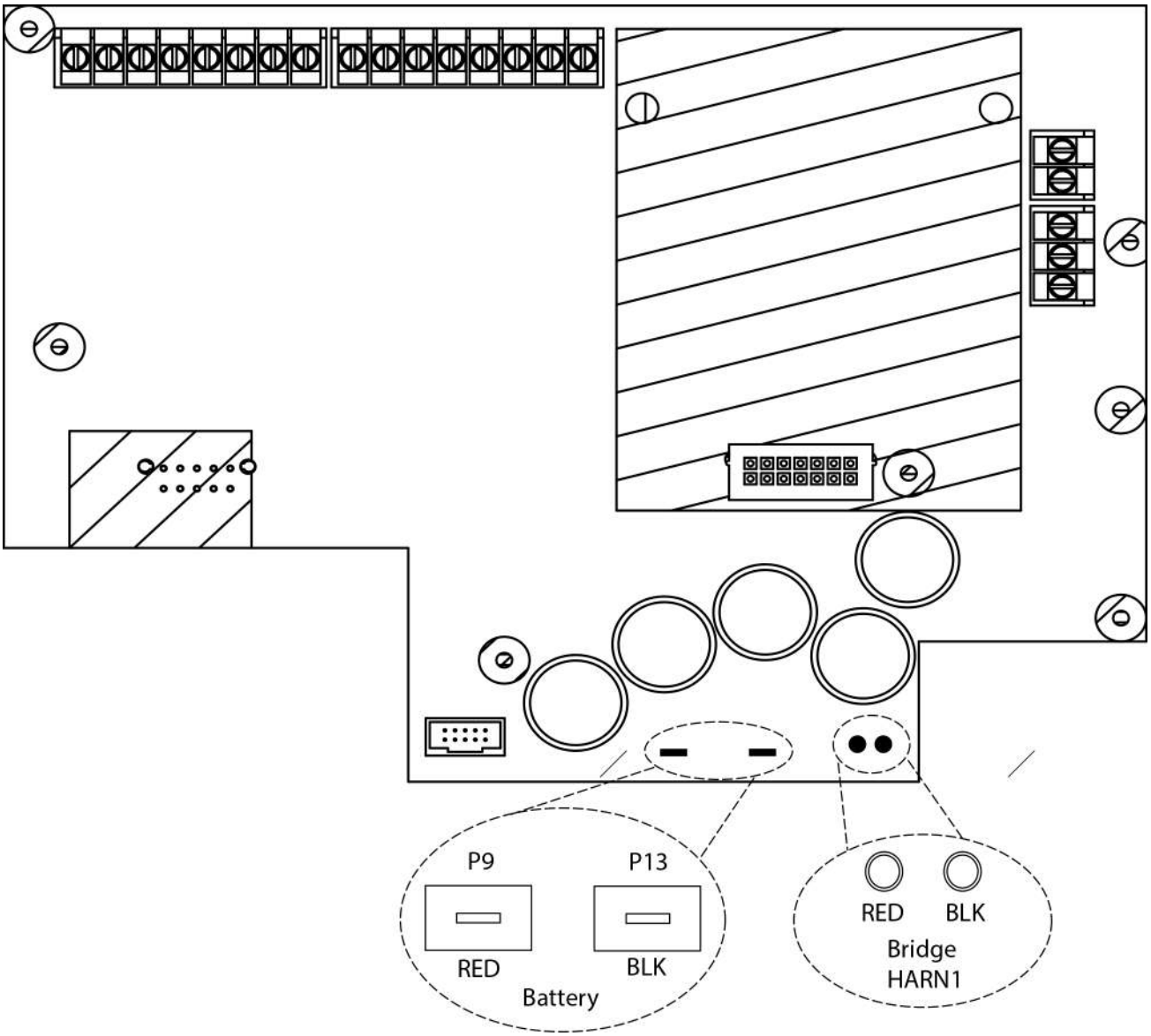


Figure 31: ESS Bridge HARN1 connector

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6.3.3 Connecting the 48-LED Module

Connect port **P1** or **P2** of the 48-LED Module card (Figure 32) to either port **P9** or **P10** of the CPU card (Figure 7). Use the 734-181 4-pin connector harness provided.

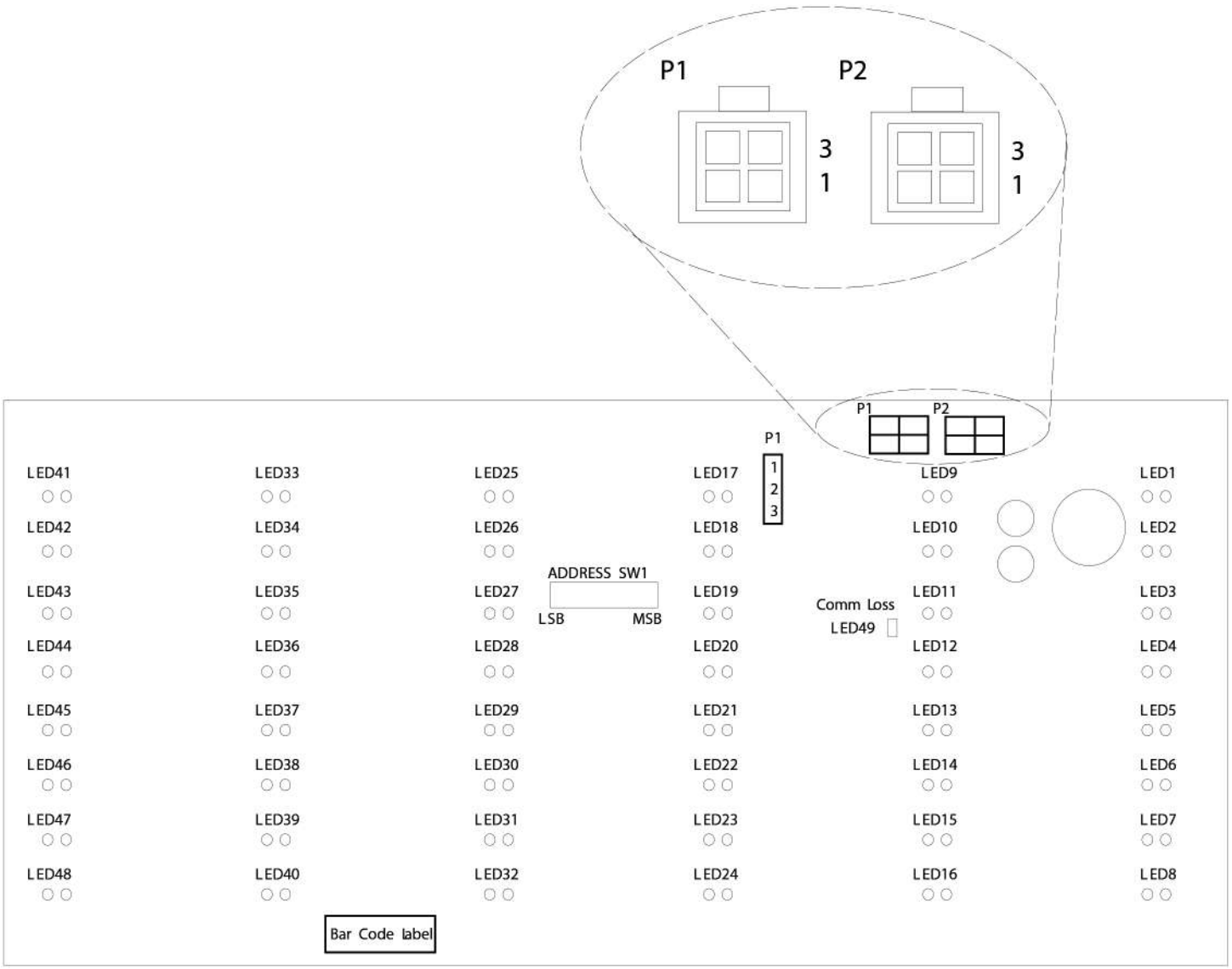


Figure 32: 48-LED Module rear view

Swapping LEDs

To swap any of the 48 LEDs on the 48-LED Module, follow the steps below:

1. Remove the battery + connection at the panel then turn off AC power at the breaker.
2. Remove the 48-LED module from the dead front by following the steps below:
   a. Disconnect any cables in **P1** or **P2** of the module
   b. Remove the four screws holding the card to the dead front.
   c. Remove the card from the dead front.
3. Pull out any necessary LEDs from the module.
4. Insert new LEDs in the vacated slots. For correct polarity, the flat line of the LED outline on the card must line up with the flat side on the LED.
5. Re-attach the 48-LED module back on its spot on the dead front.
6. Re-attach the batteries and re-apply AC power to the 4010ES panel.

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6.4 RUI wiring

The CPU card's RUI channel supports the following devices:

- 4009T
- 4009 TPS
- 4602 Series RCU/SCU Annunciators
- 4606-9102 Remote LCD Annunciator
- 4100-7400 Series Graphic Annunciators
- 4100-9400 Series Remote InfoAlarm Command Center

Wire from the CPU card's RUI interface to the RUI terminal block (Figure 33). From there, wire to each RUI device. The wiring may be Class A, Class B, or Class X:

Class A wiring allows devices to communicate with the FACU even in the event of a single open circuit somewhere in the loop. Class A wiring requires that two wires are routed from the CPU card to each device, and then back again to the CPU card.

Class B wiring allows "T" tapping, and therefore requires less wiring distance per installation than Class A.

Class X wiring extends Class A survivability by isolating shorted segments from impacting the rest of the loop. Class X operation requires that every device on the loop support short isolation, and as a result only the 4009 TPS and InfoAlarm User Interface can be used in a Class X loop.

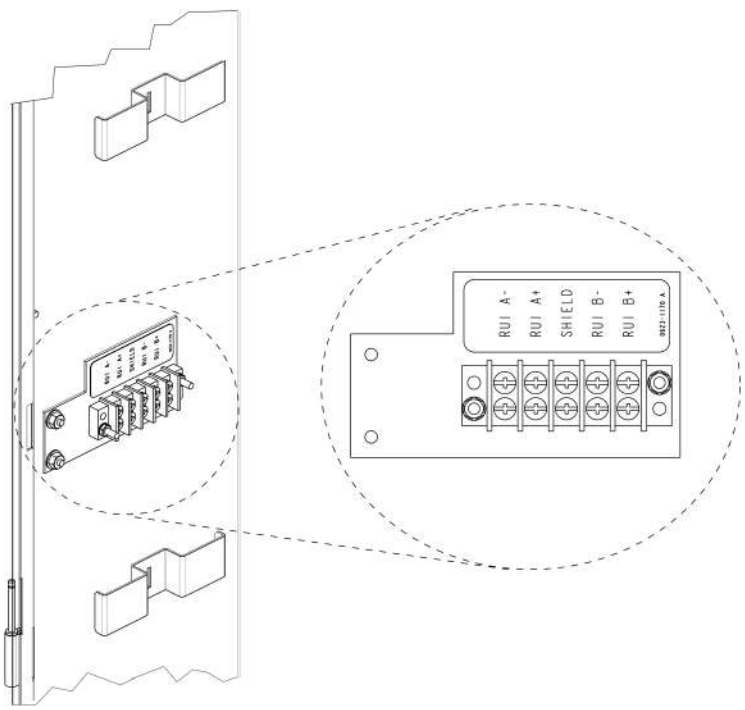


Figure 33: Location of the RUI terminal block

Class A and Class B wiring are shown below.

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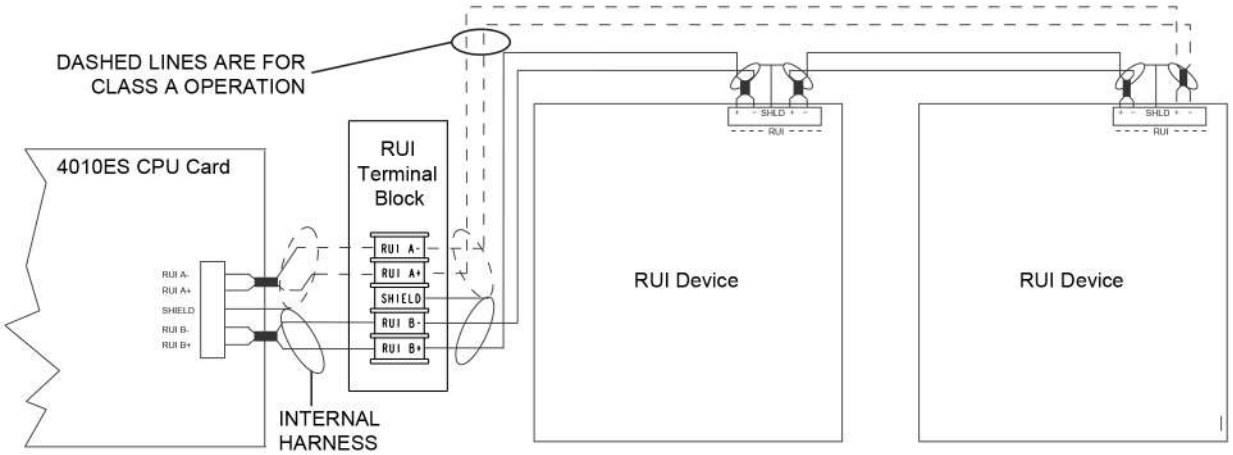


Figure 34: RUI wiring to the host panel

Note:

1. Wire size must be between 18 AWG (0.8231 mm^2) and 12 AWG (3.309 mm^2).
2. Maximum wiring distance: 2,500 feet (762 m) to device from CPU card.
3. Maximum "T" tapping length: 10,000 feet (3,048 m).
4. Maintain correct polarity on terminal connections. Do not loop wires under terminals.
5. If Class A is not used, leave loop back wires from A+ to B+ and A- to B- on RUI terminal blocks.
6. Shield wire is not required. Twisted wire is recommended for improved noise immunity.
7. Internal harness part numbers: 0734-241 (1 bay), 0734-243 (2 bay).

For more detailed field wiring information on each device, refer to its specific installation instructions manual. See Available panels and devices, for a list of instructions manuals.

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6.5 Installing the optional modules

Note: Skip this section if no optional modules need to be installed.

This page contains the general placement guidelines for the optional modules that can be used with the 4010ES panels. Always consult the individual cards' installation guides for more specific instructions. Refer to Table 23 and Available panels and devices for a list of these installation instructions.

In addition to basic system components, the 4010ES panel has space on the PDI to accommodate the following option card configurations:

1. One Two-Block 4 inch x 10 inch option card (such as a NIC or a SafeLINC card) and one 4 inch x 5 inch option card. Or,
2. Three 4 inch x 5 inch single-block option cards.

If the system is a two-bay system, an eight-block PDI card in the second bay allows for additional mounting space beyond the three blocks in the top bay.

Note: Some systems come with option cards pre-installed. In these cases, the number of available option card blocks is reduced. See the PID list table in Available panels and devices.

6.5.1 Installing one-block and two-block cards

The PDI cards are mounted to the back of each bay and carry power and data across all bays.

Use the following instructions and Figure 35 to mount cards into a 4010ES panel bay.

1. Screw standoffs and washers to the appropriate holes in the back of the cabinet. These holes must line up with the screw holes in the card.
2. Plug the card into the appropriate blind mating connector. Seat the card firmly onto the PDI when installing to ensure complete insertion of the power connector into the PDI.
3. Secure the card to the standoffs with screws and washers.

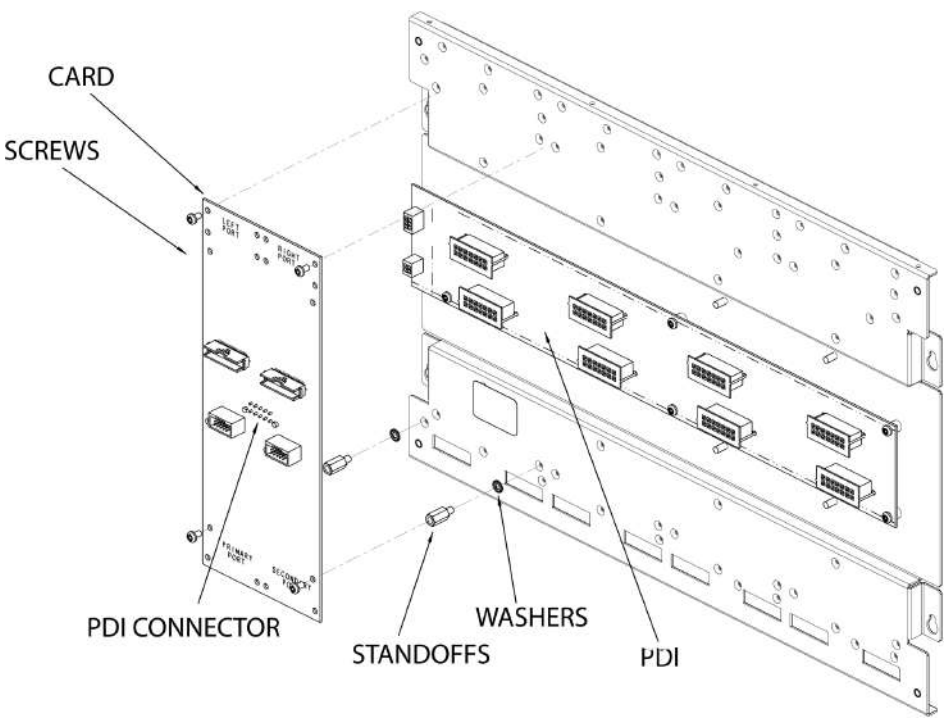


Figure 35: Card connection to a PDI

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6.6 Address configuration DIP switch

Addressable cards include a bank of eight DIP switches. From left to right (Figure 36) these switches are designated as SWx-1 through SWx-8. The function of these switches is as follows:

- **SWx-1**. This switch sets the baud rate for the internal 4010ES communications line running between the card and the CPU. Set this switch to ON.
- **SWx-2** through **SWx-8**. These switches set the card's address within the 4010ES FACU. Refer to Figure 36 for a complete list of the switch settings for all of the possible card addresses.

Note: You must set these switches to the value assigned to the card by the ES Panel Programmer.

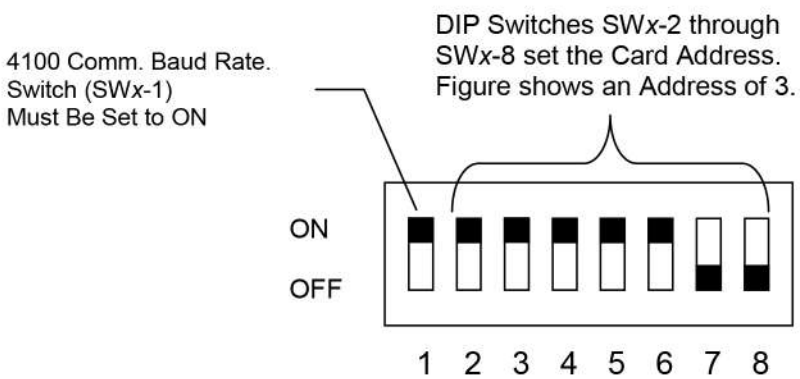


Figure 36: DIP switch SWx

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Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8
1	ON	ON	ON	ON	ON	ON	OFF	61	ON	OFF	OFF	OFF	OFF	ON	OFF
2	ON	ON	ON	ON	ON	OFF	ON	62	ON	OFF	OFF	OFF	OFF	OFF	ON
3	ON	ON	ON	ON	ON	OFF	OFF	63	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	ON	ON	ON	ON	OFF	ON	ON	64	OFF	ON	ON	ON	ON	ON	ON
5	ON	ON	ON	ON	OFF	ON	OFF	65	OFF	ON	ON	ON	ON	ON	OFF
6	ON	ON	ON	ON	OFF	OFF	ON	66	OFF	ON	ON	ON	ON	OFF	ON
7	ON	ON	ON	ON	OFF	OFF	OFF	67	OFF	ON	ON	ON	ON	OFF	OFF
8	ON	ON	ON	OFF	ON	ON	ON	68	OFF	ON	ON	ON	OFF	ON	ON
9	ON	ON	ON	OFF	ON	ON	OFF	69	OFF	ON	ON	ON	OFF	ON	OFF
10	ON	ON	ON	OFF	ON	OFF	ON	70	OFF	ON	ON	ON	OFF	OFF	ON
11	ON	ON	ON	OFF	ON	OFF	OFF	71	OFF	ON	ON	ON	OFF	OFF	OFF
12	ON	ON	ON	OFF	OFF	ON	ON	72	OFF	ON	ON	OFF	ON	ON	ON
13	ON	ON	ON	OFF	OFF	ON	OFF	73	OFF	ON	ON	OFF	ON	ON	OFF
14	ON	ON	ON	OFF	OFF	OFF	ON	74	OFF	ON	ON	OFF	ON	OFF	ON
15	ON	ON	ON	OFF	OFF	OFF	OFF	75	OFF	ON	ON	OFF	ON	OFF	OFF
16	ON	ON	OFF	ON	ON	ON	ON	76	OFF	ON	ON	OFF	OFF	ON	ON
17	ON	ON	OFF	ON	ON	ON	OFF	77	OFF	ON	ON	OFF	OFF	ON	OFF
18	ON	ON	OFF	ON	ON	OFF	ON	78	OFF	ON	ON	OFF	OFF	OFF	ON
19	ON	ON	OFF	ON	ON	OFF	OFF	79	OFF	ON	ON	OFF	OFF	OFF	OFF
20	ON	ON	OFF	ON	OFF	ON	ON	80	OFF	ON	OFF	ON	ON	ON	ON
21	ON	ON	OFF	ON	OFF	ON	OFF	81	OFF	ON	OFF	ON	ON	ON	OFF
22	ON	ON	OFF	ON	OFF	OFF	ON	82	OFF	ON	OFF	ON	ON	OFF	ON
23	ON	ON	OFF	ON	OFF	OFF	OFF	83	OFF	ON	OFF	ON	ON	OFF	OFF
24	ON	ON	OFF	OFF	ON	ON	ON	84	OFF	ON	OFF	ON	OFF	ON	ON
25	ON	ON	OFF	OFF	ON	ON	OFF	85	OFF	ON	OFF	ON	OFF	ON	OFF
26	ON	ON	OFF	OFF	ON	OFF	ON	86	OFF	ON	OFF	ON	OFF	OFF	ON
27	ON	ON	OFF	OFF	ON	OFF	OFF	87	OFF	ON	OFF	ON	OFF	OFF	OFF
28	ON	ON	OFF	OFF	OFF	ON	ON	88	OFF	ON	OFF	OFF	ON	ON	ON
29	ON	ON	OFF	OFF	OFF	ON	OFF	89	OFF	ON	OFF	OFF	ON	ON	OFF
30	ON	ON	OFF	OFF	OFF	OFF	ON	90	OFF	ON	OFF	OFF	ON	OFF	ON
31	ON	ON	OFF	OFF	OFF	OFF	OFF	91	OFF	ON	OFF	OFF	ON	OFF	OFF
32	ON	OFF	ON	ON	ON	ON	ON	92	OFF	ON	OFF	OFF	OFF	ON	ON
33	ON	OFF	ON	ON	ON	ON	OFF	93	OFF	ON	OFF	OFF	OFF	ON	OFF
34	ON	OFF	ON	ON	ON	OFF	ON	94	OFF	ON	OFF	OFF	OFF	OFF	ON
35	ON	OFF	ON	ON	ON	OFF	OFF	95	OFF	ON	OFF	OFF	OFF	OFF	OFF
36	ON	OFF	ON	ON	OFF	ON	ON	96	OFF	OFF	ON	ON	ON	ON	ON
37	ON	OFF	ON	ON	OFF	ON	OFF	97	OFF	OFF	ON	ON	ON	ON	OFF
38	ON	OFF	ON	ON	OFF	OFF	ON	98	OFF	OFF	ON	ON	ON	OFF	ON
39	ON	OFF	ON	ON	OFF	OFF	OFF	99	OFF	OFF	ON	ON	ON	OFF	OFF
40	ON	OFF	ON	OFF	ON	ON	ON	100	OFF	OFF	ON	ON	OFF	ON	ON
41	ON	OFF	ON	OFF	ON	ON	OFF	101	OFF	OFF	ON	ON	OFF	ON	OFF
42	ON	OFF	ON	OFF	ON	OFF	ON	102	OFF	OFF	ON	ON	OFF	OFF	ON
43	ON	OFF	ON	OFF	ON	OFF	OFF	103	OFF	OFF	ON	ON	OFF	OFF	OFF
44	ON	OFF	ON	OFF	OFF	ON	ON	104	OFF	OFF	ON	OFF	ON	ON	ON
45	ON	OFF	ON	OFF	OFF	ON	OFF	105	OFF	OFF	ON	OFF	ON	ON	OFF
46	ON	OFF	ON	OFF	OFF	OFF	ON	106	OFF	OFF	ON	OFF	ON	OFF	ON
47	ON	OFF	ON	OFF	OFF	OFF	OFF	107	OFF	OFF	ON	OFF	ON	OFF	OFF
48	ON	OFF	OFF	ON	ON	ON	ON	108	OFF	OFF	ON	OFF	OFF	ON	ON
49	ON	OFF	OFF	ON	ON	ON	OFF	109	OFF	OFF	ON	OFF	OFF	ON	OFF
50	ON	OFF	OFF	ON	ON	OFF	ON	110	OFF	OFF	ON	OFF	OFF	OFF	ON
51	ON	OFF	OFF	ON	ON	OFF	OFF	111	OFF	OFF	ON	OFF	OFF	OFF	OFF
52	ON	OFF	OFF	ON	OFF	ON	ON	112	OFF	OFF	OFF	ON	ON	ON	ON
53	ON	OFF	OFF	ON	OFF	ON	OFF	113	OFF	OFF	OFF	ON	ON	ON	OFF
54	ON	OFF	OFF	ON	OFF	OFF	ON	114	OFF	OFF	OFF	ON	ON	OFF	ON
55	ON	OFF	OFF	ON	OFF	OFF	OFF	115	OFF	OFF	OFF	ON	ON	OFF	OFF
56	ON	OFF	OFF	OFF	ON	ON	ON	116	OFF	OFF	OFF	ON	OFF	ON	ON
57	ON	OFF	OFF	OFF	ON	ON	OFF	117	OFF	OFF	OFF	ON	OFF	ON	OFF
58	ON	OFF	OFF	OFF	ON	OFF	ON	118	OFF	OFF	OFF	ON	OFF	OFF	ON
59	ON	OFF	OFF	OFF	ON	OFF	OFF	119	OFF	OFF	OFF	ON	OFF	OFF	OFF
60	ON	OFF	OFF	OFF	OFF	ON	ON								

Figure 37: Card addresses

6.7 Connecting main system power

The 4010ES panel is shipped with the AC block, the transformer and the rectifier already wired together. You only need to wire the AC block to the main power line. The ground wire on the power line connects to a screw, located on the top right back box (Figure 38). The other wires connect to the AC terminal block, as indicated by the labels (Figure 39).

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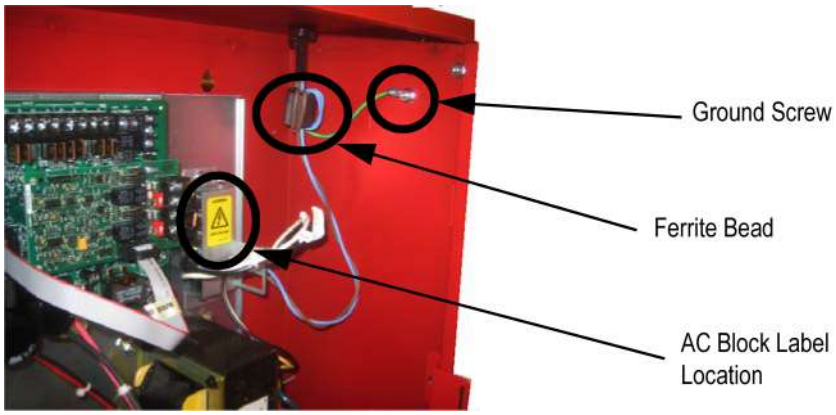


Figure 38: Grounding wire

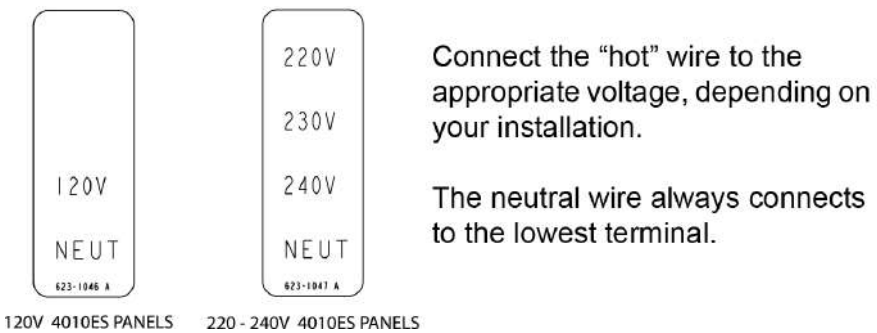


Figure 39: AC block labels for AC power connections

Note:

In 220-240 V panels, the 4010ES requires a true transformer output of 220-240 V. Do not connect two out of phase "hot" wires to create the desired voltage.

When connecting the AC power wire to the AC block, it needs to pass through a ferrite bead to reduce radiated emissions. Route the black and white AC power wires to the supplied ferrite bead. Loop the wires twice through the bead and secure with two cable ties as shown in Figure 40. The cable ties are supplied in the ship group that comes with the panel.

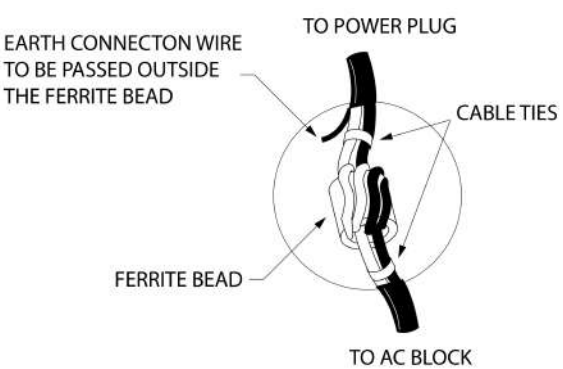


Figure 40: AC Power line ferrite bead

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6.8 Panel power-up sequence

Follow the steps below to power-up the 4010ES panel:

1. Connect the negative (-) connector on the battery.
2. Apply AC power.
3. Connect the positive (+) connector on the battery.

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7 ESS field wiring

This chapter describes the wiring between the ESS card and compatible devices.

General wiring guidelines

- Conductors must test free of all grounds. See Checking system wiring.
- All wiring must be done using copper conductors only, unless noted otherwise.
- If shielded wire is used:
  - The metallic continuity of the shield must be maintained throughout the entire cable length.
  - The entire length of the cable must have a resistance greater than 1 megohm to earth ground.
- Underground wiring must be free of all water.
- In areas of high lightning activity, or in areas that have large power surges, the 2081-9027 Transient Suppressor should be used on monitor points.
- Wires must not be run through elevator shafts.
- Splicing is permitted. All spliced connections must either be soldered (resin-core solder), crimped in metal sleeves, or encapsulated with an epoxy resin. When soldering or crimped metal sleeves are used, the junction must be insulated with a high-grade electrical tape that is as sound as the original insulating jacket. Shield continuity must be maintained throughout.
- A system ground must be provided for earth detection and lightning protection devices. This connection must comply with approved earth detection per NFPA780.
- Only system wiring can be run together in the same conduit.

7.1 ESS IDNet wiring

A single IDNet2 channel is provided that can connect up to 250 IDNet devices. The IDNet2 channel has two isolated circuits that support either Class A or Class B wiring. Class X wiring can be supported through the use of IDNet isolator devices. Typical devices include smoke and heat sensors, QuickConnect sensors and a variety of addressable input and/or output modules. Refer to datasheet S4090-0011 for a list of compatible IDNet devices.

Class A wiring provides an alternate communication path that provides communications to all devices when a single open circuit fault occurs. Class A wiring requires two wires to be routed from the IDNet Primary Terminals (B+, B-) to each IDNet device, and then back to the IDNet Secondary Terminals (A+, A-).

Note: Wiring is in/out. "T" tapping is not allowed.

Class B wiring allows "T" tapping, and typically results in less wiring used per installation compared to Class A. IDNet wiring is inherently supervised due to individual device level communications, and end-of-line resistors are not required.

Class X wiring improves on Class A wiring by providing resilience not only to single open fault but also to single short-circuit fault. Class X requires the use of IDNet isolator devices.

7.1.1 Wiring parameters

Table 30 identifies the ESS IDNet wiring parameters that must be considered when applying this module. For additional wiring information, see the applicable installation documentation or contact your authorized Simplex Product supplier.

Table 29: ESS IDNet wiring capacitance parameters

Parameter	Value
Maximum supported channel capacitance; **Total of both isolated outputs**	The sum of line-to-line capacitance, plus the capacitance of either line-to-shield (if shield is present) = 0.6 µF (600 nF)
Capacitance between IDNet SLCs wiring (between wires of the same polarity; plus to plus, minus to minus)	1 µF maximum (this is for multiple IDNet channels)

Table 30: IDNet wiring distance limits

Channel loading	Class B wiring, total channel wiring parameters, Including T-Taps		Class A/X wiring, total channel wiring parameters	
	Up to 125 devices	126 to 250 devices	Up to 125 devices	126 to 250 devices
Total loop resistance	**50 Ω maximum**	**35 Ω maximum**	**50 Ω maximum**	**35 Ω maximum**
18 AWG (0.82 mm^2)	12,500 ft (3.8 km)		4000 ft (1219 m)	2500 ft (762 m)
16 AWG (1.31 mm^2)	12,500 ft (3.8 km)		5000 ft (1524 m)	2500 ft (762 m)
14 AWG (2.08 mm^2)	12,500 ft (3.8 km)		5000 ft (1524 m)	2500 ft (762 m)
12 AWG (3.31 mm^2)	12,500 ft (3.8k m)		5000 ft (1524 m)	2500 ft (762 m)

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Table 30: IDNet wiring distance limits

Channel loading	Class B wiring, total channel wiring parameters, Including T-Taps		Class A/X wiring, total channel wiring parameters	
	Up to 125 devices	126 to 250 devices	Up to 125 devices	126 to 250 devices
Total loop resistance	**50 Ω maximum**	**35 Ω maximum**	**50 Ω maximum**	**35 Ω maximum**
Note: Maximum wiring distance is determined by either reaching the maximum resistance, the maximum capacitance, or the stated maximum distance, whichever occurs first. Class A/X maximum distances are to the farthest device on the loop from either "B" or "A" terminals. For Class B wiring, the maximum distance to the farthest device is limited to the stated Class A/X wiring distances. Shielded wire is not required. Twisted wire is recommended for improved noise immunity.				
IDNet wiring considerations using 2081-9044 Overvoltage Protectors (2081-9044 is UL listed to Standard 60950-1, Standard for Safety of Information Technology Equipment)	**Note:** External wiring must be shielded (for lightning suppression) and 2081-9044 Overvoltage Protectors must be installed at building exit and entrance locations.			
	Capacitance; each protector adds 0.006µF across the connected line.			
	Resistance; each protector adds 3 Ω per line of series resistance; both IDNet lines are protected; 6 Ω per protector will be added to total loop resistance.			
	Maximum distance of a single protected wiring run is 3270 ft (1 km).			
	Refer to document number 574-832, 2081-9044 *Overvoltage Protector Installation Instructions,* for additional information.			

7.1.2 Class A wiring

To connect the ESS with an IDNet2 channel to devices using Class A wiring, read the following instructions and refer to Figure 41:

1. Route wiring from the IDNet Circuit Primary Terminals (B+, B-) on TB1 of the IDNet terminal to the appropriate inputs on the first IDNet device.
2. Route wiring from the first IDNet device to the next as in/out as shown in Figure 41. Repeat for each device.
3. Route wiring from the last IDNet device to the IDNet Circuit Secondary Terminals (A+, A) on TB1 of the IDNet terminal.
4. Ensure that circuit jumpers are configured for Class A operation.

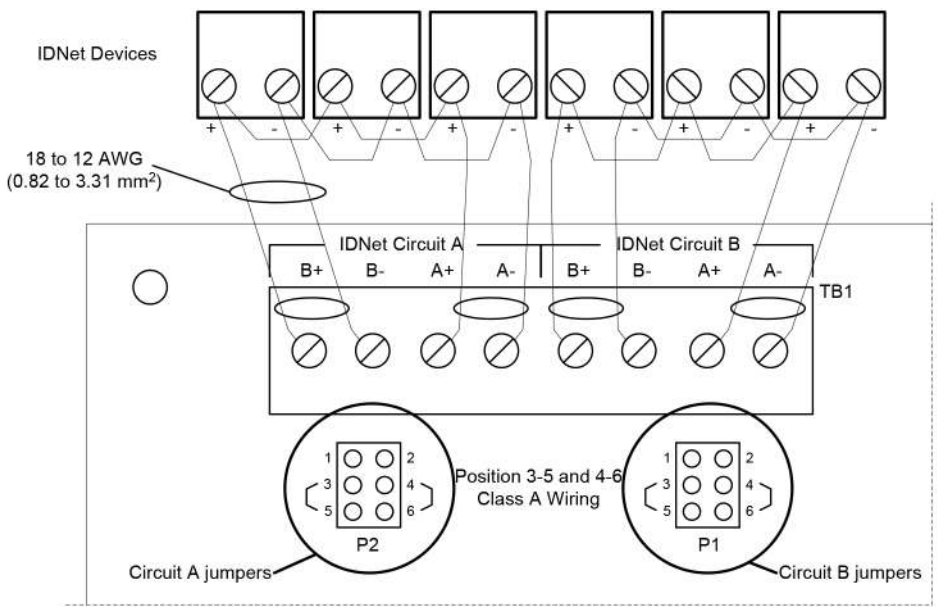


Figure 41: Class A wiring

Note: Set jumpers to Positions 3-5 and 4-6 to select Class A operation. (Refer to P1 and P2 in Figure 41 for correct orientation)

Note:

a. If no remote isolators or isolator bases are on the loops, device addressing can be assigned without concern for sequence.

b. If remote isolators or isolator bases are on the loops, the required addressing approach is to start from the "B" side of the A Loop output and assign each successive isolator a higher address than the isolator it proceeds. Follow this sequencing through to the "B" side of the B Loop.

There are two considerations for addressing Class A wired IDNet devices connected to the IDNet terminal:

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7.1.3 Class B wiring

Class B wiring requires the configuration jumpers to be set to positions 1-3 and 2-4. Two jumpers must be set for each circuit (refer to Figure 42 for locations). Each of the two IDNet outputs provides short circuit isolation between itself and the others. A short on one output is isolated from the others.

For Class B wiring only, both the B+, B- and A+, A- terminals are available for parallel connections. A+ is connected to B+, and A- is connected to B- as shown in Figure 42. Additionally, two wires can be connected to each screw terminal. The result is that for Class B wiring only, four parallel output branch circuits can be connected at the IDNet terminals.

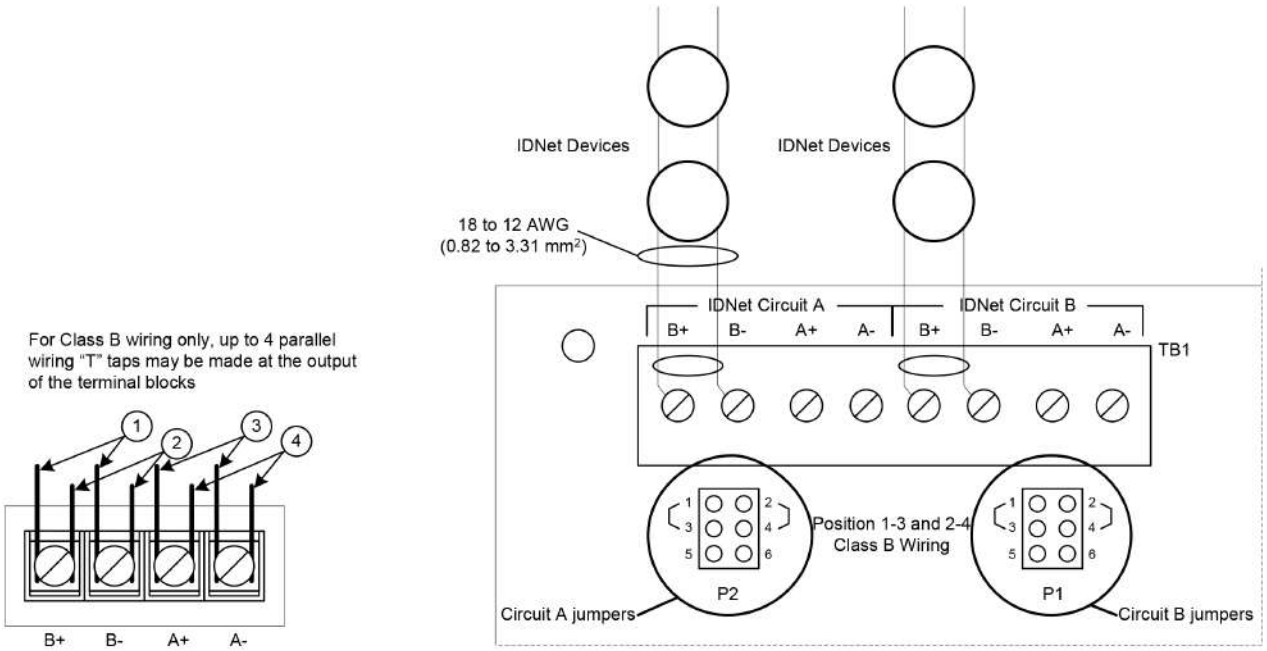


Figure 42: Class B wiring

Note: Set jumpers to Positions 1 - 3 and 2 - 4 to select Class B operation. (See P1 and P2 in Figure 42 for correct orientation)

Note:

1. If no remote isolators or isolator bases are on the loops, device addressing can be assigned without concern for sequence.
2. If remote isolators or isolator bases are on the loops, the required addressing approach is to start at the A Loop output and assign each successive isolator a higher address than the previous one. Follow this sequencing through to the B Loop.
3. For Class B wiring only, the "A" output and "B" output per loop are connected together in parallel for wiring convenience.

There are two considerations for addressing Class B wired IDNet devices connected to the IDNet terminal.

7.1.4 Class X wiring

For Class X wiring, see Class A wiring and add isolator devices along the loop.

7.2 ESS IDNAC wiring

The ESS has 2 IDNAC SLCs for power and communication wiring. Each IDNAC SLC on the ESS supports Class B wiring to 127 appliances from the TrueAlert ES and TrueAlert Addressable lines.

Class B wiring allows "T" tapping. IDNAC SLC wiring is inherently supervised due to individual device level communications. End-of-line resistors are not required.

For Class A operation, Dual Class-A Isolators (DCAI, 4100-6103) are required. P11 on the ESS has been provided for mounting one DCAI. Up to three others can be installed (maximum two per IDNAC SLC) in available 4 inch x 5 inch blocks.

Class X operation requires the use of Dual Class-A Isolators (DCAI, 4100-6103) and IDNAC isolator devices.

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7.2.1 Device wiring guidelines

Review the following guidelines for devices before you begin the field wiring.

- Only IDNAC appliances and other compatible appliances are allowed on the IDNAC SLCs. See the appendix for a list of compatible appliances.
- Maximum of 127 appliances or 139 unit loads per channel. The maximum number of visuals that can be synchronized on one circuit is 127.
- Maximum of six TrueAlert Addressable isolators between any appliance and SLC terminals. Maximum 12 isolators per SLC.
- Maximum of 30 appliances connected directly to any isolator terminal pair.
- All wiring is 20 AWG to 12 AWG.
- The required wiring is unshielded Twisted Pair. This wiring must have a capacitive rating of less than 60pF/ft and a minimum 3 twists (turns) per foot.
- All wiring is supervised and power-limited.
- The maximum alarm current is 3 A per circuit.
- Maximum cable load is 10,000 feet (3,048 m) per channel. Maximum wire length from panel to any appliance is 4,000 feet (762 m).
- The nominal voltage rating is 29 VDC.
- The total available current from the ESS is 6 A.
- All visible appliances wired from an ESS are synchronized to appliances on SPS, XPS, TPS, 4009A, 4009T and other ESS within the system. Appliances wired from TrueAlert Adapter (4905-9816) are not synchronized to other system appliances.

7.2.2 Ferrite beads

Ferrite beads must be used for field wiring.

1. Install the ferrite bead close to the ESS field wiring terminals for lowest radiated emissions (before the wires leave the box).
2. Loop the wires through the bead as shown.



Figure 43: Ferrite bead installation

7.2.3 Class B wiring tables

Use the following tables to calculate the wiring distance.

Maximum wiring distance is the shorter of the distance limits as calculated by alarm current voltage drop or by reaching the communications distance limit.

Note: Wiring distance must not exceed 4000 ft

Note: Although the required wire IDNAC circuits is twisted pair (controlled impedance) wiring, some applications will wish to take advantage of existing wiring that is not twisted pair. This is only allowed if both conductors of the IDNAC circuit reside in the same metal conduit, and only under certain conditions. Check with your local sales office before using wiring that is not twisted pair.

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Alarm current	Distance to the last appliance				
	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG
0.050	4000 ft	4000 ft	4000 ft	4000 ft	4000 ft
0.100	2644 ft	4000 ft	4000 ft	4000 ft	4000 ft
0.150	1763 ft	2802 ft	4000 ft	4000 ft	4000 ft
0.200	1322 ft	2102 ft	3342	4000 ft	4000 ft
0.250	1058 ft	1681 ft	2674 ft	4000 ft	4000 ft
0.300	881 ft	1401 ft	2228 ft	3542 ft	4000 ft
0.350	755 ft	1201 ft	1910 ft	3036 ft	4000 ft
0.400	661 ft	1051 ft	1671 ft	2657 ft	4000 ft
0.450	588 ft	934 ft	1485 ft	2362 ft	3756
0.500	529 ft	841 ft	1337 ft	2125 ft	3380
0.750	353 ft	560 ft	891 ft	1417 ft	2254 ft
1.000	264 ft	420 ft	668 ft	1063 ft	1690 ft
1.250	212 ft	336 ft	535 ft	850 ft	1352 ft
1.500	176 ft	280 ft	446 ft	708 ft	1127 ft
1.750	151 ft	240 ft	382 ft	607 ft	966 ft
2.000	132 ft	210 ft	334 ft	531 ft	845 ft
2.250	118 ft	187 ft	297 ft	472 ft	751 ft
2.500	106 ft	168 ft	267 ft	425 ft	676 ft
2.750	96 ft	153 ft	243 ft	386 ft	615 ft
3.000	88 ft	140 ft	223 ft	354 ft	563 ft
Wiring distance must not exceed 4000 ft					

Figure 44: UTP wiring limit based on alarm current

Line impedance (Ohms)	Devices	Distance to the last appliance				
		20 AWG	18 AWG	16 AWG	14 AWG	12 AWG
14.54	1	1252 ft	2038 ft	3241 ft	4000 ft	4000 ft
12.96	5	1142 ft	1815 ft	2887 ft	4000 ft	4000 ft
11.38	10	1003 ft	1595 ft	2536 ft	4000 ft	4000 ft
10.14	15	893 ft	1420 ft	2258 ft	3590 ft	4000 ft
9.12	20	804 ft	1278 ft	2033 ft	3231ft	4000 ft
8.28	25	730 ft	1160 ft	1845 ft	2934 ft	4000 ft
7.58	30	668 ft	1061 ft	1688 ft	2683 ft	4000 ft
6.97	35	614 ft	977 ft	1553 ft	2469 ft	3928 ft
6.45	40	568 ft	904 ft	1437 ft	2285 ft	3634 ft
6.00	45	528 ft	840 ft	1336 ft	2124 ft	3378 ft
5.60	50	493 ft	784 ft	1247 ft	1982 ft	3152 ft
5.24	55	462 ft	734 ft	1168 ft	1856 ft	2952 ft
4.92	60	434 ft	690 ft	1097 ft	1744 ft	2774 ft
4.75	63	419 ft	665 ft	1058 ft	1682 ft	2675 ft
4.64	65	409 ft	650 ft	1034 ft	1643 ft	2613 ft
4.38	70	386 ft	614 ft	976 ft	1552 ft	2468 ft
4.15	75	366 ft	581 ft	924 ft	1469 ft	2337 ft
3.94	80	347 ft	551 ft	877 ft	1394 ft	2217 ft
3.74	85	330 ft	524 ft	833 ft	1325 ft	2107 ft
3.56	90	314 ft	499 ft	794 ft	1262 ft	2006 ft
3.40	95	299 ft	476 ft	757 ft	1203 ft	1913 ft
3.24	100	286 ft	454 ft	723 ft	1149 ft	1827 ft
3.10	105	273 ft	435 ft	691 ft	1099 ft	1748 ft
2.97	110	262 ft	416 ft	662 ft	1052 ft	1673 ft
2.85	115	251 ft	399 ft	634 ft	1009 ft	1604 ft
2.73	120	241 ft	383 ft	609 ft	968 ft	1539 ft
2.58	127	228 ft	362 ft	576 ft	915 ft	1456 ft
Wiring distance must not exceed 4000 ft						

Figure 45: UTP wiring limit based on communication

Table 31: Ohms per 1000 ft

Gage	Ohms/1000 ft
20 AWG	11.347
18 AWG	7.137
16 AWG	4.488
14 AWG	2.8230
12 AWG	1.7750

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7.2.4 Class B wiring to devices

To connect the ESS IDNAC terminal block to appliances using Class B wiring:

1. Route the wire from the "+" and the "-" outputs on the IDNAC SLC terminal blocks (TB1, TB2 or TB3) to the appropriate inputs on a peripheral notification appliance.
2. Route wire from the first appliance to the next one. "T" tapping is allowed. Repeat for each appliance.
3. Repeat steps 1 through 3 for each IDNAC SLC output you want to use.

Note:

a. Notification appliances are rated per individual nameplate label. Maintain correct polarity on terminal connections.
b. Each IDNAC + and - terminal is rated for 2 identical wires. This allows up to 4 Class B T-TAP circuits directly from each IDNAC terminal block. See Figure 46.

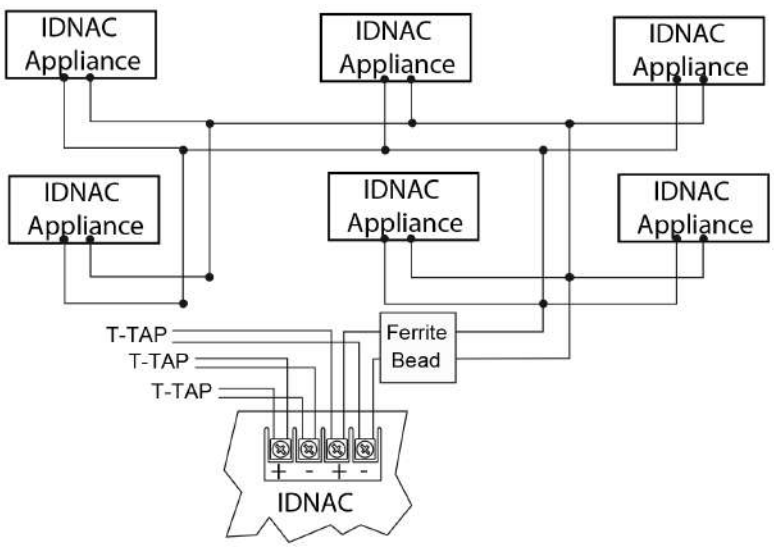


Figure 46: Class B wiring

7.2.5 Calculating Class B wiring with isolators

When using isolators, the maximum wire distance of each of these SLC branches from panel to any device is the smaller of the values obtained from Figure 45, and the Equation 1. See Table 31 for the ohms per 1000 ft.

Note: Each IDNAC + and - terminal is rated for 2 identical wires. This allows up to 4 Class B T-TAP circuits directly from each IDNAC terminal block. See Figure 42.

Equation 1: Maximum SLC wire branch length based on appliance alarm current load

$$\text{Distance (feet)} = \frac{6V - (0.1\text{ohm} \times \text{number of isolators on branch} \times \text{branch alarm amps})}{2 \times \text{resistance per foot} \times \text{branch alarm amps}}$$

- Add the alarm loads of all the devices on an SLC wire branch and apply to Equation 1.
- Add the unit loads for all devices on an SLC wire branch and the number of isolators and apply UTP wiring limit as described in Figure 45.

Maximum wire resistance protected by 1 isolator is 1.5 ohm (total, both wires).

Wire the devices as instructed in Class B wiring to devices.

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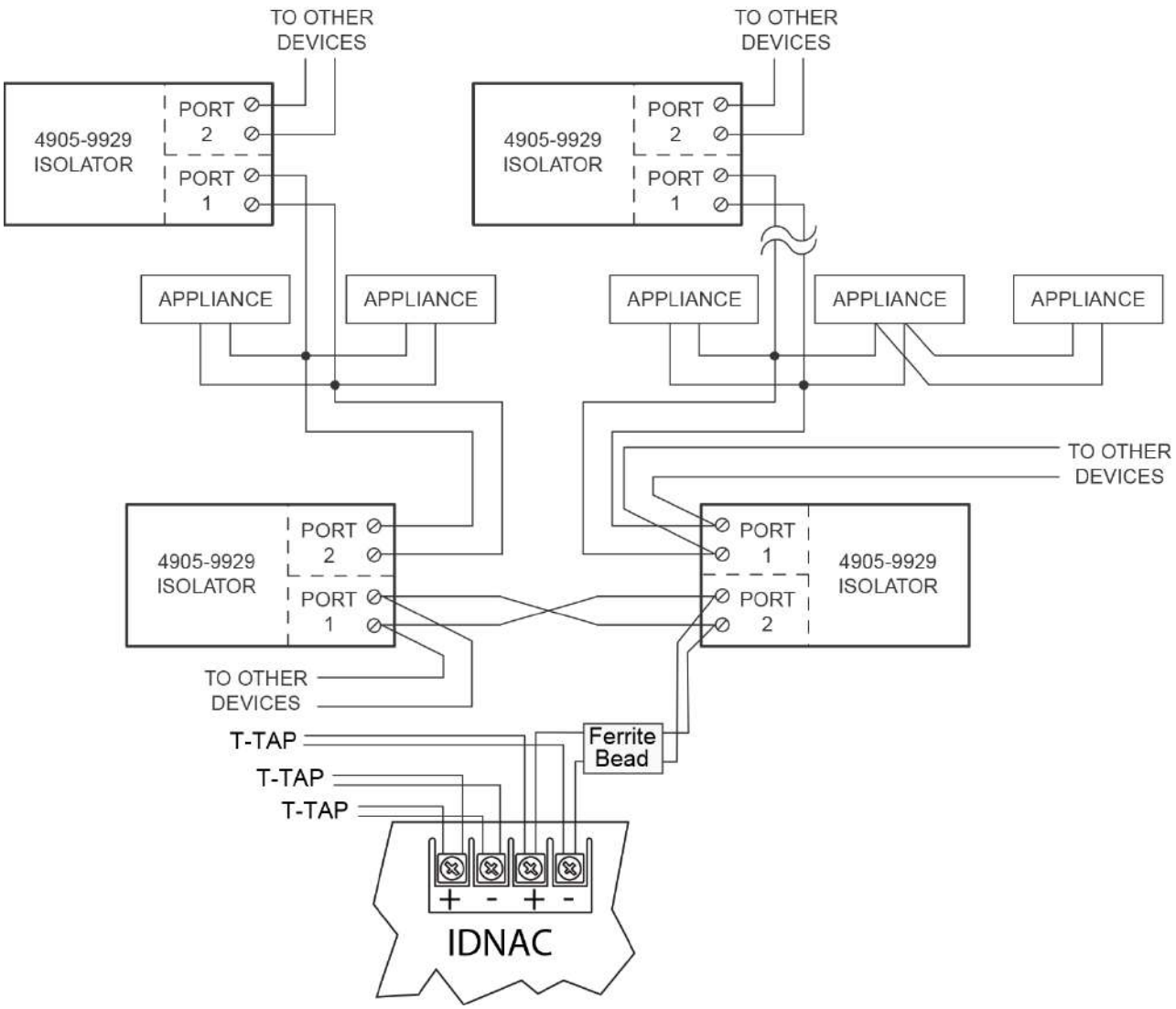


Figure 47: Class B wiring with TrueAlert addressable isolators

7.3 ESS AUX/NAC wiring

AUX/NAC terminal

The AUX/NAC terminal block is located on the upper right side of the ESS.

Through the ES Panel Programmer, this point can be configured as either a 24V Auxiliary (AUX) power (with Class B support, see note 6) or as a Class B simple reverse polarity Notification Appliance Circuit (NAC).

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Table 32: AUX/NAC wiring specification

Voltage rating	24V special application
Rating	2 A, maximum.
Wiring gauge	18 AWG (min.) to 12 AWG (max.).

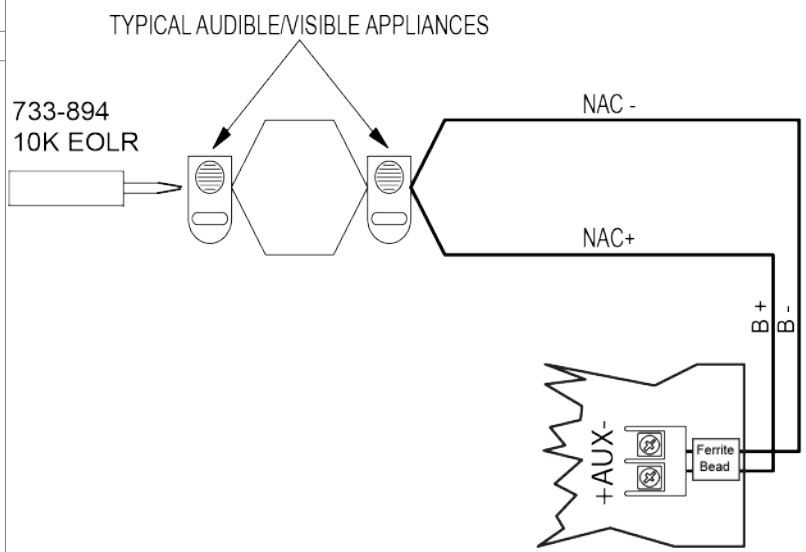


Figure 48: Simple NAC wiring

Wiring Notes:

1. All wiring from the AUX/NAC is power limited.
2. Conductors must test free of all grounds and stray voltages before connection to appliances and panel.
3. Terminate Class B NACs as shown using 733- 894. For Canadian applications, mount end-of-line resistor to Simplex-US Model 431537 EOL plate in accordance with ULC-S527.
4. If circuit is terminated with a 10k EOLR, at the terminals, remove this resistor before wiring.
5. If wiring is routed outside the building, use of a listed secondary protector is required. Use Simplex 2081- 9028 or 2081-9044. A protector must be installed at each building exit/entrance. Each 2081-9028 adds 0.2 ohms wiring resistance. 2081-9044 adds 6 ohms wiring resistance, and will greatly reduce wiring distance.
6. External wiring from the auxiliary power tap (AUX) is not supervised unless an end-of-line relay is wired to auxiliary power, and normally open contacts are monitored by the FACU (IDNet device or IO point). Relay current must be considered as part of the load. When only addressable devices are connected to the auxiliary power tap, an end-of-line relay is not required because the power for the addressable devices is supervised due to the device being addressable. The preceding configurations provide AUX Power Class B.
7. Install a ferrite bead close to the AUX field wiring terminals for FCC compliance, as shown in Figure 48. Order separately as needed (order kit 4100-5129).

Table 33: NAC wiring limits

Alarm current	20 AWG	18 AWG	16 AWG	14 AWG	12 AWG	Line resistance (Ohms)
0.25	617 ft	981 ft	1560 ft	2480 ft	3944 ft	14.00
0.50	308 ft	490 ft	780 ft	1240 ft	1972 ft	7.00
0.75	206 ft	327 ft	520 ft	827 ft	1315 ft	4.67
1.00	154 ft	245 ft	390 ft	620 ft	986 ft	3.50
1.25	123 ft	196 ft	312 ft	496 ft	789 ft	2.80
1.50	103 ft	163 ft	260 ft	413 ft	657 ft	2.33
1.75	88 ft	140 ft	223 ft	354 ft	563 ft	2.00
2.00	77 ft	123 ft	195 ft	310 ft	493 ft	1.75

Note:

This chart indicates the maximum distance for 1/4 -2A loads. Wiring distance is from the panel terminals to the last appliance. Use of a 2081-9044 protector reduces wiring distance.

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Note: Output of AUX or NAC is 24V nominal. Minimum voltage is 19.5 @ full load and minimum battery; maximum is 31.5V at light load, high AC line. Aux Loads include 4602-9101 Annunciator, 4100-94xx series Annunciators, 4090 series of IDNet ZAMs and IAMs and any Listed device operating within the output limits of the AUX. Calculate wiring loss for actual devices used. Compatible appliances include 4904 series of free-run strobes, 4901 series non-smartsync horns, 4098 series TrueAlarm Sounder Base, 4090-9005 & 4090-9006 SRP and 4009 NAC extenders, used in reverse-polarity activation mode.

7.4 ESS Auxiliary relay wiring Guidelines

The ESS includes one on-board, programmable relay.

- All wiring must be between 18 AWG (0.8231 mm^2) and 12 AWG (3.309 mm^2).
- When power through auxiliary contacts is provided by the ESS, wiring is power-limited.
- When power through auxiliary contacts is not provided by the ESS, use an in-line fuse (208-165). If the power source is not power-limited to the requirements of UL864, wiring is to be segregated to the non-power-limited spaces of the cabinet.
- The relay circuit is not supervised.
- The relay circuit is rated to switch 2 A at 30 VAC or 30 VDC, resistive load.
- Relay contacts are Form C dry contacts. Suppression is provided to earth. Do not switch voltages greater than rating, or damage may result.

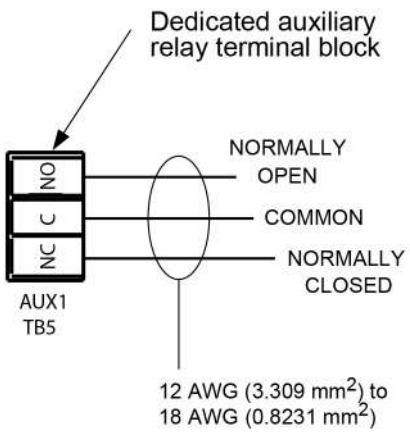


Figure 49: Auxiliary relay wiring

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8 PC software connections

The service port on the CPU allows the 4010ES panel to connect to a PC running utilities, such as diagnostics, programming, CPU firmware downloading, and channel monitoring.

8.1 Software modes

There are three basic software modes that the service port can be used to connect to:

- Service and Diagnostics Mode
- Data Transfer Interface Mode
- Master Bootloader Interface Mode

Each mode is described below.

Service and Diagnostics Mode:

This is the default functionality when a PC is connected to the FACU. On a PC, this mode provides application startup messages, an ASCII interface to a UI command set for diagnostics, and event reporting. A pre-configured terminal emulator is part of the 4010ES software and can be launched from the programmer. The connection to a PC is made through the Ethernet port. If it is not available, the serial port can be used instead.

Note: Ethernet connection is the preferred connection for service.

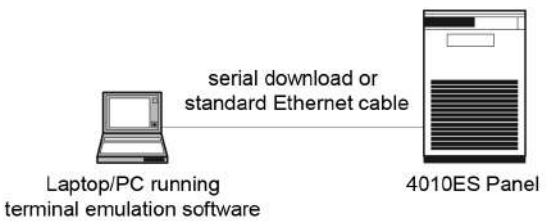


Figure 50: Service and Diagnostic interface

Data Transfer Interface Mode:

In this mode, the ES Panel Programmer is used. This allows for slave downloading and uploading a configuration or history log from the FACU. Connection to a PC is made through the Ethernet port. If it is not available, the serial port can be used instead.

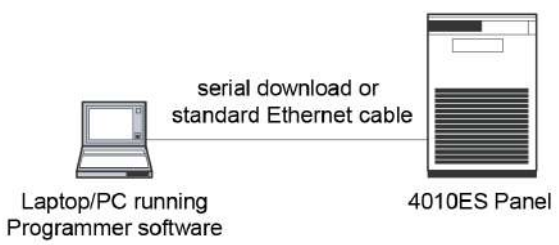


Figure 51: Data Transfer interface

Master Bootloader Interface Mode:

This interface should be used when the Master executable is not functioning. It downloads the CPU Exec firmware and the CFG.TXT file to the CPU via the serial or the Ethernet port.

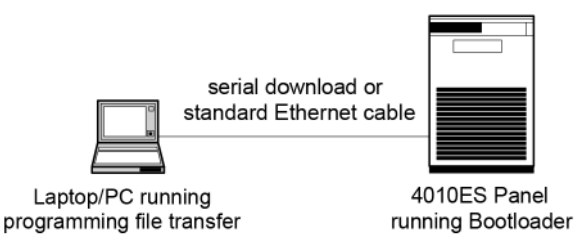


Figure 52: Bootloader interface

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8.2 Ethernet service port

The Ethernet service port J7 on the CPU card is used to connect the panel to a local PC. See below for the port location.

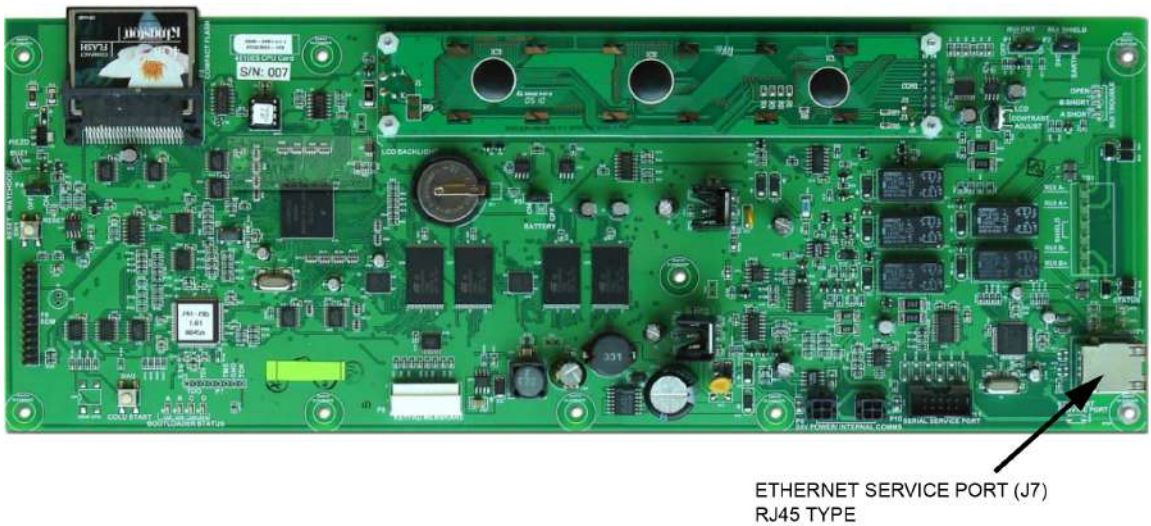


Figure 53: Ethernet service port

The Ethernet service port connects to the front panel Ethernet connection through a standard straight (non-crossover) Ethernet patch cable. The front panel Ethernet connection is located on the top left of the 4010ES front panel. The service technician should connect his PC to the CPU card through this front panel connection with a standard straight Ethernet cable. If this connection is not available, you may plug the CPU Card connector J7 directly to the PC with a standard straight Ethernet cable.

Note:

If a BNIC card or an ES Net NIC card is used with the system, the CPU card Ethernet connection connects to it. The BNIC card or an ES Net NIC card then connects to the Front Panel Ethernet Connection board.

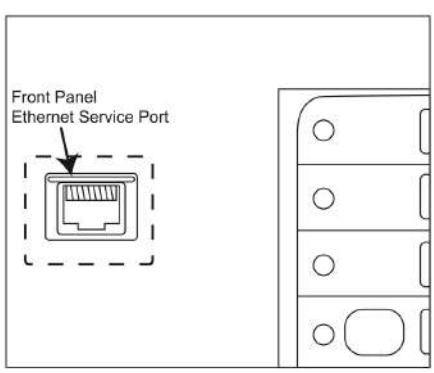


Figure 54: Front Panel Ethernet Service Port

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9 System wiring checkout and earth fault diagnostics

This chapter describes how to check system wiring and run the Earth Fault Diagnostics in the panel.

9.1 Checking system wiring

This section contains instructions on how to use a multimeter to check system wiring.

When using the multimeter to check each circuit, make sure to adhere to the notes and instructions below.

Note:

- Ensure that no power is applied to the 4010ES fire alarm panel and that all wiring is properly connected (terminal blocks, LED/switch module ribbon cables, etc.)
- Use the grounding lug with the earth ground symbol inside the control panel for all measurements to ground.
- Each circuit must test free of all grounds and extraneous (stray) voltages.
- If there are problems removing all power from the fire alarm system, there is an alternate method of testing for stray voltage. The wires may be lifted from the panel and terminated with appropriate resistors. Use 3.3 KOhms across conductor pairs and 50 KOhms connected from any conductor under test to ground. All conductors must read less than 1.0 VAC or VDC.

Use a multimeter as described in the steps below to check each circuit type.

1. At the control panel, locate wires from each initiating device or indicating appliance circuit.
2. Check each circuit for extraneous voltage by setting the volt/ohm meter to AC. Place the meter probes so that the black probe is on the "-" wire and the red probe is on the "+" wire. Meter readings must show less than 1.0 VAC.
3. Set the multimeter to DC and repeat step 2. The meter must read less than 1.0 VDC.
4. Check all conductors for extraneous voltage to ground. The meter must read less than 1.0 VAC and VDC.
5. Set the multimeter to OHMS and place the meter probes as described in step 2. Check the circuits using the resistance measurements in Table 34. Locate and correct any abnormal conditions at this time.

   Note: If the reading indicates an open circuit in an initiating circuit, make sure the smoke detector heads are properly mounted and seated. The circuit may be open if smoke detector power is not present, and if separately powered 4-wire devices are used.
6. Check all other system wiring to verify that each circuit is free of grounds and extraneous voltages.

9.1.1 Meter readings

Table 34 lists the correct meter readings for indicating appliances and initiating devices.

Table 34: Acceptable zone and signal circuit meter readings

Circuit type	Meter reading
Class B Initiating Device (Zone) Circuit	
From zone + to zone – (each zone)	3.3 KOhms
From zone + to ground	Infinity
From zone - to ground	Infinity
Class A Initiating Device (Zone) Circuit	
From zone + to zone – (each zone)	Infinity
From zone + to ground	Infinity
From zone - to ground	Infinity
From zone + OUT to + IN	Less than 25 Ohms
From zone - OUT to - IN	Less than 25 Ohms
Class B Notification Appliance Circuit (each signal circuit)	
From + to ground	Infinity
From - to ground	Infinity
Class A Notification Appliance Circuit (each signal circuit)	
From + to ground	Infinity
From - to ground	Infinity
From B+ to A+	Less than 15 Ohms
From B- to A-	Less than 15 Ohms
IDNET+ Loops (ZAMs and IAMs)	
From IDNET+ "+" to ground	Infinity
From IDNET+ "-" to ground	Infinity

Note: Ground refers to earth ground.

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9.2 Earth fault diagnostics

This section contains instructions on how to use the Earth Fault Search feature of the 4010ES diagnostics menus. The minimum earth fault detection level for the 4010ES is 10 KOhms for all circuits.

Earth Fault Search is a diagnostic search of external field wiring that assists in locating circuits with earth faults. An earth fault occurs when an electrical circuit is shorted to ground. Although most circuits operate with a single earth fault, multiple earth faults can disable communications. Because of this, earth faults must be located and repaired.

Earth Fault Search is conducted by the FACU. The diagnostic may be activated using either the front panel interface or the computer port protocol (CPP), via a service port.

The 4010ES supports two types of Earth Fault Searches:

- **Location Search.** Searches all circuits at a location. For the purposes of earth fault searching,
  - A location is composed of a group of slaves connected to each other via 4010ES comm (local RUI).
  - The main panel is defined as all slaves local to the Master CPU.
- **IDNet Channel Search.** Selectively enables channel isolators and repeaters to detect which segment of the channel wiring has a fault. Earth faults are detected by one of the following:
  - A single designated power supply at a location. The power supply that detects the fault is designated via a jumper setting on the power supply slave. For any given location, only one power supply should detect earth faults.
  - Each 4009 IDNet NAC Extender on an IDNet channel.

9.2.1 General guidelines

Review the guidelines below before initiating an Earth Fault Search.

- Only one power supply per location is configured to detect earth faults.
- For more reliable earth fault searching:
  - Use IDNet channel isolators to isolate channel faults to a specific segment of channel wiring.
  - Set IDNet channel isolator addresses to the lowest IDNet device addresses, increasing with communication distance from the IDNet card.
- If an earth fault is suspected on the IDNet channel with multiple isolators, start an IDNet Channel Search before doing a Location Search. If the Location Search is done first, it may not yield the correct location (this is a by-product of the extended amount of time required for the IDNet channel to initialize during a Location Search).

Note: The 4009 IDNet NAC Extender has a common ground fault trouble that reports to the panel without running the Earth Fault Search.

- Earth Fault Search detects only one fault at a time. Multiple faults require fixing the first fault and then repeating the search.
- The FACU suspends normal operation for the duration of the Earth Fault Search.
- Location Earth Fault Searches optionally allow exclusion of auxiliary power circuits from the search, so that modules connected to the 24V auxiliary outputs can remain in operation during the search.
- The option to exclude auxiliary power circuits does not apply to IDNet devices, because the entire IDNet communication channel is isolated during each search.
- During the search, all related troubles are suppressed and a single trouble pseudo-point is activated (P438).
- At the completion of the search, all slaves are restarted and normal panel operation resumes.

Important: The fire panel cannot provide fire protection during an Earth Fault Search.

9.3 Earth fault searching from the front panel

This section describes how to conduct an Earth Fault Search, from selecting the appropriate access code to correcting the fault.

9.3.1 Access level selection

The panel must be at the appropriate access level (2, 3, or 4) in order to run diagnostics. To get to the correct access level:

1. Press the **Menu** button. The following message comes up (press the Next or Previous buttons, if necessary, to display it):

   ```
   Press <NEXT> or <PREVIOUS> to scroll Change Access Level?
   ```

2. Press the **Enter** button. Now you are prompted to log in or log out.

   ```
   1=Login 2=Logout
   CURRENT ACCESS LEVEL = x
   ```

3. Press the **1** key on the numeric keypad to log in, so that the passcode prompt comes up.

   ```
   Enter a Passcode followed by <ENTER>
   ```

4. Enter the passcode and press the **Enter** button. ACCESS GRANTED displays briefly on the LCD, and then the display goes back to:

   ```
   1=Login 2=Logout
   ```


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```
CURRENT ACCESS LEVEL = y
```

You can now open the diagnostic menu as described in the next topic.

9.3.2 Starting the Earth Fault Search

To start an Earth Fault Search:

1. If necessary, press the **Menu** button to access the menus.
2. Press the **Previous** or **Next** buttons until the diagnostic functions option appears:

```
Press <NEXT> or <PREVIOUS> to scroll Diagnostic Functions?
```

3. Press the **Enter** button. Then press Next or Previous buttons until the Earth Fault Search option appears:

```
Press <NEXT> or <PREVIOUS> to scroll Earth Fault Search?
```

4. Press the **Enter** button. The following options become available when you press the Next and Previous buttons:

```
Press <NEXT> or <PREVIOUS> to scroll Location Search
Press <NEXT> or <PREVIOUS> to scroll IDNet Channel Search
Press <NEXT> or <PREVIOUS> to scroll Last Search Result
```

The search types are described below. When you have determined what kind of search to initiate, display its option (one of the three shown above) and press the Enter button. Each option is described below.

9.3.3 Search Option A: Select Location

- If you select the **Location Search** menu item, a list of cards to search becomes available. Use the **Next** and **Previous** buttons to scroll through the list.
- If you find a card that you suspect is connected to a circuit with an earth ground, press the **Enter** button when that circuit is shown.
- Before you can start the search, the Aux Power Select option comes up.

```
1=Exclude 2=Include Exclude AUXPWR circuits from search?
```

- The number you select, 1 or 2, determines whether the auxiliary power circuit on the selected board is searched for earth grounds. If you exclude the auxiliary power circuit from the search, the circuit will continue to operate normally.
- Press **1** (or just press the **Enter** button) to exclude the card's auxiliary power circuits from the search, or press **2** to remove auxiliary power circuits from normal operation and search them for earth grounds.
- Now you are prompted to start the search. When the location you want to search is shown and "Press <ENTER> to start search" displays, the search is ready to start. A sample is shown below.

```
CARD 1, SYSTEM POWER SUPPLY Press <ENTER> to start search
```

Note: The FACU suspends normal operation for the duration of the search.

- Press the **Enter** button to start the search.
- As the search progresses, watch the display for an indication of how much of the search has been completed. The search can be aborted at any time if you press the **Clear** button.

```
Earth Search In-Progress, Please Wait...
40%
```

Skip ahead to Completing the Search.

9.3.4 Search Option B: Select Location

- If you select the IDNet Channel Search menu item, a list of IDNet channels to search becomes available. Use the **Next** and **Previous** buttons to scroll through the list. When the IDNet channel you want to search is shown and "Press <ENTER> to start search" displays, the search is ready to start. A sample screen is shown below.

```
IDNET CHANNEL M12 Press <ENTER> to select for search
```

Note:

The FACU suspends normal operation for the duration of the search.

- Press the **Enter** button to start the search.
- As the search progresses, watch the display for an indication of how much of the search has been completed. The search can be aborted at any time if you press the **Clear** button.

```
Earth Search In-Progress, Please Wait...
```

Skip ahead to Completing the Search.

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9.3.5 Search Option C: Last Search Result

This option simply displays the last Earth Fault Search result. If there has been no search since the last system startup, or if the last search was aborted, the panel displays:

```
RESULT NOT AVAILABLE.
```

9.3.6 Completing the Search

When a Location or IDNet Channel Search completes, all of the following occur:

- All slaves automatically reset.
- The FACU turns off the Earth Fault Search trouble pseudo-point.
- The panel displays the specific fault information.

The panel can only return one Earth Fault Search result at a time. If another fault exists, it can only be found via diagnostics after the first fault is cleared. Faults will continue to appear, one by one, until each one has been found and corrected.

Important: Once you have been directed to an earth ground fault and corrected it, it is recommended that you restart the system (warm- or cold-start).

Continue to the next topic for a list of search results and their required actions.

9.4 Earth fault search results

There are several types of results that can display at the end of an Earth Fault Search. This section covers all types of results.

Important: Once you have been directed to an earth ground fault and corrected it, it is recommended that you restart the system (warm- or cold-start).

9.4.1 Non-point faults

A non-point fault indicates a ground that cannot be traced to an addressable point (for example, a shield).

9.4.2 Point faults

A point fault indicates a ground at a specific addressable point. Point faults can be found at any point in the system that connects to field wiring.

Some IDNet channel point fault examples are illustrated below.

Fault not cleared. The message below shows that an IDNet channel that has been isolated for fault detection still has the earth fault:

```
CARD 2, IDNET CARD (250 POINTS) M1, EARTH FAULT SEARCH FAULT CLEAR FAIL
```

Fault between channel output and first isolator. The message below shows a fault between the IDNet channel output and the first isolator on the line:

```
CARD 2, IDNET CARD (250 POINTS) M1, CHANNEL OUTPUT EARTH FAULT
```

4009 IDNet NAC Extender/TrueAlert Addressable Controller faults. The message below shows a fault detected on the 4009 IDNet NAC Extender before the repeater connected to that circuit is turned on:

```
CARD 2, IDNET CARD (250 POINTS) M1-18, 4009A NAC EARTH FAULT
```

Conversely, the following example shows a fault detected after the repeater connected to that circuit is turned on:

```
CARD 2, IDNET CARD (250 POINTS) M1-18, 4009A REPEATER EARTH FAULT
```

IDNet isolator fault. The message below shows a fault detected after the IDNet isolator was turned on:

```
CARD 2, IDNET CARD (250 POINTS) M1-3, IDNET ISOLATOR EARTH FAULT
```

9.4.3 Fault Not Found

If the message in the lower right corner of the LCD reads FAULT NOT FOUND (for a Location Earth Fault Search) or FAULT CLEAR FAIL (for an IDNet Channel Earth Fault Search), it means the search could not locate the fault, but it acknowledges that a fault exists.

There are five possible causes for this message:

- There are one or more internal wiring earth(s) in the system.
- There are system defects (hardware or software, such as a failed isolation circuit).
- An intermittent earth exists in the system (it occurs inconsistently and is therefore difficult to track via diagnostics).
- The cable to the service port may be grounded due to the remote PC's 3-prong plug. Use a non-grounded plug adapter to the remote PC to get rid of the earth ground.
- The fault is on an auxiliary output that was excluded from the search.

The problem may have to be found manually and then corrected in some of the above scenarios.

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9.4.4 No Fault

If the message in the lower right corner of the LCD reads NO FAULT, it means the IDNet channel search could not locate any earth faults on that channel.

9.4.5 Result Not Available

If the message in the lower right corner of the LCD reads RESULT NOT AVAILABLE, it means there is no result to view. This message comes up only when you have selected "Last Search Result" on the menu.

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10 Appendix A: ULC programming requirements

This appendix discusses the programming operations that must be met to comply with Canadian Underwriter's Laboratory (ULC) standards.

10.1 Common earth fault ground indicator

This application monitors a system pseudo (A112) that counts the number of ground faults that occur on the system. Each time this counter increments (i.e., a ground fault occurs), a yellow LED on the operator interface panel illuminates.

10.1.1 Step 1. Open CPU Card Properties dialog

1. Click on the **Hardware** tab and expand the Unit 0, Box 1, Bay 1 icons to display the CPU Card. (Click on the + signs to the left of the Unit 0, Box 1, and Bay 1 icons to expand them.)

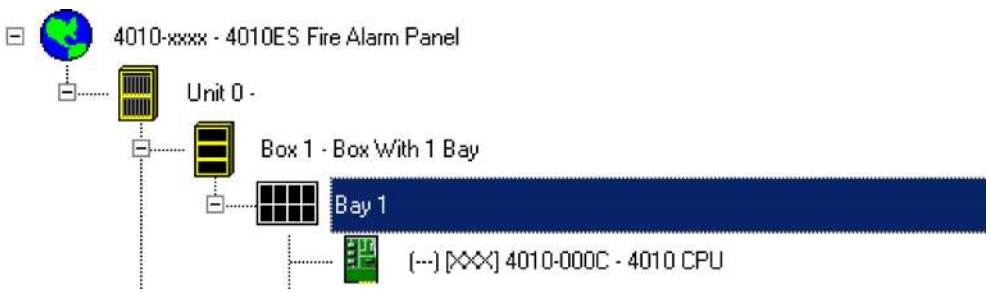


Figure 55: Selecting the CPU Card

2. Right-click on the CPU card icon (it is highlighted in the example above) and select **Properties**. When the CPU card properties dialog appears, click on the **Display** tab as shown in the example below.

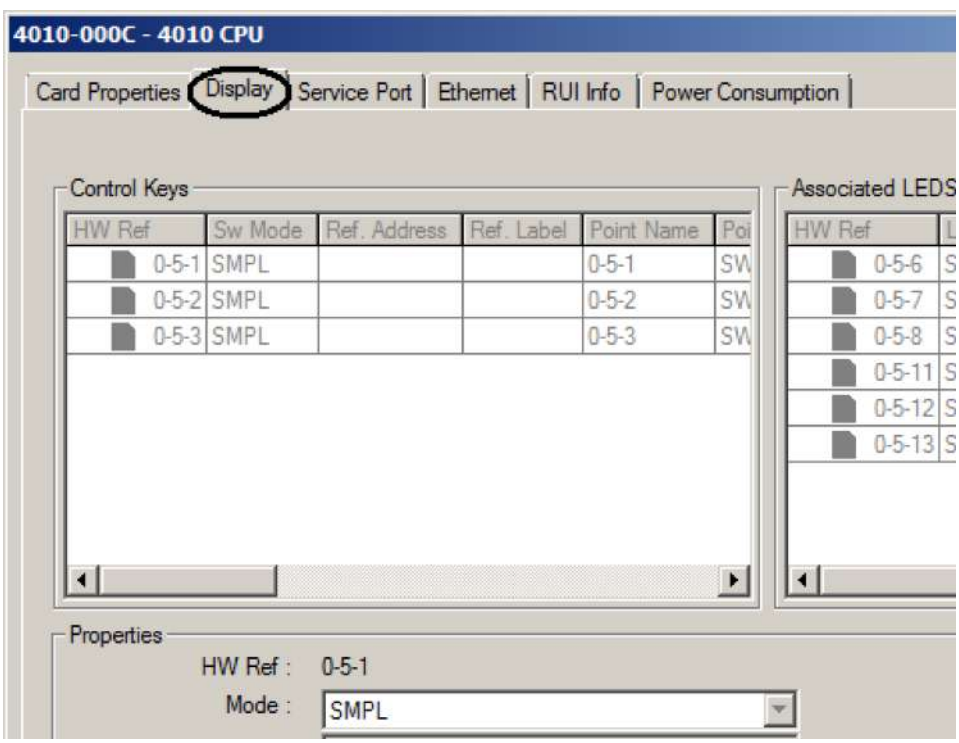


Figure 56: The Display tab: Display checkbox

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10.1.2 Step 2. Program the LED

1. Select one of the multicolor LEDs (0-5-11, 0-5-12, or 0-5-13) to program (Figure 57).
2. Click on the **Point Type** list box and select **LEDYELLOW**.
3. Click on the Mode drop-down list box and select **ON**.
4. Enter A112 (no spaces) in the **Reference Address** field.

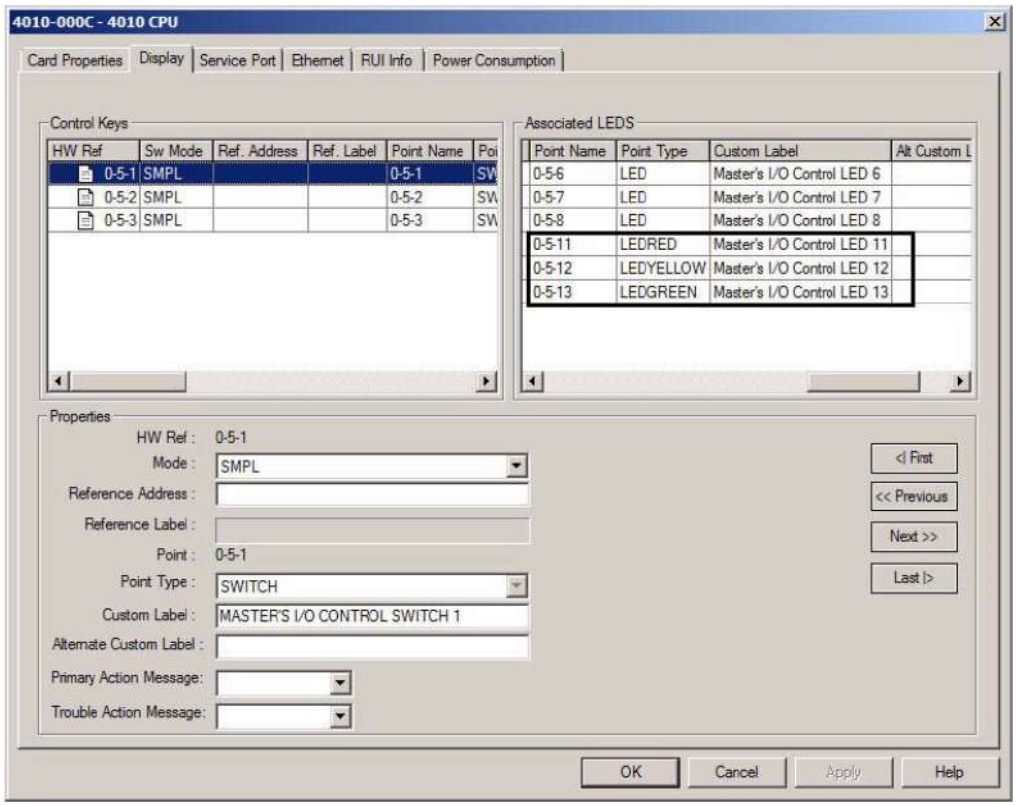


Figure 57: The Display tab: LEDs

10.2 Simultaneous alarm display

ULC requires that every fire panel be capable of indicating the presence of up to eight simultaneous alarms. The 48-LED Module supplied with some configurations of the 4010ES panels is used for that purpose. Implementing this on the 4010ES is a two-step process, as follows:

1. Create Annunciation Zone Lists. Divide the panel's initiating devices into physical areas (by floor, by department, etc.). Create a user-defined list for each zone and include all of the initiating devices for the zone in the list. See "Creating Annunciation Zone Lists" below for information on doing this.

   Note: Annunciation Zone Lists are only necessary if you are using addressable devices. If you are using hardwired monitor zones, it is not necessary to create a list.
2. Program LED modes and reference addresses. This step associates the address of the zone list with the LED and its mode.

10.2.1 Creating annunciation zone lists

To create the annunciation zone lists – which are the lists containing the initiating devices for each zone – follow these steps.

1. Click on the **List** tab in the main ES Panel Programmer window.
2. Right-click anywhere in the **TagList** dialog. A menu appears, containing a range of options. Select **Add List**. A tag list, similar to the following, appears.

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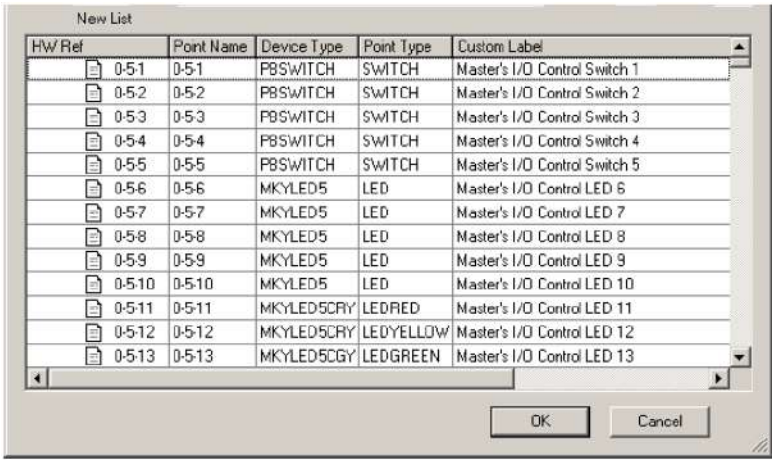


Figure 58: The TagList dialog

3. Select points for the list as follows.
   a. Non-Adjacent Points. If the points required for the zone are not adjacent to one another, select the points by holding down the CTRL key and then click the mouse cursor on each point. When all of the non-adjacent points are selected, press the space key to select the points and add them to the zone's list. A ">>" symbol appears to the left of each point to indicate that it is selected.
   b. Range of Adjacent Points. If the points required for the zone are adjacent to one another in the tag list, highlight the first point then hold down the shift key and use the Up or Down arrow key to highlight the points above or below the first point. When the full range of points is highlighted, press the space key to select the points and add them to the zone's list. A >> symbol appears to the left of each point to indicate that it is selected.
4. Click the **OK** button in the **TagList** dialog. A labeling dialog appears, allowing you to specify the name for the list.



Figure 59: The List dialog

5. Enter a text name that uniquely identifies the zone (i.e., Floor1, Zone1, etc.). Click **OK**. The list is added to the List Window. Repeat steps 1 through 5 for each annunciation zone list.

10.2.2 Programming the address and mode for each LED

This section describes associating each pair of LEDs with the correct mode and reference address.

1. Click on the **Hardware** tab. Locate the icon for the 48 Pluggable LED Module (Door Mount). Right-click the mouse and select Properties. When the properties dialog for the card appears, click on the **Point Editing** tab. A window similar to the following appears.

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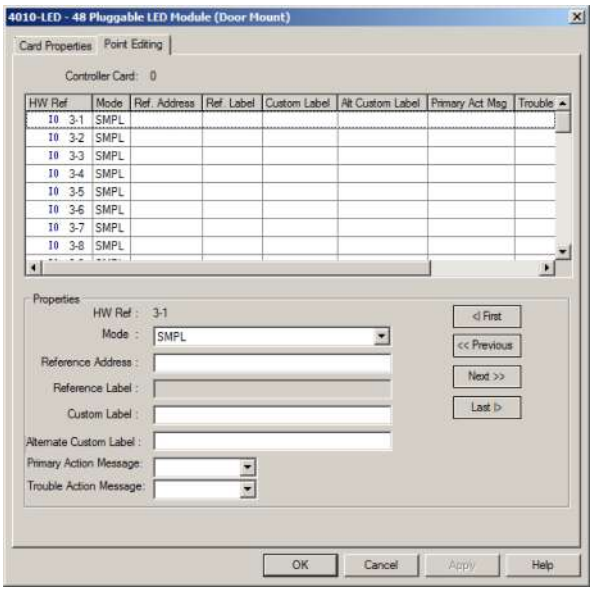


Figure 60: The Point Editing tab

2. Do the following for each zone.
   a. Click on the line for a red LED.
   b. Click on the **Mode** list box and select the **FIRE** mode.
   c. Click on the **Reference Address** field and enter the identifier for one of the zone's list
   d. Click on the line for the yellow LED that is paired with the red LED you selected in Step 2a.
   e. Click on the **Mode** list box and select the **TROUBLE** mode.
   f. Click on the **Reference Address** field and enter the identifier for the same list specified in Step 2c.

The effect of this programming is that if any of the points within the zone's list enters an alarm state, the red LED illuminates. Likewise, if any of the points within the zone's list enters a trouble state, the yellow LED illuminates.

10.3 Setting alarm verification timer to Canadian operation

When you select Canadian operation for the alarm verification feature, the system operates as follows:

- If a point specified within one of the alarm verification lists enters an alarm state, the system delays the annunciation of the alarm for 15 seconds. If a second initiating device or a pull station goes into the alarm state during this verification process, the panel immediately announces the alarm.
- When the 15-second timer expires, the system attempts to reset the initiating device for five seconds.
- After the five-second timer expires, the system evaluates the state of the initiating device for 10 additional seconds. After 10 seconds, if the device is still in alarm, the system immediately annunciates the alarm.

10.3.1 Procedure

1. Click on the **List** tab to display the List window.
2. At the bottom of the List window, select the **Alarm Verification** tab.
3. Right-click on one of the lists and select **Properties**. The Alarm Verification Properties dialog shown below appears.
4. Click on the **Alarm Verification** tab.
5. Click on the drop-down list box and select Canadian (ULC).

Setting this property for one alarm verification list sets it for all lists.

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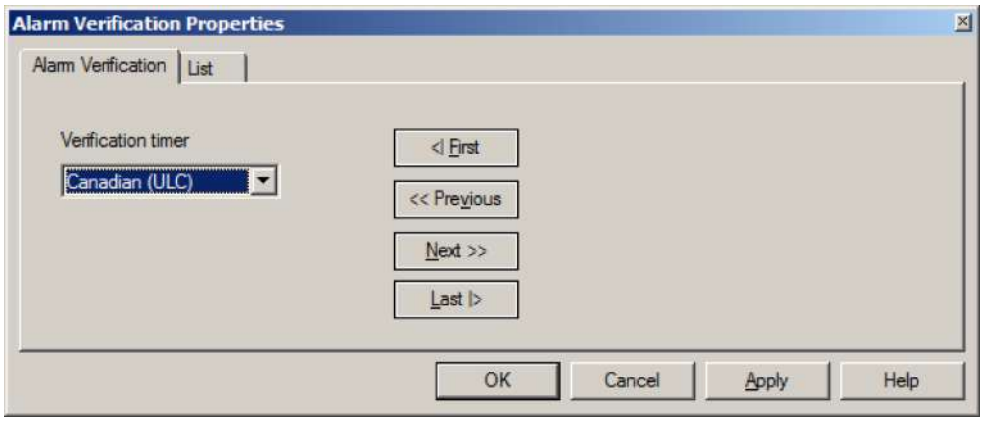


Figure 61: Alarm verification properties: Alarm Verification tab

10.4 Setting Alarm Reset/Inhibit Timer

The Alarm Reset/Inhibit Timer system option disables the Alarm Silence and System Reset keys for a user-definable duration that ranges from 1 to 60 minutes. The timer is activated only by the first alarm (i.e., subsequent alarms do not reset the timer).

Note:

The default setting is not enabled. This option can be enabled for Canadian jobs

10.4.1 Enabling Alarm Reset/Inhibit Timer

To enable the Alarm Reset/Inhibit Timer, do the following:

1. Click on the **Panel** tab at the top of the programmer.
2. Click on the **System Options** tab at the bottom of the programmer. A screen similar to the one shown below appears.
3. Click on the check-box to the right of Alarm Silence/Reset Inhibit. Specify the timer value in the **Seconds** box to the right of the check-box.

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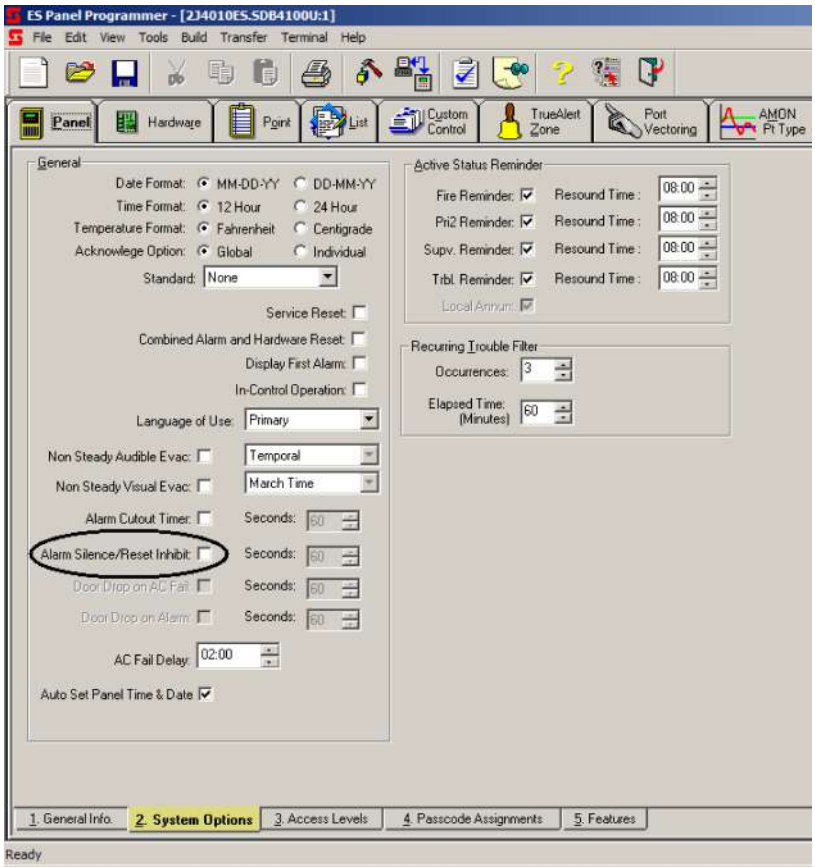


Figure 62: The Panel: System Options tab

10.5 Alarm Cutout Timer

The **Alarm Cutout Timer** allows you to set a duration (up to 10 minutes) that specifies how long signals sound following an alarm. For example, with this option set at two minutes, building signals sound for two minutes and then automatically stop. After the signals stop, the alarm condition remains active at the panel.

Note: The default setting is not enabled. This option must be enabled for Canadian jobs.

10.5.1 Enabling Alarm Cutout Timer

To enable the **Alarm Cutout Timer**, do the following:

1. Click on the **Panel** tab at the top of the programmer.
2. Click on the **System Options** tab at the bottom of the programmer. A screen similar to the one shown below appears.
3. Click on the check-box to the right of **Alarm Cutout Timer**. Specify the timer value in the **Seconds** box to the right of the check-box.

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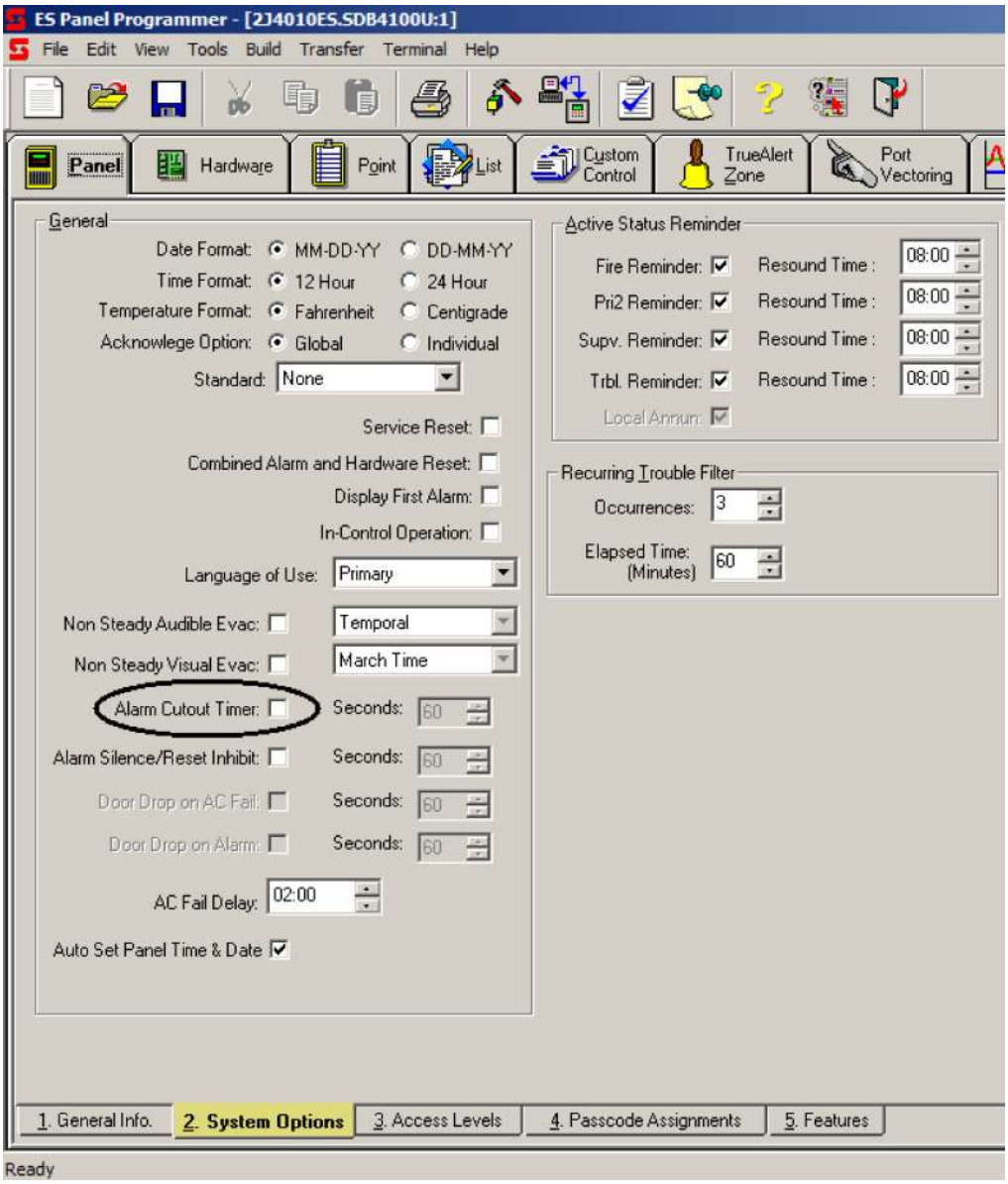


Figure 63: System Options: Setting the Alarm Cutout Timer

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11 Appendix B: UL Programming Requirements

This appendix identifies key UL programming requirements for the 4010ES FACU.

11.1 Setting Alarm Verification to US operation

When you select United States operation for the alarm verification feature, the system operates as follows:

- If a point specified within one of the alarm verification lists enters an alarm state, the system delays the annunciation of the alarm for 30 seconds. If a second initiating device or a pull station goes into the alarm state during this verification process, the panel immediately announces the alarm.
- When the 30 second timer expires, the system attempts to reset the initiating device for five seconds.
- After the five second reset timer expires, the system evaluates the state of the initiating device for up to 120 additional seconds. If the device re-alarms during this time, the system immediately annunciates the alarm.

11.1.1 Procedure

1. Click on the **List** tab to display the List window.
2. At the bottom of the List window, select the **Alarm Verification** tab.
3. Right-click on one of the lists and select **Properties**. The **Alarm Verification Properties** dialog shown below appears.
4. Click on the **Alarm Verification** tab.
5. Click on the drop down list box and select **United States**.

Setting this property for one alarm verification list sets it for all lists.

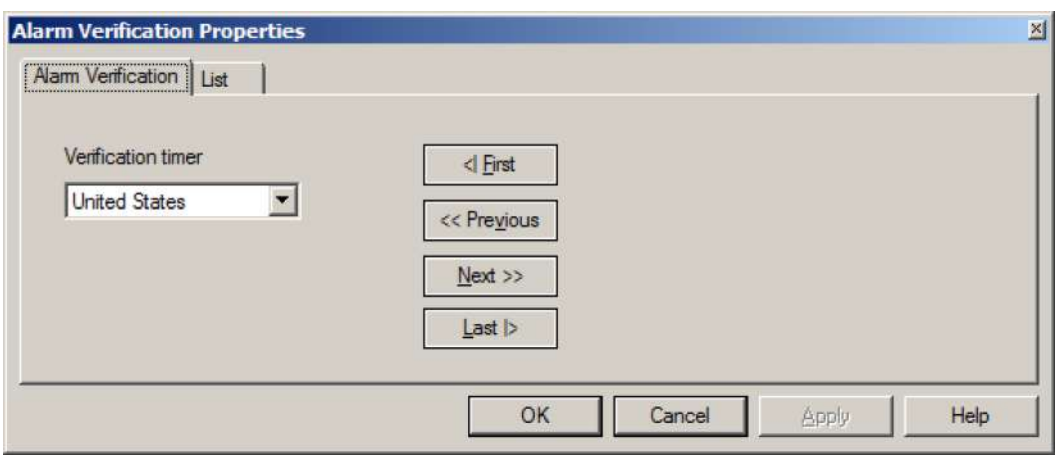


Figure 64: Alarm Verification Properties: Alarm Verification tab

11.2 Alarm Cutout Timer

The **Alarm Cutout Timer** allows you to set a duration (up to 10 minutes) that specifies how long signals sound following an alarm. For example, with this option set at two minutes, building signals sound for two minutes and then automatically stop. After the signals stop, the alarm condition remains active at the panel.

Note: The default setting is not enabled. This option can be enabled for Canadian jobs.

Notice to users, installers, authorities having jurisdiction, and other involved parties

This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, certain programming features or options must be limited to specific values or not used at all as indicated below.

- Program feature or option: Alarm Cutout Timer
  - Permitted in UL 864? (Y/N): Y
  - Possible settings: 60 to 3600 sec
  - Settings permitted in UL 864: not less than 180 sec

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11.2.1 Enabling Alarm Cutout Timer

To enable the **Alarm Cutout Timer**, do the following:

1. Click on the **Panel** tab at the top of the programmer.
2. Click on the **System Options** tab at the bottom of the programmer. A screen similar to the one shown below appears.
3. Click on the check-box to the right of **Alarm Cutout Timer**. Specify the timer value in the **Seconds** box to the right of the check-box.

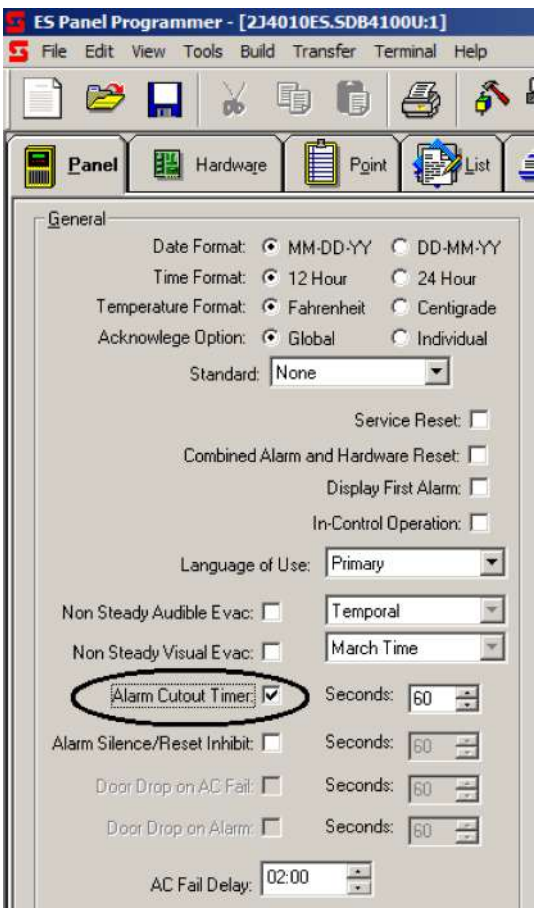


Figure 65: System Options: Setting the Alarm Cutout Timer

11.3 Non-Steady Visual Evacuation system option

When enabled, this option allows you to select the flash pattern output by Non-Steady Visual Signals. The term Non-Steady Visual Signal refers to any visual notification appliance capable of emitting a pattern of flashes (such as incandescent visuals).

The default setting for this option is not enabled.

When you enable this option, use the drop-down list box to the right of the option to set the flash pattern as follows:

- **March Time**. A coded signal that uses 120 beats per minute. Each beat consists of 1/4 second pulse on, 1/4 second off.
- **Slow March Time**. A coded signal that uses 60 beats per minute. Each beat consists of 1/2 second pulse on, 1/2 second off.
- **Temporal**. A five-pulse coding pattern consisting of five 1/2 second pulses, each separated by a 1/2 second silence. Each five-pulse group is separated by 1 1/2 seconds of silence.

Note: This option cannot be used for public mode signaling as defined in Section 4-4 of NFPA 72-99.

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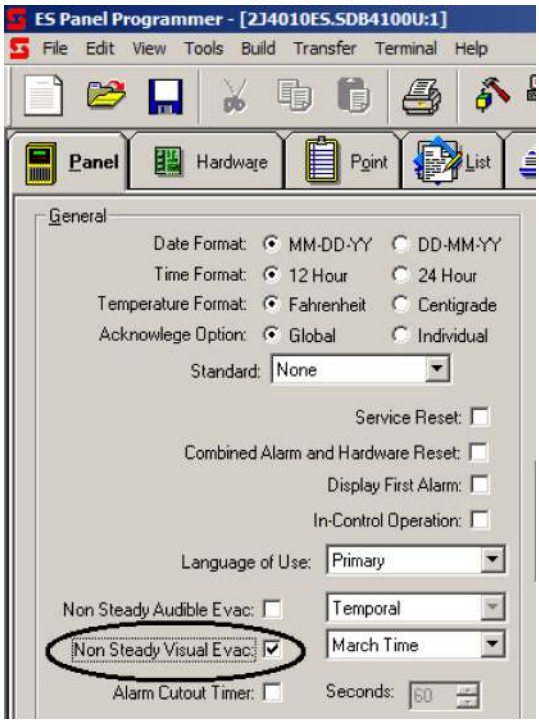


Figure 66: System Options: Setting Non-Steady Visual Evacuation

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12 Appendix C: Simplex special application appliances and accessories

The following table lists Simplex special application, NAC-compatible, notification appliances and accessories.

Table 35: Miscellaneous

P/N	Description
4090-9005	Suppression Release Peripheral (SRP)
4090-9006	Suppression Release Peripheral (SRP) w/ENCLOSURE

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13 Appendix D: IDNAC compatible appliances

The following IDNAC appliances are compatible with this FACU. Any device PID listed below also represents the same PID with a [-BA] suffix; that suffix only signifies the place of manufacture.

Table 36: Audible Only Horn notification appliances

TrueAlert ES appliances		TrueAlert appliances
Model numbers		**Model numbers**
49AO-WRF	49AO-WRQ	
49AO-WRF-BA	49MT-WRF *	
49AO-WRS-BA	49MT-WRF-BA *	
49AO-WWF	49MT-WRS-BA *	
49AO-WWF-BA	49MT-WWS-BA *	4901-9850
49AO-WWS-BA	49MT-WWF-BA *	4901-9853
49AO-WRS	49MT-APPLW *	
49AO-APPLW	49MT-APPLW-BA *	
49AO-APPLW-BA	49CHO-APPLW	
49AO-APPLC	49CHO-APPLW-BA	
49AO-APPLC-BA	49AO-APPLC-O	

Table 37: Audible/Visible notification appliances

TrueAlert ES appliances		TrueAlert appliances
Model numbers		**Model numbers**
	49AV-APPLW	
	49AV-APPLW-BA	
49AV-WRF	49MTV-WRF **	
49AV-WWF	49MTV-WRF-BA **	
49AV-WRF-BA	49MTV-WRS-BA **	
49AV-WRQ-BA	49MTV-WWF **	
49AV-WRS-BA	49MTV-WWF-BA **	
49AV-WWF-BA	49MTV-WWS-BA **	4906-9227
49AV-WWS-BA	49MTV-APPLW **	4906-9228
49AV-WRS	49MTV-APPLW-BA **	4906-9229
49AV-WRQ	49AV-APPLC	4906-9230
49CHV-APPLW	49AV-APPLC-BA	
49CHV-APPLW-BA	49AVH-APPLC	
49AVH-APPLCR	49AVH-APPLC-BA	
49AVH-APPLCR-BA	49AVH-APPLCA	
49AVH-APPLCG	49AVH-APPLCA-BA	
49AVH-APPLCG-BA	49AVH-APPLCB	
	49AVH-APPLCB-BA	

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Table 38: Visible Only notification appliances

TrueAlert ES appliances		TrueAlert appliances
Model numbers		**Model numbers**
	49VO-WWA-A-BA	
	49VO-WWS-A-BA	
49VO-WRF	49VO-WRS	
49VO-WWF	49VO-WWS	
49VO-WRA-A	49VO-WWA	
49VO-WWA-A	49VO-WWQ	
49VO-WRA-BA	49VO-WRA	
49VO-WRF-BA	49VO-WRQ	4906-9201
49VO-WRQ-BA	49VO-APPLWE	4906-9202
49VO-WRS-BA	49VO-APPLWE-BA	4906-9203
49VO-WWA-BA	49VO-APPLW	4906-9204
49VO-WWF-BA	49VO-APPLW-BA	4906-9207
49VO-WWS-BA	49VO-APPLC	4906-9208
49VO-WRA-A-BA	49VO-APPLC-BA	4906-9211
49VOH-APPLCR	49VOH-APPLC	
49VOH-APPLCR-BA	49VOH-APPLC-BA	
49VOH-APPLCG	49VOH-APPLCA	
49VOH-APPLCG-BA	49VOH-APPLCA-BA	
	49VOH-APPLCB	
	49VOH-APPLCB-BA	

Table 39: Weatherproof notification appliances and accessories

Addressable appliance description	TrueAlert ES appliances		TrueAlert appliances
	Model numbers		**Model numbers**
Audible/Visible Weatherproof notification appliances	49AV-WRFO 49AV-WRFO-BA 49AV-WWFO-BA	49AV-APPLW-CO 49AV-WRQO-C 49AV-WRFO-C 49AV-APPLW-O 49AV-APPLW-O-BA 49AVH-APPLC-O 49AVH-APPLC-CO	-
Visible Only Weatherproof notification appliances	49VO-WRFO 49VO-WRFO-BA 49VO-WRSO-BA 49VO-WWFO-BA 49VO-APPLW-CO	49VO-WRFO-C 49VO-WRQO-C 49VO-WRSO 49VO-APPLW-O 49VO-APPLW-O-BA 49VOH-APPLC-O 49VOH-APPLC-CO	-
TrueAlert Adapter	-		4905-9816
TrueAlert Isolator+			4905-9929

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Table 40: Compatible LED addressable appliances

Addressable appliance description	TrueAlert ES appliances		TrueAlert appliances
	Model numbers		Model numbers
LED Visible Only Wall Mount	59VO-WRF 59VO-WRF-BA 59VO-WWF 59VO-WWF-BA 59VO-WRFAB	59VO-WRFAB-BA 59VO-WWFAB 59VO-WWFAB-BA 59VO-APPLWR 59VO-APPLWW	
LED Visible Only High Candela Wall Mount	59VO-WRFH-BA 59VO-WWFH-BA 59VO-WRFABH-BA	59VO-WWFABH-BA 59VO-APPLWRH 59VO-APPLWWH	
LED Visible Only Wall Mount Weatherproof	59VO-WRFO 59VO-WRFO-BA 59VO-WWFO-BA 59VO-WRFABO	59VO--WRFABO-BA 59VO-WWFABO-BA 59VO-APPLWR-O 59VO-APPLWW-O	
LED Visible Only High Candela Wall Mount Weatherproof	59VO-APPLWRH-O 59VO-APPLWWH-O		
LED Audible/Visible Wall Mount	59AV-WRF 59AV-WRF-BA 59AV-WWF 59AV-WWF-BA 59AV-WRFAB	59AV-WRFAB-BA 59AV-WWFAB 59AV-WWFAB-BA 59AV-APPLWR 59AV-APPLWW	
LED Audible/Visible Wall Mount High Candela	59AV-WRFH 59AV-WRFH-BA 59AV-WWFH-BA 59AV-WRFABH	59AV-WRFABH-BA 59AV-WWFABH-BA 59AV-APPLWRH 59AV-APPLWWH	
LED Audible/Visible Wall Mount Weatherproof	59AV-WRFO 59AV-WRFO-BA 59AV-WWFO-BA 59AV-WRFABO	59AV-WRFABO-BA 59AV-WWFABO-BA 59AV-APPLWR-O 59AV-APPLWW-O	
LED Audible/Visible Wall Mount High Candela Weatherproof	59AV-APPLWRH-O 59AV-APPLWWH-O		
Audible Only Wall Mount	59AO-WRS 59AO-WRS-BA 59AO-WWS	59AO-WWS-BA 59AO-APPLWR 59AO-APPLWW	
Audible Only Wall Mount Weatherproof	59AO-WRSO 59AO-WRSO-BA 59AO-WWSO-BA	59AO-APPLWR-O 59AO-APPLWW-O	

Table 41: Compatible audible addressable appliances

Addressable appliance description	TrueAlert ES appliances		TrueAlert appliances
	Model numbers		Model numbers
Audible Only Wall Mount	59AO-WRS 59AO-WRS-BA 59AO-WWS	59AO-WWS-BA 59AO-APPLWR 59AO-APPLWW	
Audible Only Wall Mount Weatherproof	59AO-WRSO 59AO-WRSO-BA 59AO-WWSO-BA	59AO-APPLWR-O 59AO-APPLWW-O	

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Table 42: Accessories and adapters

Addressable appliance description	TrueAlert ES appliances Model numbers	TrueAlert appliances Model numbers
Adapter Plate	59AP-EUROBB	
TrueAlert Adapter	-	4905-9816
TrueAlert Isolator+	-	4905-9929

* Maximum 32 49MT appliances per circuit.

** Maximum 21 49MTV appliances per circuit.

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