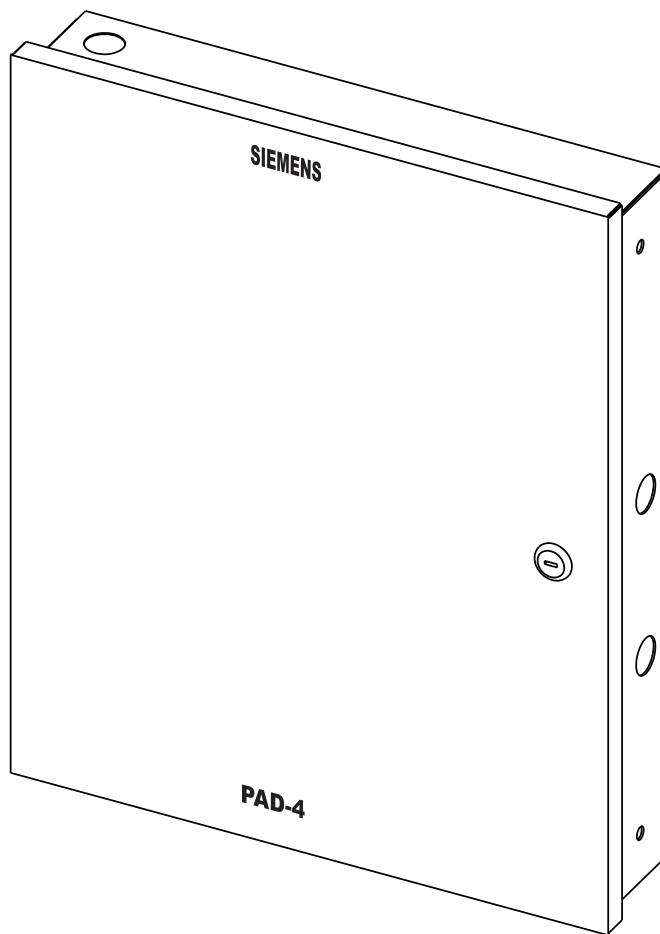


# SIEMENS

## Model PAD-4

Distributed Power Module NAC Expander

### Installation, Operation and Maintenance Manual



## **Cyber security disclaimer**

Siemens products and solutions provide security functions to ensure the secure operation of building comfort, fire safety, security management and physical security systems. The security functions on these products and solutions are important components of a comprehensive security concept.

It is, however, necessary to implement and maintain a comprehensive, state-of-the-art security concept that is customized to individual security needs. Such a security concept may result in additional site-specific preventive action to ensure that the building comfort, fire safety, security management or physical security system for your site are operated in a secure manner. These measures may include, but are not limited to, separating networks, physically protecting system components, user awareness programs, defense in depth, etc.

For additional information on building technology security and our offerings, contact your Siemens sales or project department. We strongly recommend customers to follow our security advisories, which provide information on the latest security threats, patches and other mitigation measures.

<http://www.siemens.com/cert/en/cert-security-advisories.htm>

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## **PREFACE**

Along with the use of this Owner's Manual, the appropriate following standards and the manufacturers' instructions for initiating and signaling devices should be used to install and maintain a functioning Fire Alarm Signaling System.

<b>NFPA 70</b>	National Electrical Code
<b>NFPA 72</b>	National Fire Alarm Code
<b>NFPA 101</b>	Life Safety Code
<b>C22.1 Part 1</b>	Canadian Electrical Code
<b>ULC-S524</b>	Installation of Fire Alarm Systems

Other Standards - Contact the authority having jurisdiction for other standards that may apply.

For Publications, contact:

National Fire Protection Association  
Batterymarch Park  
Quincy, MA 022691

## 1. DESCRIPTIONS

The Model PAD-4 from Siemens Industry, Inc. is a notification and auxiliary power expander that provides up to 9 amps of 24 volt DC for powering notification appliances and auxiliary devices. The PAD-4 provides its own AC power connection, battery charging circuit, and battery connections. Used with a fire alarm control unit, this enables you to connect and distribute power to many more devices than your control unit may normally allow.

### 1.1 GENERAL DESIGN FEATURES

#### Inputs

The PAD-4 has two optically isolated inputs that provide the connection from the fire alarm control unit notification appliance circuit to the PAD-4. The inputs also provide a connection for returning a trouble condition to the control unit notification appliance circuit.

The fire alarm control unit supervises its notification appliance circuit used for communicating with the PAD-4 the same way it supervises ordinary NACs. The inputs on the PAD-4 monitor the polarity of the voltage coming from the fire alarm control unit's NACs to determine when to operate the notification appliance circuit outputs. The PAD-4 emulates the trouble behavior of a NAC by opening the EOL supervision current for trouble conditions. Note that the PAD-4 will sense the polarity of the fire alarm control unit's NACs to drive the outputs whether or not the supervision connection is intact.

The following situations will open the EOL supervision at the inputs indicating a trouble condition:

- No or low AC power. For AC Fail reporting, refer to Section 5.1.4 for configuration and response times.
- No and low battery condition.
- Ground fault to the output wiring.
- Auxiliary power supply output over-current condition.
- NAC output open, shorted or over-current condition on outputs associated with its input.
- Failure of the battery charger.

#### Notes:

If input 1 controls all four outputs, a fault on any output will cause input 1 to indicate trouble. The fault does not affect input 2.

If input 1 controls outputs 1 and 2, and input 2 controls outputs 3 and 4, a fault condition on output 3 or 4 will cause input 2 to indicate trouble. The fault does not affect input 1.

Once the PAD-4's inputs and outputs are activated, the fire alarm control unit will not be able to sense trouble conditions through its notification appliance circuit connected to the PAD-4 input circuits. Use the PAD-4 trouble relay when it is necessary to monitor trouble conditions and active alarm conditions at the same time.

#### Notification Appliance Circuit Outputs

The PAD-4 has four dedicated, power-limited, NAC outputs that can be configured as two Class A (Style Z) or four Class B (Style Y) circuits. An additional two Class A (Style Z) circuits are available when the PAD-4-CLSA module is installed.

The PAD-4 provides four configuration options that will set the outputs as slaves that will follow the input. If the inputs are on constant, they may be configured as ANSI temporal code, Sync strobe/horn operation or carbon monoxide (CO) alarms.

Each of the four outputs is rated at 3 amps, though a total of 6 amps maximum (or 9 amps depending on power supply) can be drawn from the PAD-4 outputs. The yellow *Output* LEDs (DS1-DS4) flash to indicate an open, shorted or over-current condition on its associated NAC Output. The yellow *Output* LEDs are on steady to indicate activation of the associated NAC output.

Selection of which input controls which output, and which inputs are Class A (Style Z) and Class B (Style Y) is done using the 10 position DIP switch on the printed circuit board. Refer to Section 5 for DIP switch settings.

The PAD-4-CLSA module, optional for UL installations but required for ULC installations, provides an additional two Class A (Style Z) notification appliance circuits to the PAD-4. When configured for ULC operation, it also provides a Form A contact for ground fault detection signaling. One PAD-4-CLSA module can be mounted on the PAD-4. Refer to P/N 315-050254 for more information.

#### Auxiliary Power Output

The PAD-4 has a dedicated, power limited, auxiliary output that can be configured in two

different ways. The auxiliary output can either be non-resettable (always on), or configured to switch off when the AC power goes off to conserve the battery standby power. When the auxiliary power is configured to switch off, there is a 30-second delay before the auxiliary power is turned off after the AC power goes off. The auxiliary power is for supplementary purposes only if it is configured to switch off when AC is lost.

The Auxiliary Power Output is rated at 3 amps. Only a total of 6 amps maximum (or 9 amps depending on power supply) can be drawn from the PAD-4 outputs. The yellow *Aux PS* LED (DS5) will flash to indicate an over-current condition on the output. The LED will go off if the battery conservation feature is active.

### Common Trouble Relay

The PAD-4 includes a Form C trouble relay that will de-energize for the following trouble conditions:

- No or low AC power (Refer to Section 5.1.4 for delay time settings).
- No and low battery condition.
- Ground fault to the output wiring.
- Auxiliary power supply output over-current condition.
- NAC output open, shorted and over-current condition.
- Failure of the battery charger.

### AC Fail Relay

A normally energized relay will be de-energized after no or low AC power without delay. A Form A contact provides a local signaling (audible and visual) of an AC fail at the protected premises.

### Battery Charging and Supervision

The PAD-4 provides a battery charging circuit for charging sealed lead-acid batteries. The unit also supervises for no and low battery conditions.

### Battery Cutoff

In order to protect the batteries when AC fails, the battery voltage is constantly monitored, and if it drops below 20.4V, all PAD-4 power will be cut off. Power will be restored when AC is restored.

### Ground Fault Detection

The PAD-4 monitors for ground faults to the output wiring. When detected, the unit lights the yellow *GRND* LED (DS6) and de-energizes the trouble relay and the input supervision relays. In addition, in ULC configuration, the ground fault relay on the PAD-4-CLSA module is also energized. Ground fault indication is common to all output circuits and all NAC outputs are to be in the same evacuation zone.

### Environmental

All hardware is suitable for use only in an indoor, dry environment.

### Power Limiting

The AC power and battery wiring are not power limited. All other circuits leaving the control unit are power limited.

### Transient Protection

Transient protection devices are provided where needed to meet the requirements of UL864.

## 1.2 REGULATORY STANDARDS

The PAD-4 meets the requirements of industry and government regulatory agencies as noted.

### Federal Communications Commission

The PAD-4 meets the Class A requirements of the Code of Federal Regulations (CFR 47), Part 15, subpart B, for electromagnetic field emissions.

### Underwriters Laboratories

The PAD-4 control unit is listed under UL Standard 864 and UL 1481. It also complies with ULC S527.

## 1.3 GENERAL SPECIFICATIONS

Operating specifications for the PAD-4 are as follows:

### Environmental

- Operating temperature  
32 - 120°F (0 - 49°C)
- Relative humidity  
Up to 93%RH @ 86°F (30°C) non-condensing

- Installation Environment  
Indoor, dry

### **Primary Supply Using FP2011-U1 External Power Supply**

- Primary Input Voltage: 120VAC/240VAC, 50Hz/60Hz

### **Primary Supply Using FP2012-U1 External Power Supply**

- Primary Input Voltage: 120VAC/240VAC, 50Hz/60Hz

### **Secondary and Trouble Power Supply**

- 24 volt lead-acid battery set
- Maximum Charge Voltage: 29.0 VDC
- Maximum Charge Current: 1.5A
- Maximum Input Current: 15.3A
- Battery capacity: up to 18 A.H. (See Section 6.2, Battery Size Calculation, when using batteries over 7 A.H.)

### **Input Circuits**

- Two Input Circuits
- Connected to power limited source
- Supervised
- Voltage Range: 24 VDC nominal
- Maximum Input Current: 7.0mA

### **Notification Appliance Circuits**

- Operating Voltage Range: Special Application 24 VDC  
Refer to Siemens Compatible Notification Appliances (P/N 315-096363) or Faraday Compatible Notification Appliances (P/N 315-096363FA), as applicable, for maximum number per NAC
- Synchronized appliances permitted
- Maximum Alarm Current: 3.0A per circuit (6.0A, or 9.0A depending on external power supply, total for NACs and auxiliary power)
- Four Class B (Style Y) circuits or two Class A (Style Z) circuits. Two additional Class A (Style Z) circuits are available when the PAD-4-CLSA module is installed.
- Power limited
- Supervised

- Maximum Standby Current: 1.0mA
- Maximum Ripple: 100mVAC
- Maximum Line Resistance:
  - 3.0 ohms @ 3.0 amps
  - 3.7 ohms @ 2.5 amps
  - 4.7 ohms @ 2.0 amps
  - 6.3 ohms @ 1.5 amps
- Maximum Voltage Drop: 9.0V
- Ground fault impedance: 60K ohms (+), 15K ohms (-)

### **Auxiliary Power Output**

- Operating Voltage Range: 24 VDC Special Applications
- Current: 3 amps max (set to shutdown when AC power fault for battery rating up to 7.0 A.H.)
- Power limited
- Supervised for ground fault and short
- Maximum Ripple: 100mVAC
- Ground fault impedance: 2K ohms +/-  
Note: The auxiliary power is for supplementary purposes only if it is configured to switch off when AC is lost.

### **Common Trouble Relay**

- Contact Rating:  
2.0A, 30VDC maximum, resistive
- Form C Contact

### **AC Fail Relay**

- Contact Rating:  
2.0A, 30VDC maximum, resistive
- Form A Contact (Normally closed, open on fail)

### **Ground Fault Relay (on the PAD-4-CLSA module)**

- Contact Rating:  
2.0A, 30VDC maximum, resistive
- Form A Contact (Normally open, closed on fail)

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## 2. INSTALLATION

### CAUTION:

It is recommended that the printed circuit boards be removed for any procedure that may cause dust, metal shavings, grease or any such matter that may affect the circuit boards and/or parts.

There may be several sources of power into the control unit. Each source must be disconnected prior to installing or connecting or disconnecting wiring.

Each output circuit is rated at 3 amps. DO NOT OVERLOAD. Overloading a circuit will cause it to shut down (power limit).

### Minimum Configuration:

1. Enclosure, Model ENCL/DOOR PAD-4, P/N 500-050081
2. Power Supply, Model FP2011-U1, P/N 500-450222 or Model FP2012-U1, P/N S54400-Z60-A1
3. PAD-4-MB, P/N 500-650217
4. 7AH or 18AH Batteries, P/N 175-387141 or 175-387194
5. Class A expansion module - model PAD-4-CLSA, P/N 500-850254. Required for ULC installations ONLY.

### Optional Configuration:

1. Class A expansion module, Model PAD-4-CLSA, P/N 500-850254. Optional for UL installations ONLY.
2. S3 Adaptor Plate, Model S3AP, P/N 500-650257
3. Battery Bracket, Model PAD-4-BATT-BRKT, P/N S54430-B4-A1

## 2.1 MOUNTING THE ENCLOSURE

(For indoor use only in dry environments)

The fire alarm control unit must be mounted in a properly accessible location as required by applicable codes. Any auxiliary battery box or other accessory not connected through a protective device or a circuit designed for remote connection must be within the same room and connected through electrical conduit. Installation is to be done only by qualified personnel who have thoroughly read and understood these instructions.

When mounting the enclosure on interior walls, use appropriate screw anchors in plaster. When

mounting on concrete, especially when moisture is expected, first attach a piece of 3/4-inch plywood to the concrete surface. Attach the PAD-4-ENCL enclosure to the plywood.

Consult the installation instructions, P/N 315-050081, included with the enclosure for proper mounting.

## 2.2 POWER SUPPLY MOUNTING

Mount the PAD-4-ENCL enclosure to the wall before mounting the FP2011-U1 or FP2012-U1 power supply to the enclosure.

1. Make sure that the dedicated circuit breaker for the FP2011-U1 or FP2012-U1 is turned off at the mains.
2. Place the housing for the FP2011-U1 or FP2012-U1 over the four studs provided in the upper left corner of the PAD-4 enclosure.
3. Secure the FP2011-U1 or FP2012-U1 to the enclosure by slipping the lock nuts over the four studs. Tighten them securely.

See Figure 2-1 and the FP2011-U1 Installation Instructions, P/N 315-050222, for details, or Figure 2-2 and the FP2012-U1 Installation Instructions, P/N A6V10334250, for details as applicable.

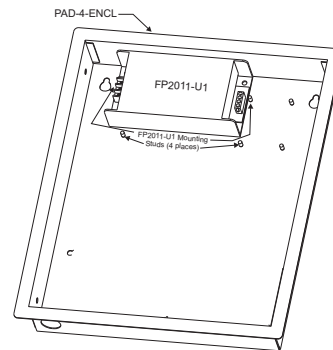


Figure 2-1  
Mounting the FP2011-U1

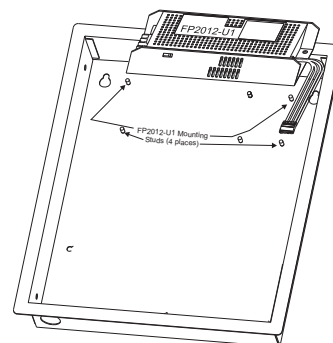


Figure 2-2  
Mounting the FP2012-U1

### 2.3 CONTROL UNIT MOUNTING

PAD-4-MB is configured out of the box for ULC operation. Remove jumper on J2 for UL installations. Leave jumper on J2 for ULC installations. Refer to Figure 2-5 for location of this jumper. To install the main board, install 4 screws loosely into the 4 bottom mounting holes for the PAD-4-MB in the enclosure. Slide the bottom of the board behind the screws, aligning the screws with the slots in the board. Install a screw in the top left and top right corners of the main board. Tighten all fasteners. All mounting hardware is included with the PAD-4 main board. See Figure 2-3 below for details.

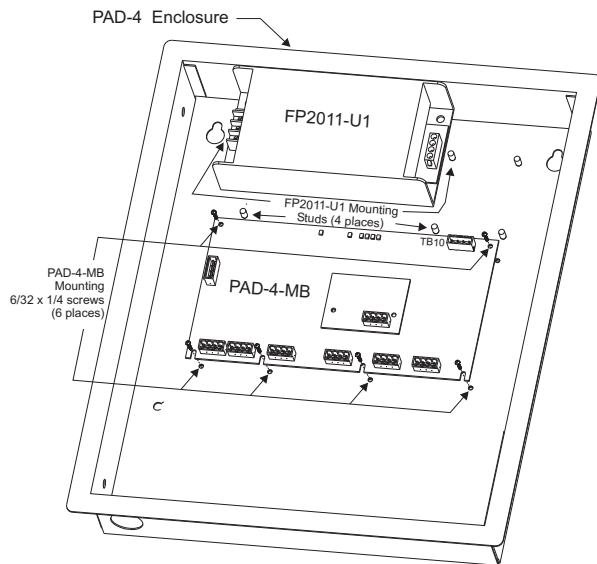


Figure 2-3  
Mounting the PAD-4-MB

### 2.4 WIRE ROUTING

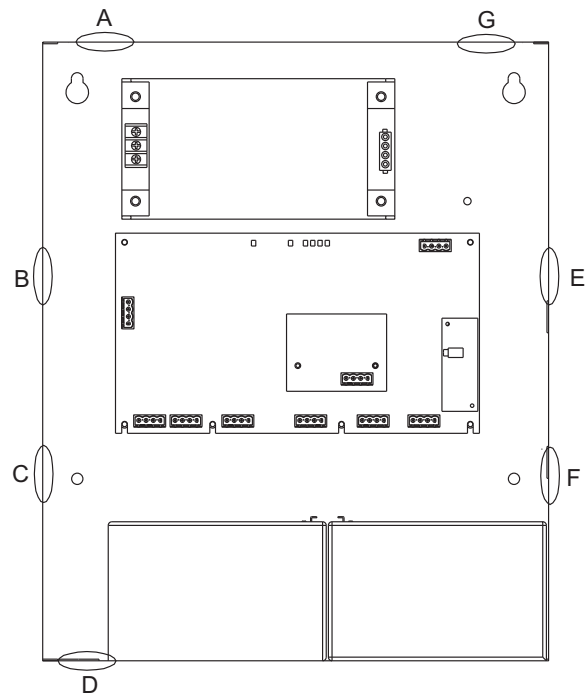
**Notes:**

All high voltage and non-power limited wiring must be kept separate from power limited wiring. A 1/4" separation must be maintained, with high voltage and non-power limited wiring running in separate conduit openings from power wiring.

To avoid induced noise (transfer of electrical energy from one wire to another), keep input wiring isolated from high current output and

power-limited wiring. Improper wiring installation may cause improper operation. Avoid pulling one multi-conductor cable for the entire system. Instead, separate high current input/output from low current.

Wiring within the cabinet should be routed around the perimeter of the cabinet. It should not cross the printed circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the switching power supply circuit.



- A. Non-power Limited - High Voltage (AC power) or B
- B. Non-power Limited - High Voltage (AC power) or A
- C. Non-power Limited - Battery wiring, if separate enclosure required) or D
- D. Non-power Limited - Battery wiring, if separate enclosure required) or C
- E. Power Limited or F or G
- F. Power Limited or E or G
- G. Power Limited or E or F

Figure 2-4  
PAD-4 Wire Routing

## 2.5 TERMINAL DESCRIPTIONS AND ELECTRICAL RATINGS

Wire in accordance with the Authority Having Jurisdiction and Article 760 of the NEC NFPA 70 latest edition and CEC.

To Connect External Wiring:

1. Loosen the screw of the terminal by turning it counterclockwise.
2. Insert the wire into the side of the terminal block.
3. Tighten the screw of the terminal block by turning it clockwise.

TABLE 2-1 PAD-4 TERMINAL DESCRIPTIONS		
Terminal	Description	Ratings
<b>TB10</b>		
BRNOUT	Brownout	
PSSI	Power Supply Signal Input	
GND	Circuit Ground	24V DC nominal, 9A max.
+24V	DC_IN	
<b>TB11</b>		
1+	Input 1 (+)	24 VDC/VFW, 7mA max.
1-	Input 1 (-)*	
1	Input 1	
2+	Input 2 (+)	
<b>TB12</b>		
2-	Input 2 (-)*	24 VDC/VFW, 7mA max.
2	Input 2	
COM	Common	2.0A @ 30 VDC, resistive
NC	Normally Closed Contact	
<b>TB13</b>		
NC	Normally Closed Contact	2.0A @ 30 VDC, resistive
COM	Common	
NO	Normally Open Contact	
	No Connection	
<b>TB14</b>		
NAC1B+	NAC 1 Output (+)	Special Application, 24 VDC, 3A max.
NAC1B-	NAC 1 Output (-)	
NAC2B+	NAC 2 Output (+)	Special Application, 24 VDC, 3A max.
NAC2B-	NAC 2 Output (-)	
<b>TB15</b>		
NAC3B+	NAC 3 Output (+)	Special Application, 24 VDC, 3A max.
NAC3B-	NAC 3 Output (-)	
NAC4B+	NAC 4 Output (+)	Special Application, 24 VDC, 3A max.
NAC4B-	NAC 4 Output (-)	
<b>TB16</b>		
AUX PWR SUPPLY+	Auxiliary Power Output (+)	24 VDC, Special Application, 3A max.
AUX PWR SUPPLY-	Auxiliary Power Output (-)	
	No Connection	
	No Connection	

AC Fail

Global Trouble

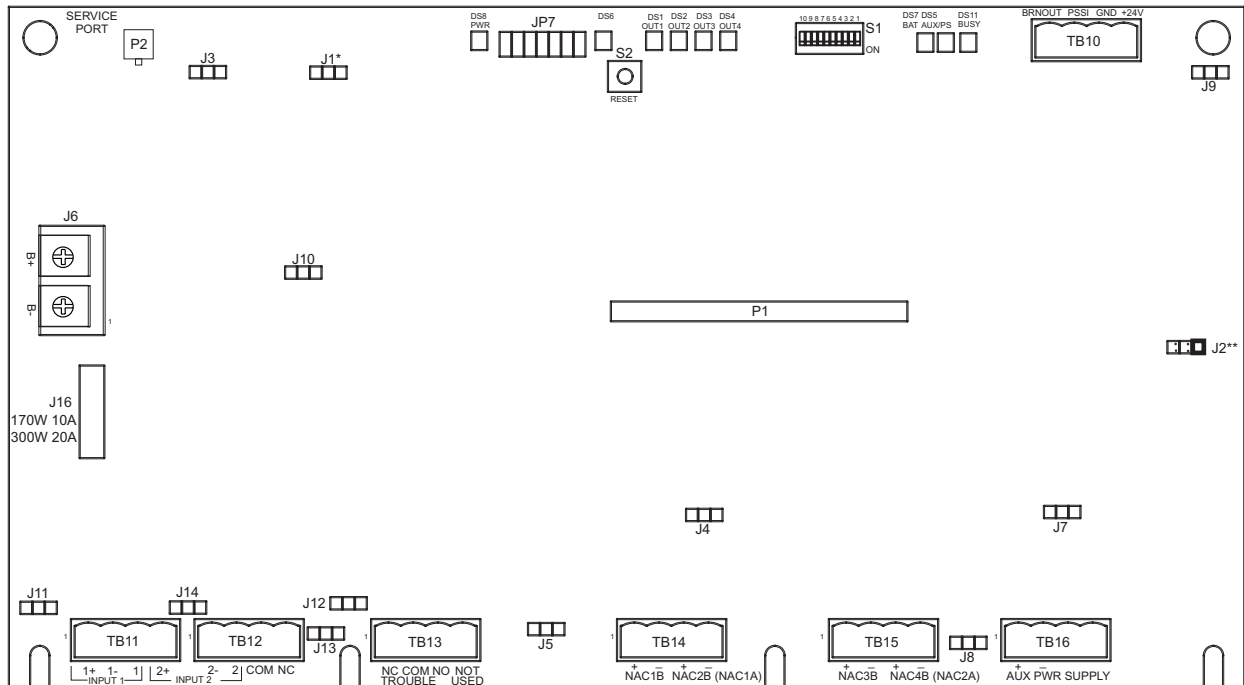
*Even though each output is rated for 3 amps, the total current draw from the 4 NAC outputs and the auxiliary power output must not exceed 6 amps for FP2011-U1 170W power supply or 9 amps for FP2012-U1 300W power supply*

\* For TB11 Input 1(-) and TB12 Input 2(-) use two conductors under one screw terminal. This screw terminal requires 16-22 AWG for multiple conductor usage.

Terminal Blocks TB10 - TB16: 22 AWG Min., 12 AWG Max.

## 2.6 WIRING THE PAD-4

**Remove all system power before installation, first battery and then AC.** (To power up, connect the AC first and then the battery.) Figure 2-5 shows the general layout of the PAD-4 main board. This section also provides specific wiring details for accessories. Consult your control unit manual for specific wiring information on the control unit being used. If you are using a Siemens control unit, see Section 3 for connections.

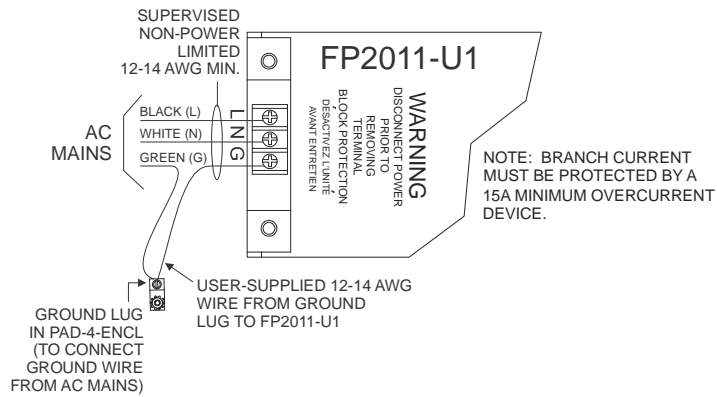


\*J1 - Set Jumper J1 to 2-3 for normal operation

\*\*J2 - Must be installed for Canadian installations. Must be removed for UL installations

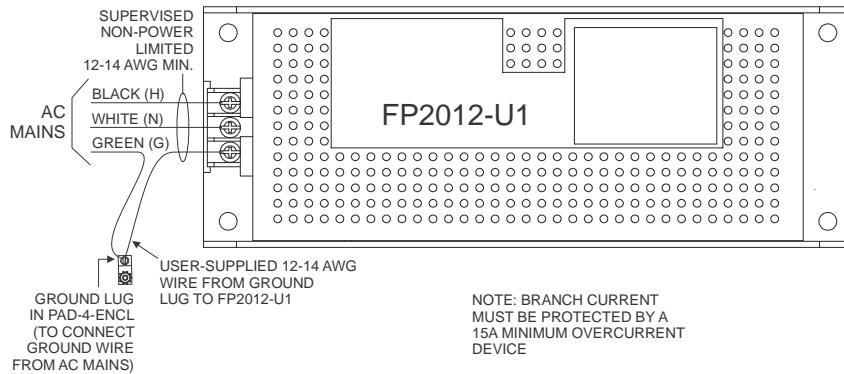
**Figure 2-5**  
**PAD-4-MB Layout**

## 2.6.1 AC Wiring



**CAUTION: INSTALL PLASTIC GUARD ON  
AC MAINS (L, N, G)**

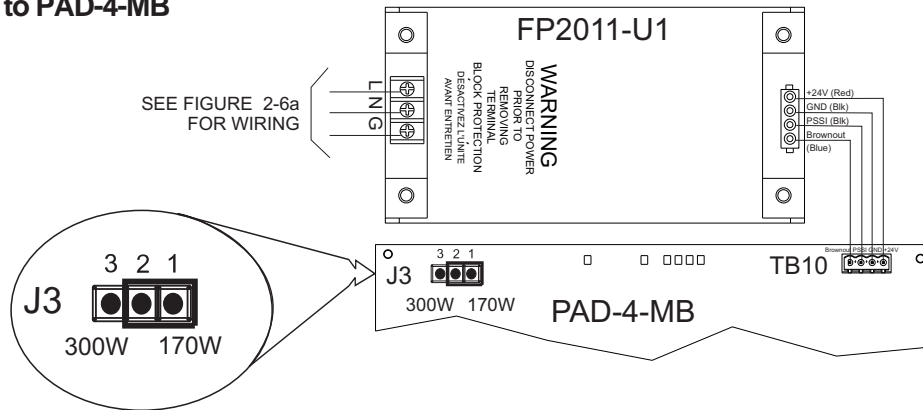
**Figure 2-6a  
AC Wiring to FP2011-U1**



**CAUTION: INSTALL PLASTIC GUARDS ON  
AC MAINS (H, N, G)**

**Figure 2-6b  
AC Wiring to FP2012-U1**

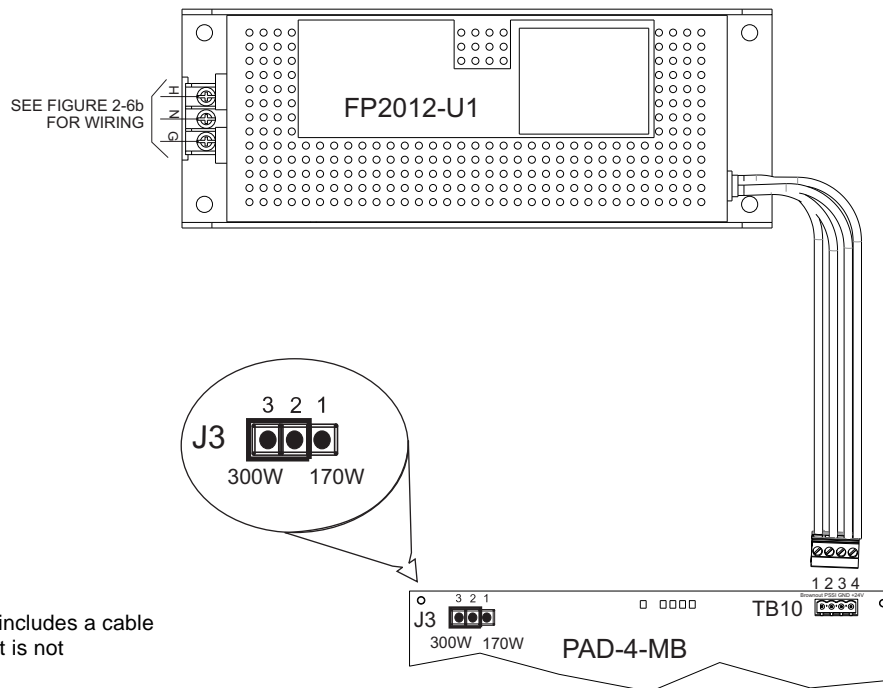
### 2.6.1.1 Wiring from FP2011-U1 and FP2012-U1 to PAD-4-MB



**NOTE:**

1. Power Supply includes a cable connection that is detachable.
2. Select 170W operation using jumper on J3.

**Figure 2-7a**  
Wiring from FP2011-U1 Power Supply to PAD-4-MB



**NOTE:**

1. Power Supply includes a cable connection that is not detachable.
2. Select 300W operation using jumper on J3.

**Figure 2-7b**  
Wiring from FP2012-U1 Power Supply to PAD-4-MB

### 2.6.2 Battery Connection

The PAD-4 requires a 24V sealed lead-acid battery set. The battery capacity can be from 7 to 18 A.H. For battery sets larger than 7 A.H., an enclosure with System 3 rails or a separate listed battery enclosure is required.

The following steps and diagram explain how to connect the Siemens BT-33, 7 A.H. battery set to the PAD-4-MB using the battery wires, P/N 600-150217, included with the PAD-4-MB.



**Make sure to connect AC power first and then the battery.**

1. Strip the insulation ¼" from the end of the red and black battery wires.
2. Connect the red battery wire to B+, the positive terminal of J6.
3. Connect the black battery wire to B-, the negative terminal of J6.
4. Attach the quick disconnect end of the red battery wire to the positive battery terminal.
5. Attach the quick disconnect end of the black battery wire to the negative battery terminal.
6. Connect jumper wire from the positive (+) side of battery #1 to the negative side of battery #2.

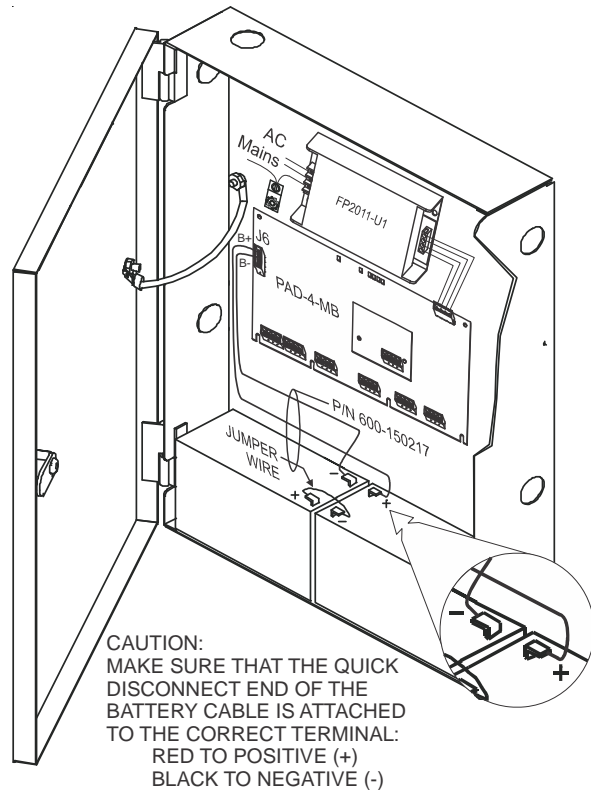


**When disconnecting the battery, remove the quick disconnects from the jumper wire, the black battery wire and the red battery wire in that order.**

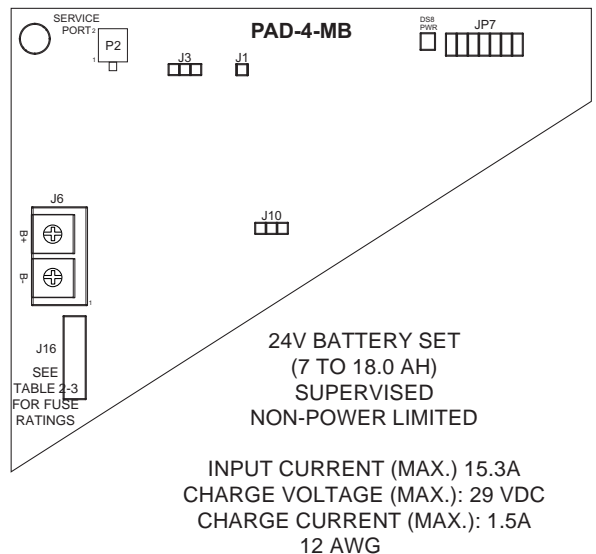
The battery set is protected by a 10/20 amp, 32VDC replaceable AUTO-FUSE.

Terminal J6	Description	Ratings
B+	Battery	24VDC nominal
B-	Circuit Ground	

Power Supply	Fuse
FP2011-U1 (170W)	10A
FP2012-U1 (300W)	20A



**Figure 2-8  
Battery Installation**



**Figure 2-9  
Battery Wiring to PAD-4-MB**

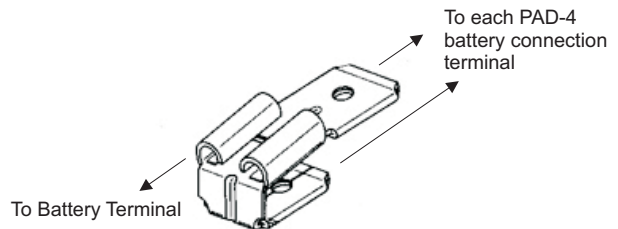
### 2.6.2.1 Multiple Module Battery Connection

For applications where multiple PAD-4 boards are mounted in an enclosure with System 3 rails, it may be possible to connect two boards to a single battery set. When using a single battery set for two boards, the following rules must be followed:

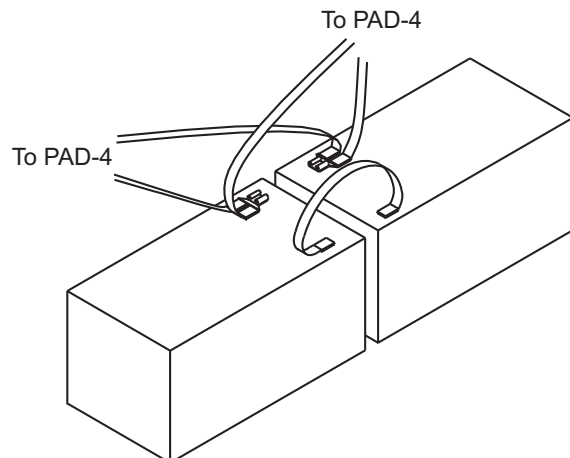
- a) Both PAD-4 boards must be located within the same enclosure and mounted adjacent to each other.
- b) The combined battery A.H. rating required for both boards does not exceed 18 A.H.
- c) Each PAD-4 and associated FP2011-U1 must be mounted on S3AP adapters. Refer to the S3AP manual, P/N 315-050257.
- d) One of the PAD-4 boards must have its charging circuit disabled.
- e) Two (2) battery connection splitters (part number 230-299203) are used on the battery set for proper connection.

The following steps and diagrams explain how to connect two PAD-4 boards to a single battery set.

1. Install a battery connection splitter (see Figure 2-10) to the positive and negative terminals on the battery set. If the battery set contains two 12-volt batteries to be wired in series, install one splitter on the positive terminal of battery #1 and the other to the negative terminal of the battery #2.
2. Connect the black wires from both PAD-4 boards to the splitter on the negative terminal of battery #2.
3. If the battery set contains two 12-volt batteries, connect the jumper wire from the remaining single positive terminal of battery #2 to the negative terminal on battery #1.
4. Connect the red wires from both PAD-4 boards to the splitter on the positive terminal of battery #1. See Figure 2-11.
5. Disable the battery charger on one of the units. See Section 5.2 for directions.



**Figure 2-10**  
**Battery Connection Splitter**



**Figure 2-11**  
**Dual Module Battery Connection**



### 2.6.3 Class B (Style Y) Input/Output NAC Wiring

Figure 2-12 shows how to wire for Class B (Style Y) input and output supervision. Use in/out wiring methods for proper supervision.

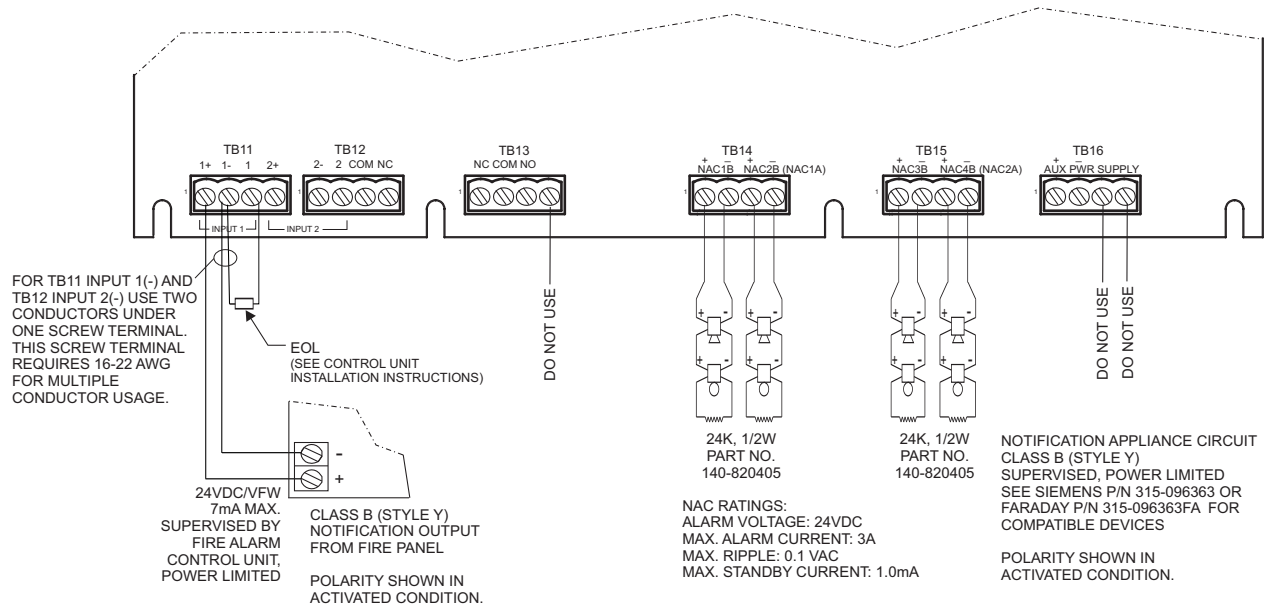
#### Class B (Style Y) Output Notification Circuits

Figure 2-12 shows four, 1.5 amp devices wired as Class B (Style Y) circuits.

Place a 24K ohm EOL resistor (provided) at the end of each loop to enable notification output supervision when using all outputs as Class B (Style Y) notification circuits. The 24K EOLs must be wired to the terminals whether or not you are using all output terminals.

#### Class B (Style Y) Supervised Input Circuits

Figure 2-12 shows Class B (Style Y) supervised wiring from a fire alarm control unit to the PAD-4 board. Use the control unit's EOL resistor installed as shown to enable notification input supervision. **Note:** MIN: 22 AWG, MAX: 12 AWG.



**Figure 2-12**  
**Class B (Style Y) Supervised Input/Output Connections**

### 2.6.4 Class A (Style Z) Input/Output NAC Wiring

Figure 2-13 shows how to wire for Class A (Style Z) input and output supervision. Use in/out wiring methods for proper supervision. **Note: MIN: 22 AWG, MAX: 12 AWG.**

#### Class A (Style Z) Output Notification Circuits

The configuration shown in Figure 2-13 shows two, 3-amp devices wired as Class A (Style Z) circuits. When you are using the outputs as Class A (Style Z) circuits, loop the wiring back to the corresponding circuit pair. For Class A (Style Z) wiring, no external EOL is necessary since it is built into the board.

#### PAD-4-CLSA Module

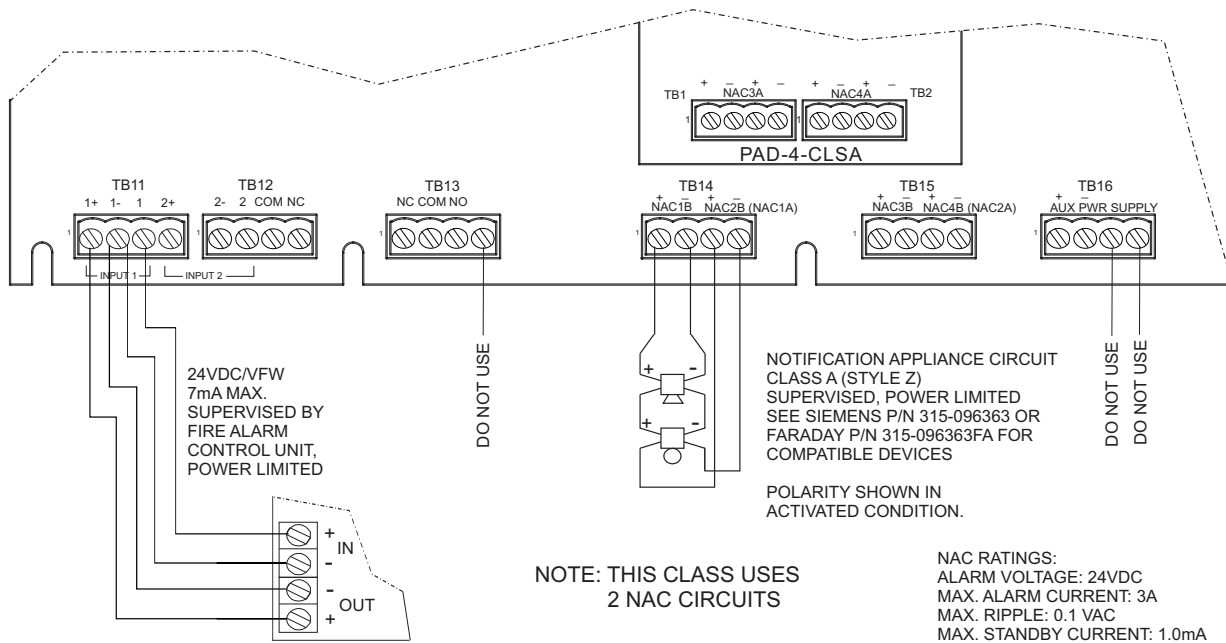
The PAD-4-CLSA module provides connectivity to two circuits wired as Class A (Style Z). Refer to the PAD-4-CLSA Installation Instructions, P/N 315-050254, for more information.

#### Class A (Style Z) Supervised Input Circuits

The configuration shown in Figure 2-13 shows Class A (Style Z) supervised wiring from a fire alarm control unit to the PAD-4 board. Pay close attention to the polarities when wiring the unit and follow these requirements:

When wiring to terminal 1-, you must use two separate wires. Do not loop a single wire or twist two conductor wires together.

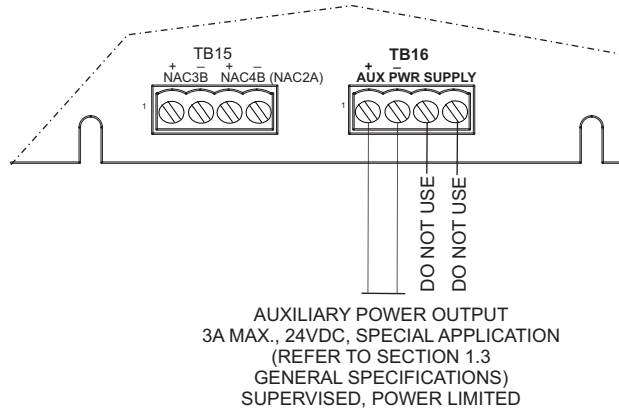
Do not use notification appliances on Class A (Style Z) circuits connected for input. The PAD-4 will detect voltage across the input circuits, but is not designed to pass the added current load from notification appliances.



**Figure 2-13**  
**Class A (Style Z) Supervised Input/Output Connections**

### 2.6.5 Auxiliary Power Supply Output

The auxiliary power supply output provides a 24VDC power source. It is supervised for ground fault and short and is power limited. This output is limited to 3.0 amps maximum.



**Figure 2-14**  
**Auxiliary Power Supply Output Connection**

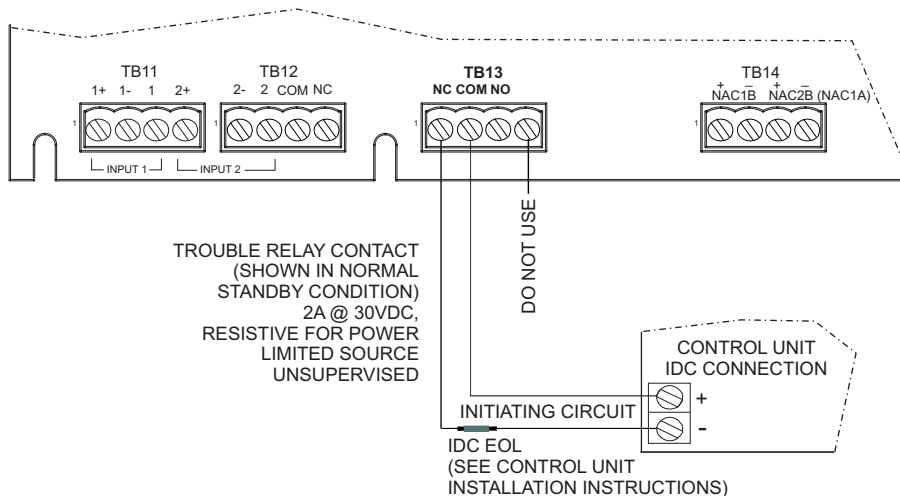
### 2.6.6 Common Trouble Relay

The PAD-4 board has a Form C trouble relay. The relay will de-energize under a trouble condition.

A typical application of the trouble relay is to connect the PAD-4 normally closed (N.C.) contacts in series with an EOL of a spare IDC or NAC or monitor input from a fire alarm control unit. This will cause a trouble on the fire alarm control unit when the PAD-4 opens its trouble contacts.

For AC Fail reporting, refer to Section 5.1.4 for configuration and response times.

Note: The N.C. contact is the relay contact that is closed when the PAD-4 has power and there are no trouble conditions.



**Figure 2-15**  
**Trouble Relay Connection Example**

### 2.6.7 AC Fail Relay

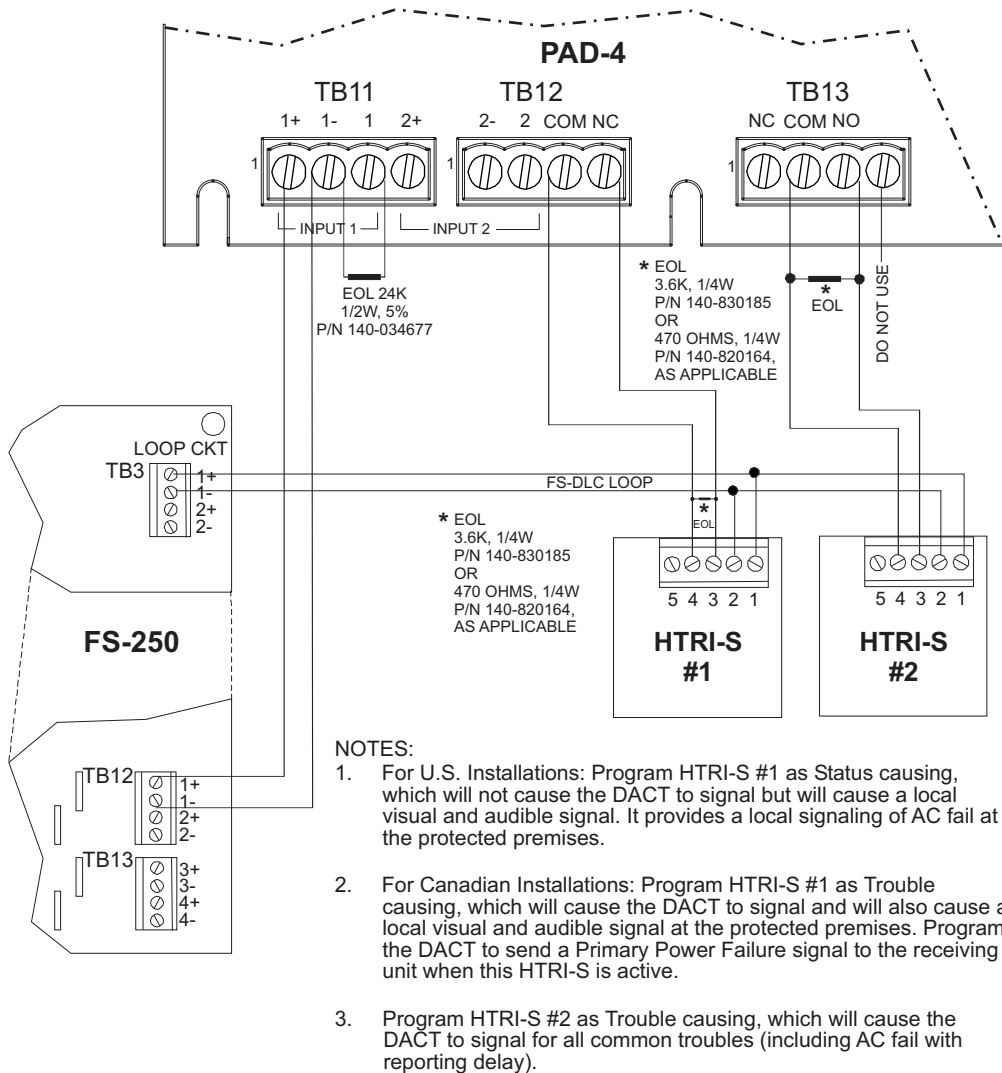
AC Fail Relay provides a normally closed (N.C.) Form A contact which will be de-energized without delay if AC is low or lost. It provides a

local signal (audible and visual) of AC fail at the protected premises. (Refer to Figure 2-16.)

### 2.6.8 Ground Fault Relay

GND FLT Relay, located on the PAD-4-CLSA module, provides a Normally Open (N.O.) Form A contact which will be energized if ground fault is detected. PAD-4-MB must be configured for

ULC operation for the contact to activate. Refer to the PAD-4-CLSA installation instructions, P/N 315-050254 for more information.



**Figure 2-16**  
**AC Fail Relay Connection Example**

## 2.7 Ground Fault Detection Enable/Disable

For some applications (when used with RSA-Series annunciators, for instance), the PAD-4 is used to provide power to an auxiliary device which gets a control signal from a fire alarm panel. The ground fault reference for the PAD-4 may be different than the reference used by the fire alarm panel, resulting in a ground fault trouble

at the panel even when none exists. To remedy this condition, the PAD-4 can have its ground fault detection circuit disabled. Once disabled, the fire alarm panel's ground fault detection circuitry will detect any ground fault in the system. See Section 5-2 for correct positioning of this jumper, and see Figure 2-5 for the location of this jumper.

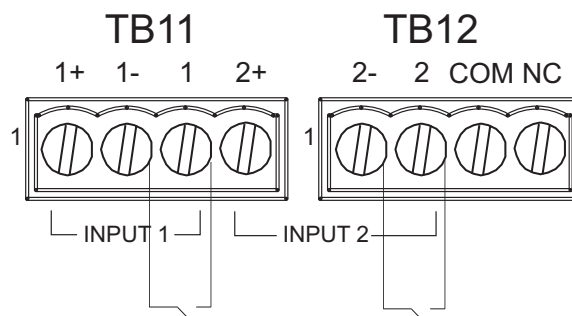
## 2.8 Input Emulation

The input circuits are normally driven by the fire alarm control unit notification appliance circuit and thus the PAD-4 will monitor the polarity of the voltage coming from the fire alarm control unit to determine when to operate the output NACs. Alternatively, the input circuits can be driven simply by a switch, such as a relay. If a switch operates the NACs, then it must be wired in a metallic conduit within 20 ft from the PAD-4 and in the same room.

Jumpers J11 and J12 configure which mode is active for input 1 and jumpers J13 and J14 configure which mode is active for input 2. If jumpers are connected to pins 1 and 2, then a

switch will activate the inputs. If jumpers are connected to pins 2 and 3, then inputs are normally driven by fire alarm control unit notification appliance circuits. See Section 5-2 for correct positioning of this jumper, and see Figure 2-5 for the location of this jumper.

If the PAD-4 is configured to monitor a switch, such as a relay, then the fire alarm control unit will not be able to receive trouble conditions through its notification appliance circuit connected to the PAD-4 input circuits. Use the PAD-4 trouble relay when it is necessary to monitor trouble conditions. Refer to Figure 3-8.

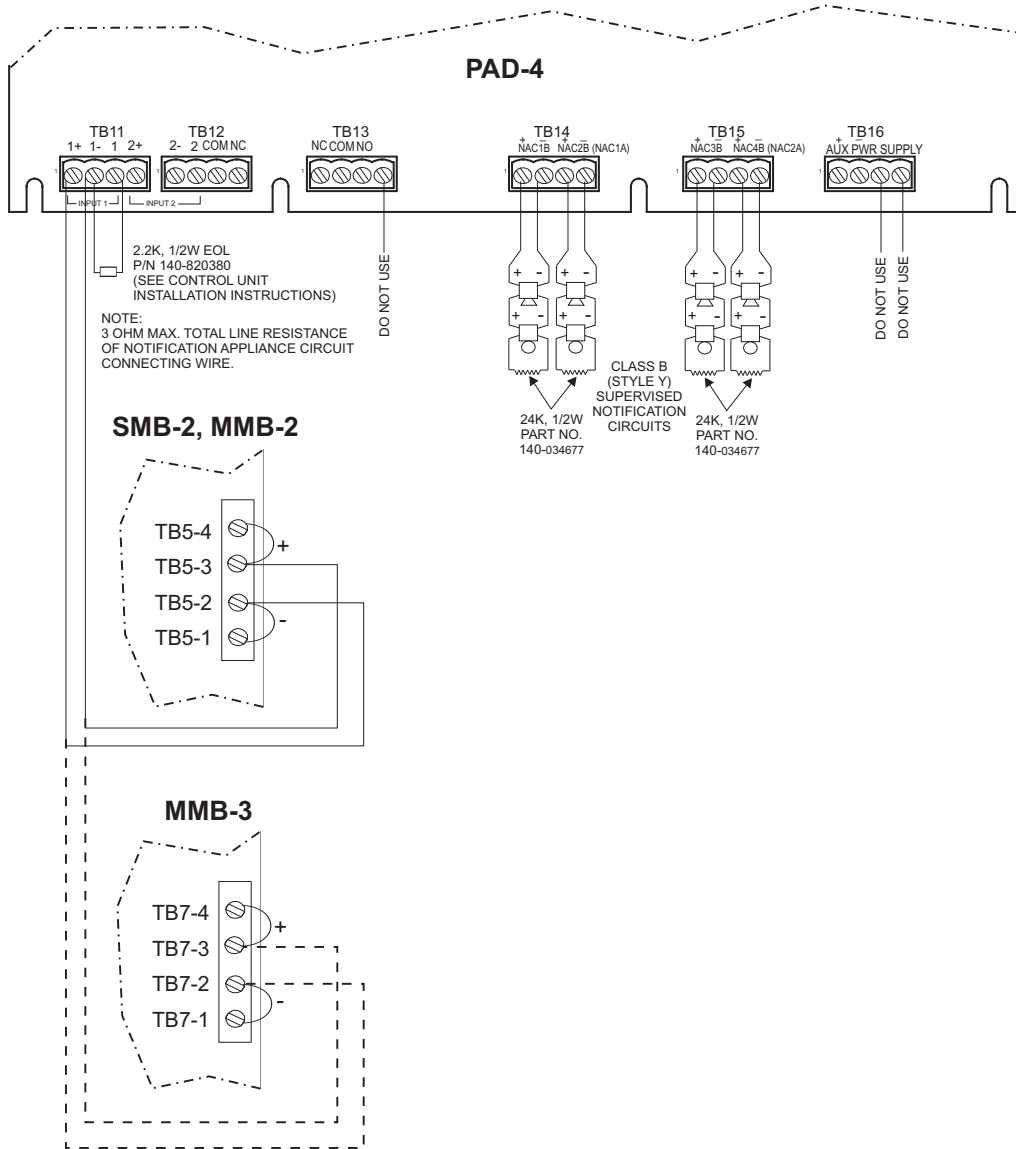


**Figure 2-17**  
Connect Switches TB11 and TB12

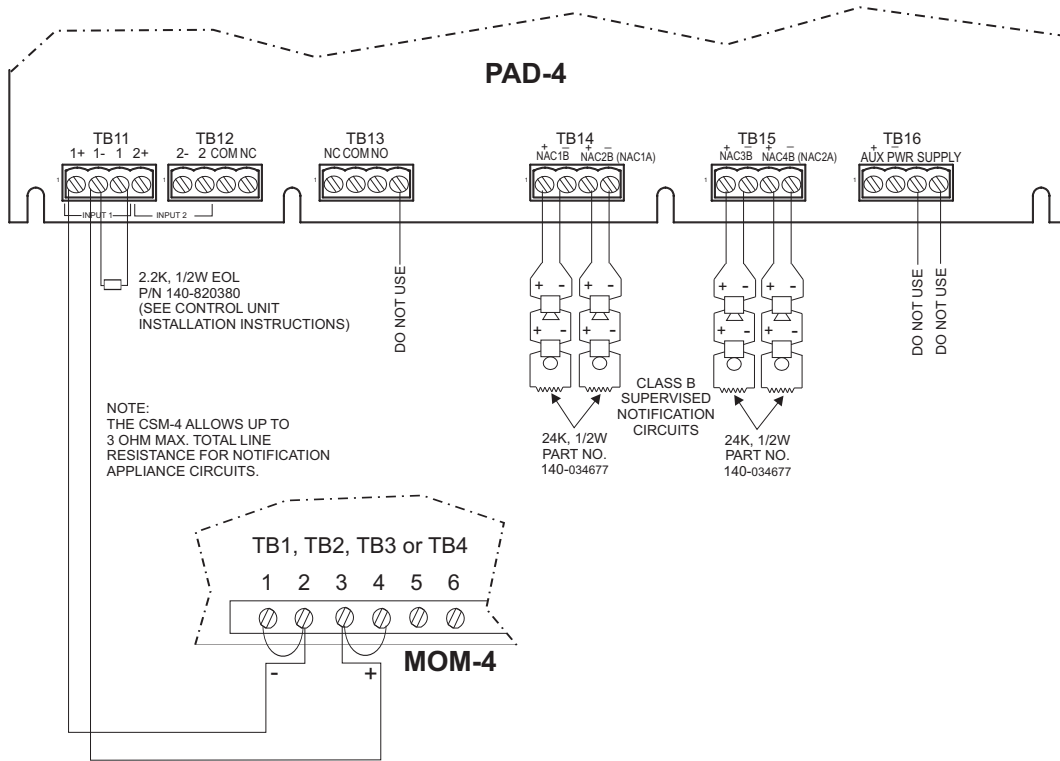
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### 3. CONNECTION TO CONTROL UNITS

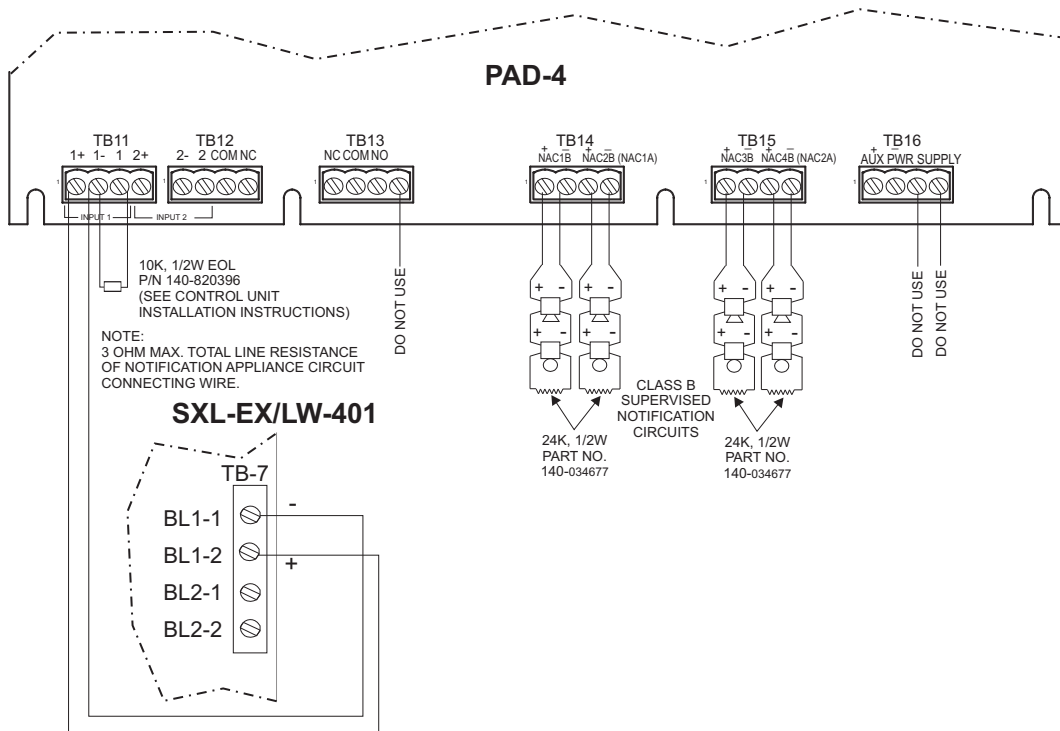
The drawings in this section show you how to connect the PAD-4 to compatible Siemens and Faraday control units. See control unit owners manual for more information.



**Figure 3-1**  
**Connection to MXL, MXL-IQ**  
**UL and ULC Installations**

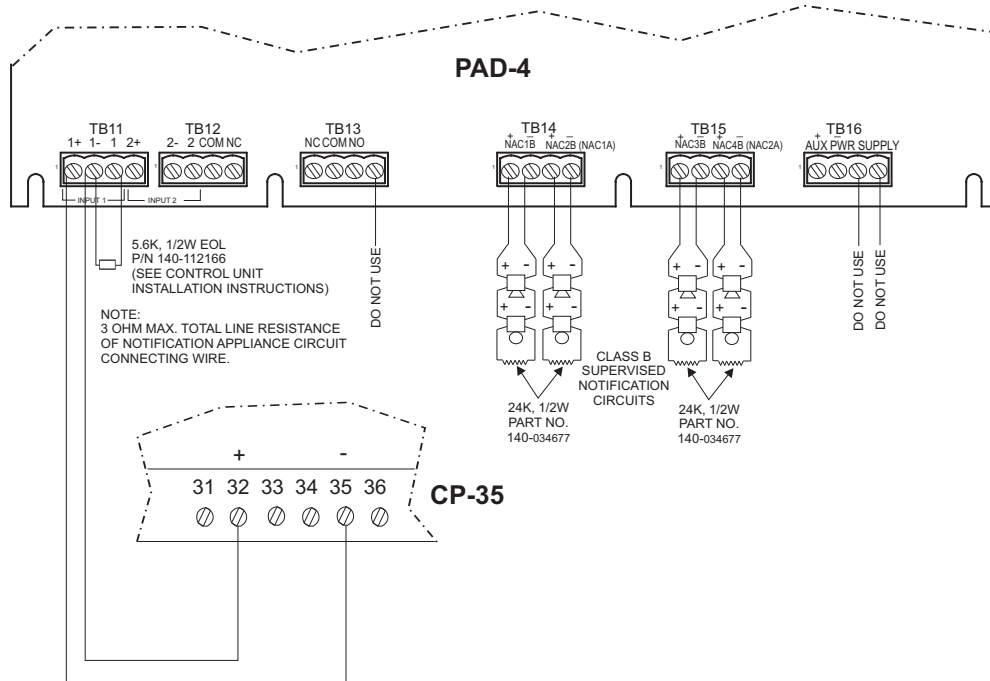


**Figure 3-2**  
**Connection to CSM-4**  
**UL and ULC Installations**

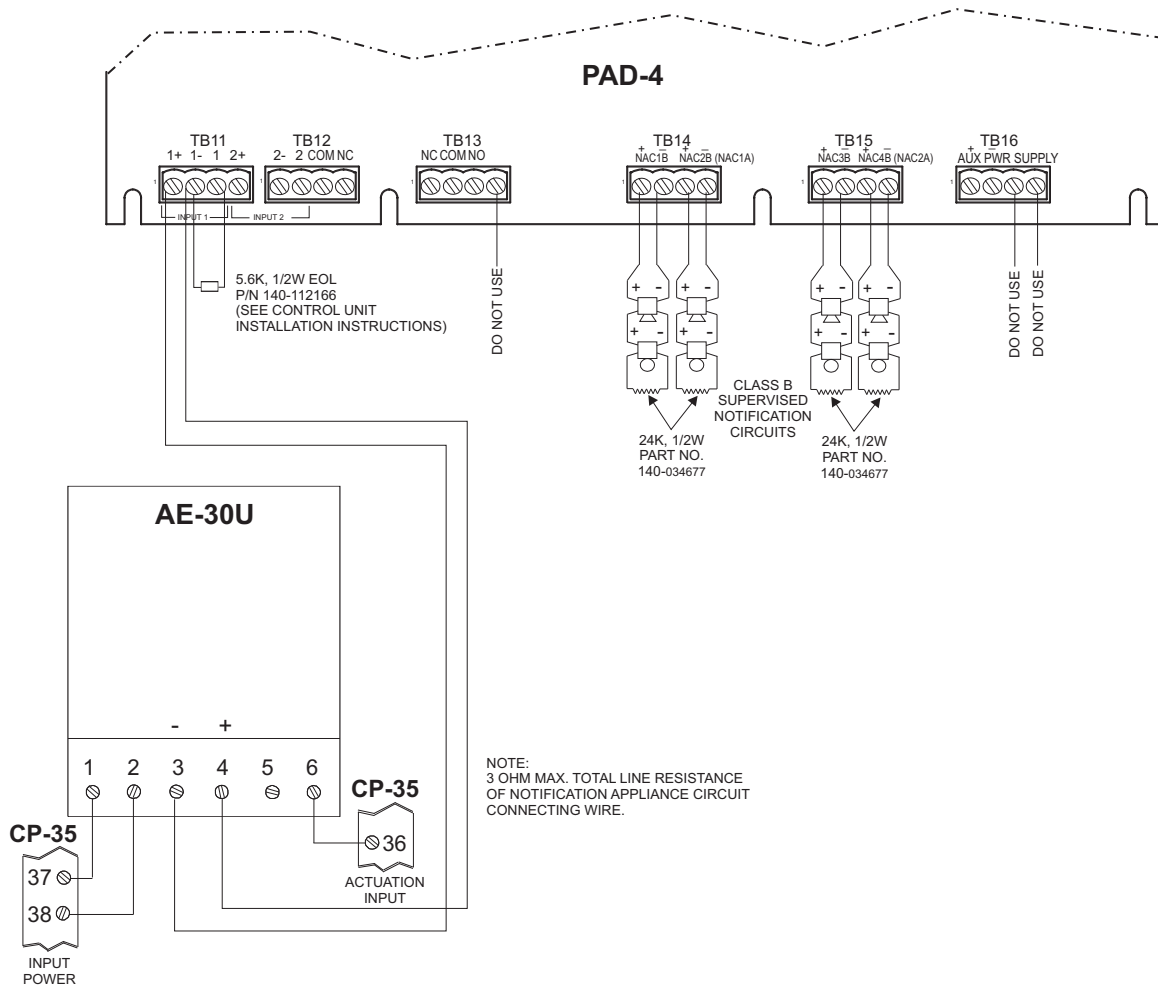


**Figure 3-3**  
**Connection to SXL-EX and LW-401**  
**UL Installations Only**

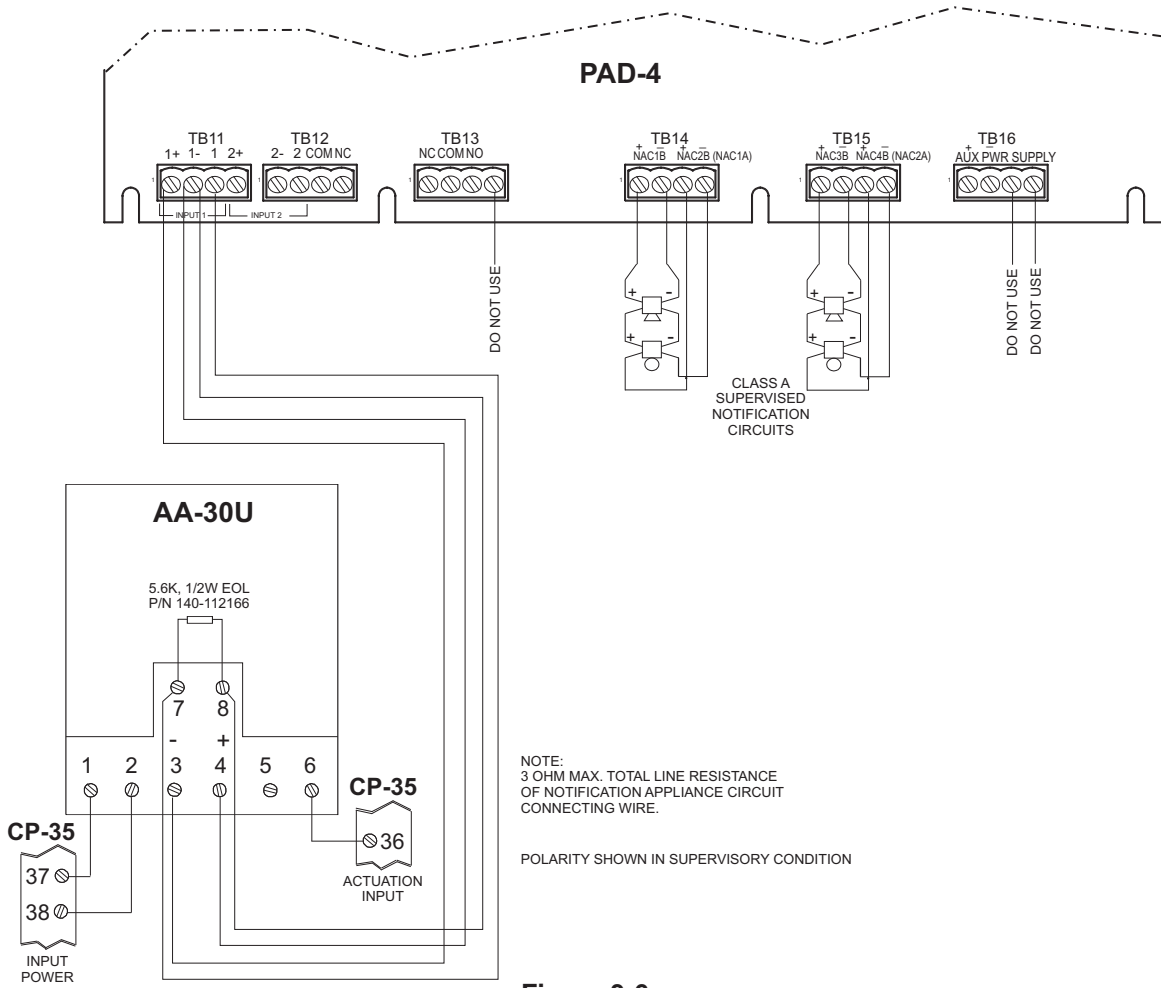




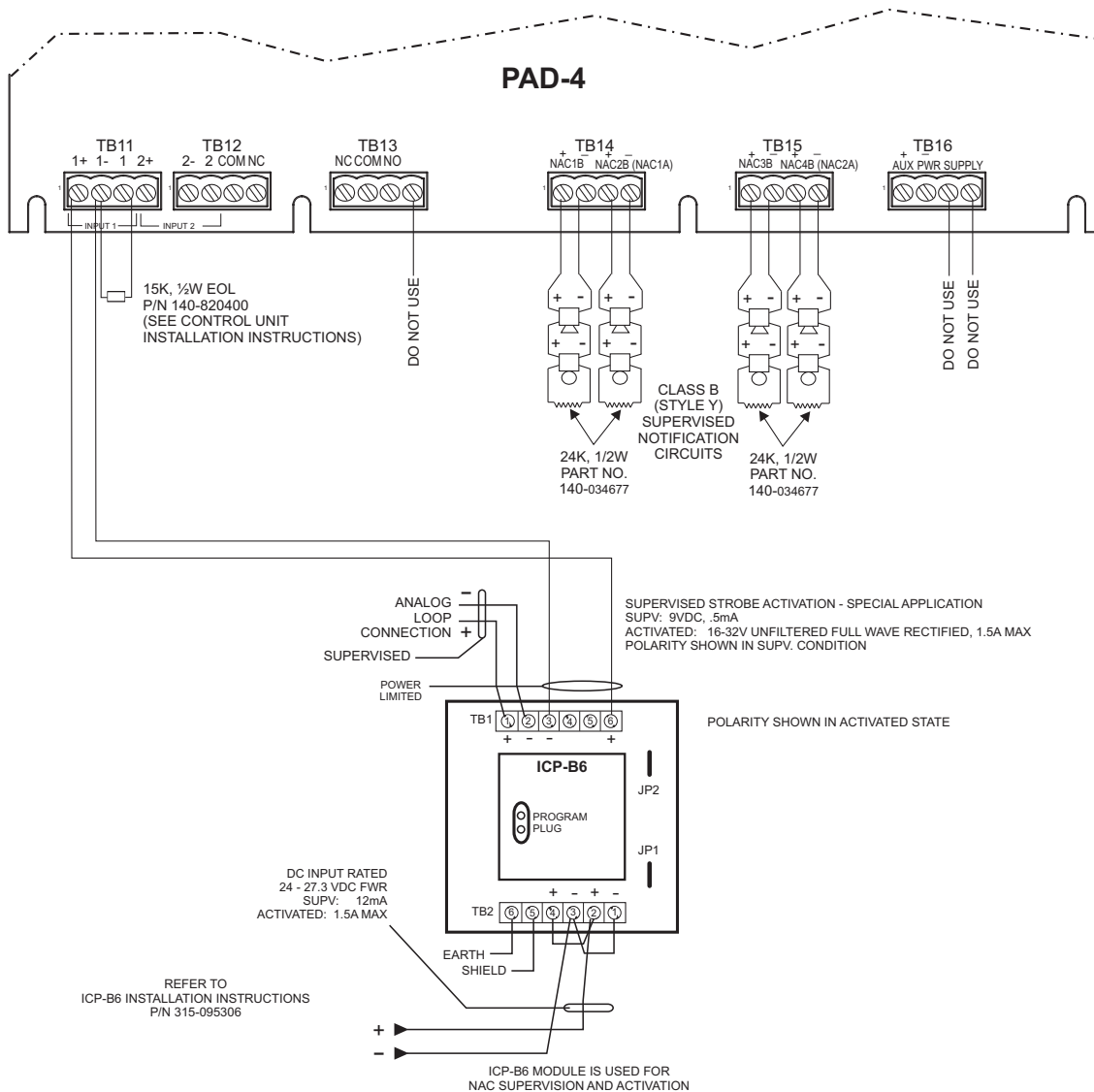
**Figure 3-4**  
**Connection to CP-35**  
**UL Installations Only**



**Figure 3-5**  
**Connection to AE-30U**  
**UL Installations Only**

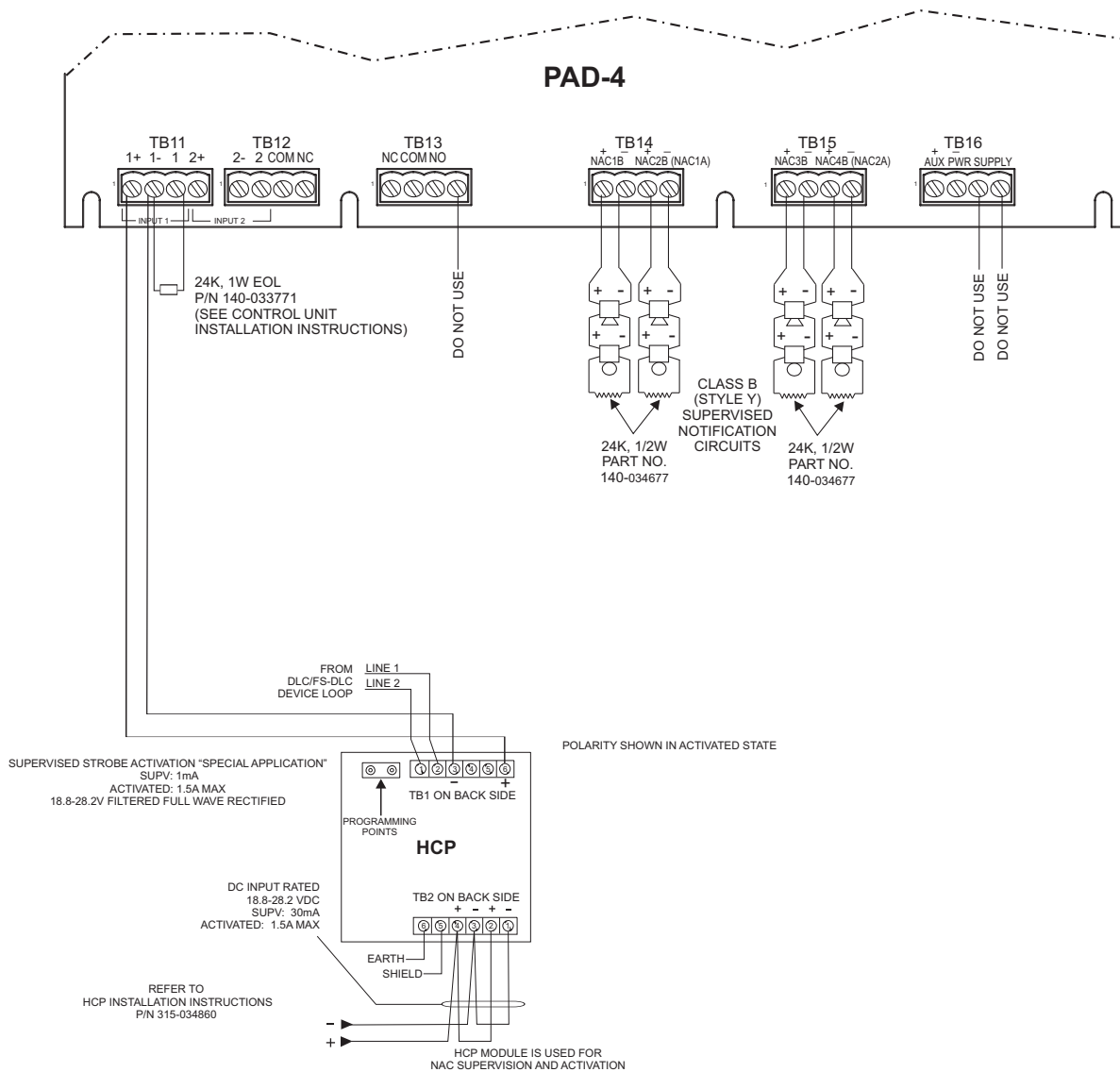


**Figure 3-6**  
**Connection to AA-30U**  
**UL Installations Only**

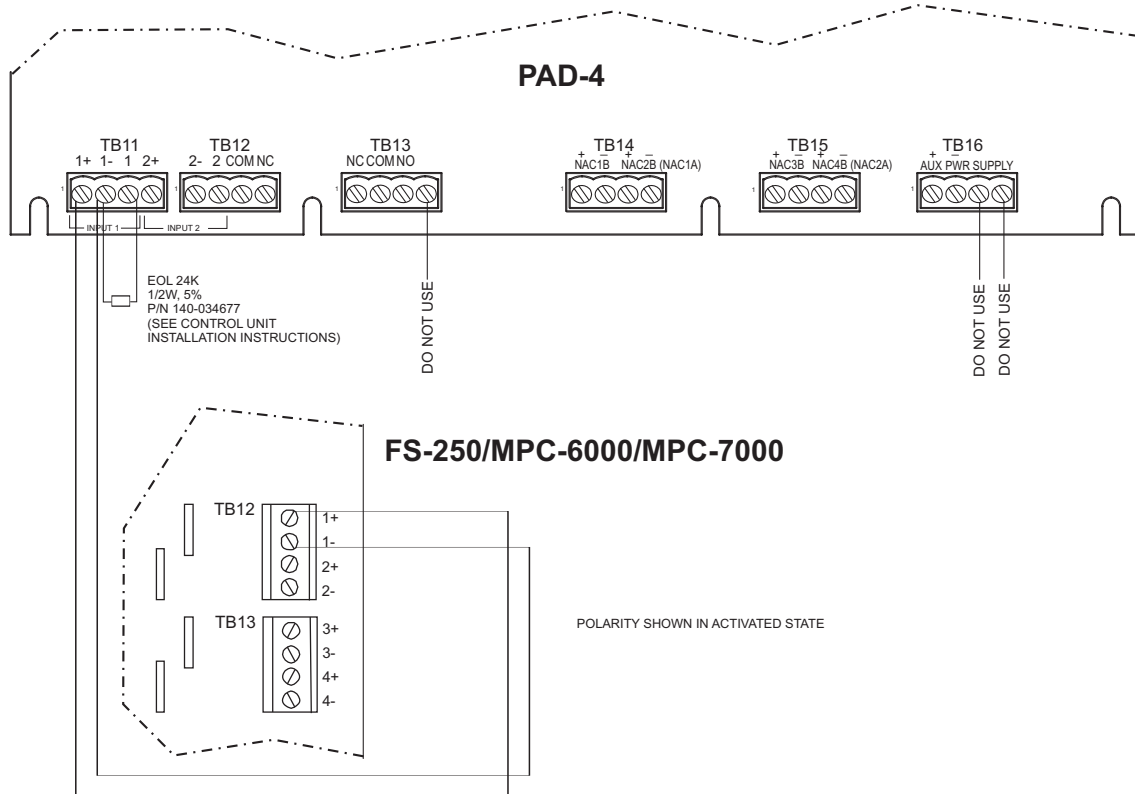


**Figure 3-7**  
**Connection to ICP-B6 (MXL/MXLV)**  
**UL and ULC Installations**

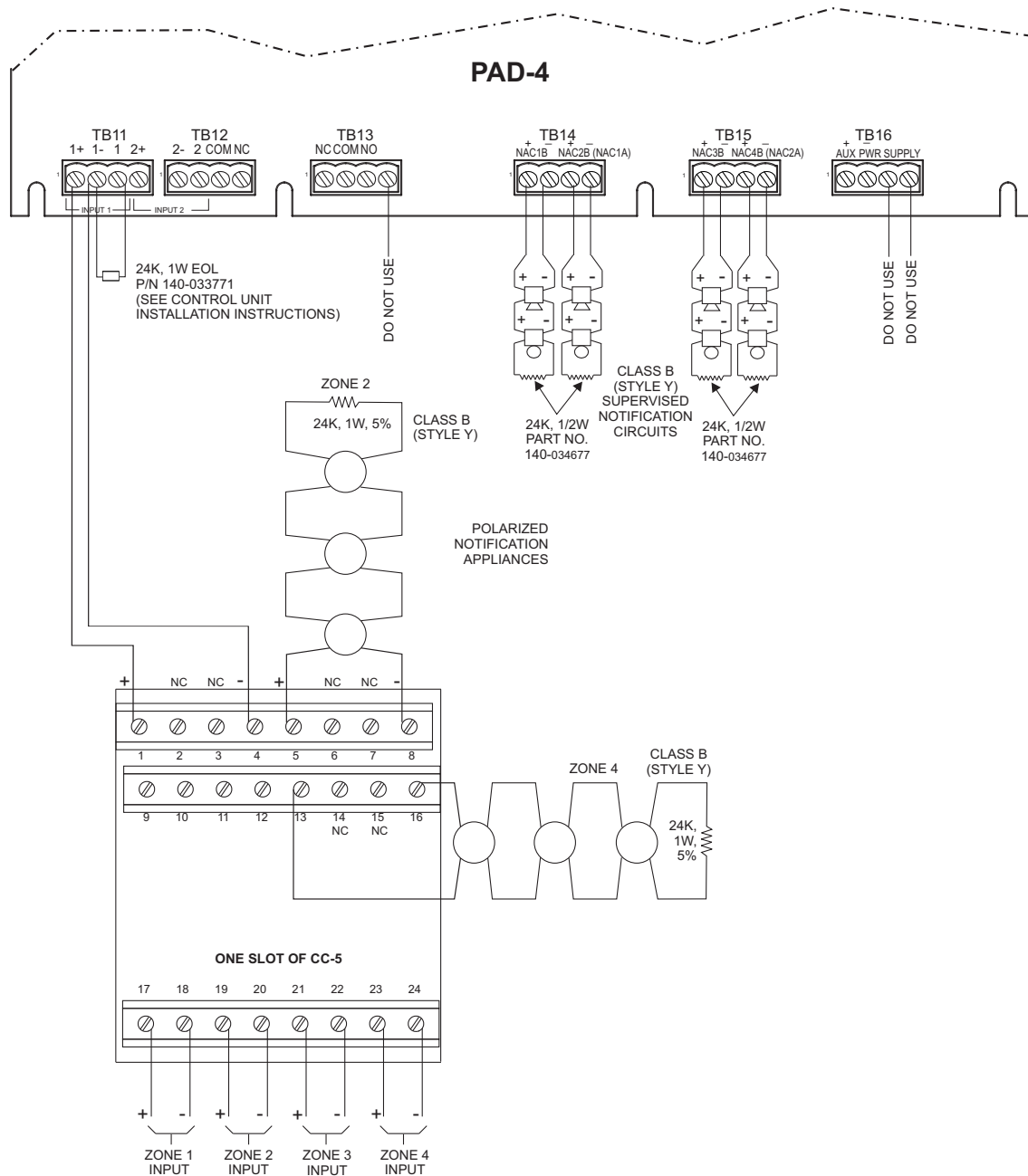




**Figure 3-9**  
**Connection to HCP (FireFinder XLS,**  
**Designo Fire Safety Modular,**  
**Cerberus PRO Modular, or FS250)**  
**UL and ULC Installations**  
**Use FS250C for ULC Installations**

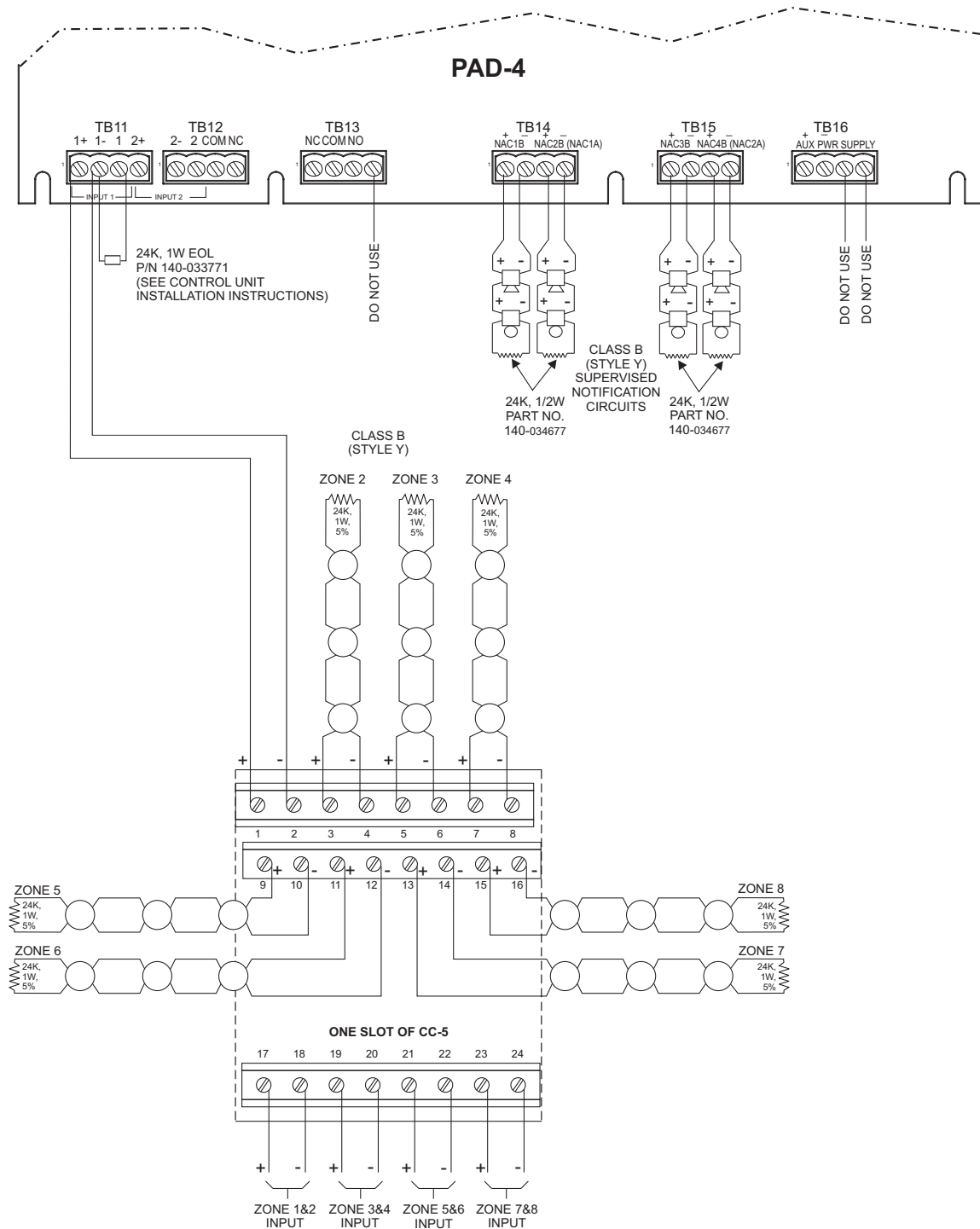


**Figure 3-10**  
**Connection to FS-250 and MPC-6000/7000**  
**UL Installations Only**

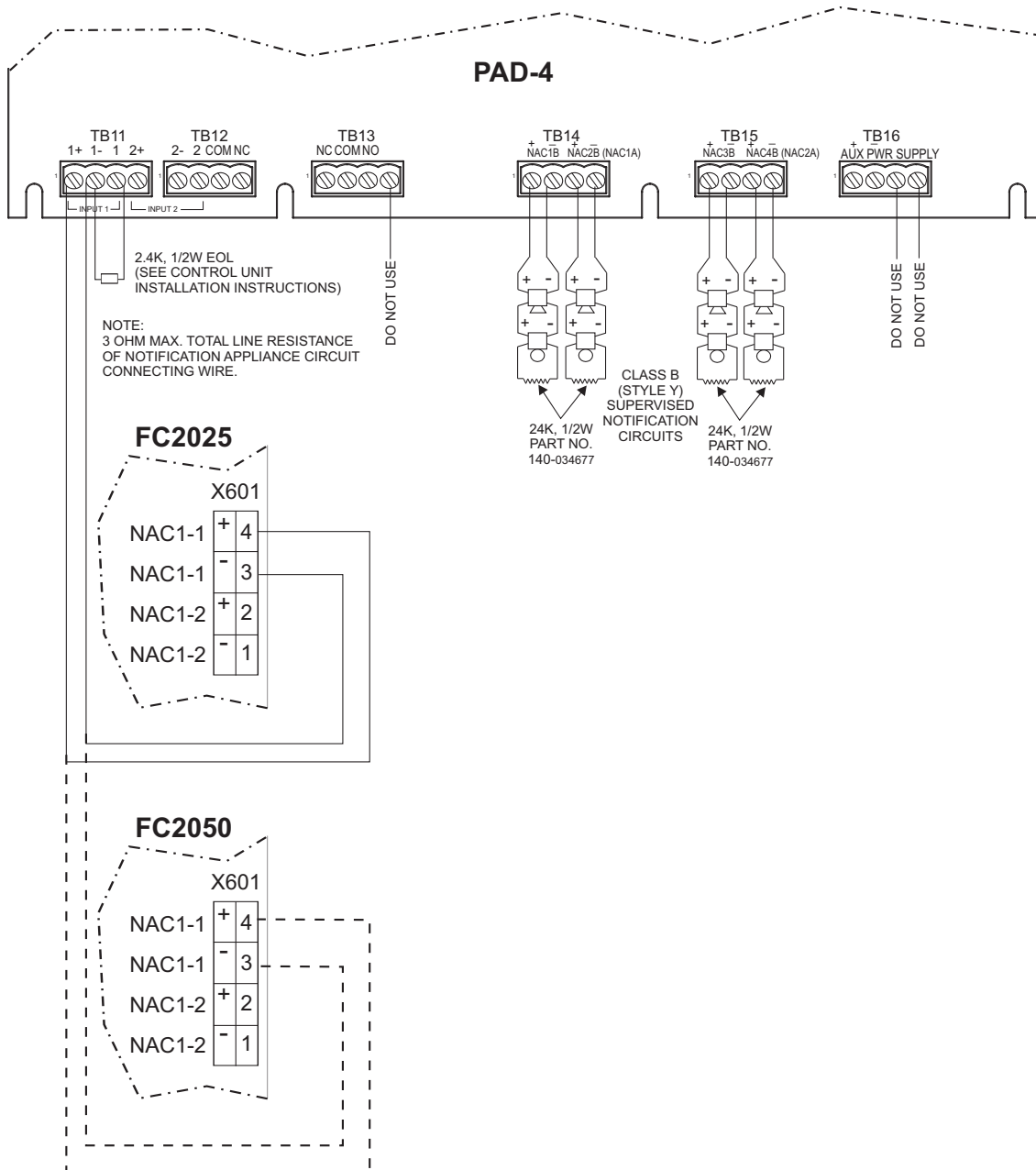


**Figure 3-11**  
**Connection to ZIC-4A (FireFinder-XLS,**  
**Desigo Fire Safety Modular,**  
**or Cerberus PRO Modular)**  
**UL and ULC Installations**

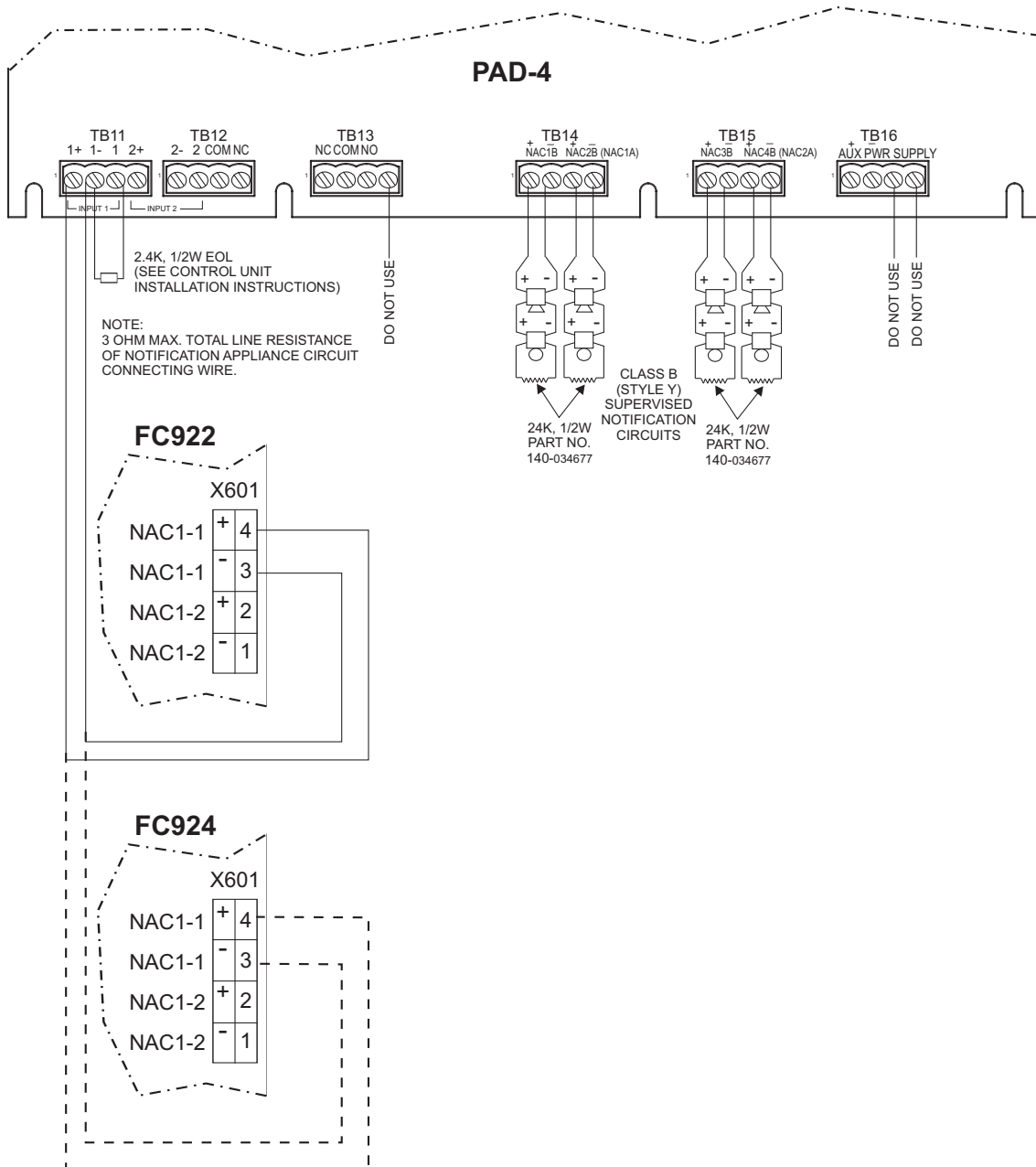




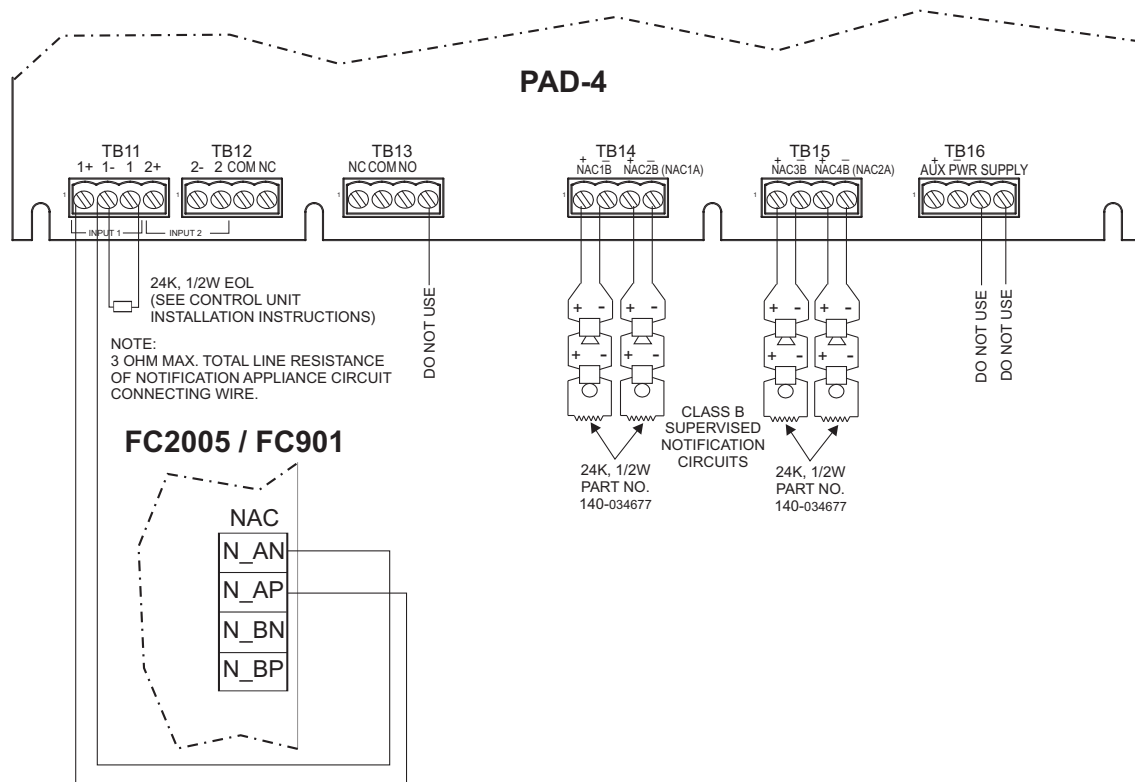
**Figure 3-12**  
**Connection to ZIC-8B (FireFinder-XLS,**  
**Design Fire Safety Modular,**  
**or Cerberus PRO Modular)**  
**UL and ULC Installations**



**Figure 3-13**  
**Connection to FC2025, FC2050**  
**UL and ULC Installations**



**Figure 3-14**  
**Connection to FC922, FC924**  
**UL and ULC Installations**

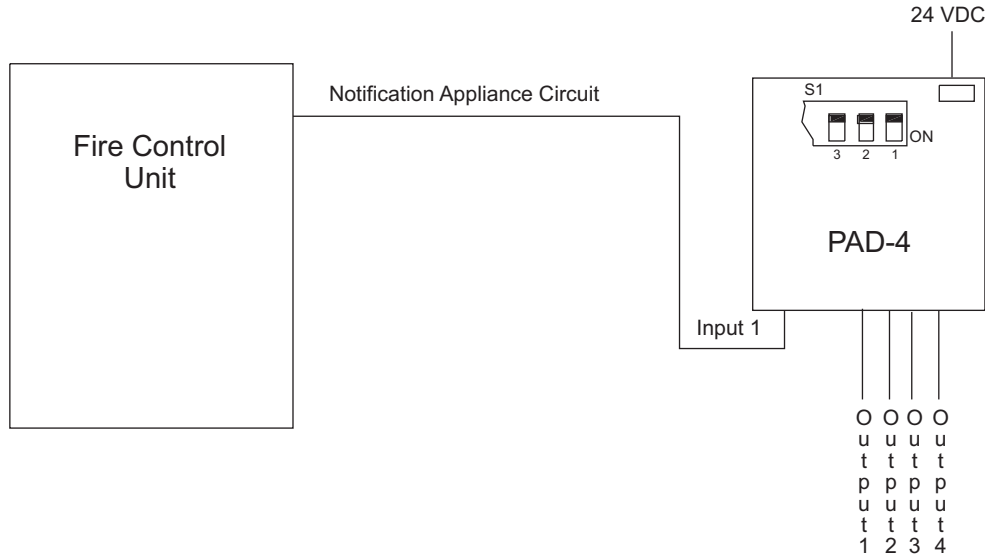


**Figure 3-15**  
**Connection to FC2005, FC901**  
**UL Installations ONLY**

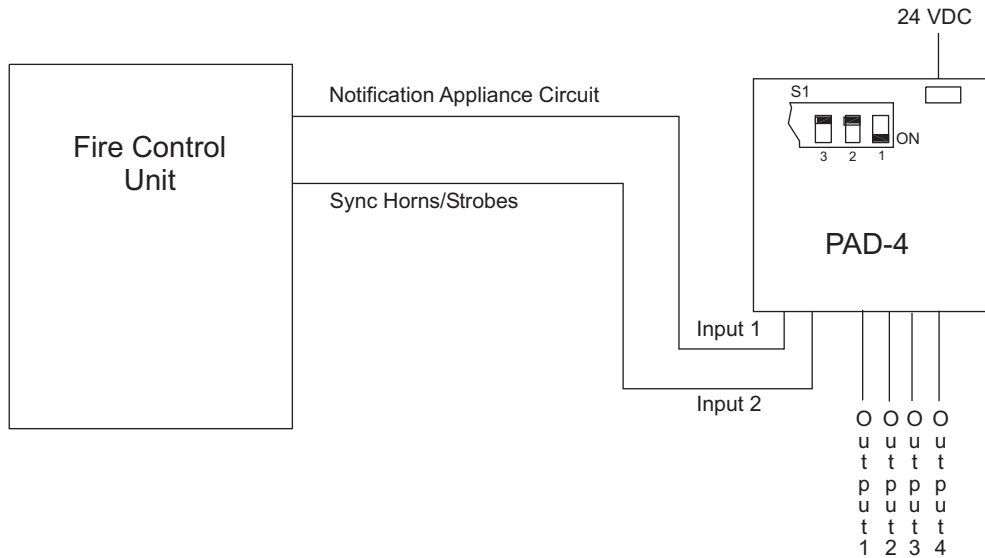
## 4. SAMPLE APPLICATIONS

The drawings in this section show various configurations, including daisy-chaining.

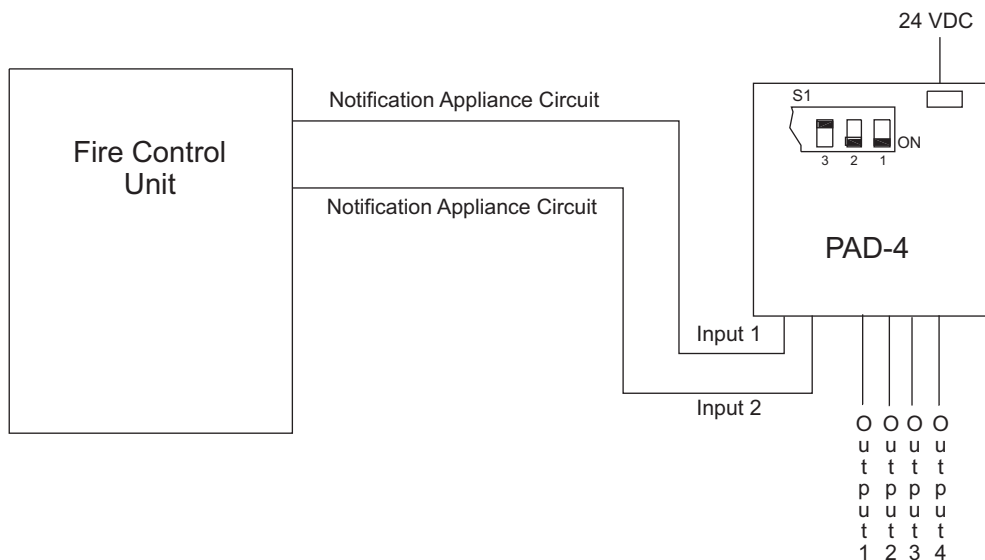
### 4.1 Notification Appliance Power Applications



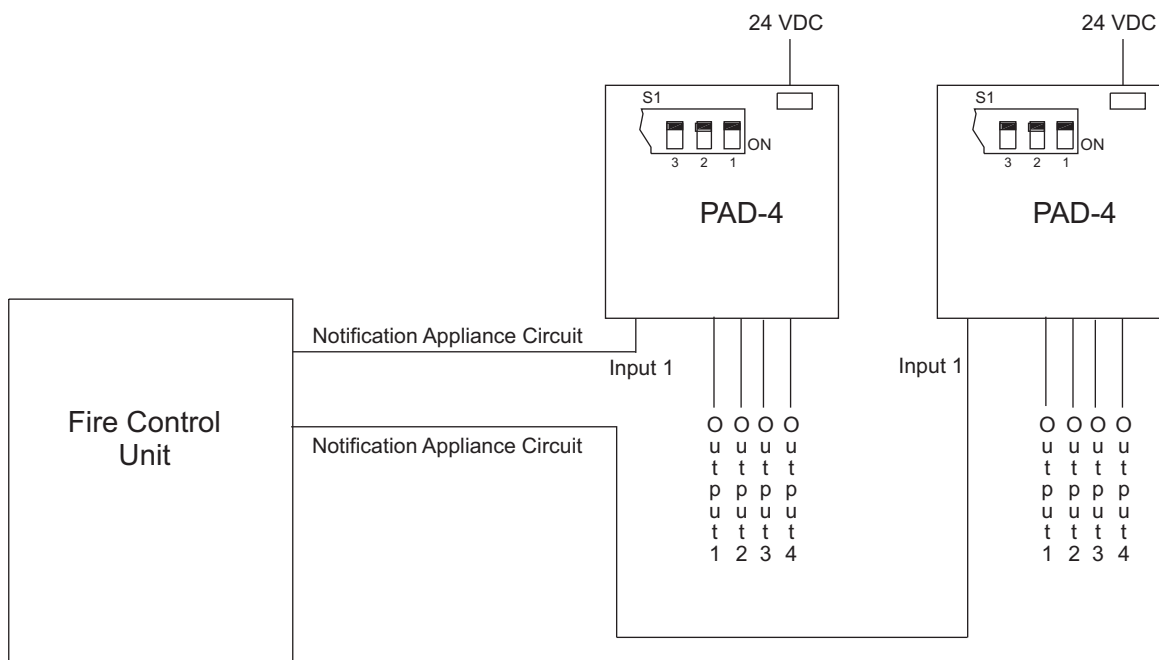
**Figure 4-1**  
Input 1 Activates All Four Outputs and Input 2 Is Not Used



**Figure 4-2**  
Input 1 Activates All Four Outputs and Input 2 Is Used to Silence Sync Horns

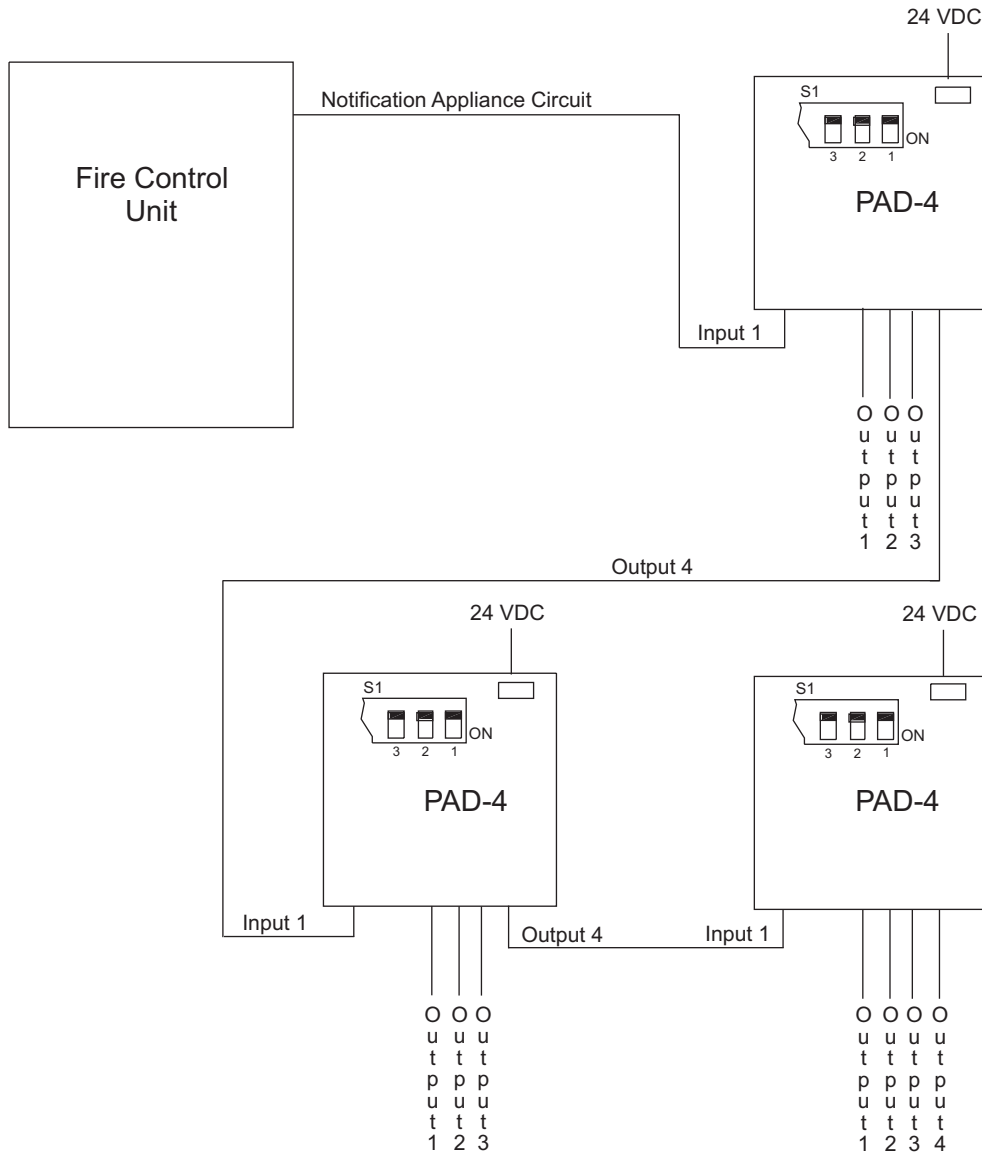


**Figure 4-3**  
**Input 1 Activates Outputs 1 & 2 and Input 2 Activates Outputs 3 & 4**

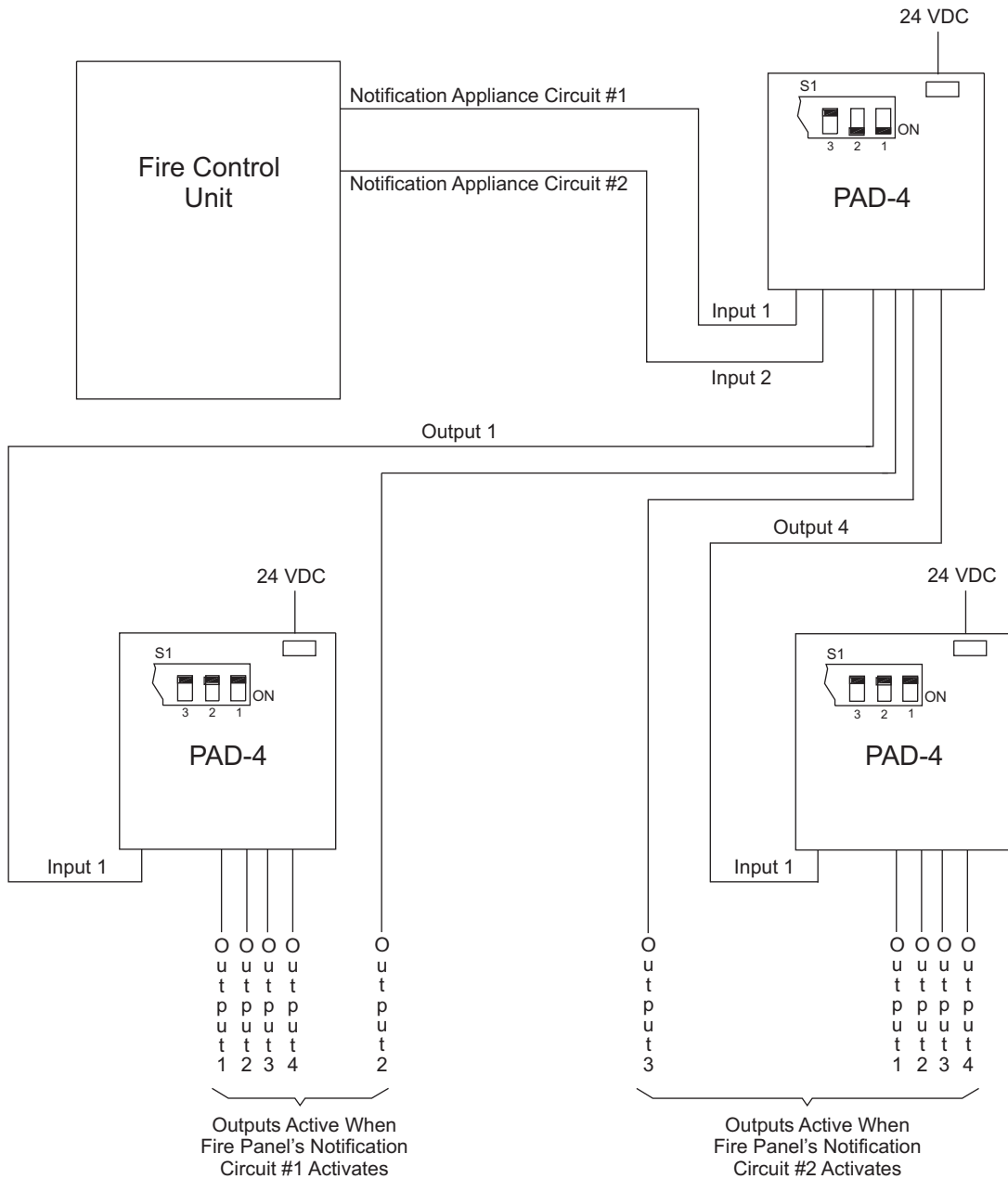


**NOTE:** Only the appliances connected to the same PAD-4 will operate synchronously when the output circuits of the PAD-4 are set to synchronization mode. The appliances connected to a different PAD-4 will not operate synchronously.

**Figure 4-4**  
**One Control Panel Activating Two PAD-4s**



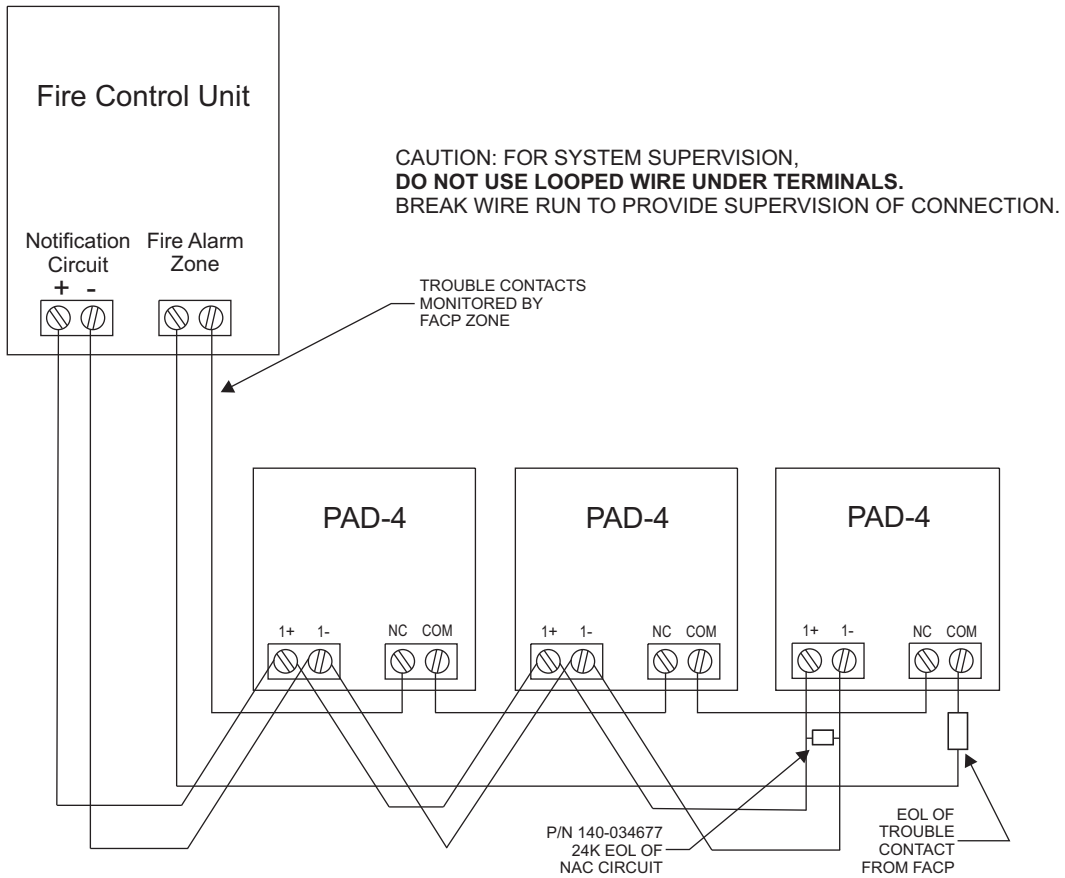
**Figure 4-5**  
**One Control Panel Activating Three PAD-4s**



NOTE: Only the appliances connected to the same PAD-4 will operate synchronously when the output circuits of the PAD-4 are set to synchronization mode. The appliances connected to a different PAD-4 will not operate synchronously.

**Figure 4-6**  
**Each Control Signal Circuit Activates Five Output Circuits**





NOTE: Only the appliances connected to the same PAD-4 will operate synchronously when the output circuits of the PAD-4 are set to synchronization mode. The appliances connected to a different PAD-4 will not operate synchronously.

**Figure 4-7**  
**Multiple PAD-4s Activated by a Single Notification Circuit**

## 4.2 Door Holder Applications

In a typical door holder application, the door holder power must be released to close all fire doors under the following conditions:

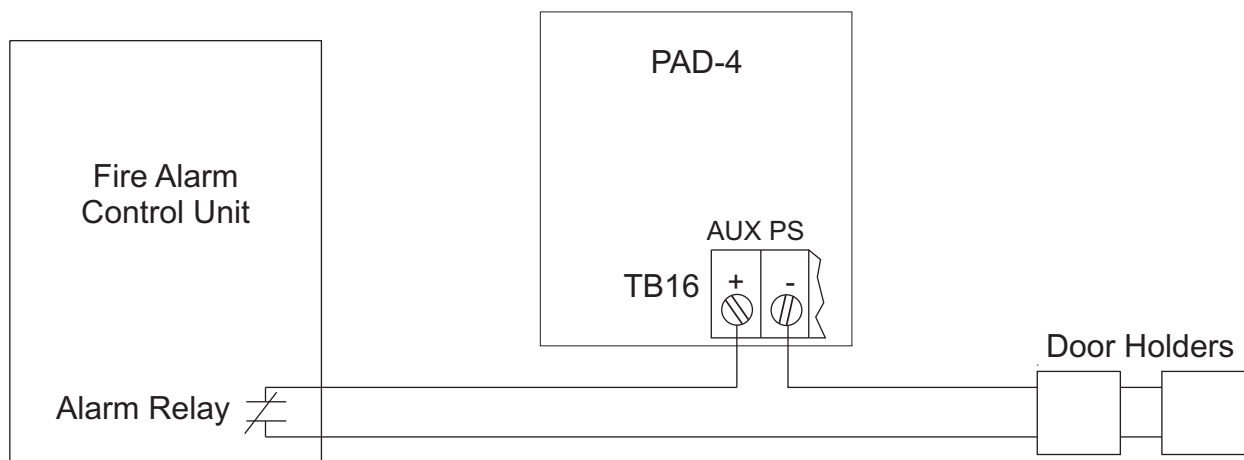
- Any active alarm condition.
- AC power is no longer present (to conserve backup battery power).

To close the fire doors in these situations, wire a normally closed relay contact from the fire alarm control unit in series with the auxiliary power to the door holders.

The circuit shown in Figure 4-8 will provide up to 3 amps of door holder current. The power in this example is released when AC power is off for 30 seconds or more, or when the relay from the fire alarm control unit opens. See Section 1.1 for a description of the auxiliary power options, and Section 5.1.2 for information on choosing the options.

**NOTE: Compatible Door Holder: Rixson FM998. Approved for UL/ULC Installations.**

**RSG DH24120. Approved for UL/ULC/FM Installations.**



**Figure 4-8**  
**Door Holder Wiring Example**

**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.			
Feature	Permitted in UL 864? (Y/N)	Possible Settings (Refer to section 5.1.4)	Settings permitted in UL 864
AC Fail Reporting	Y	1) Will never be reported	N
		2) Not delayed *Used for local systems	N
		3) Delayed 60 minutes	Y
		4) Delayed 180 minutes	Y

## 5. PROGRAMMING

The PAD-4 functions are programmed with a 10-position DIP switch and ten 3-position jumpers. The following section describes each setting.

### 5.1 DIP SWITCH SETTINGS

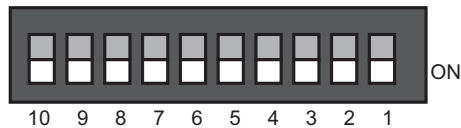
The 10-position DIP switch allows you to select the following:

- How long will the unit wait before indicating a loss of AC in UL installations. Loss of AC settings are disabled in Canadian installations and AC Fail will be reported immediately.
- Which input (Input 1 or Input 2) will control the NAC outputs
- Which outputs to wire as Style Z (Class A) and Style Y (Class B)
- Auxiliary power output operation on AC power fault
- Which outputs to operate as steady outputs, ANSI temporal or Carbon Monoxide (CO) alarms.

Refer to Figure 2-5 for the location of the DIP switch on the circuit board assembly.

All DIP switches are factory set for off; verify proper settings for proper system operation. Slide the switches up for OFF and down for ON.

**Note:** The unit checks DIP switch settings only when reset. If you change these switch settings, you must push S2 reset switch to recognize the new DIP switch settings.



### 5.1.1 Selecting the Input/Output Configuration

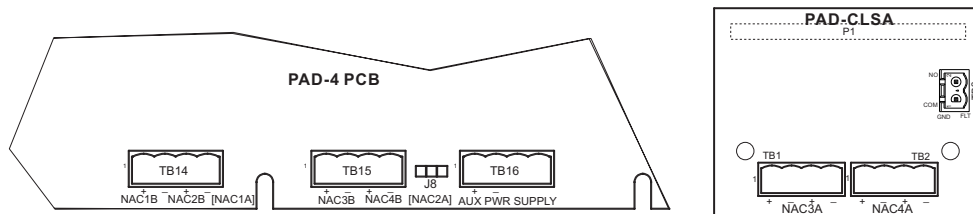
Figure 5-1 shows the position of each switch on the DIP switch for various input and output configurations. Refer also to Figure 5-2 for the terminal block designated on the PAD-4 or PAD-4-CLSA board. The position of switch 4 through 10 does not affect the relationship of inputs to outputs.

**Note: Changing settings for DIP switches 1-3 may affect the settings for jumpers J4-J8.**

	NO PAD-4-CLSA BOARD UL INSTALLATION ONLY	WITH PAD-4-CLSA BOARD UL INSTALLATION ONLY	WITH PAD-4-CLSA BOARD ULC INSTALLATION ONLY
	Switch 1 OFF & Switch 2 OFF & Switch 3 OFF: Input 1 controls outputs 1B - 4B (Class B). Input 2 not used.	Not Applicable	Switch 1 OFF & Switch 2 OFF & Switch 3 OFF: Input 1 controls outputs 1B - 4B (Class B). Input 2 not used.
	Switch 1 ON & Switch 2 OFF & Switch 3 OFF: Input 1 controls outputs 1B - 4B (Class B). Input 2 used to control silencing of Sync horns.	Not Applicable	Switch 1 ON & Switch 2 OFF & Switch 3 OFF: Input 1 controls outputs 1B - 4B (Class B). Input 2 used to control silencing of Sync horns.
	Switch 1 OFF & Switch 2 ON & Switch 3 OFF: Input 1 controls outputs 1B, 2B and 3B (Class B). Input 2 controls output 4B (Class B).	Not Applicable	Switch 1 OFF & Switch 2 ON & Switch 3 OFF: Input 1 controls outputs 1B, 2B and 3B (Class B). Input 2 controls output 4B (Class B).
	Switch 1 ON & Switch 2 ON & Switch 3 OFF: Input 1 controls outputs 1B and 2B (Class B). Input 2 controls outputs 3B and 4B (Class B).	Not Applicable	Switch 1 ON & Switch 2 ON & Switch 3 OFF: Input 1 controls outputs 1B and 2B (Class B). Input 2 controls outputs 3B and 4B (Class B).
	Switch 1 OFF & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A and 2A as Class A. Input 2 not used.	Switch 1 OFF & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A - 4A as Class A. Input 2 not used.	Switch 1 OFF & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A - 4A as Class A. Input 2 not used.
	Switch 1 ON & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A and 2A as Class A. Input 2 used to control silencing of Sync horns.	Switch 1 ON & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A - 4A as Class A. Input 2 used to control silencing of Sync horns.	Switch 1 ON & Switch 2 OFF & Switch 3 ON: Input 1 controls outputs 1A - 4A as Class A. Input 2 used to control silencing of Sync horns.
	Switch 1 OFF & Switch 2 ON & Switch 3 ON: Input 1 controls outputs 1A as Class A. Input 2 controls outputs 2A as Class A.	Switch 1 OFF & Switch 2 ON & Switch 3 ON: Input 1 controls outputs 1A and 2A as Class A. Input 2 controls outputs 3A and 4A as Class A.	Switch 1 OFF & Switch 2 ON & Switch 3 ON: Input 1 controls outputs 1A and 2A as Class A. Input 2 controls outputs 3A and 4A as Class A.
	Not Applicable	Switch 1 ON & Switch 2 ON & Switch 3 ON: Input 1 controls outputs 1A, 2A and 3A (Class A). Input 2 controls output 4A (Class A).	Switch 1 ON & Switch 2 ON & Switch 3 ON: Input 1 controls outputs 1A, 2A and 3A (Class A). Input 2 controls output 4A (Class A).

**Figure 5-1  
Setting DIP Switches 1-3**

PROGRAMMING S1 DIPSWITCHES 1-3						
	PAD-4 PCB				PAD-4-CLSA	
Terminal Designation on PCB	NAC1B	NAC2B	NAC3B	NAC4B	NAC3A	NAC4A
Class A Configuration Designation	1A		2A		3A	4A
Class B Configuration Designation	1B	2B	3B	4B	N/A	N/A

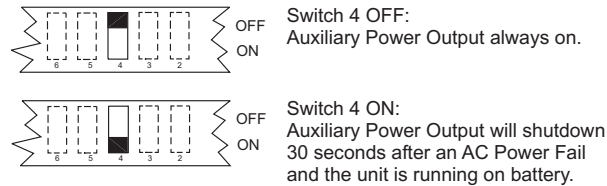


**Figure 5-2  
Designation of NAC Outputs on PAD-4 PCB and PAD-4-CLSA**

### 5.1.2 Setting the Auxiliary Output

Switch 4 on the DIP switch determines how the auxiliary power operates.

The PAD-4 checks switch 4 only when powering up. If you change this switch, you must push switch S2 momentarily to reset the unit to recognize the new switch setting.



**Figure 5-3**  
Setting DIP Switch 4

### 5.1.3 Setting the Input's NAC Control

DIP switch settings 5 to 8 are designed to produce outputs from a constant on input. The figures shown below compare the output patterns of configurations before and after the addition of this feature.

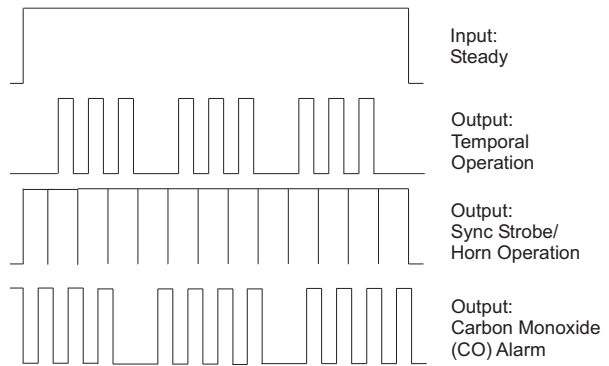
#### Slave Operation

The Slave operation output follows the input and can be used when the fire alarm control unit NAC is steady, coded, march time, or temporal and the desired output is the same.

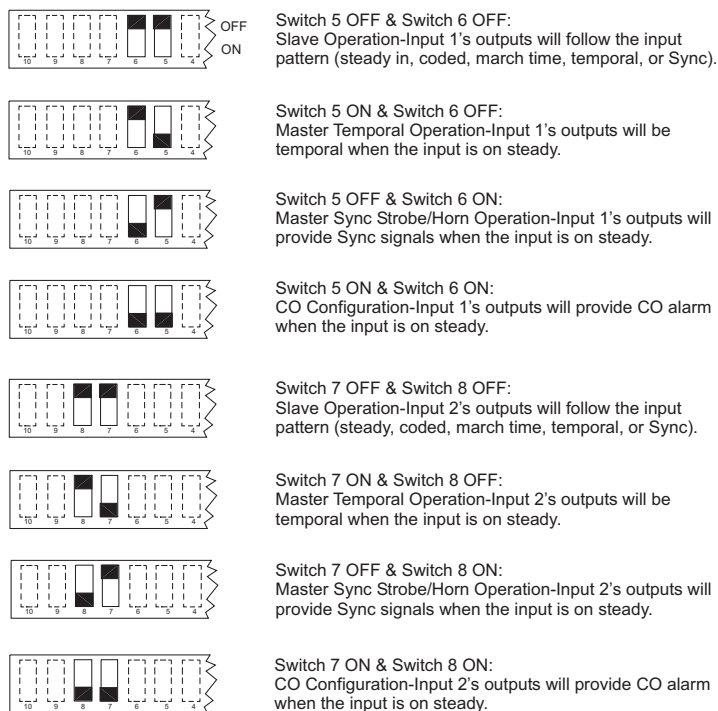
#### Master Temporal Operation

#### Master Sync Strobe/Horn Operation

#### Master Carbon Monoxide (CO) Alarm Operation



**Figure 5-4**  
Master Input/Output Relationship



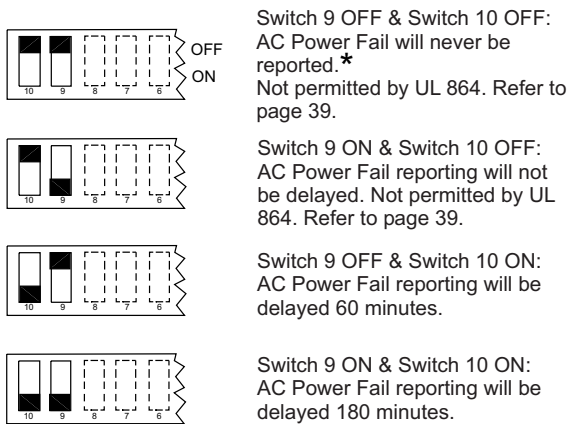
**Figure 5-5**  
Setting DIP Switches 5-8

### 5.1.4 Setting the AC Power Fault Reporting Delay on the Global Trouble Relay

Refer to Figure 5-6 to set the AC Power Fault Reporting on the Global Trouble Relay to one of the following selections:

- AC Power Fail will never be reported. Not permitted by UL 864. Refer to page 39.
- AC Power Fail reporting will not be delayed. Not permitted by UL 864. Used for local systems. Refer to page 39.
- AC Power Fail reporting will be delayed 60 minutes.
- AC Power Fail reporting will be delayed 180 minutes.

**Note: Switch settings on Switches 9 and 10 do not affect the operation of the AC Fail Relay. The AC Fail Relay will activate immediately upon low or no AC power under all conditions. In ULC configuration, DIP Switch 9 and 10 are disabled and AC Power Fail Reporting will not be delayed.**



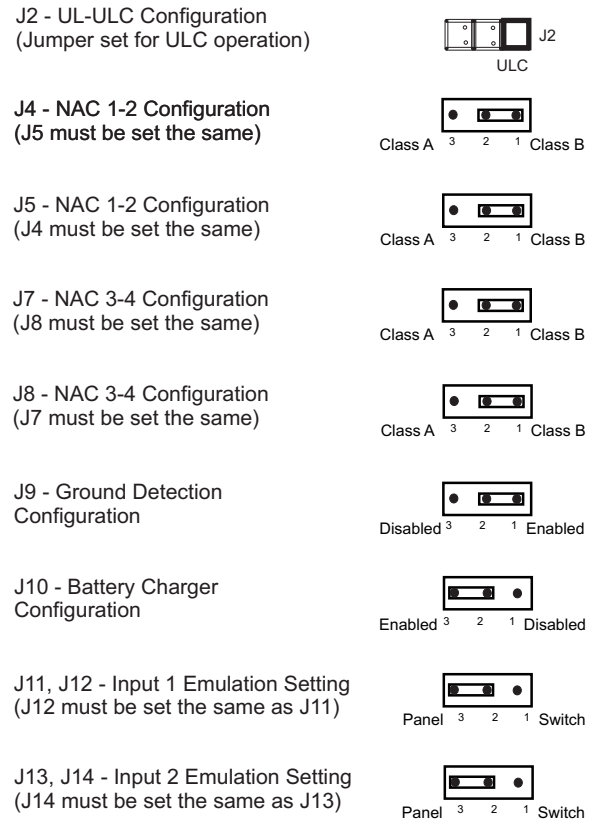
\* If this option is chosen, the PAD-4 must always be monitored via the AC Fail relay.

**Figure 5-6**  
**Setting DIP Switch 9 and 10**

## 5.2 JUMPER SETTINGS

Factory settings are shown. See Figure 2-5 for the location of these jumpers.

**Note: Changing settings for J4-J8 also affect the settings for S1 DIP switches 1-3. Also the NACs must be configured as either all Class A or all Class B.**



**Figure 5-7**  
**Jumper Configuration Settings**

## 6. REFERENCE DATA

This section provides reference for the following topics:

- Wire selection guides
- Battery size calculations

### 6.1 WIRE SELECTION GUIDES

#### 6.1.1 Resistance of Solid Copper Wire

AWG	Ohms per Thousand Feet*
18	8.08
16	5.08
14	3.19
12	2.01

\*NEC Chapter 9, Table 8.

## 6.2 BATTERY SIZE CALCULATIONS

Device	Quantity	Current Per Device (amps)	Standby Current (A)	Alarm Current(A)
Multiply	This column	times this column	= current	
1) PAD-4 Control Unit	1 or 2 <sup>A</sup>	0.066A per PAD-4		
2) PAD-4 Control Unit	1 or 2 <sup>A</sup>	5.0A per PAD-4		
<b>Notification Appliances - refer to the device manual for ratings</b>				
Model No.	Quantity	Alarm Current Per Device		
Multiply	This column	times this column		
3)				
<b>Auxiliary Devices - refer to the device manual for ratings</b>				
Model No.	Quantity	Standby Current Per Device	Alarm Current Per Device	
Multiply	This column	times this column	times this column	
4)				
5) Total amperage required (totals for lines 1, 2, 3 and 4) <sup>B</sup>			A	A
6) Number of Standby Hours required (4, 24, or 60, per NFPA 72)			Hrs.	
7) A.H. for Standby. Multiply line 5 times line 6			A.H.	
8) Length of Alarm Operation <sup>C</sup>				Hrs.
9) A.H. for Alarm (multiply line 5 times line 8)				A.H.
10) Total Standby and Alarm A.H. required (add line 7 and line 9)				A.H.
11) Battery De-rating Factor			1.25	
12) Battery Amp-Hour Rating required (multiply line 10 times line 11) <sup>D</sup>				A.H.

- A. Up to two PAD-4 boards can be connected to a common battery set. When calculating for 2 PAD-4 boards
- I. Both boards must be mounted on S3AP adapter plates on System 3 rails in the same enclosure.
  - II. One of the boards must have the battery charger circuit disabled.
  - III. The board with the ACTIVE charger is limited to 1.50 amps for the aux. power (TB16, Aux Pwr Supply+, Aux Pwr Supply-).
  - IV. Both sets of battery connections are to be connected to the same battery set using 2 battery connection splitters, P/N 230-299203.
- B. The Alarm Current from sections 3 and 4 above must never exceed 6.0 amps for FP2011-U1 or 9.0 amps for FP2012-U1.
- C. Alarm operation length while on battery power varies with application and local codes. Check with the AHJ to determine if 5 minutes (0.0833 hours), 30 minutes (0.5 hours), 1 hour, or 2 hours of alarm operation is required. For Carbon Monoxide (CO) alarms, the alarm operation is 12 hours for local systems, and 1 hour for systems that utilize off-premises monitoring.
- D. Battery rating required cannot exceed 18 A.H.



## 7. COMPATIBLE DEVICES

See Siemens P/N 315-096363 or Faraday P/N 315-096363FA, as applicable, for compatible notification appliances.

## 8. TROUBLESHOOTING

This section describes the LED states and provides possible trouble conditions of the PAD-4.

### 8.1 LED INDICATORS

Light-emitting diodes (LEDs) indicate fault and normal conditions. The seven LEDs indicate a fault condition in one of the circuits (either outputs 1 through 4, auxiliary power, ground fault, or battery). A fault condition in the LEDs corresponding circuit will turn on the LED (labeled on the board). The POWER LED will normally be on and turn off to indicate an AC Fail condition. See Figure 2-5 for locations of LEDs. Their functions are as follows:

DESIGNATION	MARKING	COLOR	DESCRIPTION	OPERATION
DS1	OUT1	Yellow	NAC 1 trouble LED	On = Alarm (active) mode; Off = No alarm, no trouble One blink per second = Open wire detected Two blinks per second = Shorted loop detected Three blinks per second = Over current detected
DS2	OUT2	Yellow	NAC 2 trouble LED	On = Alarm (active) mode; Off = No alarm, no trouble One blink per second = Open wire detected Two blinks per second = Shorted loop detected Three blinks per second = Over current detected
DS3	OUT3	Yellow	NAC 3 trouble LED	On = Alarm (active) mode; Off = No alarm, no trouble One blink per second = Open wire detected Two blinks per second = Shorted loop detected Three blinks per second = Over current detected
DS4	OUT4	Yellow	NAC 4 trouble LED	On = Alarm (active) mode; Off = No alarm, no trouble One blink per second = Open wire detected Two blinks per second = Shorted loop detected Three blinks per second = Over current detected
DS5	AUX/PS	Yellow	Auxiliary power output trouble LED	On = Aux power switched on One blink per second = Aux power switched off after 30 seconds on battery power Three blinks per second = Over current detected
DS6	GND	Yellow	Ground Fault LED	On = ground fault detected; Off = no ground fault detected
DS7	BAT	Yellow	Battery trouble LED	Off = Battery OK One blink per second = Battery trouble Two blinks per second = Battery charger trouble
DS8	PWR	Green	AC Power normal LED	On = On AC power One blink per second = On battery power Two blinks per second = Incorrect power supply setup Three blinks per second = System overcurrent detected
DS11	BUSY	Yellow	Test Mode LED	On = PAD-4 operates in test/service mode (e.g. for firmware upload) IT MUST BE RESET FOR NORMAL OPERATION Off = PAD-4 operates in normal operation mode
<p><b>NOTE 1:</b> DS1 through DS8 will blink three times per second (after a reset) if the Input/Output configuration has a "Not Applicable" setting as described in section 5.1.1.</p> <p><b>NOTE 2:</b> DS6, DS7, and DS8 will blink three times per second to indicate "Missing CLSA Module" when configured for ULC-S527 (Canada) compliance. To configure the system for UL864 (US) compliance, remove J2 jumper and press the reset button as described in section 2.3. See Figure 2-5 for location of the jumper and the reset button.</p>				

## 8.2 IMPROPER OPERATION

If there is improper operation of the activation of the outputs, check for the following:

Was the reset switch S2 pressed after changing the DIP switch, jumper settings or reconnecting to any terminals/wiring/devices?

Are the DIP switch settings correct for the application?  
(See Section 5.1)

Are the jumper settings correct for the application?  
(See Section 5.2)

Are the inputs activating correctly?

Are the correct type of notification appliances connected?  
(Conventional or Sync Strobes/Horns)

## 8.3 TROUBLE CONDITIONS

**CAUTION: Troubleshooting is to be done only by qualified personnel who have been trained to repair and test this fire alarm accessory.**

Trouble conditions are sent to the fire alarm control unit from the trouble relay or associated input trouble relay.

DESCRIPTION	PROBABLE CAUSE
POWER LED (DS8) not lit.	No AC input power Low AC input power (Less than 90VAC). Flashes if PAD-4 is on secondary power.  Notes: 1. DIP Switch S1 switches 9 & 10 set the delay for reporting AC power faults from 0 to 180 minutes or never. a. Will never be reported b. Reporting will not be delayed c. Reporting will be delayed 60 minutes d. Reporting will be delayed 180 minutes 2. The green POWER LED turns off as soon as low AC or loss of AC occurs (does not wait for delay). 3. The trouble restores within 1 minute of the AC voltage restoring to normal level.
BATTERY LED (DS7) blinking.	Low battery input power (Less than 20.4VDC). No battery input power. Shorted battery input. If PAD-4 is configured to use battery power from another system, battery voltage below 20.4V is reported as trouble to panel.  Note: The battery input is checked about once a minute for troubles and restorals.
GRND LED (DS6) lit.	One or more external field connections shorted to earth ground (Less than 40K ohms).  Note: When the PAD-4 power is referenced to the control unit power; the ground detection circuit may be disabled with jumper J9.
AUX. P.S. LED (DS5) blinking.	Overcurrent condition on the auxiliary power output. (Trip with greater than 3.5 Amps.)  Note: The circuit automatically tries to restore about once a minute.
OUTPUT1 LED (DS1) blinking or OUTPUT2 LED (DS2) blinking or OUTPUT3 LED (DS3) blinking or OUTPUT4 LED (DS4) blinking.	Associated NAC is open (Greater than 49K ohms). Associated NAC is shorted (Less than 18K ohms). Associated NAC has an overcurrent condition (Trip with greater than 3.5 Amps).  Note: The circuit automatically tries to restore about once a minute.
BUSY LED (DS11) lit.	PAD-4 is in firmware upload mode. Press reset switch S2 to change to normal operation mode.

## 9. BATTERY MAINTENANCE

Perform the following tests at the recommended interval. Replace the battery set every four years or if any of the test criteria are not met.

### Initiation / Reacceptance

1. **Charger Test**—With the batteries fully charged and connected to the charger, measure the voltage across the battery set. It must read 27.3V +/- 0.3V.
2. **Discharge Test**—With full system alarm load, the voltage on a fully charged battery must not fall below 20.4V after 30 minutes.
3. **Load Voltage Test**—With full system alarm load, the voltage on a fully charged battery must not fall below 24.6V after one minute.

### Testing Interval

1. **Semiannually**—Perform the Load Voltage Test.
2. **Annually**—Perform the Charger Test and Discharge Test.

## 10. GLOSSARY

**Alarm Signal.** A signal that indicates the presence of an emergency requiring immediate action, such as an alarm for fire from a manual station, a waterflow alarm, or an automatic smoke detector.

**Alarm System.** A combination of compatible initiating devices, control units, and notification appliances designed and installed to produce an alarm signal in the event of a fire.

**Audible Signal.** A sound made by one or more audible notification appliances, such as bells or horns, in response to the operation of an initiating device.

**Authority Having Jurisdiction (AHJ).** The organization, office, or individual responsible for approving equipment, installations or procedures.

**CO Alarm.** Carbon Monoxide alarms.

**Class A Circuit.** An initiating device or notification appliance circuit in which all components remain fully functional when a single open or ground exists in the circuit.

**Class B Circuit.** An initiating device or notification appliance circuit in which some or all components may be disabled when a single open or ground exists in the circuit.

**End Of Line (EOL).** A device used to terminate a supervised circuit.

**General Alarm.** A term usually applied to the simultaneous operation of all the notification appliances on a system.

**Ground Fault.** A trouble condition in which a low resistance has been detected between the system wiring and earth ground.

**Initiating Device Circuit (IDC).** A circuit to which initiating devices are connected.

**Labeled.** Equipment or materials to which a label, symbol, or other identifying mark of an organization acceptable to the AHJ and concerned with product evaluation has been attached. The organization's label indicates that the manufacturer complies with appropriate standards, performs in a specified manner and

maintains periodic inspection of the production of such labeled equipment or materials.

**Listed.** Equipment or materials included in a list published by an organization acceptable to the AHJ and concerned with product evaluation. Inclusion in the list indicates that the equipment or materials comply with appropriate standards, and has been found suitable for use in a specified manner. The manufacturer maintains periodic inspection of production of listed equipment or materials.

**NEC.** National Electrical Code also published as NFPA standard 70.

**Notification Appliance.** An electrically operated appliance used to indicate the system status such as a bell, horn, strobe light or speaker.

**Notification Appliance Circuit (NAC).** A circuit to which notification appliances are connected.

**PAD.** Power Auxilliary Device

**Power Supply.** That portion of the fire alarm control unit which provides the power needed to operate all control unit modules, as well as that, needed to operate all electrically powered initiating devices and all notification appliances.

**Trouble Signal.** An audible signal indicating trouble of any nature, such as a circuit break or ground, occurring in the device or wiring associated with a fire alarm signal.

**Zone.** A designated area of a building.

## Appendix A

The following lists compatible legacy devices for the PAD-4 and PAD-4-CLSA.

Model	Instruction Part Number	Description	Appliance	Sync Compatible	Setting	Maximum Number Per NAC With Maximum Rating			
						PAD-4 3.0 Amp. DC	PAD-4- CLSA 3.0 Amp. DC		
U-MCS	315-545576	Selectable Candela Sync/	Strobe Only	Yes	15cd	24	0		
U-MCS-W	315-545800	Non-Sync Strobe			30cd	19	0		
U-MCS-WE		75cd			12	0			
U-MCS-AR		95cd			9	0			
U-MCS-WP	315-049499	Selectable Candela Sync/	Strobe Only	Yes	15cd	24	0		
U-MCS-W-WP		Non-Sync Strobe			30cd	19	0		
		Weatherproof			75cd	12	0		
					95cd	9	0		
U-MCS-6090V	315-545614	Selectable Candela Sync/	Bx-F Bell Only	Yes	N/A	8	0		
U-MCS-6090V-W		Non-Sync Strobe with	Bx-SS Bell Only		N/A	7	0		
		Bell Signal Plates	Strobe Only		15cd	24	0		
					30cd	19	0		
					75cd	12	0		
					110cd	9	0		
			Bx-F/Strobe		15cd	7	0		
					30cd	7	0		
					75cd	6	0		
					110cd	5	0		
			Bx-SS/Strobe		15cd	6	0		
					30cd	6	0		
					75cd	6	0		
					110cd	5	0		
U-MHU-MCS	315-545787	Selectable Candela Sync/	Horn Only	Yes	Steady or Temporal	35	0		
U-MHU-MCS-W	315-545807	Non-Sync Strobe with	Strobe Only		15cd	24	0		
		Sync/Non-Sync Volume			30cd	19	0		
		Control Horn			75cd	12	0		
					110cd	9	0		
					Horn/Strobe	15cd	16	0	
						30cd	14	0	
						75cd	10	0	
						110cd	8	0	
U-MHU-MCS-WP		315-149460	Selectable Candela Sync/		Horn Only	Yes	Steady or Temporal	35	0
U-MHU-MCS-W-WP			Non-Sync Strobe with		Strobe Only		15cd	24	0
			Sync/Non-Sync Volume				30cd	19	0
			Control Horn, Weatherproof				75cd	12	0
							110cd	9	0
				Horn/Strobe	15cd		16	0	
					30cd		14	0	
					75cd		10	0	
				110cd	8	0			
S-HPMG-MCS	315-545782	Speaker with Selectable Candela	Strobe Only	Yes	15cd	32	0		
		Sync/Non-Sync Strobe			30cd	25	0		
					75cd	13	0		
					110cd	9	0		
2837	315-149460FA	Selectable Candela Sync/	Horn Only	Yes	Steady or Temporal	35	0		
		Non-Sync Strobe with	Strobe Only		15cd	24	0		
		Sync/Non-Sync Volume			30cd	19	0		
		Control Horn, Weatherproof			75cd	12	0		
					110cd	9	0		
					Horn/Strobe	15cd	16	0	
						30cd	14	0	
						75cd	10	0	
						110cd	8	0	

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Model	Instruction Part Number	Description	Appliance	Sync Compatible	Setting	Maximum Number Per NAC With Maximum Rating	
						PAD-4 3.0 Amp. DC	PAD-4- CLSA 3.0 Amp. DC
2705	315-049499FA	Selectable Candela Sync/ Non-Sync Strobe Weatherproof	Strobe Only	Yes	15cd	24	0
					30cd	19	0
					75cd	12	0
					95cd	9	0
2700	315-545576	Selectable Candela Sync/ Non-Sync Strobe	Strobe Only	Yes	15cd	24	0
					30cd	19	0
					75cd	12	0
					95cd	9	0
2830	315-545779	Selectable Candela Sync/ Non-Sync Strobe with Sync/Non-Sync Volume Control Horn	Horn Only Strobe Only	Yes	Steady or Temporal	35	0
					15cd	24	0
					30cd	19	0
					75cd	12	0
			Horn/Strobe	Yes	110cd	9	0
					15cd	16	0
					30cd	14	0
					75cd	10	0
110cd	8	0					



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