

# 2004 Foundation Series Fire Alarm Control Unit Installation Guide

579-1402AC Rev B





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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 AUTOCALL™ PRODUCT THAT APPEARS DAMAGED** Upon unpacking your Autocall 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 Autocall 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 Autocall 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.



**SULFURIC ACID WARNING** Battery contains sulfuric acid, which can cause severe burns to the skin and eyes and can destroy fabric. Replace any leaking or damaged battery while wearing appropriate protective gear. If you come in contact with sulfuric acid, immediately flush skin or eyes with water for 15 minutes and seek immediate medical attention.

### 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 NFPA-72, 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.

## 1.1 FCC Information

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the door of this equipment is a label that contains, among other information, the following product identifier: US: 5QWAL01A2004. If requested, the number must be provided to the telephone company.

In the event of equipment malfunction, all repairs should be performed by an authorized agent. It is the responsibility of users requiring service to report the need for service to our company or to one of our authorized agents. Service can be arranged through our office at:

Autocall Products

6 Technology Park Drive

Westford, MA 01886 USA

+1-978-577-4000

The Ringer Equivalence Number (REN), which is 01 for the DACT installed in this fire alarm control unit, is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total number of RENs, contact the local telephone company. The REN is part of the product identifier, which uses the format US:AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (for example 01 is a REN of 0.1)

If the DACT causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify you as soon as possible. If your service is discontinued, you will be advised of your right to file a complaint with the FCC.

The telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make the necessary modifications to maintain uninterrupted service.

If trouble is experienced with the DACT, please contact Tyco Safety Products at the location identified above. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

## 1.2 DACT Wiring overview

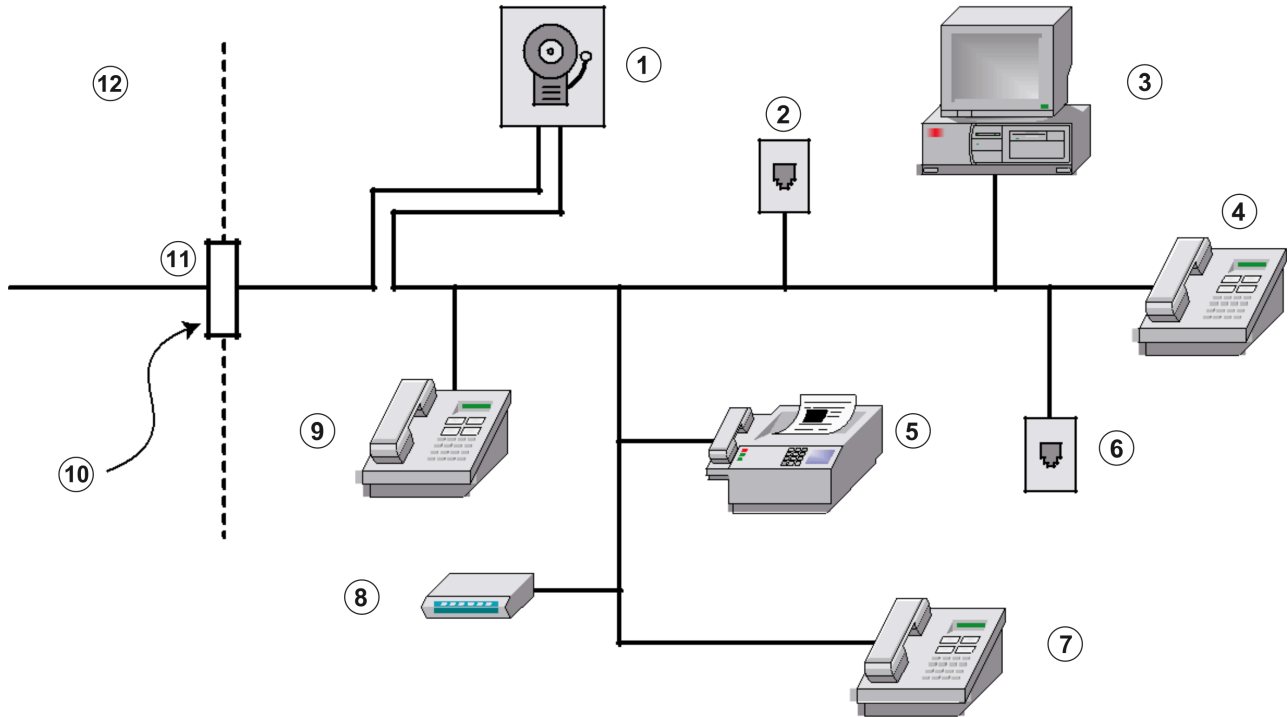


Figure 1: Digital alarm communications transmitter (DACT) wiring overview

Callout	Component
1	DACT
2	Unused RJ-11 jack
3	Computer
4	Telephone
5	Fax
6	Unused RJ-11 jack
7	Telephone
8	Answering system
9	Telephone
10	Network demarcation point
11	Telephone line
12	Network service provider's facilities

### Alarm Dialing Equipment

In an emergency, this equipment must be able to take control of the telephone line and place a call. It must do so even if other equipment (telephone, answering system, computer modem) already has the telephone line in use. The DACT must be electrically in series with, and ahead of, all other equipment attached to the same telephone line. Proper installation is depicted in Figure 1. If you have any questions concerning these instructions, consult your telephone company or a qualified installer about connecting the alarm dialing equipment for you.

## 2 Overview

The A004-9101 is a conventional fire alarm control unit (FACU). The system includes four Class B initiating device circuits (IDCs) and one notification appliance circuit (NAC). You can wire the NAC with Class A or Class B wiring.

Use the built in digital alarm communications transmitter (DACT) for remote station or central station monitoring.

The A004-9101 control unit uses audible and visible indications during alarm, supervisory, or trouble conditions. If any of these conditions occur, the system activates the applicable notification appliances, respective LEDs, and the piezo. The indications continue until an operator acknowledges the condition.

### 2.1 Features

- User interface contains LEDs and a keypad
- System power supply 3 A, 24 V filtered
- Four Class B IDCs
- One Class A or B NAC
- On-board dual DACT
- Three on-board relay circuits:
  - Default for alarm
  - Supervisory
  - Trouble
- Two auxiliary power outputs:
  - Aux 1: Non-resettable power
  - Aux 2: Resettable power
- USB service port
- Connection to interface with the optional city card module
- Communication channel for remote annunciators
- Battery-backed, non-volatile memory preserves logs, time and date information and disabled points on AC loss



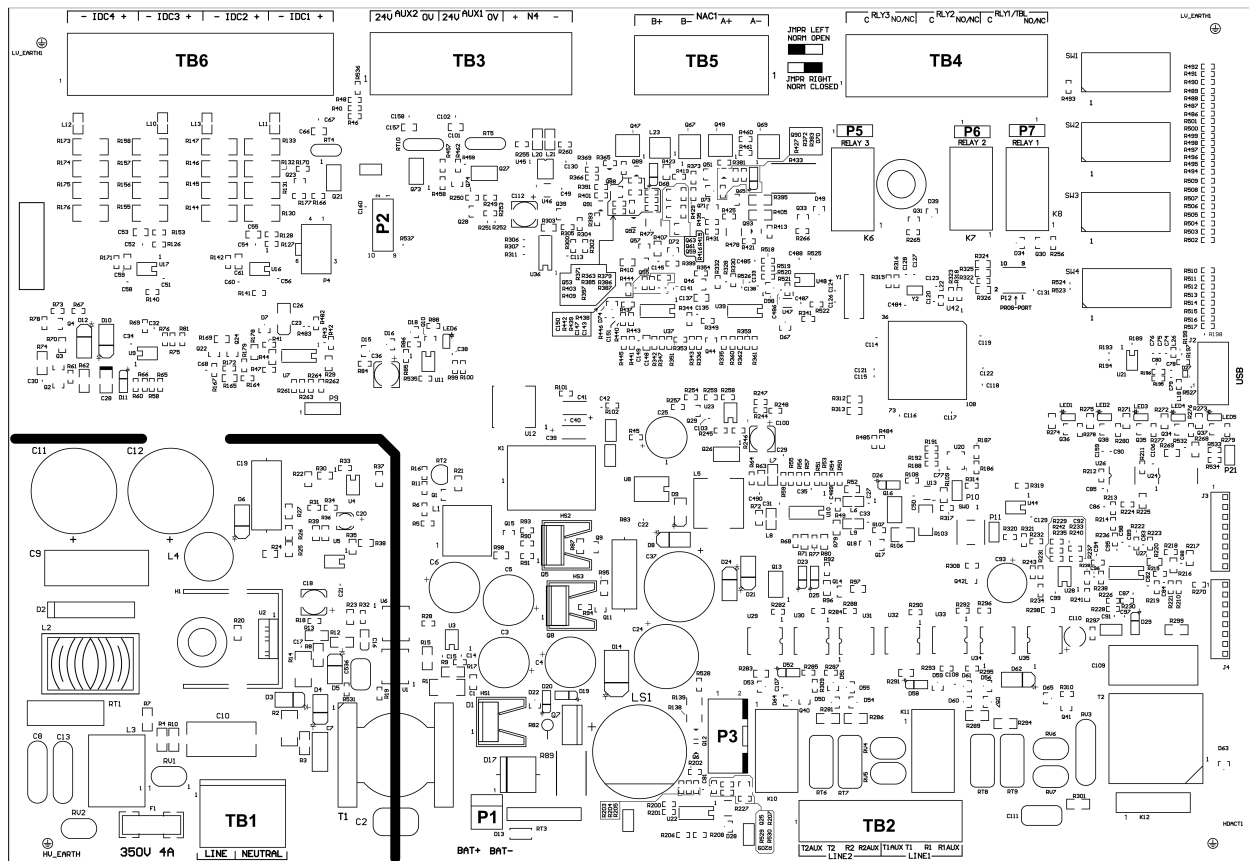


Figure 2: A004-9101 control unit board

Table 1: Description of the main components

Identifier	Description	Identifier	Description	Identifier	Description
TB1	AC supply	TB5	NAC1	P3	City card connector
TB2	Dual DACT	TB6	IDC1 to IDC4	P7	Jumper for relay-1 setting
TB3	Annunciator and aux. power	P1	Battery terminal	P6	Jumper for relay-2 setting
TB4	Relays	P2	User interface connector	P5	Jumper for relay-3 setting

## 2.2 Power supply specifications

This section lists the AC power and battery specifications for the A004-9101 FACU.

### 2.2.1 AC power specification

The A004-9101 FACU operates on either of the following power inputs:

- 120 VAC, 60 Hz, 4 A
- 240 VAC, 50 Hz, 3 A

The FACU automatically detects the voltage. You do not require a jumper or switch to select the configuration.

### 2.2.1.1 Replacing the fuse

To replace the fuse, complete the following steps:

1. At the breaker, remove the AC power from the control unit.
2. Remove the insulating cover of the FACU. The insulating cover has a high voltage warning on the front.
3. Open the flap cover and remove the AC mains wiring connected to TB1.
4. Remove the fuse **F1** from the fuse holder and check if the fuse is blown.
5. If the fuse is blown, replace it with a fuse that has the following ratings:

- Voltage: 350 VAC

- Current: 4 A

- The fuse must be type 209 by Littlefuse.

**Note:** Only a qualified service technician can replace the fuse with the specified rating 350 VAC and 4 A.

6. Connect to the mains and reattach the safety cover before switching on the mains.

### 2.2.2 Battery specification

**Note:** Only use sealed lead acid batteries.

Maximum battery charger capacity: 12.7 Amps Hours

The A004-9101 FACU can hold a maximum of two 12 VDC, 7 Ah batteries.

The dimensions for a single battery must be within: 151 mm x 65 mm x 94 mm (L x W x H).

Batteries up to 12.7 Ah require an external battery cabinet: A009-9801.

#### 2.2.2.1 Replacing the batteries

1. If the AC power fails, the system operates from standby batteries only for a specified time and only if the batteries are properly maintained and replaced regularly.
2. This system meets NFPA requirements for operation at 32°F to 120°F (0°C to 49°C), up to 93% relative humidity at 90°F (32°C). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity.

To replace the batteries, complete the following steps:

1. Remove the AC power at the breaker from the control unit.
2. Remove the insulating cover of the FACU. The insulating cover has a high voltage warning on the front.
3. Remove the red wire from the positive terminal of the battery.
4. Remove the black wire from the negative terminal of the second battery.
5. Replace the batteries with new batteries that have the correct Ah rating.

## 3 Installing the FACU

The A004-9101 FACU is surface mount only. This section describes how to install the A004-9101 control unit.

### 3.1 Unpacking the FACU

Before you begin installation, ensure your shipment includes the following contents:

- A sheet metal cabinet, a metal door and an assembled motherboard.
- A transparent plastic bag that contains the following contents:
  - Door lock key
  - Battery harness
  - Operating instruction page

### 3.2 Determining a suitable location for the FACU

To determine a suitable location for the A004-9101 back box, ensure you adhere to the following guidelines:

- Choose a space that is well-ventilated, clean and dust-free.
- Locate the back box near a dedicated AC individual branch circuit with an earth ground to maintain a consistent supply of voltage.
- Keep the back box away from sources of heat, including direct sunlight.
- Keep the back box away from sources of vibration or physical shock.
- Keep the back box away from sources of radio frequency interference (RFI), for example, radio transceiver base station and hand held unit.
- Isolate the back box from sources of strong electromagnetic field, for example, air conditioners, large fans and large electric motors.
- Mount the back box to the wall so that the top of the enclosure is no more than six feet above the floor. For more information, see [Mounting the back box](#).

### 3.3 Mounting the back box

To mount the back box, complete the following steps:

1. Unlock the control unit cabinet with the supplied key.
2. Remove the earth cable, then remove the control unit's hinged door and black insulating cover. Keep the control unit's door and insulating cover in a secure location.
3. Place the control unit against the wall and mark the top two keyholes. Keep the control unit in a secure location.
4. Pre-drill the marked top two keyholes.
5. Install the two top fasteners in the wall. Ensure that the screw heads are protruding.
6. Place the back box over the top two screws. Ensure that the back box is level and secure.
7. Mark the lower two holes. Remove the back box from the wall and drill the mounting holes.
8. Mount the back box. Install the remaining fasteners and tighten each screw.
9. Complete the entire wiring and terminations as described in [Wiring the A004-9101 FACU](#).
10. Mount the black insulating cover and the control unit's hinged door back onto the FACU.

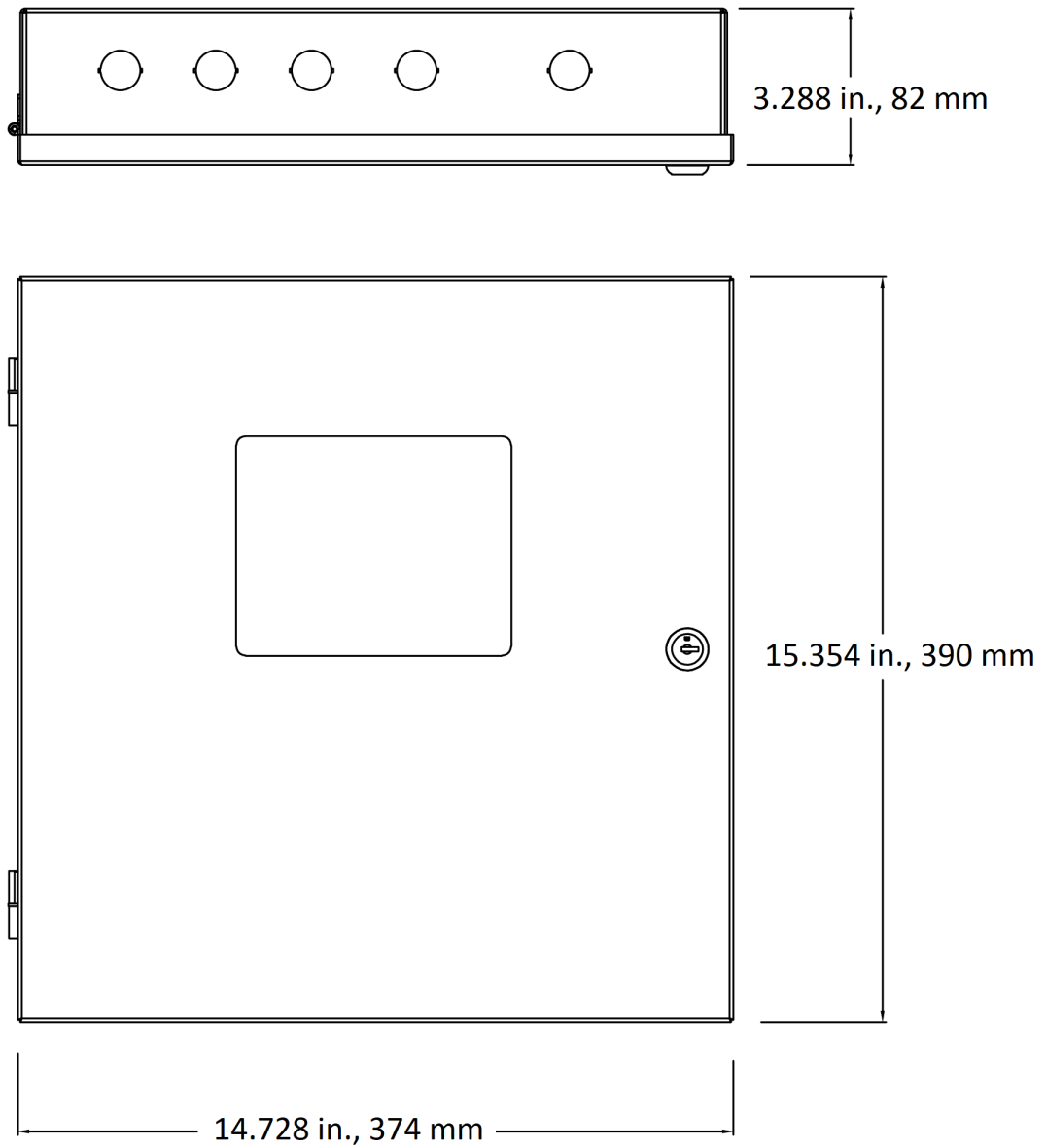


Figure 3: Dimensions of cabinet with door

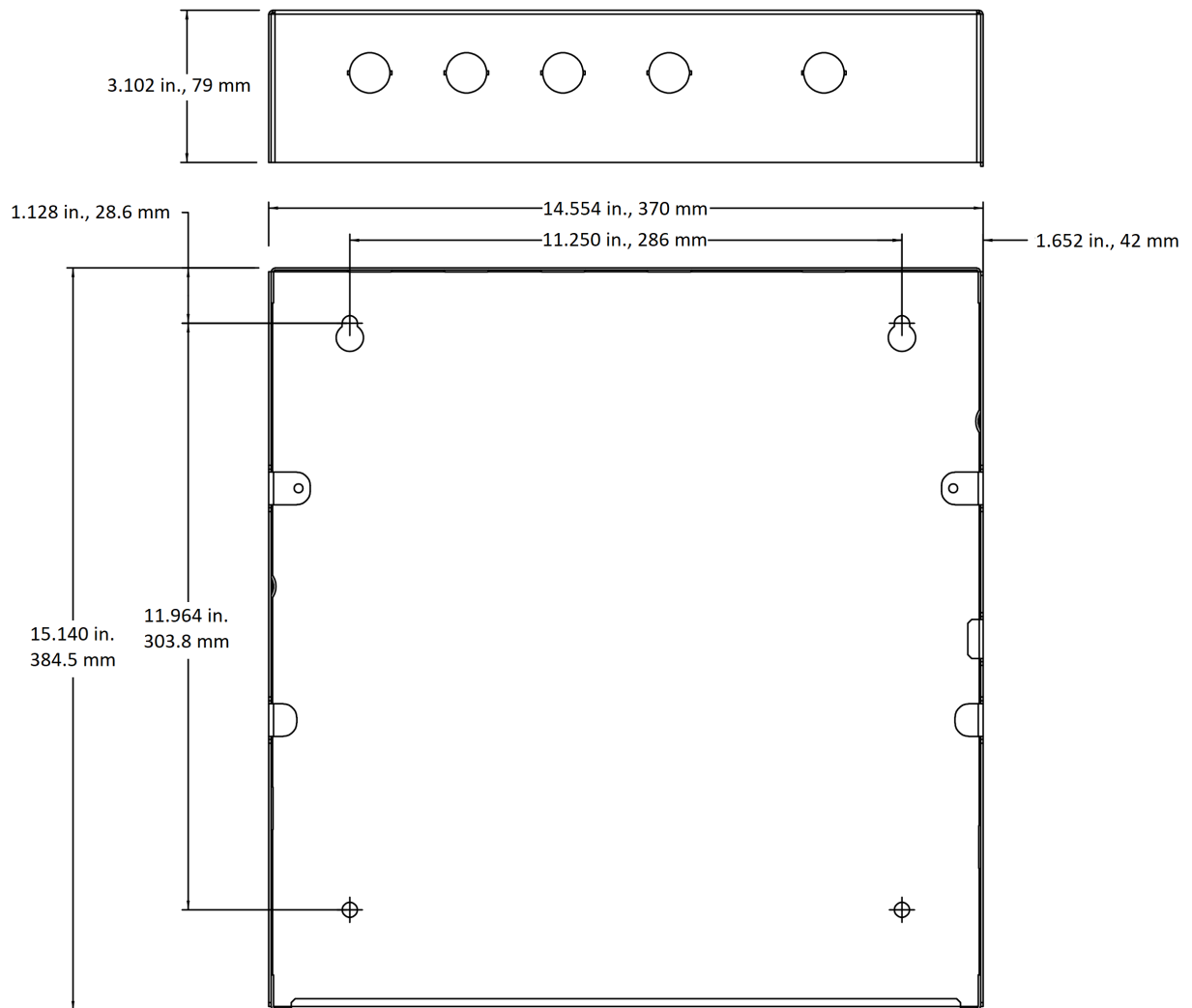


Figure 4: Dimensions of cabinet without door



### 3.4 Connecting conduits

Eight knockouts are provided for conduit connection. The location of each knockout is shown in Figure 6. To connect a conduit, complete the following steps:

1. Select the suitable knockout or knockouts and pull the conductors in the box.
2. Separate the non-power limited (NPL) wiring from the power limited (PL) wiring.
3. Maintain a minimum distance of 0.25 in. (6.35 mm) between NPL and PL wiring.
4. Power all auxiliary relay loads from the AUX power circuit or from a regulated 24 VDC power limited power supply that is UL listed for fire protective signaling service.

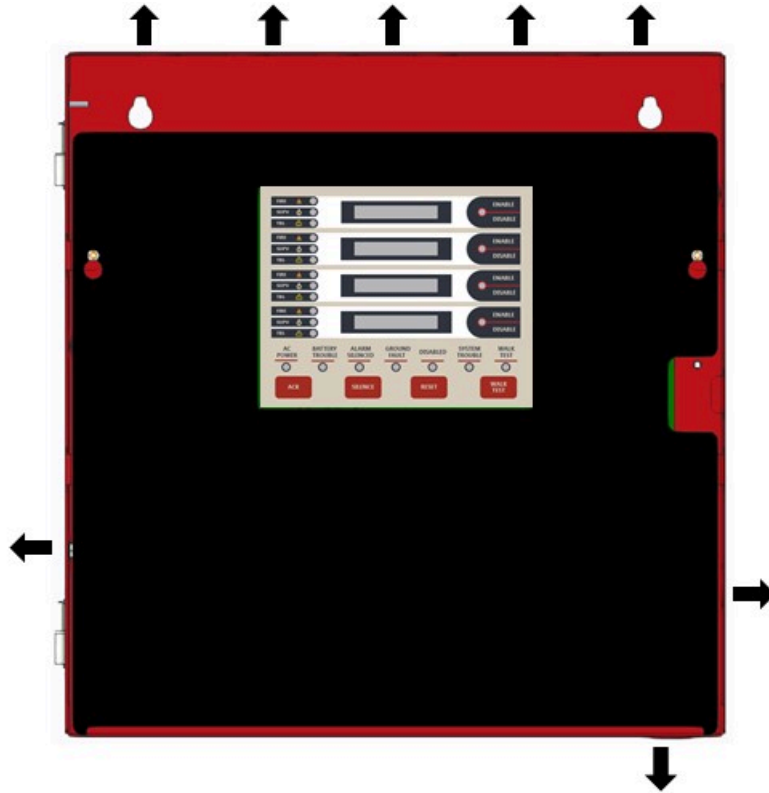


Figure 6: Knockout locations

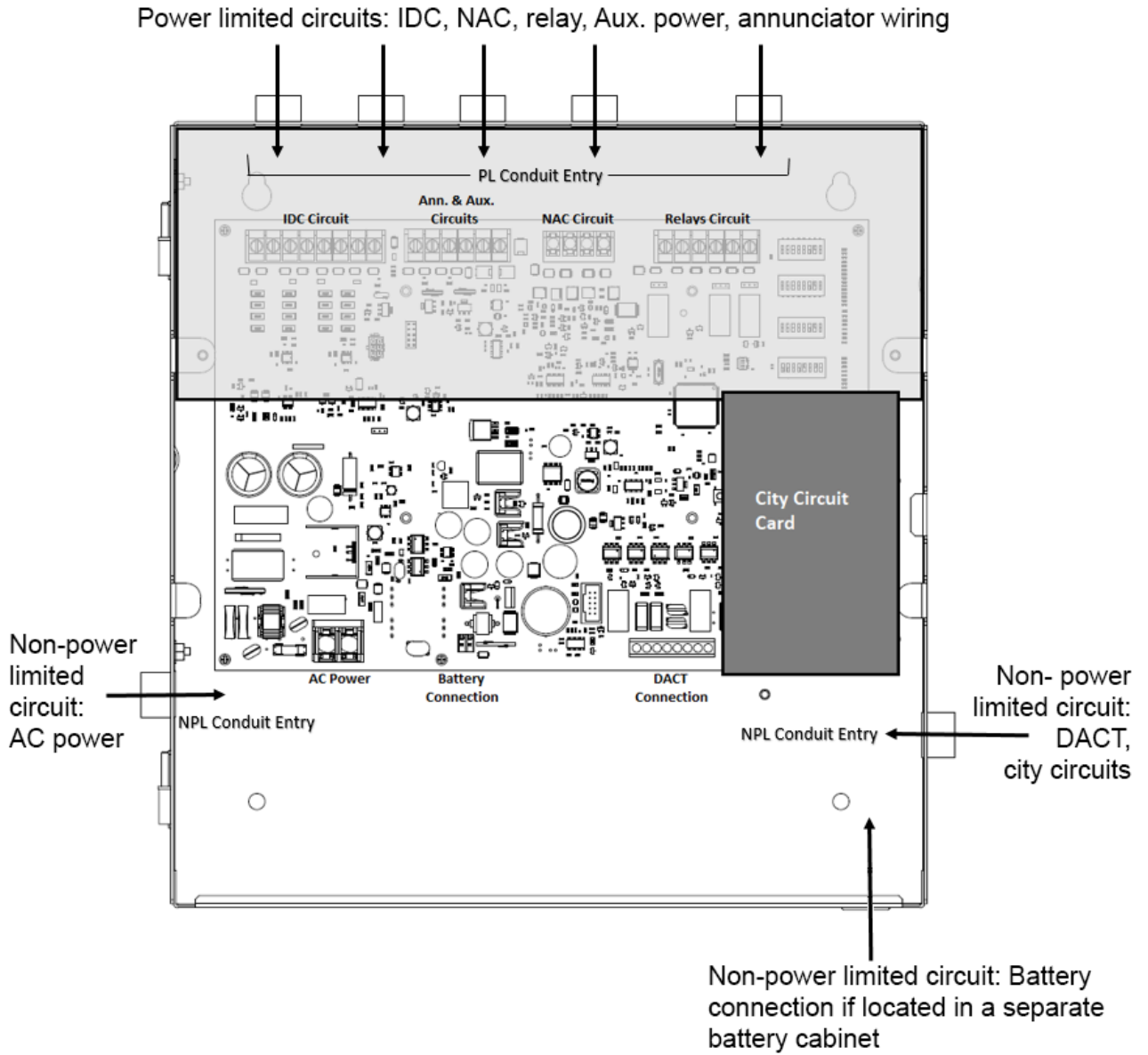


Figure 7: Power limited (shaded) and non-power limited wiring areas



## 4 Wiring the FACU

This section describes how to wire the A004-9101 control unit.

### 4.1 Wiring the A004-9101 FACU

To connect power-limited (PL) systems, ensure you adhere to the following guidelines:

1. Install and route PL field wiring, for example, IDC, NAC and Aux, in the shaded areas shown in Figure 7.
2. Separate the PL circuit wiring from the NPL circuit wiring in the cabinet.
3. Maintain a minimum of 0.25 in. (6.35 mm) space between NPL and PL wiring.
4. Conductors test free of all grounds.
5. Provide a system ground for earth detection and lightning protection devices.

**Note:** According to NFPA780, check that this connection complies with approved earth detection. Earth detection threshold: 10 k ohm minimum from either positive or negative terminals.

6. For all wiring, use only copper conductors unless noted otherwise.
7. Keep excess slack to a minimum inside the back box enclosure.
8. Use wire ties to neatly dress and bundle the circuit wiring together.
9. Use unshielded wire. If you are using shielded wire, leave the shield unterminated or open.
10. Do not run wires through elevator shafts.

#### 4.1.1 Wiring the AC supply and earth ground connection

The primary power required for the A004-9101 FACU is:

- 120 VAC, 60 Hz, 4 Amp

or

- 240 VAC, 50 Hz, 3 Amp

You do not require a jumper or switch to select the AC power as the FACU automatically detects the voltage.

To wire the AC power supply, ensure you adhere to the following guidelines:

1. Before handling the AC feed, use a voltmeter to verify that the AC feed is not live.
2. De-energize and tag the circuit to prevent injury.
3. Wire the AC power from a dedicated circuit breaker or fuse that is rated at 20 A max. in accordance with NFPA 72, NEC and local codes.

**Note:**

- Each AC supply wire must be between 14 AWG minimum and 12 AWG maximum.
- AC power wiring is supervised and non-power limited.

4. Remove the insulating cover of the FACU. The cover has a high voltage warning on the front.
5. Remove the nut from the grounding stud in the cabinet.
6. Connect a 12 AWG copper ground wire from a safety ground in the electrical distribution unit to the control unit's safety ground stud and secure with a nut.
7. Open the flap cover to connect the line and neutral wires from the AC mains to the TB1 terminal of the FACU.
8. Apply the AC power to the FACU after the system is completely installed and visually checked.

**Note:** The AC power must be applied before connecting the red wire to the positive terminal of battery two.

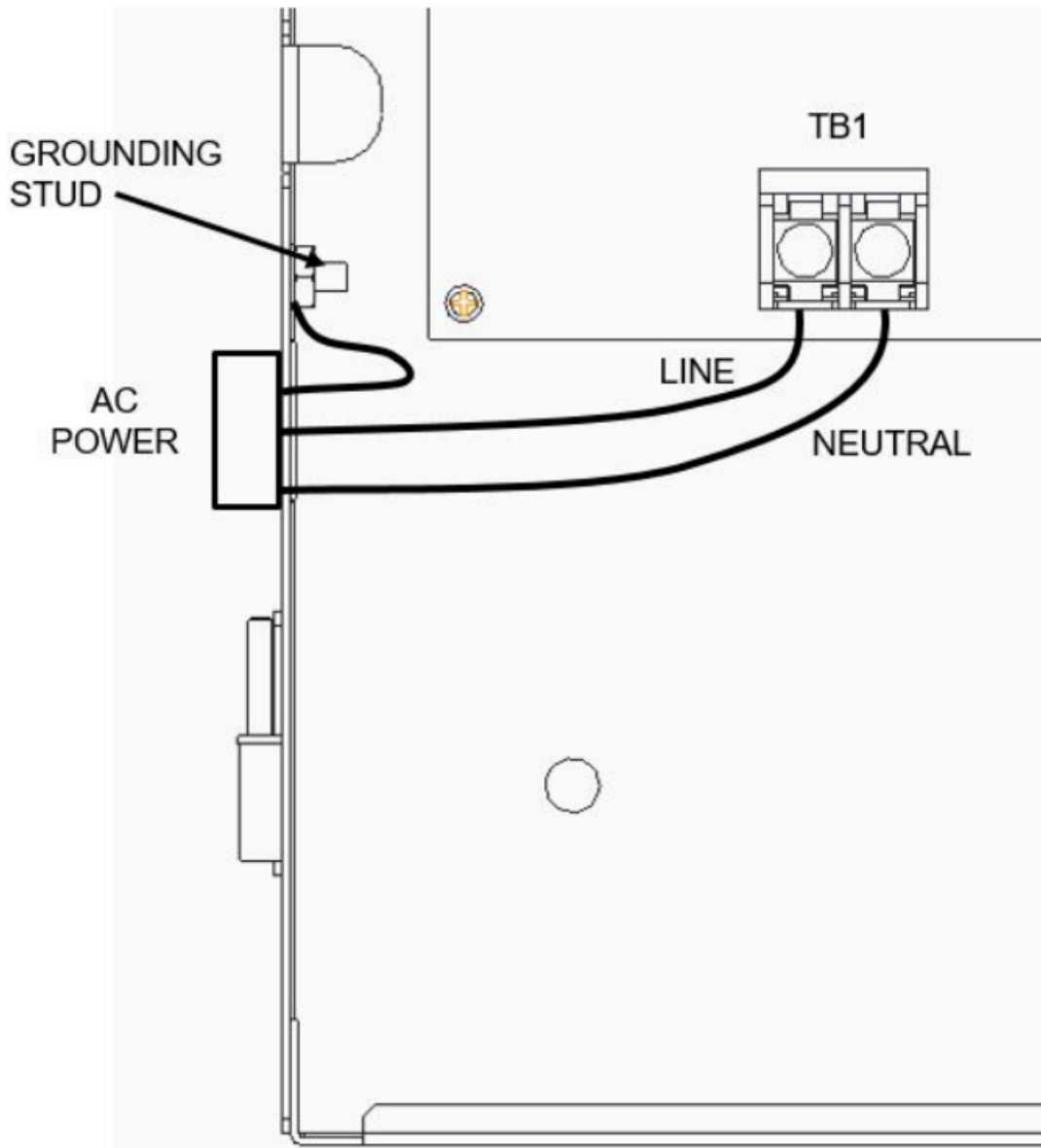


Figure 8: AC power wiring

#### 4.1.2 Connecting the backup batteries

Ensure the batteries are the sealed lead acid type. Use the supplied battery harness to connect up to two 12 VDC, 7 Ah batteries inside the FACU cabinet. For more information, see [Connecting the battery harness](#). The system requires a 24 V battery backup. Use the battery harness to connect two 12 V batteries in series to the FACU.

### 4.1.3 Connecting the battery harness

The mating spade lug on the battery needs to be 0.250 in. x 0.032 in. (6.35 mm x 0.81 mm). If another size is needed, you need to replace the battery terminal connectors on the supplied battery harness.

To connect the battery harness, complete the following steps:

1. Place both batteries securely inside the cabinet.
2. Ensure the battery wiring is supervised and non-power limited.
3. Connect the black wire to the negative terminal of battery one.
4. Connect the white wire from the positive battery terminal of battery one to the negative battery terminal of battery two.
5. Apply AC power.
6. Connect the red wire to the positive terminal of battery two.

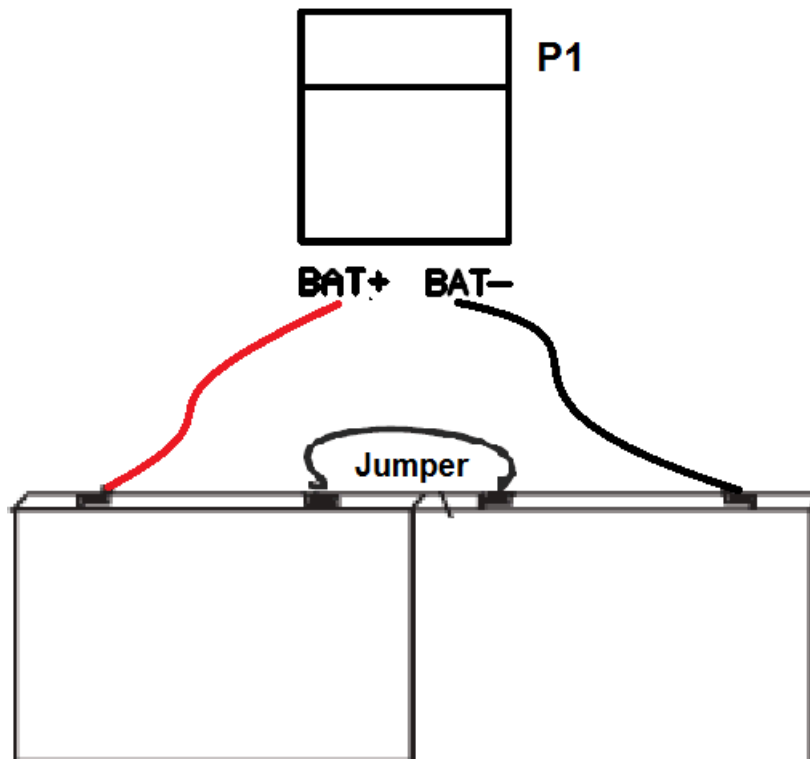


Figure 9: Connecting the battery harness

### 4.1.4 Batteries in the external battery cabinet

To minimize power losses due to wiring from the external battery box to the FACU, ensure you adhere to the following guidelines:

1. Cut or remove the lugs from the long harness provided with the external battery enclosure.
2. Remove the Molex connector from the end of the small harness provided with the FACU.
3. Connect the Molex connector end of the small harness to the long harness.
4. Use the modified long harness to connect the battery connector on the panel (P1) to the batteries mounted in the external cabinet.
5. Mount the battery box less than 20 ft or 609.6 cm from the control unit in accordance with the mounting instructions label in the box.

**Note:** All interconnecting wiring needs to be enclosed in conduit.

### 4.1.5 Enabling the FACU for depleted battery cutout

To enable the **Depleted Battery Cutout** option, complete the following steps:

1. Remove the resistor from the system board.

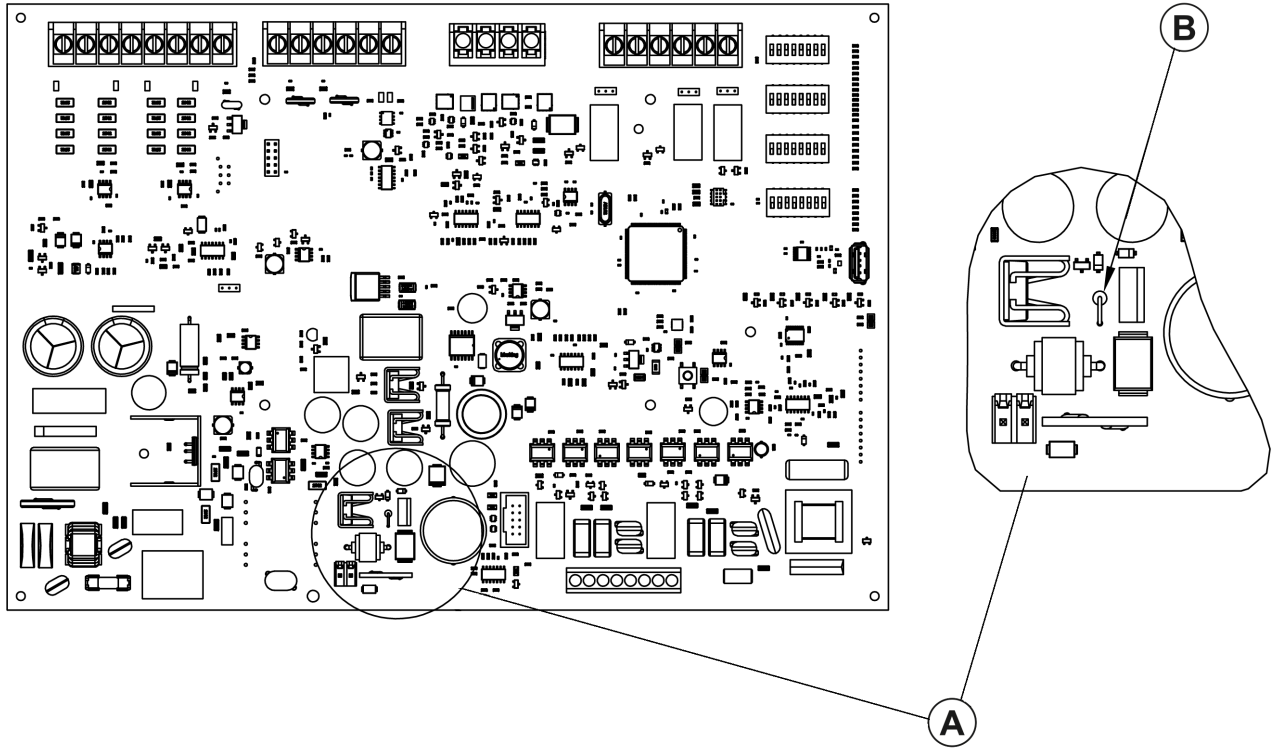


Figure 10: Depleted battery cutout

Table 2: Depleted battery cutout callout information

Callout	Description
A	Magnified area of the PCB
B	Remove this resistor

2. When programming the FACU, enable **Depleted Battery Cutout** system option.
3. Enable **Depleted Battery Cutout** by setting the DIP switch **SW4-7** to on.

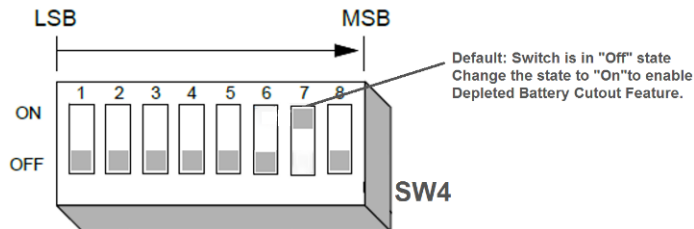


Figure 11: Setting the DIP switch SW4-7 to on

Removing the resistor as shown in Figure 10 and enabling the **Depleted Battery Cutout** system option configures the system to de-energize when AC power is lost and battery power is depleted.

**Note:** When you configure the control unit for **Depleted Battery Cutout**, the system does not power up until you apply AC power.

## 5 Powering up the system

To power up the system, complete the following steps:

1. Check that the AC power is wired to the control unit.
2. Check that the breaker controlling the circuit is off.
3. Connect the negative lead, the black wire, of the battery harness to the battery.  
**CAUTION:** At this point, do not connect the positive lead, the red wire, of the battery harness to the battery.
4. Verify the system's wiring with a volt-ohm meter (VOM). For more information, see [Wiring the A004-9101 FACU](#).
5. Apply AC power.
6. Connect the positive lead, the red wire, of the battery harness to the battery's positive terminal. The piezo sounds and the display lights, unless you have removed the depleted battery resistor. For more information on removing the depleted battery resistor, see [Enabling the FACU for depleted battery cutout](#).
7. On power up, the control unit performs the following actions:
  - The Central Processing Unit (CPU) self-test.
  - The **Link Scan** and checks for a programming unit connection.
  - The **Memory Test** and verifies the system and job-specific software.  
 If the control unit successfully completes the start up self-test, it indicates a warm or cold start trouble that clears automatically. If there are no other troubles in the system, the control unit displays the following indications:
    - Only the green AC Power LED is steady on.
    - All the rest of the LEDs are off.  
 If other troubles exist in the system, the control unit displays the following indications:
      - The yellow system trouble LED starts blinking and continues to blink until an operator acknowledges the trouble. Press the **ACK** key to acknowledge the trouble.
      - If the ground or battery related troubles are present, the respective LEDs start blinking along with the system trouble LED.
      - If the A004-9101 startup self-test fails, the control unit outputs a crash code and attempts the startup sequence after 45 seconds.

## 6 Product description

This section contains the product description of the A004-9101 control unit and a list of compatible devices.

### 6.1 Initiating Device Circuits

The A004-9101 control unit is compatible with the following different types of conventional initiating devices:

- Photoelectric smoke detector
- Heat detector
- Combination photo and heat detector
- Manual pull station

Refer to the *Two-Wire Detector Compatibility Chart 579-1417AC* for more details.

#### 6.1.1 Wiring IDCs

To wire IDCs, ensure you adhere to the following guidelines:

- All wiring is between 18 AWG minimum and 12 AWG maximum.
- Conductors test free of all grounds and stray voltages before attempting to connect to appliances and devices.
- All wiring is supervised and power-limited.
- Leave the supplied 3.3 k, 1/2 W resistor across all unused IDC terminals.
- Terminate Class B circuits with UL listed 3.3 k, 1W end-of-line resistor harness, part number 0733-893AC.

**Note:** In case of retrofit applications, the IDC Class B circuit can additionally support 4.7 k EOL. You are not required to make a selection. Use UL listed 4.7 k EOLR harness 0733-896AC or any other 4.7 k UL listed EOLR.

##### 6.1.1.1 Wiring Class B IDCs

To wire a Class B IDC, complete the following steps:

1. Route the wire from the **- IDC1 +** terminals of the system board to the appropriate inputs on a peripheral initiating appliance.
2. Route the wire from the first appliance to the next. Repeat this step for each appliance.
3. Route the wire from the last appliance to the 3.3 k, 1 W end-of-line resistor harness 0733-893AC. Use UL listed 4.7 k EOLR harness 0733-896AC or any other 4.7 k UL listed EOLR.
4. Do not T-Tap the wiring.

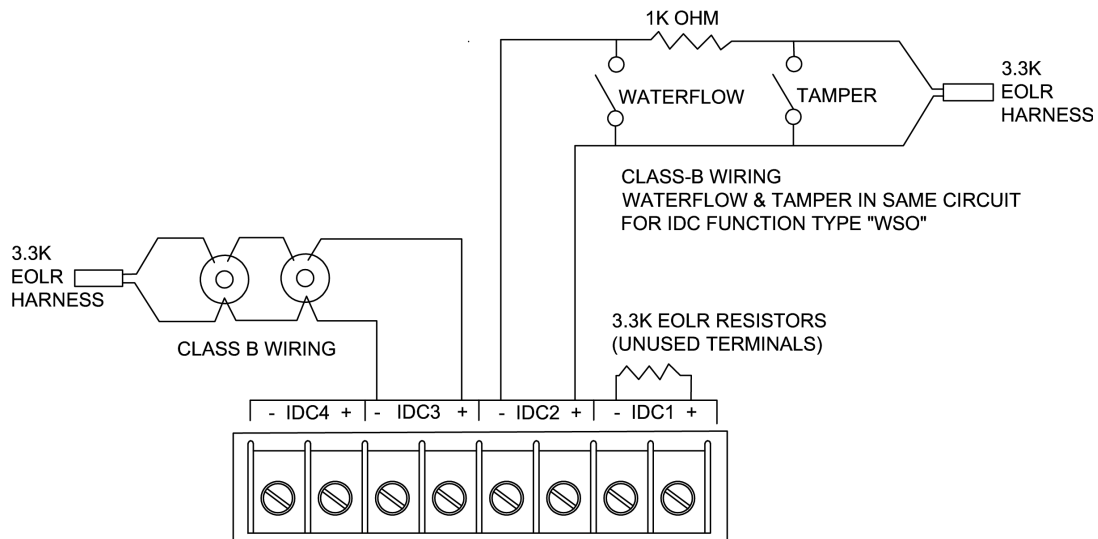


Figure 12: Class B wiring

### 6.1.1.2 Four wire base wiring

For four-wire wiring application, use A4098-9682 four-wire base with the following detectors:

- A4098-9601
- A4098-9602
- A4098-9605
- A4098-9612
- A4098-9613
- A4098-9614
- A4098-9615

When you use the A4098-9682 base, you need to route the auxiliary 24 V power through the A2098-9735 end-of-relay, as shown in Figure 13.

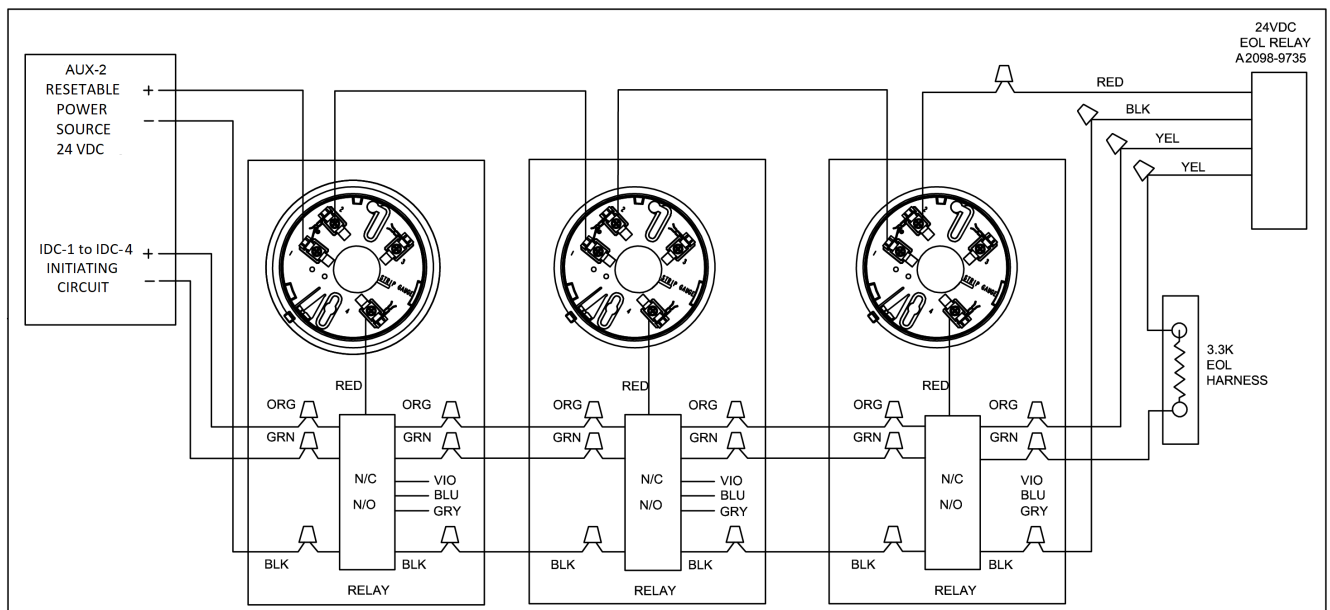


Figure 13: Four wire base wiring

#### Note:

- Only use the Aux-2 resettable Aux power circuit.
- Only use four-wire base wiring in Class B wiring style.

### 6.1.2 IDC wiring specifications

- The maximum wiring resistance for each circuit is 50 ohm.
- Suggested wire is 18 AWG, allow up to 3500 ft. distance from the control unit to the EOLR Class B.
- The maximum detector standby current for each IDC is 3 mA.
- The maximum detector alarm current for each IDC is 75 mA.
- The maximum ripple for each IDC is 2V peak to peak for a voltage range of 15VDC to 30VDC.
- The maximum circuit capacitance for each IDC is 100  $\mu$ F.





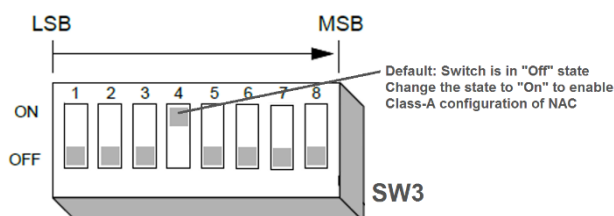
**Table 4: Supported EOL and supervisory current**

EOLR value	Current
3.9 K ohm (0734-171AC)	5.7 mA
4.7 K ohm (0733-896AC)	4.8 mA
5.1 K ohm	4.4 mA
5.6 K ohm	4.0 mA
10 K ohm (Default)	2.2 mA
15 K ohm	1.4 mA

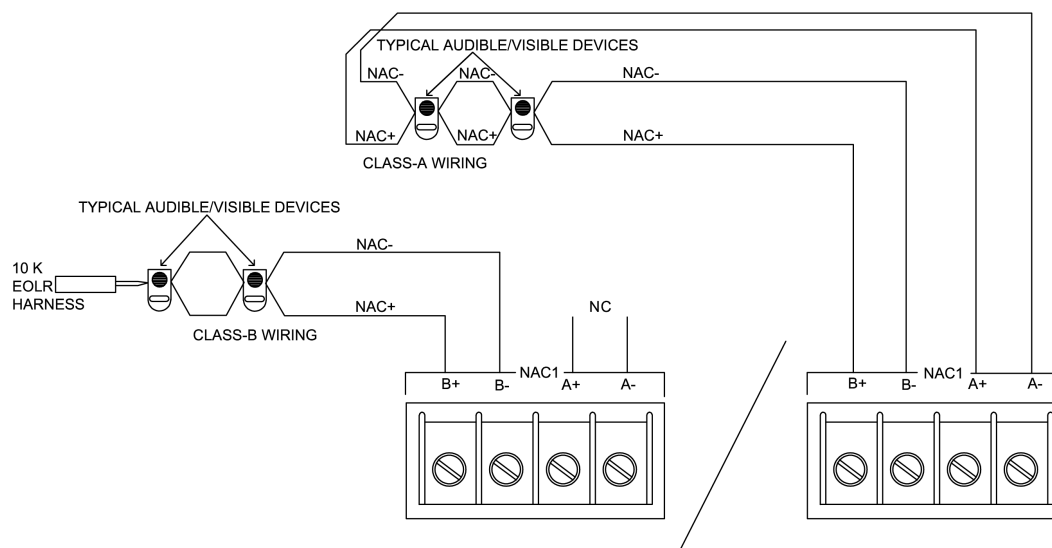
### 6.2.1.2 Wiring Class A NACs

To wire a Class A NAC, complete the following steps:

1. Use DIP switch **SW3-4** to select the Class A configuration.


**Figure 15: DIP switch SW3-4**

2. Route the wire from the **B+** and **B-** terminals of the system board to the appropriate inputs on a peripheral notification appliance.
3. Route the wire from the first appliance to the next. Repeat this step for each appliance.
4. Route the wire from the last appliance to the **A+** and **A-** terminals on the same NAC circuit of the system board.
5. Do not T-Tap the wiring.


**Figure 16: NAC wiring**

### 6.2.1.3 Wiring Class B NACs

To wire a Class B NAC, complete the following steps:

1. Route the wire from the **B+** and **B-** terminals of the system board to the appropriate inputs on a peripheral notification appliance as shown in Figure 16.
2. Route the wire from the first appliance to the next. Repeat this step for each appliance.
3. Terminate the Class B circuits with a listed 10 k, 1/2W end-of-line resistor harness, part number 0733-894AC or different value EOL resistor. See the [Selecting an end-of-line resistor](#) section.

4. Do not T-Tap the wiring.

#### 6.2.1.4 NAC wiring distance

This section describes the wiring distances for the Class A and Class B NACs. The wiring distances for the Class A and Class B NACs are calculated at 49°C (120°F). If you are installing in locations that are exposed to higher temperatures, refer to NEC. The wiring distance is based on a 3 V drop and takes into account the control unit's worst case output voltage.

**Table 5: NAC Class A wiring distances**

Maximum wiring distance in feet					
Alarm current A	18 AWG	16 AWG	14 AWG	12 AWG	Line resistance, Ohms
.25	420	667	1063	1691	6
.50	210	334	532	845	3
.75	140	222	354	564	2
1.0	105	167	266	423	1.5
1.25	84	133	213	338	1.2
1.50	70	111	177	282	1

The wiring distance for the Class A NACs is from the control unit's terminals to the last appliance and back to the control unit's terminals.

**Table 6: NAC Class B wiring distances**

Maximum wiring distance in feet					
Alarm current A	18 AWG	16 AWG	14 AWG	12 AWG	Line resistance, Ohms
.25	840	1335	2126	3382	12
.50	420	667	1063	1691	6
.75	280	445	709	1127	4
1.0	210	334	532	845	3
1.25	168	267	425	676	2.4
1.50	140	222	354	564	2

The wiring distance for the Class B NACs is from the control unit's terminals to the last appliance.

#### 6.2.1.5 NAC wiring specifications

The NAC ratings for specific voltage specifications are listed in [Notification appliances circuits](#).

- The maximum ripple is 1/2 V peak-to-peak.
- The current rating for the circuit is 1.5 A maximum. The total current rating for the unit's power consumption including the panel board, NAC circuit and Aux circuits must be less than 2.2 A.
- The maximum wiring capacitance, when using two-wire audible or visible appliances is 0.22  $\mu$ F.
- See Table 5 and Table 6 for the wiring distances for 0.25 A to 1.5 A loads.
- For all other UL listed notification appliances, the rating for NAC is 24 VDC regulated at a maximum of 1.5 A.

## 6.3 Auxiliary relays

There are three on-board relays on the FACU, see Figure 17. The contact rating is 30 VDC at 2 A, 0.35 power factor. Each relay is selected for normally closed or normally open operation. For information about relay settings see Table 7.

All three relays are non-programmable:

- Relay 1 is the default for the common trouble relay and is normally energized. When the control unit is completely powered off, the default setting of the trouble relay is **Off Normal**.
- Relay 2 is the common alarm and the default setting for Relay 2 is **On Until Reset**.
- Relay 3 is the common supervisory.

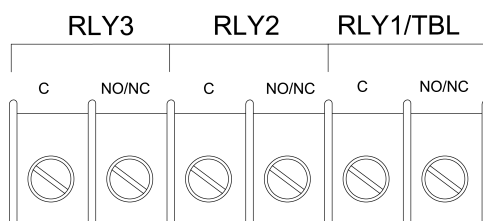






Figure 17: Auxiliary relay connections

Table 7: Relay settings

Ref designator	Functions	Settings	Jumper position
P7	Relay 1 contact setting	Normally closed (default)	1-2 (Left) 
		Normally open	2-3 (Right) 
P6, P5	Relays 2 and 3 contact setting	Normally open (default)	1-2 (Left) 
		Normally closed	2-3 (Right) 

### 6.3.1 Wiring an auxiliary relay

To wire an auxiliary relay, ensure you adhere to the following guidelines:

- All wiring is between 18 AWG minimum and 12 AWG maximum.
- Conductors test free of all grounds and stray voltages before you connect the auxiliary relay to the control unit and other appliances.
- All wiring is unsupervised.
- Power all Aux. relay loads from the Aux. power circuit or from a regulated, 24 VDC, power limited power supply that is UL-listed for fire protective signaling service.

## 6.4 RS485 Interface

This section describes the RS485 interface. Use the RS485 interface to connect annunciators.

- You can connect a maximum two numbers of A606-9111 annunciators to the A004-9101 control unit.

### 6.4.1 Wiring an Annunciator

To wire an annunciator, adhere to the following guidelines:

- All wiring is between 18 AWG minimum and 12 AWG maximum.
- All wiring is supervised and power limited.
- Conductors must test free of all grounds and stray voltages before you connect the annunciator to the unit and other appliances.
- For bus style wiring, the maximum wiring limit is 4,000 ft. (1219 m) For bus style wiring, see Figure 19.

**Note:** Figure 19 shows communication wiring only.

- For T-Tap style wiring, the maximum distance to the furthest device is 2,500 ft. (762m). For T-Tap style wiring, see Figure 20. Figure 20 shows communication wiring only.
- The maximum wiring capacitance is 0.58  $\mu$ F.

- Attach 0733-974AC (100 ohm, 1/2 W) resistor A as shown in Figure 19 and Figure 20 for the line matching. For more information, refer to the remote annunciator's instructions.
- Annunciator wiring of RS485 needs to be in Class B only.

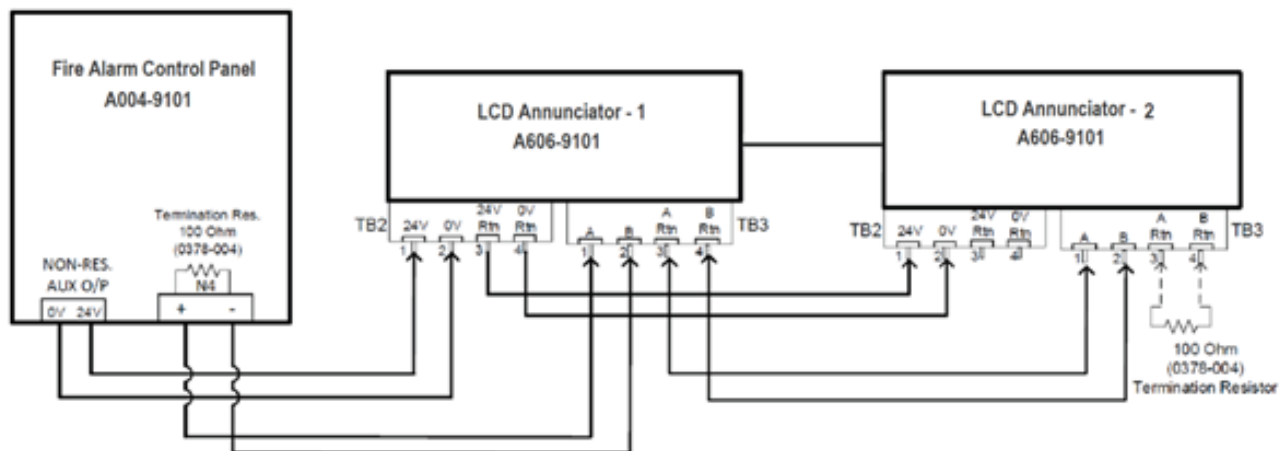


Figure 18: Annunciator wiring

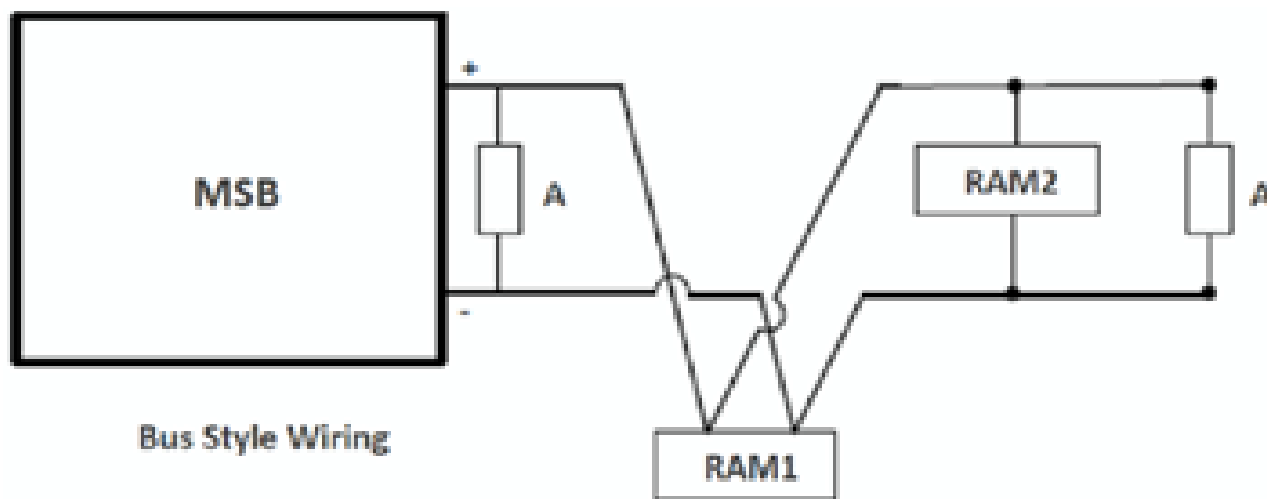
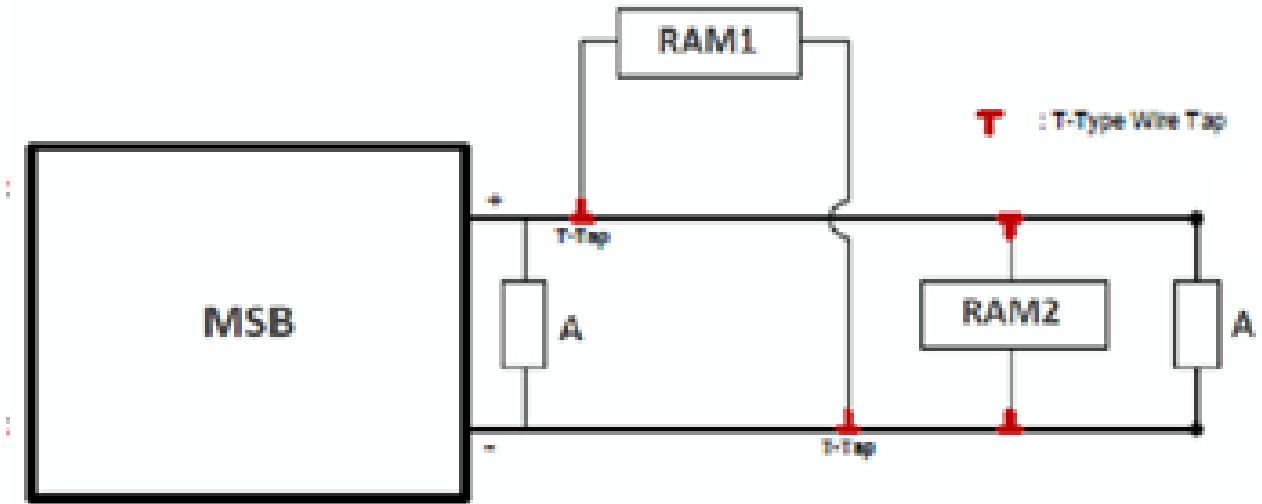


Figure 19: Bus style wiring



**T-Tap Style Wiring**

Figure 20: T-Tap style wiring

Table 8: Annunciator wiring callout list

Abbreviations	Description
RAM	Remote annunciator module
MSB	Main system board
A	100 ohm, 1/2 W line matching resistor

Table 9: Maximum distance supported for respective AWG for annunciator quantity

Maximum Annunciator QTY	Maximum distance (ft) w/22 AWG	Maximum distance (ft) w/20 AWG	Maximum distance (ft) w/18 AWG	Maximum distance (ft) w/16 AWG	Maximum distance (ft) w/14 AWG
2	1239	1970	3132	4000	4000
1	2478	3941	4000	4000	4000

## 6.5 Auxiliary power

There are two on-board auxiliary power circuits on the FACU:

- Aux. 1: Non-resettable power
- Aux. 2: Resettable power

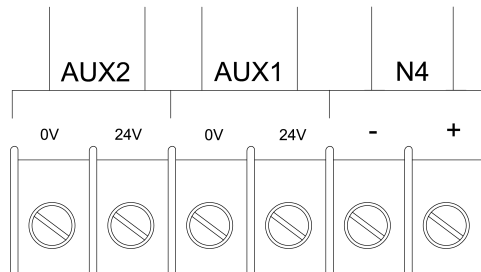


Figure 21: Auxiliary power connections

Table 10: Auxiliary power specifications

Specification	Rating
Voltage	24 V, 0.25 A maximum available at aux circuit. Total 0.25 A for both circuits.
Voltage rating	24 VDC special application 1 V peak-to-peak ripple max.
Total availability from both NACs, both auxiliary circuits and panel board	2.2 A

### 6.5.1 Auxiliary power wiring

To wire an auxiliary power circuit, ensure you adhere to the following guidelines:

- All wiring is between 18 AWG minimum and 12 AWG maximum.
- Both Aux-1 and Aux-2 circuits are unsupervised and power limited.
- Both Aux circuits require external supervision relay A2098-9735 in order to achieve Class B supervision.
- Aux-1 must be used to power A606-9111 annunciators only.
- Aux-2 must be used to power 4-wire detectors.
- Conductors test free of all grounds and stray voltages before you connect the auxiliary power circuit to the control unit and other appliances.
- Operate compatible devices from a range of 20 VDC to 27 VDC or greater. Compatible devices require a total current draw of 250 mA or less.
- AUX power wiring must be only class B.

## 6.6 USB interface

You can use the USB interface to connect the control unit with a PC or operating system for programming the control unit and for upgrading the control unit firmware.

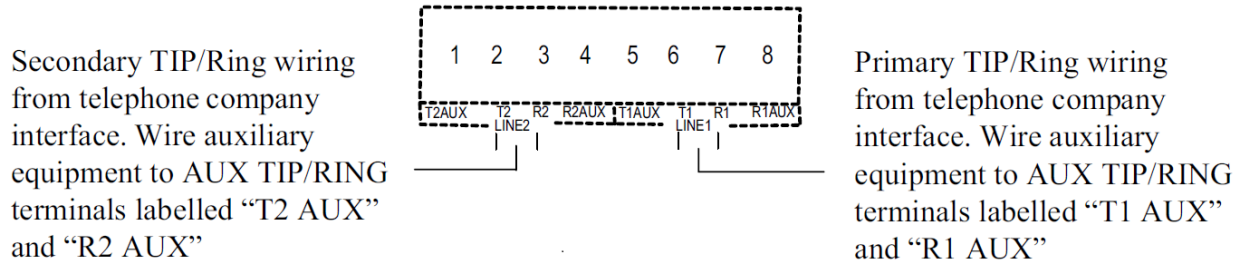
## 6.7 Digital alarm communicator transmitter

This section describes how to use the on-board dual digital alarm communicator transmitter (DACT) to connect with the remote monitoring system.

### 6.7.1 Connecting the DACT using telephone lines

The DACT requires two telephone line connections to meet NFPA 72 requirements. To connect the DACT using two telephone line connections, ensure you adhere to the following guidelines:

1. The telephone wiring from the public telephone network connects to the **T1** and **R1** terminals for the primary line.
2. Connect to the **T2** and **R2** terminals for the secondary line.



OR

Connect T2 R2 to TL300 / C900V2 IP transmitter cards for Ethernet interface.

Figure 22: DACT wiring

3. Wire from TELCO equipment to TB2 with wiring that is between 18 AWG maximum and 24 AWG minimum.
4. All DACT wiring is supervised.
5. For the compatible digital alarm communicator receivers (DACRs) see Table 11.

Table 11: Compatible DACRs

Digital alarm communicator receiver (DACR)						
Communication format	FBI CP220FB with Rec-11 Line Card	Osborne/Hoffman QuickAlert Model II	ADEMCO 685 with 685-8 Line Card	Tyco System I (See note 3)	Tyco System III (See note 3)	Bosch Radionics D6600 (see note 1 and 2)
Contact ID (CID)	Yes	Yes	Yes	Yes	Yes	Yes

**Note:**

1. Is with or without the D6680 network Ethernet adapter in D6600.
2. Bosch C900V2 card for Ethernet connection interfaces.
3. Tyco TL300 card for Ethernet connection interfaces.

### 6.7.2 Connecting the DACT using Ethernet lines and the DSC TL300

To connect the DACT using Ethernet lines and the DSC TL300, ensure you adhere to the following guidelines:

1. Mount the control unit containing the TL300 less than 20 ft (6.1 m) from the FACU.
2. The wiring to FACU must be in 20 ft (6.1 m) conduit.
3. Connect the TL300 to the FACU's IDC to monitor LAN connection failure.
4. Only use terminals **T2** and **R2** of TB2. Do not use auxiliary equipment.
5. For programming and installation, refer to the *TL300 Installation Manual*.
6. Use the PC tool version 01.00 or later. Select the **IP communicator** mode from the **DACT setting** tab.
7. The power supply must be listed for fire applications and the wiring must be in 20 ft (6.1 m) conduit.
8. Use a ferrule connector or a lever nut connector or other suitable multiple wiring connector for the two wires that are shown to be connected to the one terminal to make sure that only one wire goes to the terminal PGM1 of TL300.

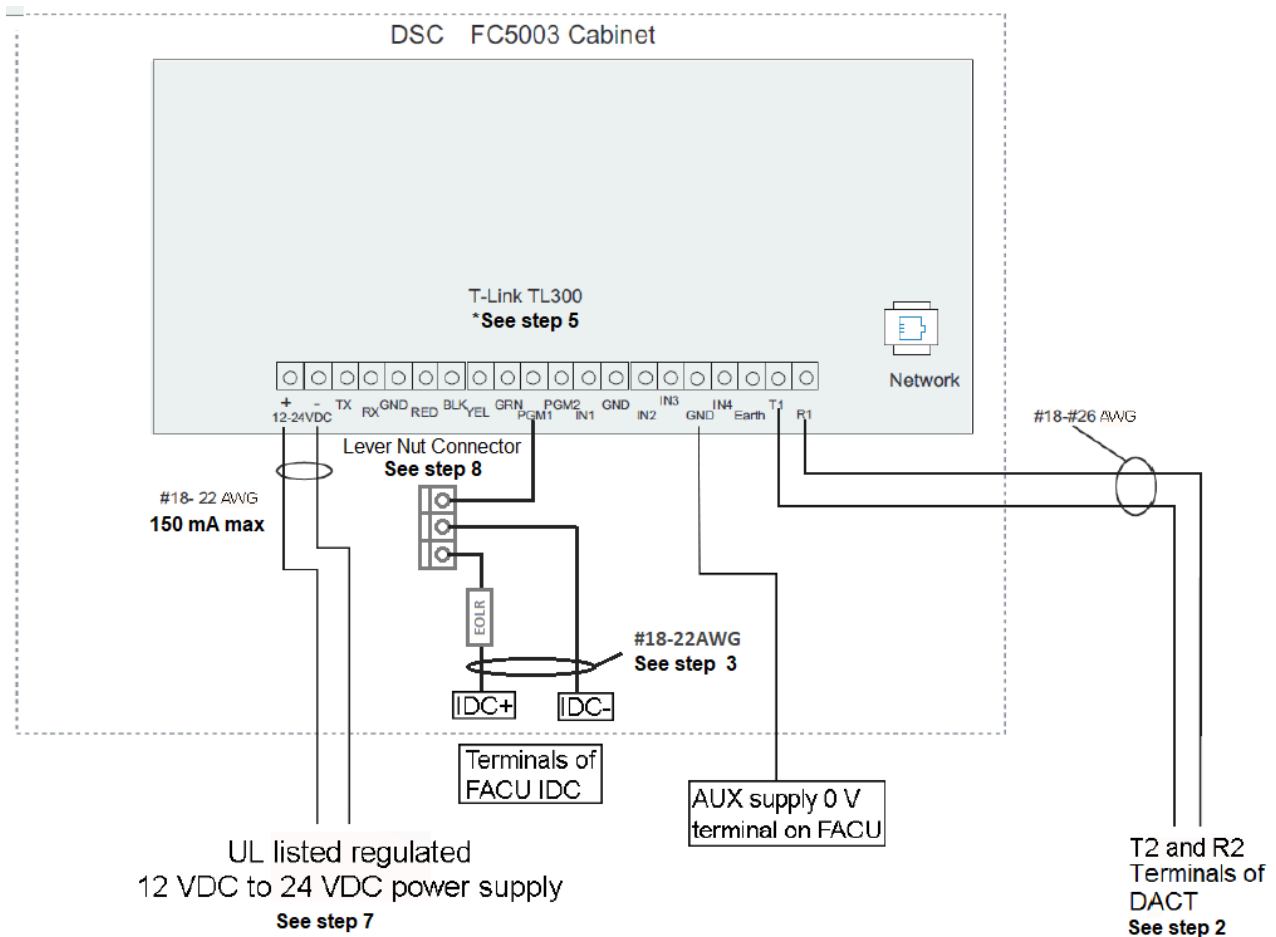


Figure 23: DACT wiring using TL300



### 6.7.3 Connecting the DACT using Ethernet lines and the Bosch C900V2

To connect the DACT using Ethernet lines and the Bosch C900V2, ensure you adhere to the following guidelines:

1. Mount the AE2 enclosure containing the Bosch C900V2, less than 20 ft (6.1 m) from the FACU.
2. The wiring to FACU must be in 20 ft (6.1 m) conduit.
3. Ground the cabinet.
4. Wire the C900V2 to the FACU's IDC to monitor LAN and board failure.
5. Only use terminals **T2** and **R2** of TB2. Do not use auxiliary equipment.
6. Refer to the *Bosch C900V2 Installation Manual* for programming and installation.
7. Use the PC tool version 01.00 or later. Select the **IP communicator** mode from the **DACT setting** tab.
8. The power supply must be listed for fire applications and the wiring must be in 20 ft (6.1 m) conduit.
9. Use a ferrule connector or a lever nut connector or other suitable multiple wiring connector for the three wires that are shown to be connected to the same terminal to make sure that only one wire goes to the terminal of CV900V2.

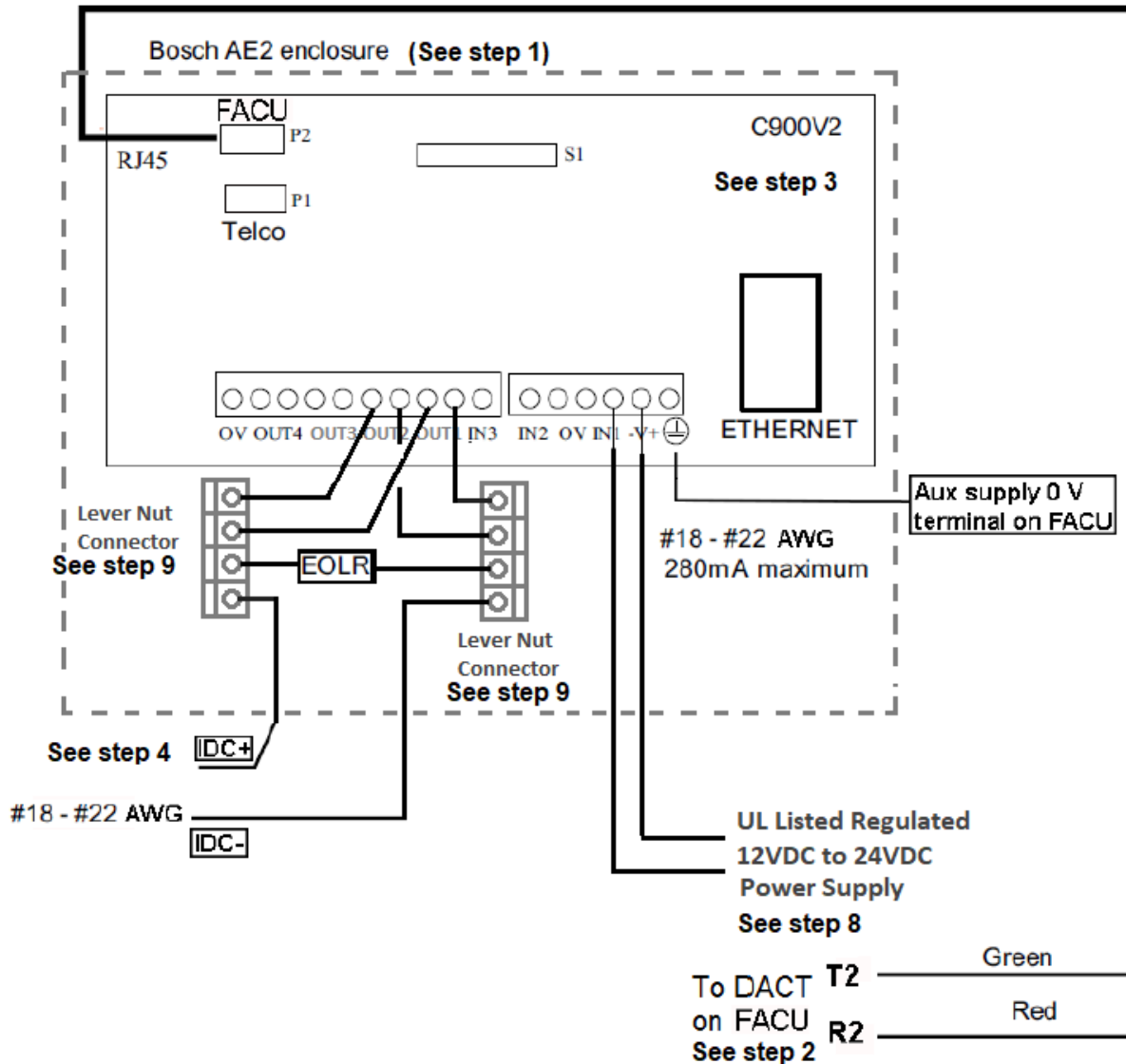


Figure 24: DACT wiring using C900V2

## 6.8 Optional modules

This section lists all of the optional modules for the A004-9101. For more information on specific modules, refer to the installation instructions of each module. For the placement of the optional modules, refer to the label on the inside of the door of the A004-9101.

### 6.8.1 City circuit cards

Use the city circuit card (A004-9909) to annunciate alarms and other urgent indications to remote facilities. The card has two circuits which are configurable for alarm, trouble or supervisory reporting. For example, if you configure a city card for a trouble output, in the event of a CPU failure the city card sends a trouble to the city circuit. The city card also provides hardware disconnect switches for each circuit.

**Note:**

- One city circuit card can be used for each system.
- Both outputs need to be programmed for the same service (both for Reverse Polarity or both for Local Energy).

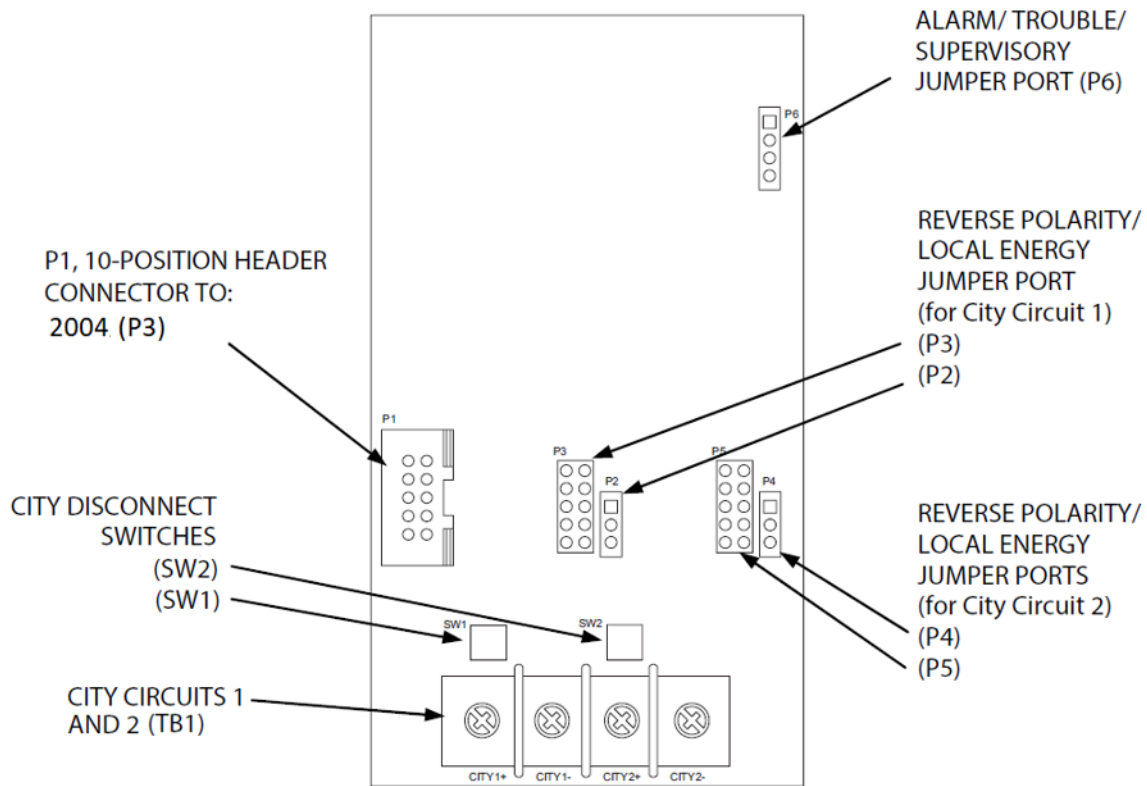


Figure 25: City circuit cards and jumper configuration

Table 12: Jumper configuration

Jumper positions		
City circuit	Reverse polarity	Local energy
1	P3: 1-2, 3-4, 5-6	P3: 7-8, 9-10
	P2: 2-3	P2: 1-2
2	P5: 1-2, 3-4, 5-6	P5: 7-8, 9-10
	P4: 2-3	P4: 1-2

**P6:** You must select either supervisory or trouble operation for the second circuit by setting P6.

- To configure City 2 for supervisory activation, install jumpers on port P6 to positions 1 and 2, and another to positions 3 and 4. When reverse polarity is selected, City 1 sends a trouble to the city by dropping circuit power.
- To configure City 2 for trouble activation, install a jumper on port 6 in positions 2 and 3. City 1 sends alarms only to the city.

### 6.8.1.1 Mounting city circuit cards

To mount the city circuit card, complete the following steps:

1. Remove the AC power at the breaker from the control unit.
2. Use the B-key to unlock the cabinet's hinged door. Remove the black insulating cover. Keep the insulating cover in a secure location.
3. Disconnect the batteries and remove them. Keep the batteries in a secure location.
4. Using the three supplied screws, mount the card on the bottom right corner of the system board.

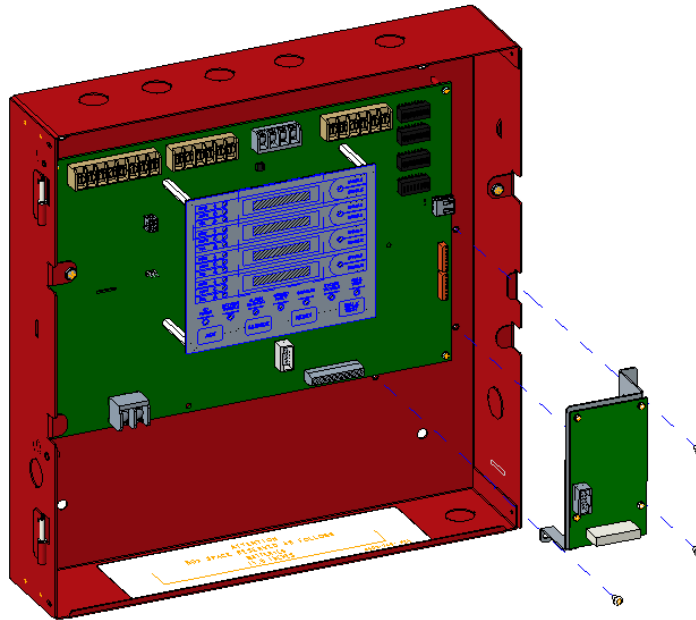


Figure 26: City card mounting

5. Enable modules with the DIP switch **SW4-4** before connection to the FACU.

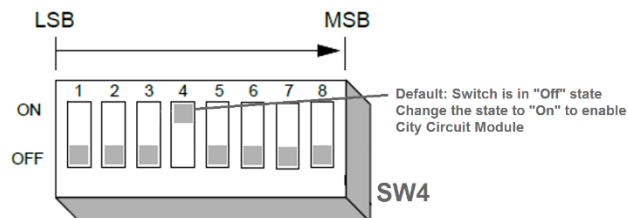


Figure 27: DIP switch SW4-4

6. Use the power and communication harness to interface the card. The power and communication harness is included with the city card.
7. Connect one end of the power and communication harness to the connector labeled **P1** on the city card.
8. Connect the other end of the power and communication harness to the connector labeled **P3** on the system board.
9. Place the batteries back inside the enclosure. Apply battery power.
10. Install the black insulating cover.
11. Apply AC power at the breaker.

### 6.8.1.2 Field wiring city circuit cards

For successful wiring, ensure you adhere to the following guidelines:

- Terminate all wiring at TB1 on the city card.
- All wiring is supervised, but not power-limited.
- Conductors test free of all grounds before you connect the city card to the system.
- Wiring for reverse polarity is between 20 AWG minimum and 12 AWG maximum.
- Wiring for local energy is between 18 AWG minimum and 12 AWG maximum.
- Leave the 2.2 k, 1/2 W resistor on an unused terminal.

**Note:**

1. The city card is intended for connection to a polarity reversal circuit of a remote station receiving unit that has compatible ratings: 19 VDC to 32 VDC, 2 V peak to peak ripple maximum.
2. The city card is intended for connection to a 14.5 ohm trip coil.
3. For Masterbox supervision, connect Masterbox relay output back to panel IDC circuit configured for SUPV function type.

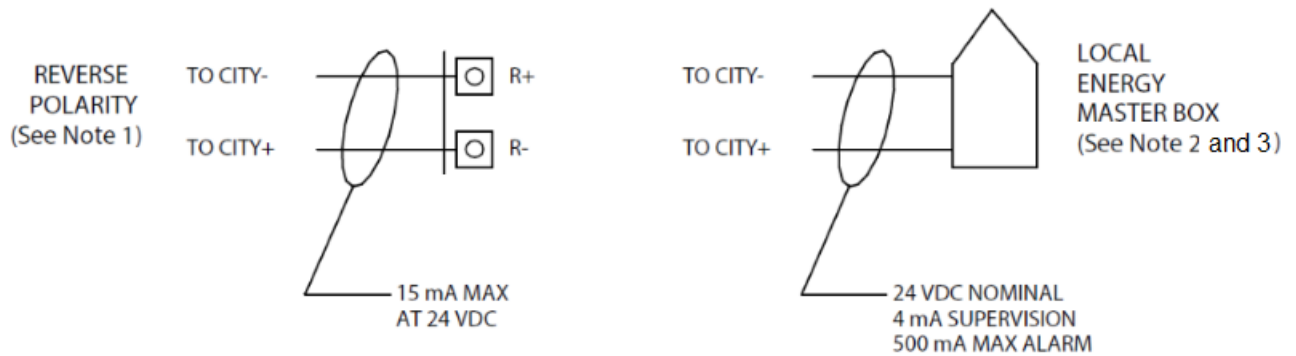


Figure 28: City card wiring

## **7 Periodic testing and maintenance**

For the minimum requirements for periodic testing of the fire alarm system, refer to chapter 14 of NFPA 72.

Local codes may require additional testing and maintenance. All system components need to be tested in accordance with governing codes.

Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance.

## 8 Battery calculations

This section contains instructions and tables for calculating battery size.

### 8.1 Current draw for system components

Each component of the FACU has a specified alarm and standby current rating. To calculate the current draw for the system, add the specified standby current for each module and device to obtain an alarm and a standby current rating for your system.

**Note:**

1. Include the auxiliary power from the system's AUX 24 V taps in the calculation, unless that power is switched off during battery standby. For example, you do not need to include door holders that are operated from 24 V if they are disconnected through a relay during a battery standby condition.
2. You need to include the notification appliance load in the alarm current total.

The current specifications for each module are described in Table 13.

**Table 13: Current specifications for each module**

Module	Standby current	Alarm current
Main system board (4 Class-B IDCs, 20 detectors each)	100 mA + 9 mA For each zone in standby	150 mA + 60 mA For each zone in alarm
Remote LED annunciator	24 mA	26 mA
City connect module	30 mA	60 mA

**Use the following steps to calculate minimum Ah battery capacity**

1. Total Standby Current (A) =
2. Total Alarm Current (B) =
3. Identify Standby Time (C), in hours (typically 24 hr) =
4. Identify Alarm Time (D), in minutes (typically 5 min) =
5. Using the values in Steps 1 to 4, perform an **Initial Battery Calculation** using the following formula:

$$(A \times C) + (0.0167 \times B \times D) = \text{_____ Ah (Ah = ampere hours)}$$

**Note:** The total current rating for the unit's power consumption, considering the panel board, NAC circuit, and Aux. 24 V load must be less than 2.2 A.

6. You need to apply a discharge factor (DF) if either the standby current or the alarm current is greater than the C/20 current for the initial battery size selected. For example, 1 A load on a 10 Ah battery requires a discharge factor of 1.08 (10 Ah / 1 A gives discharge time of 10 hours; DF = 1.08). Use Table 14 to determine the discharge factor (use the 20 hr value for 24 hr standby):

**Table 14: Discharge factor**

Discharge time		Discharge factor	Discharge time	Discharge factor	Discharge time	Discharge factor	Discharge time	Discharge factor
0.083 hr	5 min	3.85	2 hr	1.43	8 hr	1.10	14 hr	1.03
0.166 hr	10 min	2.78	3 hr	1.30	9 hr	1.09	16 hr	1.02
0.249 hr	15 min	2.27	4 hr	1.22	10 hr	1.08	18 hr	1.01
0.332 hr	20 min	2.08	5 hr	1.18	11 hr	1.06	20 hr	1.00
0.5 hr	30 min	1.96	6 hr	1.14	12 hr	1.05	48 hr	1.00
1 hr	60 min	1.67	7 hr	1.11	13 hr	1.04	60 hr	1.00

7. Standby Discharge Factor (SDF) = \_\_\_\_\_ Alarm Discharge Factor (ADF) = \_\_\_\_\_
8. Minimum Required Battery Capacity Calculation (to account for battery aging, a 1.25 multiplier is included).  
Minimum battery capacity in Ah =  $1.25 \times [(A \times C \times SDF) + (0.0167 \times B \times D \times ADF)] = \text{_____}$
9. If the battery size initially selected is smaller than the result of the previous step, repeat the calculations using a larger battery size.

## 9 Annexure A

**Table 15: Notification Appliances**

Devices	Minimum candela cd	Minimum current mA	Max device quantity	Description
A4901-9820	-	23	65	TrueAlert Non-Addressable Horn, Free-Run/SmartSync, Red, Logo Only
A4901-9858	-	19	78	Non-Addressable Mini-Horn, SmartSYNC, Red, Blank
A4901-9859	-	19	78	Non-Addressable Mini-Horn, SmartSYNC, White, Blank
A4902-9210	-	15	100	Non-Addressable Chime, SmartSYNC, Red, FIRE
A4906-9101	15	60	25	TrueAlert Multi-Candela Strobe, Wall-Mount, 15/30/75/110cd, Red, FIRE
A4906-9103	15	60	25	TrueAlert Multi-Candela Strobe, Wall-Mount, 15/30/75/110cd, White, FIRE
A4906-9107	15	60	25	TrueAlert Multi-Candela Strobe, Wall-Mount, 15/30/75/110cd, White, Amber Lens, ALERT
A4906-9108	15	60	25	TrueAlert Multi-Candela Strobe, Wall-Mount, 15/30/75/110cd, Red, Amber Lens, ALERT
A4906-9109	135	209	7	TrueAlert Multi-Candela Strobe, Wall-Mount, High-Candela 135/177/185cd, Red, FIRE
A4906-9111	135	209	7	TrueAlert Multi-Candela Strobe, Wall-Mount, High-Candela 135/177/185cd, White, FIRE
A4906-9102	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, Red, FIRE
A4906-9104	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, White, FIRE
A4906-9110	135	237	6	TrueAlert Multi-Candela Strobe, Ceiling-Mount, High-Candela 135/177/185cd, Red, FIRE
A4906-9112	135	237	6	TrueAlert Multi-Candela Strobe, Ceiling-Mount, High-Candela 135/177/185cd, White, FIRE
A4906-9114	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, Red, ALERT
A4906-9115	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, White, ALERT
A4906-9116	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, Red, Blank
A4906-9117	15	75	20	TrueAlert Multi-Candela Strobe, Ceiling-Mount, 15/30/75/110cd, White, Blank
A4906-9128	15	86	17	TrueAlert Multi-Candela Horn/Strobe, Ceiling-Mount, 15/30/75/110cd, Red, FIRE
A4906-9130	15	86	17	TrueAlert Multi-Candela Horn/Strobe, Ceiling-Mount, 15/30/75/110cd, White, FIRE
A4906-9140	135	237	6	TrueAlert Multi-Candela Horn/Strobe, Ceiling-Mount, High-Candela 135/177/185cd, Red, FIRE
A4906-9142	135	237	6	TrueAlert Multi-Candela Horn/Strobe, Ceiling-Mount, High-Candela 135/177/185cd, White, FIRE
A4906-9127	15	75	20	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, 15/30/75/110cd, Red, FIRE
A4906-9129	15	75	20	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, 15/30/75/110cd, White, FIRE
A4906-9139	135	209	7	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, High-Candela 135/177/185cd, Red, FIRE
A4906-9141	135	209	7	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, High-Candela 135/177/185cd, White, FIRE
A4906-9131	15	91	16	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, Weatherproof, 15/60/75/WP75cd, Red, FIRE (order back box separately)
A4906-9132	15	91	16	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, Weatherproof, 15/60/75/WP75cd, White, FIRE (order back box separately)
A4906-9143	5	125	12	TrueAlert Multi-Candela Horn/Strobe, Wall-Mount, Weatherproof, ULC, 5/20/30cd, Red, FIRE (order back box separately)
A4906-9105	15	77	19	TrueAlert Multi-Candela Strobe, Wall-Mount, Weatherproof, 15/60/75/WP75cd, Red, FIRE (order back box separately)
A4906-9106	15	77	19	TrueAlert Multi-Candela Strobe, Wall-Mount, Weatherproof, 15/60/75/WP75cd, White, FIRE (order back box separately)
A4906-9113	5	115	13	TrueAlert Multi-Candela Strobe, Wall-Mount, Weatherproof, ULC, 5/20/30cd, Red, FIRE (order back box separately)
A4906-9136	15	85	17	Non-Addressable Chime/Strobe, 15/30/75/110/135/185cd, SmartSYNC, White, FIRE
A4906-9133	15	70	21	Non-Addressable Chime/Strobe, 15/30/75/110/135/185cd, SmartSYNC, Red, FIRE

**Table 15: Notification Appliances**

Devices	Minimum candela	Minimum current	Max device quantity	Description
	cd	mA		
A49CMT-APPLW	-	62	24	TrueAlert Non-Addressable MultiTone Horn Appliance Electronics, Wall/Ceiling-Mount (order mounting plate and cover separately)
A49CMTV-APPLW	15	145	10	TrueAlert Non-Addressable MultiTone Horn/Strobe Appliance Electronics, Wall-Mount, 15/30/75/110/135/185cd (order mounting plate and cover separately)