# 4100-5013 and 4010-9935 Zone/Relay Module Installation Instructions

**Cautions and warnings**

**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 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.

**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.

## Introduction

The 4100-5013/4010-9935 Zone/Relay Module is an 8-point I/O card, where the I/O points can be independently configured as a Class B conventional initiating device zone, a Class A conventional initiating zone using two I/O points, a Class B security point, or a relay point. This document covers the installation and wiring of the module.

For information about programming the 4100-5013/4010-9935 Zone/Relay Module, refer to *ES Panel Programmer's Manual:* 574-849.

**Note:** In some cases, the initiating devices on a loop require the use of the 4100-5130 or 4010-9916 25 V Regulator Module. See the **Installation** section of this document for more information.

## Compatibility

| Part number | Compatible FACU |
|---|---|
| 4100-5013 | 4100ES |
| 4010-9935 | 4010ES |

For a list of the initiating devices which are compatible with 4100-5013/4010-9935 Zone/Relay Module, refer to *2-Wire Compatibility Chart:* 579-832.

**Note:** From this point on, the 4100-5013/4010-9935 Zone/Relay Module card is referred to as the Zone/Relay Module**.**

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# Installation

**Card overview**

The Zone/Relay Module is powered in the 4100ES and 4010ES FACUs using the FACU PDI connector. Some detectors may also require regulated voltage. This is done by installing the 25 V Regulator Module 4100-5130 or 4010-9916 in the FACU bay. See *2-Wire Detector Compatibility Chart*: 579-832 for compatibility. All output zones, including security zones, are regulated to 25 volts when the 25 V Regulator Module is installed.

**Note:** For jumper configuration information, see the **Address and jumper configuration** section of this document.

Refer to Figure 1 for the Zone/Relay Module card layout.

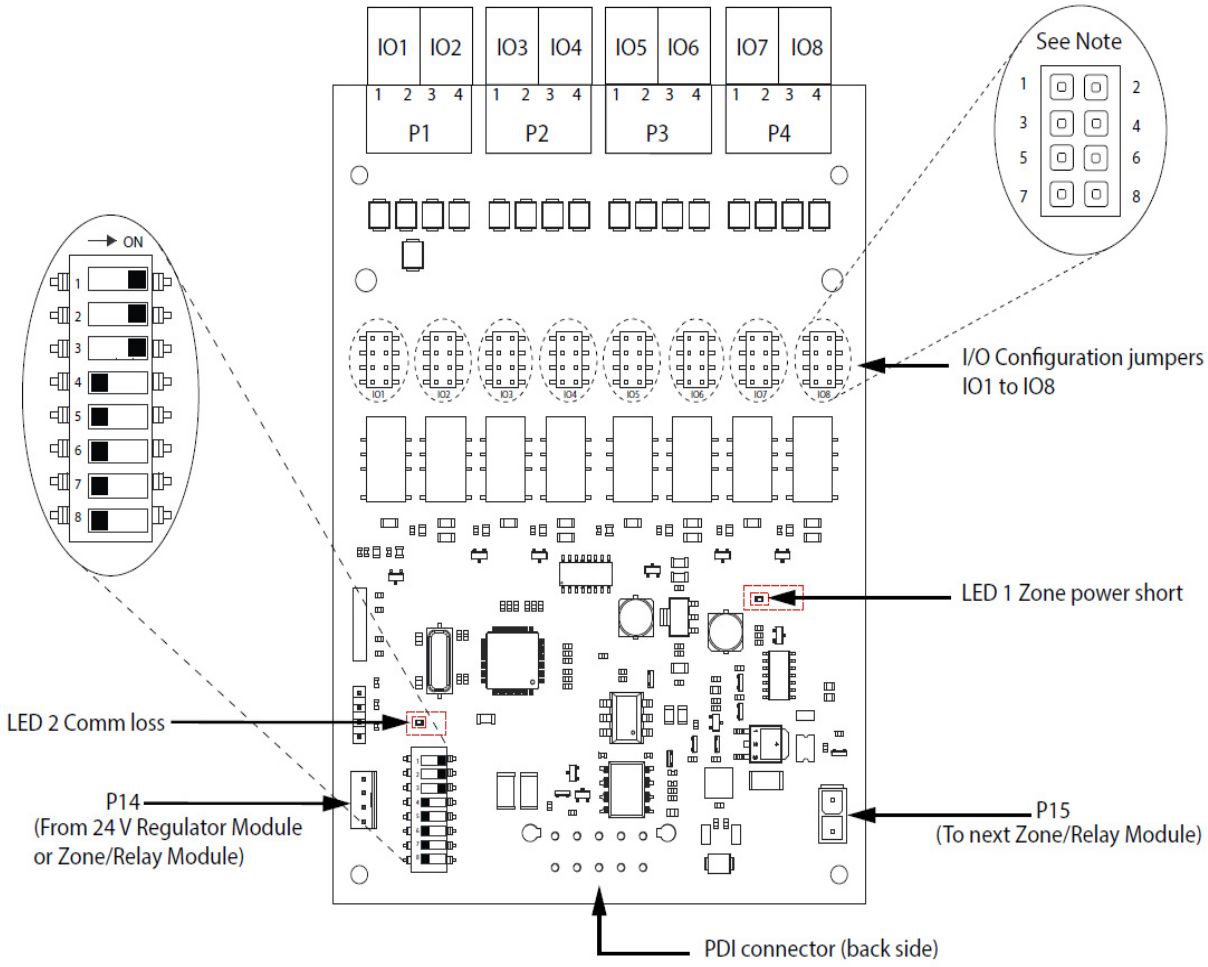



**Figure 1. Front view of the Zone/Relay Module card**

# Installation, *continued*

**Mounting the Zone/Relay Module**

The maximum number of Zone/Relay Modules that can be mounted in the 4100ES and 4010ES FACUs is limited both by the current draw of the FACU power supply, and the space occupied by other hardware installed in the bay.

To mount the Zone/Relay Module in the 4100ES and 4010ES FACUs, complete the following steps:

1. Insert the Zone/Relay Module into an available PDI block in the bay.
2. Align the card with the standoffs against the back of the FACU as shown in Figure 2.
3. Secure the card to the standoffs using the two #6-32 screws.

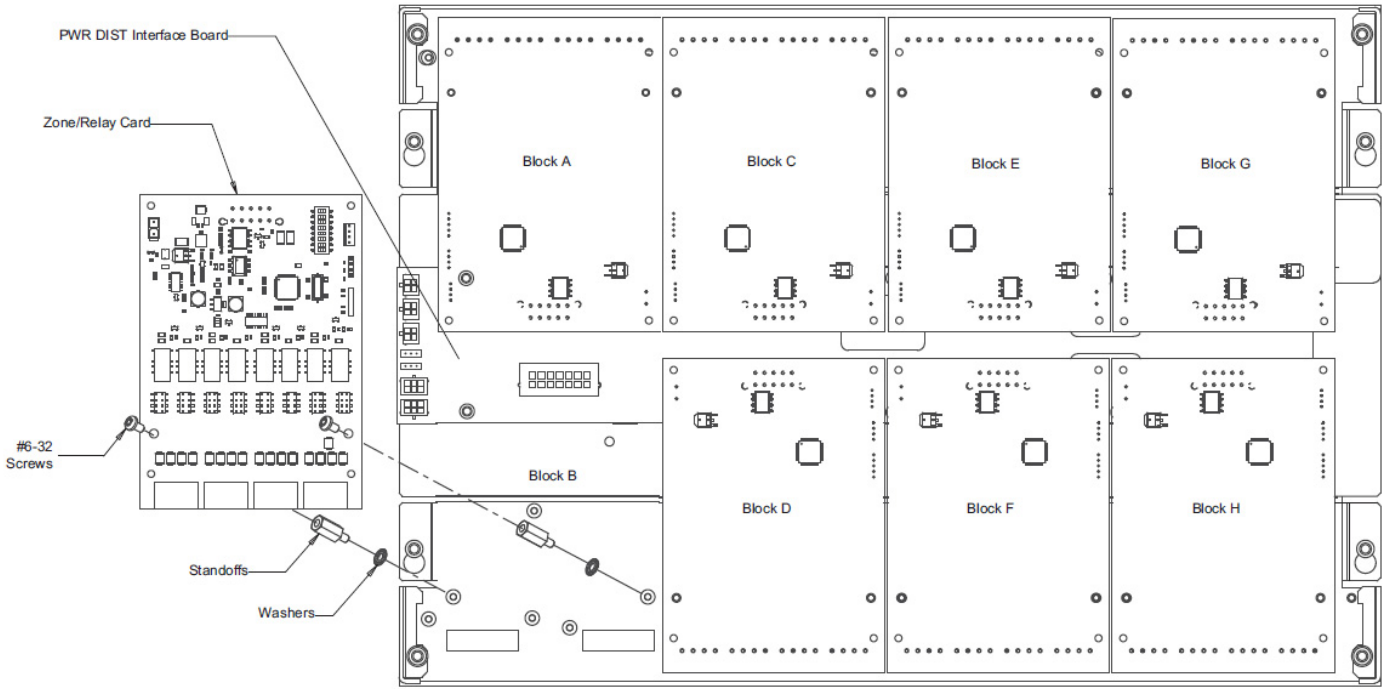



**Figure 2. Mounting the card**

**Connecting the Zone/Relay Module to the 25 V Regulator Module**

**IMPORTANT: When the 25 V Regulator Module is used to power Zone/Relay Modules, it is dedicated to this function, and cannot also be used to power field wired devices.**

Some older or third party detectors require a regulated voltage to operate. In these cases the 4100-5130 or 4010-9916 25 V Regulator Module is required to regulate the voltage output of the detector initiating zones. For a complete list of detectors which require the 25 V Regulator Module, see 579-832: *2-Wire Compatibility Chart*. See document 579-812 for 25 V Regulator Module mounting guidelines. Up to five Zone/Relay Modules can be powered by a single 25 V Regulator Module.

**Notes:**

1. You must order harness 4100-6305 / 4010-6305 for each Zone/Relay Module that is powered by the 25 V Regulator.
2. You must mount the Zone/Relay Module in the same bay as the 25 V Regulator Module.
3. When the Zone/Relay Module is powered by the 25 V Regulator, no other connections to the regulator are permitted.

*Continued on the next page*

# Installation, *continued*

### Connecting the Zone/Relay Module to the 25 V Regulator Module

To connect the Zone/Relay Module to a 25 V Regulator Module, complete the following steps:

1. Insert the Zone/Relay Module into an available PDI block adjacent to the 25 V Regulator Module.

**Note:** If you install more than one Zone/Relay Module, ensure that you wire subsequent cards in a clockwise direction without crossing the wires.

2. Clip harness 4100-6305 / 4010-6305 close to the two-pin connector on the P15 mating side, to expose the red and black wires. See Figure 3.

**Note:** A clipped harness is required only for connecting the Zone/Relay Module to the 25 V Regulator Module.

3. Strip 1/4 inch (6 mm) of the insulation from both 20 AWG wires carefully, using a wire stripper.
4. Connect the harness to the 25 V Regulator Module:
   - Insert the red wire into +25V of the terminal block, TB1-1 or -3.
   - Insert the black wire into 25C of the terminal block, TB1-2 or -4.
5. Remove the jumpers from P14 on the card.
6. Connect the other end of the harness to P14 on the Zone/Relay Module.
7. Connect the next card using an unmodified harness, going from P15 on card one, to P14 on card two.
8. Repeat step 7 to wire additional cards clockwise around the bay.
9. Use the cable tie provided to keep wires neat in the bay.

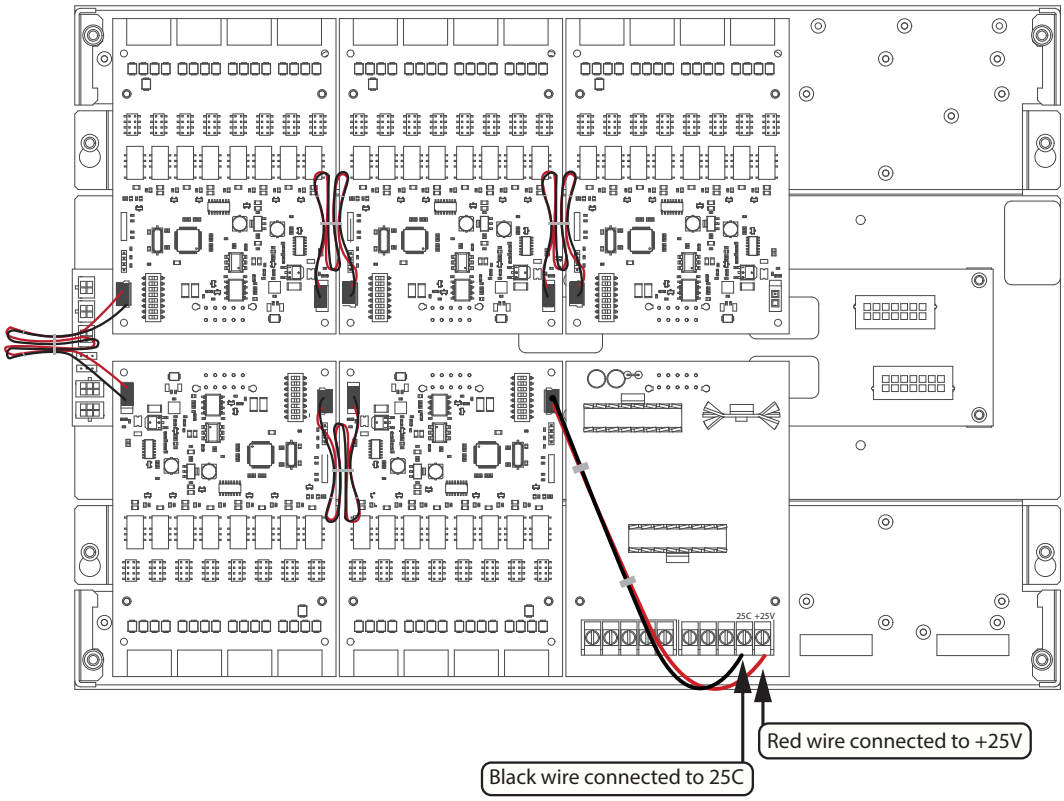



**Figure 3. Connected cards powered by the 25 V Regulator**

# Address and jumper configuration

**Setting the address**

Use the DIP Switch SW1 to set the communications address as identified in the ES Programmer job. See the Programming section of document 574-849, *ES Panel Programmer's Manual* for more information. From top to bottom, these switches are designated as SW1-1 through SW1-8. The function of these switches are as follows:

- **SW1-1**. When this switch is set to OFF, the card is offline and stops communicating with the panel. Set this switch to **ON**.
- **SW1-2 through SW1-8**. These switches set the card address within the FACU. Refer to Table 1 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 Programmer.

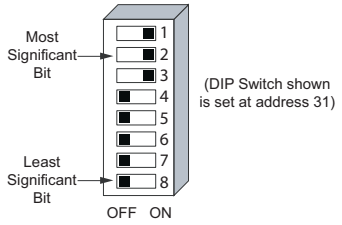



**Figure 4. DIP switch SW1**

**Table 1. 4100-5103/4010-9935 card addresses**

| 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 | 17 | ON | ON | OFF | ON | ON | ON | OFF |
| 2 | ON | ON | ON | ON | ON | OFF | ON | 18 | ON | ON | OFF | ON | ON | OFF | ON |
| 3 | ON | ON | ON | ON | ON | OFF | OFF | 19 | ON | ON | OFF | ON | ON | OFF | OFF |
| 4 | ON | ON | ON | ON | OFF | ON | ON | 20 | ON | ON | OFF | ON | OFF | ON | ON |
| 5 | ON | ON | ON | ON | OFF | ON | OFF | 21 | ON | ON | OFF | ON | OFF | ON | OFF |
| 6 | ON | ON | ON | ON | OFF | OFF | ON | 22 | ON | ON | OFF | ON | OFF | OFF | ON |
| 7 | ON | ON | ON | ON | OFF | OFF | OFF | 23 | ON | ON | OFF | ON | OFF | OFF | OFF |
| 8 | ON | ON | ON | OFF | ON | ON | ON | 24 | ON | ON | OFF | OFF | ON | ON | ON |
| 9 | ON | ON | ON | OFF | ON | ON | OFF | 25 | ON | ON | OFF | OFF | ON | ON | OFF |
| 10 | ON | ON | ON | OFF | ON | OFF | ON | 26 | ON | ON | OFF | OFF | ON | OFF | ON |
| 11 | ON | ON | ON | OFF | ON | OFF | OFF | 27 | ON | ON | OFF | OFF | ON | OFF | OFF |
| 12 | ON | ON | ON | OFF | OFF | ON | ON | 28 | ON | ON | OFF | OFF | OFF | ON | ON |
| 13 | ON | ON | ON | OFF | OFF | ON | OFF | 29 | ON | ON | OFF | OFF | OFF | ON | OFF |
| 14 | ON | ON | ON | OFF | OFF | OFF | ON | 30 | ON | ON | OFF | OFF | OFF | OFF | ON |
| 15 | ON | ON | ON | OFF | OFF | OFF | OFF | 31 | ON | ON | OFF | OFF | OFF | OFF | OFF |
| 16 | ON | ON | OFF | ON | ON | ON | ON | | | | | | | | |

**I/O point jumper configuration**

Each I/O point can be configured as follows:

- **A Class B initiating device circuit (IDC).**
- **A Class A IDC** (requires two I/O points in the same connector, P1 - P4).
- **A Relay point** (normally open or normally closed).
- **A Security point** (Class B only).

The I/O points are configured individually, and circuit types can be mixed as required.

To configure the points, do the following:

1. Position the jumpers as illustrated below.
2. Program the I/O point to the desired configuration in the ES Programmer. See *ES Programmer's Manual:* 574-849.

**Relay configuration**

For relay configuration, see Figure 5 and Figure 6.

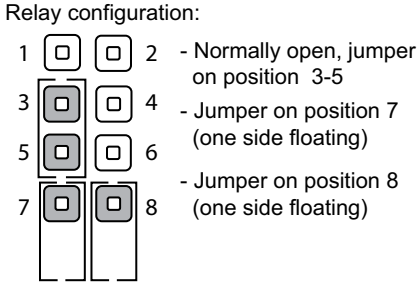



**Figure 5. Normally open**

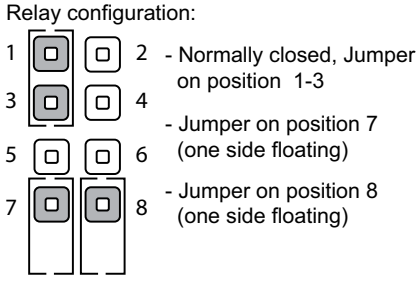



**Figure 6. Normally closed**

# Address and jumper configuration, *continued*

**Class A jumper configuration**

To connect the Zone/Relay Module as a Class A IDC, see Figure 7. Two adjacent I/O points located in the same four terminal connector must be used for a Class A circuit.

**IMPORTANT: Both I/O point jumper blocks must be configured as shown.**

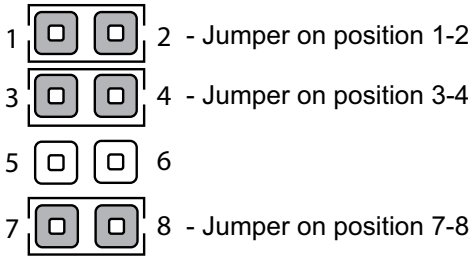



**Figure 7. Class A jumper configuration**

**Class B jumper configuration**

To connect the Zone/Relay Module as a Class B initiating device circuit (IDC) see Figure 8.

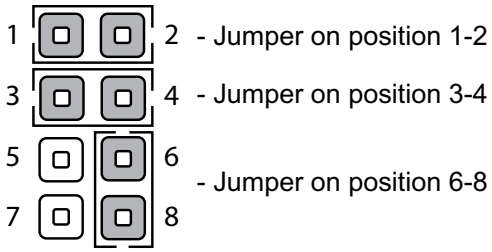



**Figure 8. Class B jumper configuration**

**Security jumper configuration**

To configure the I/O point for security, see Figure 9.

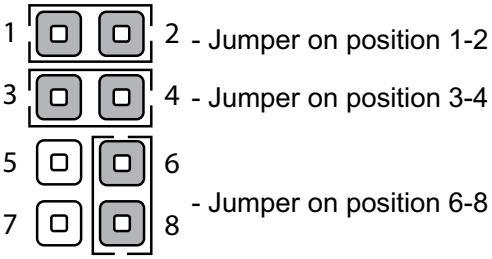



**Figure 9. Security jumper configuration**

# Field wiring

## General field wiring guidelines

Review the following requirements before beginning field wiring:

- The wire size must be 18 AWG minimum and comply to local code.
- Conductors must test free of all grounds.
- Document each circuit EOL value in the FACU for future reference.

**IDC requirements only**:

- Use a 1W 3.3kOhm end-of-line resistor (EOLR) 4081-9002 for Class B installation.
- Program the FACU for the appropriate EOLR installed during Class B **retrofit installations.** Compatible EOLR values are:

| | |
|---|---|
| - 2.0kOhms | - 4.7kOhms (733-896) |
| - 2.2kOhms | - 5.1kOhms |
| - 3.4kOhms | - 5.6kOhms |
| - 3.6kOhms + 1.1kOhm | - 6.34kOhms |
| - 3.9kOhms (734-171) | - 6.8kOhms |

**Note:** The 3.6kOhm + 1.1kOhm EOLR is a special waterflow and tamper switch configuration for retrofit jobs.

**Security point requirements only**:

- Use a 1/2W 8.2kOhm EOLR (378-090).

## Detector-only wiring

Review the following requirements before wiring detector-only circuits:

- The 2.0kOhm EOLR is not supported when using the 566-710 25 V Regulator Module.
- When using a smoke detector base with a relay, only wire one base or relay on an IDC.
- The maximum line resistance is 50 Ohms.
- Class A loop circuit pairs:
  - IO1 and IO2 (P1)
  - IO3 and IO4 (P2)
  - IO5 and IO6 (P3)
  - IO7 and IO8 (P4)

To connect the Zone/Relay Module for detector-only circuits using **Class A wiring:**

1. Route the wiring from IO1+ and IO1- on TB1 of the Zone/Relay Module to the appropriate inputs on the first device. See Figure 10.
2. Route the wiring from the first device to the next as in/out style.

**Note:** T tapping is not permitted.

3. Repeat in/out style route wiring for each device.
4. Route the wiring from the last device to the card and connect the wiring to the IO2+ to IO2- on TB1 of the Zone/Relay Module.
5. Repeat steps 2-4 for each zone.

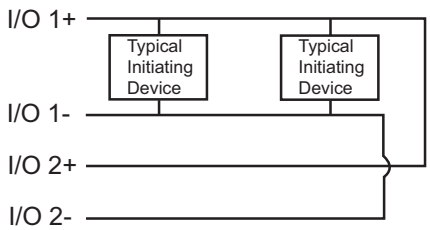



**Figure 10. Class A detector-only wiring**

**Note:** Up to four Class A zones can be configured on a Zone/Relay Module. To configure a second zone, use IO3 and IO4, for a third zone IO5 and IO6, and for a fourth zone IO7 and IO8.

# Field wiring, *continued*

**Detector-only wiring**

To connect the Zone/Relay Module for detector-only circuits using **Class B wiring:**

1. Route the wiring from IO1+ and IO1- on TB1 of the Zone/Relay Module to the appropriate inputs on the first device. See Figure 11.
2. Route the wiring from the first device to the next as in/out style.

**Note:** T tapping is not permitted.

3. Repeat in/out style route wiring for each device.
4. Route the wiring from the last device to the EOLR.
5. Repeat steps 2-4 for each zone.

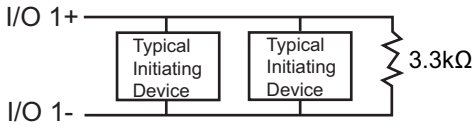



**Figure 11. Class B detector-only wiring**

**Shunt-only wiring guidelines**

Review the following requirements before wiring shunt-only circuits:

- The maximum line resistance for EOLR values of 3.3 kOhm and above is 800 Ohms.
- The maximum line resistance for EOLR values below 3.3 kOhm is 600 Ohms.
- Class A loop circuit pairs:
  - IO1 and IO2 (P1)
  - IO3 and IO4 (P2)
  - IO5 and IO6 (P3)
  - IO7 and IO8 (P4)

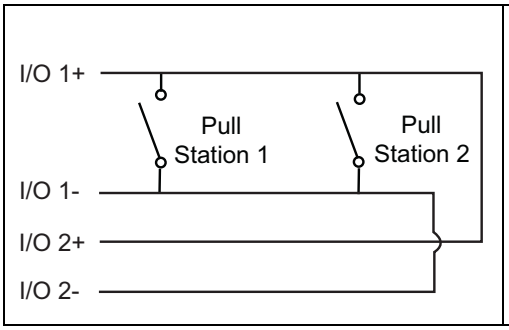



**Figure 12. Class A shunt-only wiring**

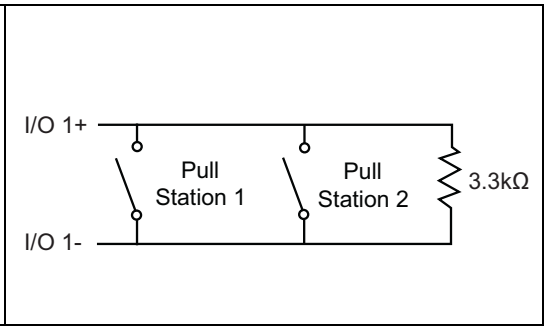



**Figure 13. Class B shunt-only wiring**

**Class B normally closed wiring**

Review the following requirements before wiring the Zone/Relay Module for Class B normally closed jobs:

- Use a 1W 2.2kOhm EOLR (734-341).
- Wire a maximum of four normally closed devices with a 1W 1kOhm shunt resistor (733-973).
- The maximum line resistance is 50 Ohms.

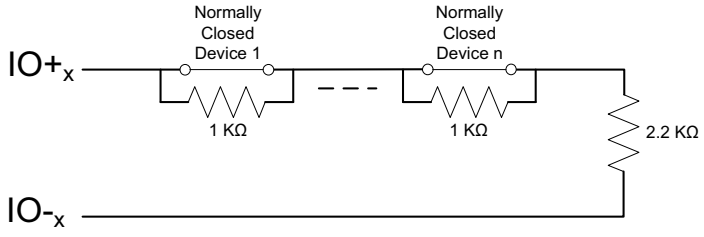



**Figure 14. Class B normally closed wiring**

# Field wiring, *continued*

**Mixed detector and shunt wiring**

Review the following requirements before wiring Class A and B mixed detector and shunt circuits:

- The minimum earth fault impedance with a 3.3 kOhm EOLR and above is 10 kOhm.
- The minimum earth fault impedance with an EOLR below 3.3 kOhm is 1 kOhm.
- Detectors with relay bases are not permitted.
- The maximum line resistance is 50 Ohms.
- Class A loop circuit pairs:
  - IO1 and IO2 (P1)
  - IO3 and IO4 (P2)
  - IO5 and IO6 (P3)
  - IO7 and IO8 (P4)

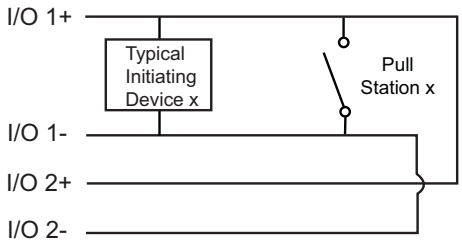



**Figure 15. Class A mixed detector and shunt wiring**

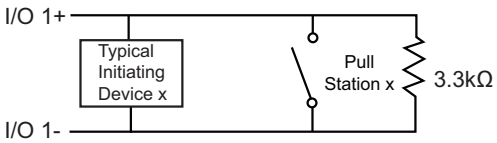



**Figure 16. Class B mixed detector and shunt wiring**

**Class B waterflow and tamper same-circuit wiring**

Review the following requirements before wiring the Zone/Relay Module for Class B waterflow and tamper same-circuit regular, and retrofit jobs:

- Use a 1W 3.3kOhm EOLR (733-893) and a 1W 470 Ohms EOLR (734-204).
- The maximum line resistance is 50 Ohms.

**Note:** For Class B installations, program the FACU for a 3.3 kOhm EOLR. An alternate FACU programmed configuration of a 3.6 kOhm+1.1 kOhm is permitted for retrofit installations.

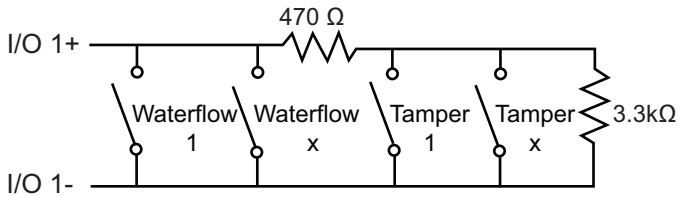



**Figure 17. Class B waterflow and tamper same-circuit wiring**

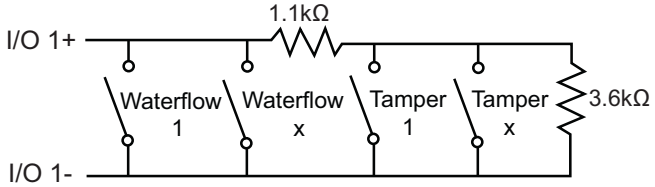



**Figure 18. Class B waterflow and tamper same-circuit wiring alternate values**

# Field wiring, *continued*

**Class A and Class B waterflow and tamper individual circuit wiring**

- The maximum line resistance for EOLR values of 3.3 kOhm and above is 800 Ohms.
- The maximum line resistance for EOLR values below 3.3 kOhm is 600 Ohms.
- Class A loop circuit pairs:
  - IO1 and IO2 (P1)
  - IO3 and IO4 (P2)
  - IO5 and IO6 (P3)
  - IO7 and IO8 (P4)

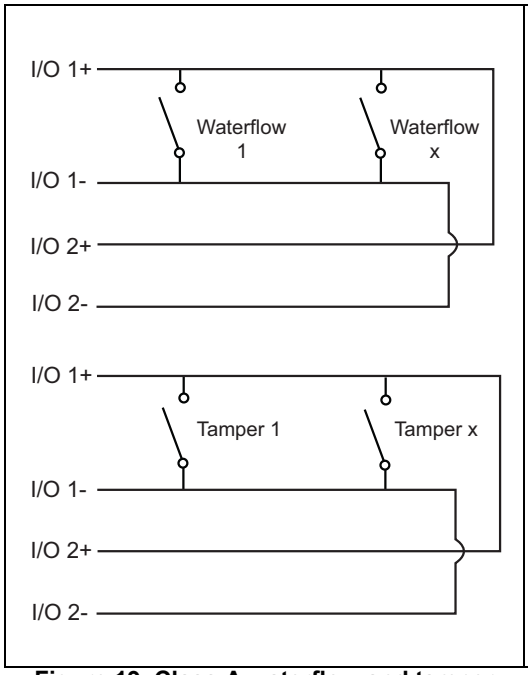



**Figure 19. Class A waterflow and tamper individual circuit wiring**

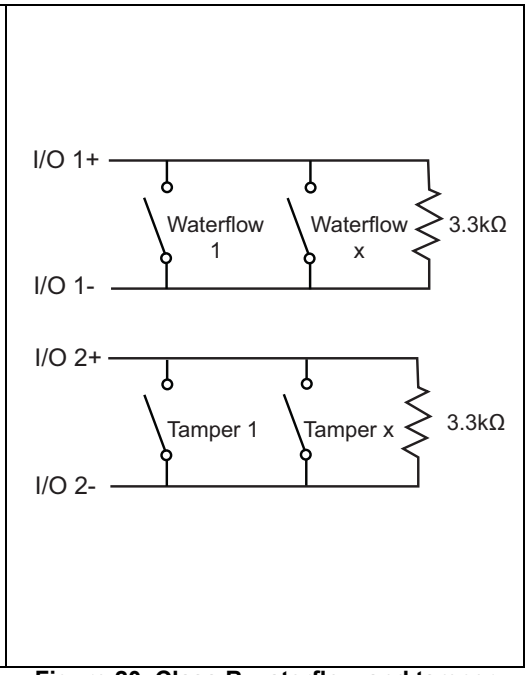



**Figure 20. Class B waterflow and tamper individual circuit wiring**

**Four-wire detector wiring**

Review the following requirements before wiring the Zone/Relay Module for four-wire detector circuits:

- Use a Class B wiring configuration.
- Use a 1W 3.3 kOhm EOLR 4081-9002.
- The minimum earth fault impedance with a 3.3 kOhm EOLR and above is 10 kOhm.
- The minimum earth fault impedance with an EOLR below 3.3 kOhm is 1 kOhm.
- The maximum IDC line resistance is 50 Ohms.

To connect the Zone/Relay Module for four-wire detector wiring, see Figure 21.

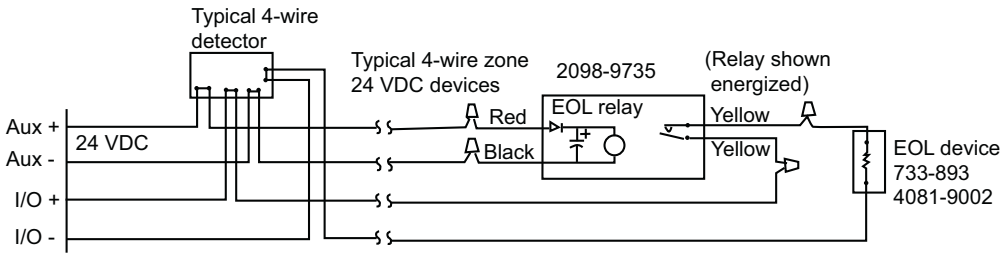



**Figure 21. Four-wire detector wiring**

# Field wiring, *continued*

## Security wiring

Review the following requirements before wiring the Zone/Relay Module for security circuits:

- The maximum line resistance for zones that connect to contacts only is 800 Ohms.
- Wire a maximum of five normally closed devices with a 12 kOhm shunt (378-069).
- Wire a maximum of five normally open devices with a 5.6 kOhm resistor (378-046).

To connect the Zone/Relay Module using security device wiring, see Figure 22 through Figure 24.

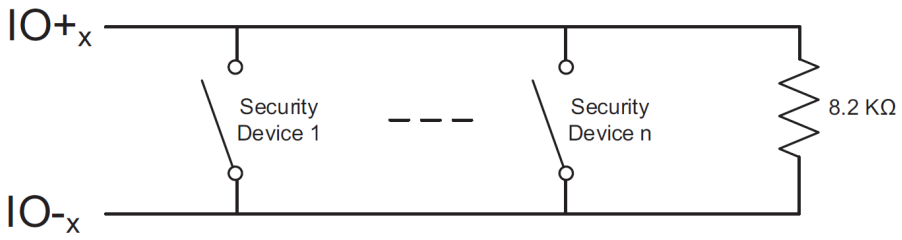



**Figure 22. Normally open security wiring**

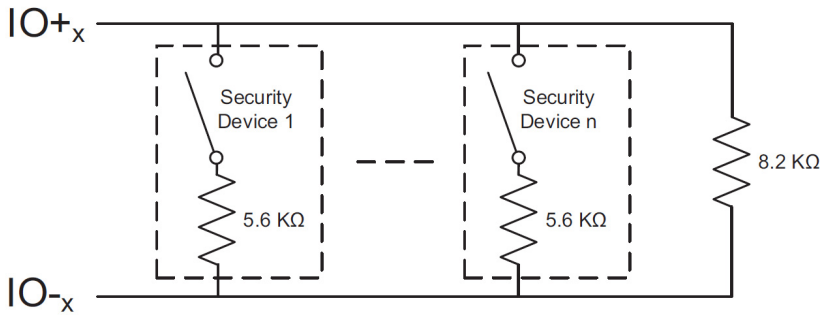



**Figure 23. Normally open security wiring with 5.6kOhm resistor**

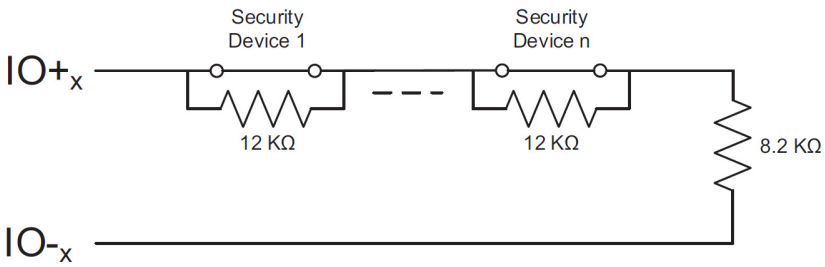



**Figure 24. Normally closed security wiring with shunt**

## Relay wiring

Review the following requirements before wiring the Zone/Relay Module for relay circuits:

- [1] The load connected through relays must not draw more than 2 A at 30 V DC or 30 VAC, non-inductive.
- [2] Ensure jumpers are correctly configured for normally open or normally closed contacts.

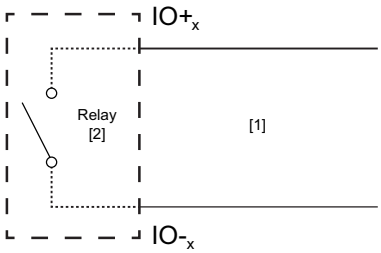



**Figure 25. Relay wiring**

# Specifications

## Card Specifications

**Table 1: Card specifications**

| | |
|---|---|
| **Card size:** | 4 inches x 5.65 inches (10.16 cm x 14.35 cm) |
| **Supports:** | Any combination of the following:<br>- Up to eight Class B conventional initiation zone<br>- Up to four Class A conventional initiation zone<br>- Up to eight relays<br>- Up to eight security points |
| **Operating conditions:** | |
| Operating temperature range | 32°F - 120°F (0°C - 49°C) |
| Operating humidity range | Up to 93% relative humidity at 100°F (38°C), non-condensing |
| **Electrical specifications:** | |
| Relay contact rating | 2 A at 30 V DC or 30 VAC non-inductive (dry contacts) |
| Conventional zone ratings | Voltage rating: 32 V max<br>Current rating: 74 mA max<br>Maximum detector standby load: 3.0 mA<br>(see document 579-832 for a list of compatible detectors)<br>Maximum wiring impedance: 50 Ohms max<br>Conventional zone circuits are supervised and power limited |
| Earth detection: | 3.3kOhm EOLR and above = 10kOhms<br>2.2kOhm EOLR and below = 1kOhms |
| Card ratings: | Maximum card current draw: 619 mA<br>Supply voltage: 24 V as supplied by the panel |

**Table 2: Battery current**

| | Standby current | Alarm current | Condition |
|---|---|---|---|
| Base card | 27 mA | 27 mA | All circuitry except for I/O |
| For each I/O add, if set for: | | | |
| Relay | 0 mA | 9 mA | If de-energized normally |
| Relay | 9 mA | 0 mA | If energized normally |
| Zone, 2k EOLR | 11 mA | 60 mA | Class B zone |
| Zone, 2.2k EOLR | 10 mA | 60 mA | Class B zone |
| Zone, 3.3k EOLR | 7 mA | 60 mA | Class B zone or<br>driving side of Class A loop (odd numbered I/O points only) |
| Zone, 3.4k EOLR | 7 mA | 60 mA | Class B zone |
| Zone, 3.3k + 470 Ohms | 6 mA | 60 mA | Waterflow = alarm<br>Tamper = current limited |
| Zone, 3.9k EOLR | 6 mA | 60 mA | Class B zone |
| Zone, 4.7k EOLR | 5 mA | 60 mA | Class B zone |
| Zone, 3.6k + 1.1K | 5 mA | 60 mA | Waterflow = alarm<br>Tamper = current limited |
| Zone, 5.1k EOLR | 5 mA | 60 mA | Class B zone |
| Zone, 5.6k EOLR | 5 mA | 60 mA | Class B zone |
| Zone, 6.34k EOLR | 4 mA | 60 mA | Class B zone |
| Zone, 6.8k EOLR | 4 mA | 60 mA | Class B zone |
| Normally closed zone, 2.2k EOLR | 10 mA | 7 mA | Normally closed Class B zone |
| Class A return | 9 mA | 9 mA | Return side of a Class A loop (even numbered I/O points only), indicates that a zone does not have an open circuit |
| Detector load | 3 mA | 0 mA | Assumes load of 30 Simplex detectors, detector load in alarm is included in zone alarm current |
| Security, 8.2k EOLR | 2mA | 3mA | Security point |