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PAR-3

Preaction - Deluge Control System

Instruction Manual

Document 15181
10/01/2002

Rev:

G

PN 15181:G0

ECN 02-

Fire Alarm System Limitations

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, or chimneys may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

While a fire alarm system may lower insurance rates, it is not a substitute for fire insurance!

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. *Heat detectors are designed to protect property, not life.*

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, crippling its ability to report a fire.

Audible warning devices such as bells may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol or medication. Please note that:

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A fire alarm system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of Chapter 7 of NFPA 72 shall be followed. Environments with large amounts of dust, dirt or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers only. Adequate written records of all inspections should be kept.

Installation Precautions

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until this manual is read and understood.

CAUTION - *System Reacceptance Test after Software Changes.* To ensure proper system operation, this product must be tested in accordance with NFPA 72 Chapter 7 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.

This system meets NFPA requirements for operation at 0-49° C/32-120° F and at a relative humidity of 85% RH (non-condensing) at 30° C/86° F. However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and all peripherals be installed in an environment with a nominal room temperature of 15-27° C/60-80° F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Adherence to the following will aid in problem-free installation with long-term reliability:

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning-induced transients. Although no system is completely immune from lightning transients and interferences, proper grounding will reduce susceptibility. *Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes.* Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, and printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

Though designed to last many years, system components can fail at any time. This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static-suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation by authorized personnel.

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing device pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his own expense.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

NFPA Standards

This control panel complies with the following NFPA standards:

- **NFPA 13** - Sprinkler Systems
- **NFPA 15** - Water Spray Systems
- **NFPA 16** - Foam-Water Deluge Systems and Foam-Water Spray Systems
- **NFPA 72 - Central Station Signaling Systems** (Automatic, Manual, and Waterflow) - Protected Premises Unit
Requires NOTI-FIRE 911AC DACT or 411UDAC Universal Digital Alarm Communicator
- **NFPA 72 - Local Fire Alarm Systems** (Automatic, Manual, Waterflow and Sprinkler Supervisory)
- **NFPA 72 - Auxiliary Fire Alarm Systems** (Automatic, Manual, and Waterflow)
Requires 4XTM
- **NFPA 72 - Remote Station Fire Alarm Systems** (Automatic, Manual, and Waterflow)
Requires 4XTM or NOTI-FIRE 911AC DACT or 411UDAC
- **NFPA 72 - Proprietary Fire Alarm Systems** (Automatic, Manual, and Waterflow)
Requires Potter EFT-C McCulloh Transmitter

Note: Applications which require the NOTI-FIRE 911AC, or the Potter EFT-C are not FM approved.

Before proceeding, the installer should be familiar with the following documents.



NFPA Standards

- NFPA 72 - Automatic Fire Detectors
- NFPA 72 - Installation, Maintenance, and Use of Notification Appliances for Fire Alarm Systems
- NFPA 72 - Testing Procedures for Signaling Systems



Underwriters Laboratories Documents

- UL 38 - Manually Actuated Signaling Boxes
- UL 217 - Smoke Detectors, Single and Multiple Station
- UL 228 - Door Closers - Holders for Fire Alarm Systems
- UL 268 - Smoke Detectors for Fire Alarm Systems
- UL 268A - Smoke Detectors for Duct Applications
- UL 346 - Waterflow Indicators for Fire Protective Signaling Systems
- UL 464 - Audible Signaling Appliances
- UL 521 - Heat Detectors for Fire Protective Signaling Systems
- UL 864 - Standard for Control Units for Fire Alarm Systems
- UL 1481 - Power Supplies for Fire Protective Signaling Systems
- UL 1638 - Visual Signaling Appliances
- UL 1971 - Signaling Devices for the Hearing Impaired
- CAN/ULC-S524-M91 Standard for Installation of Fire Alarm Systems
- CAN/ULC-S527-M87 Standard for Control Units for Fire Alarm System



Other

- NEC Article 300 - Wiring Methods
- NEC Article 760 - Fire Protective Signaling Systems
- Applicable Local and State Building Codes
- Requirements of the Local Authority Having Jurisdiction
- ADA - Americans with Disabilities Act

Refer to "Appendix B: Compatible Devices" on page 41 for a listing of all compatible initiating, indicating and releasing devices.

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1. Product Description

Overview

The PAR-3 Preaction - Deluge Control System has been designed as a control center for use in preaction and single- and dual-hazard deluge applications. The panel is a feature-packed control unit suitable to perform detection and control functions associated with the release of water-based fire protection systems. The panel is designed for maximum reliability with 100% solid state circuitry and isolated relay contacts for outside interfacing and features programmable options to allow on-site customization of the unit for various operating configurations.

An integral standby battery system, with charger, is provided. In case of commercial AC power interruption, automatic switchover to the battery system will provide power to the panel for a minimum of 24 hours.

The FACP is supplied complete with backbox, hinged door, control switches, and indicator LEDs.

The entire unit is housed in a standard sheet-metal enclosure with 1/2 in. (12.7 mm) and 3/4 in. (19.05 mm) conduit knockouts available.

The PAR-3 (p/n 07907) and the PAR-3C (p/n 07953), for Canadian applications, are 110/120 VAC control panels. The PAR-3E (p/n 07908) is an export version that uses 220/240 VAC.

Features

- Microprocessor-controlled
- Power-limited on all circuits except Municipal Box Output
- Alarm and trouble resound
- Four Style B/D Initiating Device Circuits
- Two Style Y/Z Notification Appliance Circuits
- Two Style Y only Indicating (Releasing) Circuits
- General alarm and trouble relays
- Includes a Zone Relay Module (4XZM) for 4 zone/function relays
- Last Event Recall
- Battery/Earth fault supervision
- Current protection on all notification circuits
- RMS regulated output power, 2.25 amps
- 7 amp-hour (AH) to 18 AH battery options, up to 90 hours standby
- Resettable and nonresettable regulated power outputs
- Extensive transient protection
- Watchdog timer to supervise microprocessor
- Output circuits protected against false activations
- Slide-in zone identification labels
- Steel cabinet 14.5" (36.83cm) wide by 16.00" (40.64cm) high by 4.75" (12.07cm) deep

Options

- 4XTM Transmitter Module - Complies with NFPA 72 Auxiliary and Remote Station Protective Signaling systems
- 4XMM Volt/Amp Meter Module
- RZA-4X Supervised remote annunciator (requires 4XLMF Interface Module)
- 411UDAC or NOTI•FIRE 911AC Digital Communicator - Complies with NFPA 72 Central Station and Remote Station Protective Signaling systems
- Potter EFT-C McCulloh Transmitter - Complies with NFPA 72 Proprietary Fire Alarm Systems
- Cross-zone option
- Dual Hazard option
- Dead-front dress panel option (DP-4X) (Required for Canadian applications)
- Trim ring for flush mount between 16 in. (40.64 cm) center studs (TR-4XR)

Note: Applications which require the 411UDAC, the NOTI-FIRE 911AC, or the Potter EFT-C are not FM approved.

Circuits

Input Circuits

Initiating Device Circuit 1 (Style B/D)

Initiating Device Circuit 2 (Style B/D)

Waterflow (Alarm Pressure) (Style B/D)

Supervisory (Auxiliary Supervisory) (Style B/D)

Output circuits

NAC 1 - Alarm/Waterflow (Style Y/Z)

NAC 2 - Alarm Pressure/Auxiliary Supervisory (Style Y/Z)

Releasing Circuit 1 (Style Y)

Releasing Circuit 2 - Auxiliary Supervisory (Style Y)

Note: Zone Relay Module (4XZM) tracks these four circuits.

Front Panel Control Switches

Switch 1 - Tone Silence

Switch 2 - Alarm Silence

Switch 3 - Alarm Activate

Switch 4 - System Reset

Supplemental Documentation

The table below lists document sources containing additional information regarding the PAR-3:

For information on...	Refer to...	Part Number
Digital Alarm Communicator/Transmitters	NOTI-FIRE 911AC Instruction Manual	74-06200-005
	411UDAC Instruction Manual	51073
Remote Station Receiver	Fire•Lite RS82-9 Instruction Manual	15400
Voltmeter/Ampmeter	4X Series Power Meter PID	15396

Control Panel

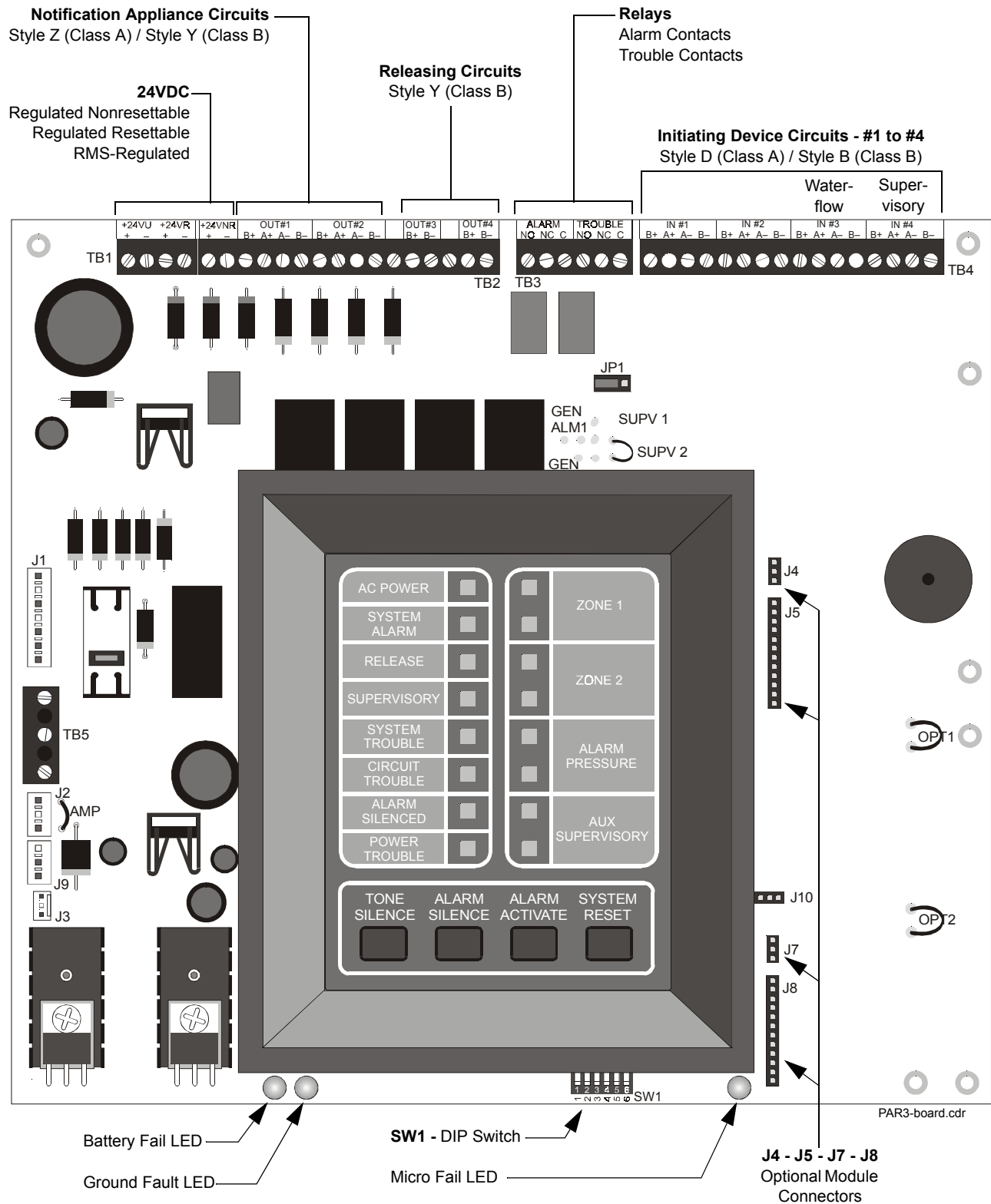


Figure 1 Control Panel

DIP Switch Functions

The table below describes the DIP switch functions. For a more detailed explanation see "Setting Mode of Operation" on page 30.

#1 & #2	Mode of Operation	Determines how NACs and Releasing Circuits respond to an alarm.
#3, #4 & #5	Timer	Selects Discharge Timer setting.
Note: See "Setting Mode of Operation" on page 30 for a more detailed explanation of DIP switch functions.		

Standard Board

A 4XZM Zone Relay Module has been factory installed on the control panel. Subsequently, the option jumper (1 OPT1) has already been removed. A second (optional) 4XZM may be mounted on the control panel at the lower position.

Note: The optional module's printed circuit board has the subassembly part number stamped on the component side (face) of the module. This part number ends with the letter "B". The completed assembly part number of the module is the same part number, but the letter "B" is replaced with the letter "M". Example (4XZB = 4XZM).

Zone Relay Module - 4XZM (Viking p/n 07912)

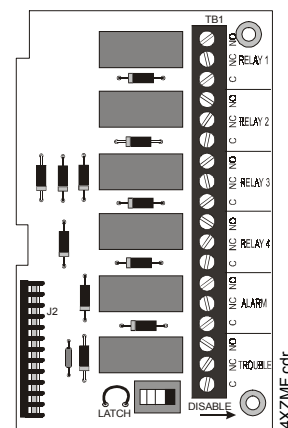
The Zone Relay module provides Form-C contacts for the following:

- Relay #1 - Alarm/Alarm Pressure NAC
- Relay #2 - Alarm Pressure/Auxiliary Supervisory NAC
- Relay #3 - Release 1
- Relay #4 - Auxiliary Supervisory NAC/Release 2
- Relay #5 - System Alarm
- Relay #6 - System Trouble

Note: As a jumper option, the first four relays can be made silenceable.

Specifications

Dry Form-C contacts rated: 2.0 amps @ 30 VDC (resistive), 0.5 amps @ 30 VAC (resistive).



Options

Two optional modules are available for use on the control panel. The control panel provides mounting slots for two module boards.

Transmitter Module - 4XTM (Viking p/n 07909)

The Transmitter Module provides a supervised output for a Local Energy Municipal Box transmitter and alarm and trouble reverse polarity circuits for Remote Station Service. Also included is a DISABLE switch and disable trouble LED.

Note: As a jumper option, the alarm reverse polarity circuit will open on trouble if no alarm exists.

Specifications for Local Energy Municipal Box service (NFPA 72 Auxiliary Fire Alarm System)

Supervisory current: 5.0 mA.

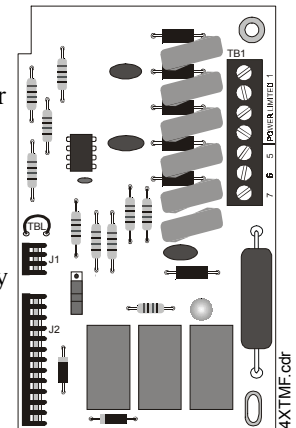
Trip current: 0.35 amps (subtracted from Notification Appliance power).

Coil Voltage: 3.65 VDC.

Coil resistance: 14.6 ohms.

Maximum allowable wire resistance between panel and trip coil: 3 ohms.

Municipal Box wiring can leave the building.



Specifications for Remote Station Service (NFPA 72 Remote Station Fire Alarm System)

Maximum load for each circuit: 10 mA.

Reverse polarity output voltage: 24 VDC.

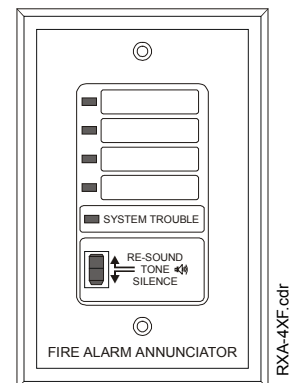
Remote Alarm and Remote Trouble wiring can leave the building.

Remote Annunciator - RZA-4X (Viking p/n 07911)

The Remote Annunciator mounts on a standard single-gang box, and provides LED indication of the same functions as the Zone Relay Module.

- Alarm/Alarm Pressure (red)
- Alarm Pressure/Aux Supervisory (red)
- Releasing Circuit 1 (red)
- Aux Supervisory/Releasing Circuit 2 (red)
- System Trouble LED (yellow)

A local trouble sounder and silence switch are also provided. All LED wiring is supervised for open conditions. Any open condition will cause the System Trouble LED to illuminate. Slide-in paper labels permit an easy change of information.



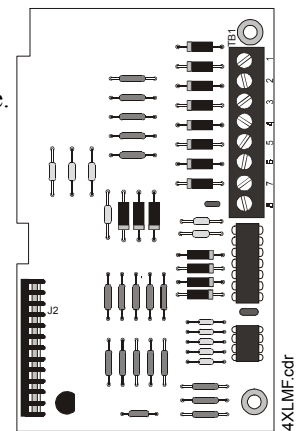
Note: The Remote Annunciator requires the use of an LED Interface Module as described below.

LED Interface Module - 4XLM (Viking p/n 07910)

The LED Interface Module supports the RZA-4X Remote Annunciator Module. Annunciator wiring is supervised for open conditions by this module. The module mounts to the main board on the J8 option connector.

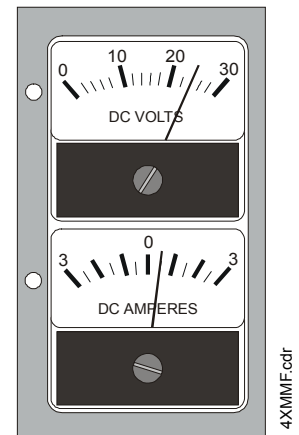
Specifications

Maximum voltage/current, each output: 27.6 V / 8 mA.
Outputs are power-limited.



Meter Module (Volts-Amps) - 4XMM (Viking p/n 07917)

The Meter Module provides a voltmeter to measure the voltage across the batteries and an ammeter to measure the charging current to the batteries. The meters are provided as an assembly that mounts to the lower left-hand corner of the cabinet.



Specifications

AC Power

PAR-3 & PAR-3C: 110/120 VAC, 50/60 Hz, 1.2 amps

PAR-3E: 220/240 VAC, 50/60 Hz, 0.6 amps

Wire size: minimum #14 AWG with 600V insulation

Battery (lead acid only)

Maximum Charging Circuit: 27.6V, 1.5 amps

Maximum Battery Capacity: 18 AH.

Note: Batteries larger than 12 AH require Notifier BB-17 or other UL-listed external battery cabinet.

Initiating Device Circuits

Power-limited circuitry

Operation: Style B (Class B) or Style D (Class A)

Normal Operating Voltage: 24 VDC (ripple = 1.0V p-p)

Alarm current: 15 mA minimum

Short circuit current: 40 mA maximum

Maximum detector current in standby: 2 mA (max) per zone

Maximum loop resistance: 100 ohms

End-of-Line Resistor: 4.7K, 1/2-Watt (Viking p/n 07913 UL listed)

Detector loop current is sufficient to ensure operation of one alarmed detector per zone.

Supervisory current: 5 mA (including End-of-Line Resistor)

Notification Appliance and Releasing Circuits

Power-limited circuitry

Maximum allowable voltage drop due to wiring: 2 VDC

Normal Operating Voltage: 24 VDC

Total current available to all external devices: 2.25 amps

Maximum signaling current per circuit: 1.5 amps

End-of-Line Resistor: 4.7K, 1/2-Watt (Viking p/n 07913 UL listed)

Alarm and Trouble Relays

Dry Form-C contacts rated: 2.0 amps @ 30 VDC (resistive), 0.5 amps @ 30 VAC (resistive).

Note: Any power connected to these relay contacts must come from a power-limited supply. Fail-safe operation ensures trouble relay functioning under loss of both primary power (AC) and secondary (battery power).

Resettable Power

Up to 200 mA is available for powering four-wire smoke detectors. Maximum ripple voltage: 1.0 V p-p.

Nonresettable Power

Total DC current available from this output is up to 200 mA (subtracted from four-wire smoke detector power). Maximum ripple voltage: 1.0 V p-p.

RMS Regulated Power

Total DC current available for powering external devices is 0.5 amp (subtracted from 2.25 amps available to Notification Appliance Circuits). Maximum ripple voltage: 100 mV p-p.

Notes

2. Installation

Cabinet Mounting

Carefully unpack the system and check for shipping damage.

Select a suitable location in a clean, dry, vibration-free environment that is not subject to extreme temperatures. Locate the top of the cabinet approximately five feet above the floor with the hinge on the left. The panel must be easily accessible for maintenance; the hinged door requires a minimum clearance of 14 in. (35.56cm) to open.

Removal of Circuit Board

To prevent damage to the printed circuit board it should be removed prior to mounting of cabinet.

Step	Action
1	Disconnect the transformer wires from the circuit board at the J1 connector.
2	Remove the four (4) phillips head screws securing circuit board to backbox rails.
3	Carefully set board aside in a secure place.

Mounting of Cabinet

Securely mount the cabinet using the mounting holes provided.

Step	Action
1	Mark and predrill holes for the top two keyhole mounting screws using the dimensions shown in Figure 2 on page 16.
2	Install two upper screws in the wall with the heads protruding.
3	Using the upper keyholes, mount the backbox over the two screws.
4	Mark and drill the lower two holes.
5	Secure backbox by installing the remaining fasteners and tightening all screws.
6	If required, attach optional Trim Ring (TR-4XR) using the provided instructions.

Attaching Conduit

Select and remove knockouts according to the number of conduits required.

Attach conduits to backbox as required.

Determine the number of conductors required for the devices to be employed. Pull required conductors into the box through the knockouts provided.

Note: All wiring should be in accordance with the National and/or Local codes for fire alarm systems, including "Power-limited Wiring Requirements" on page 19.

The figure below shows the exterior dimensions and mounting hole locations for the cabinet backbox and dimensions of the optional trim ring:

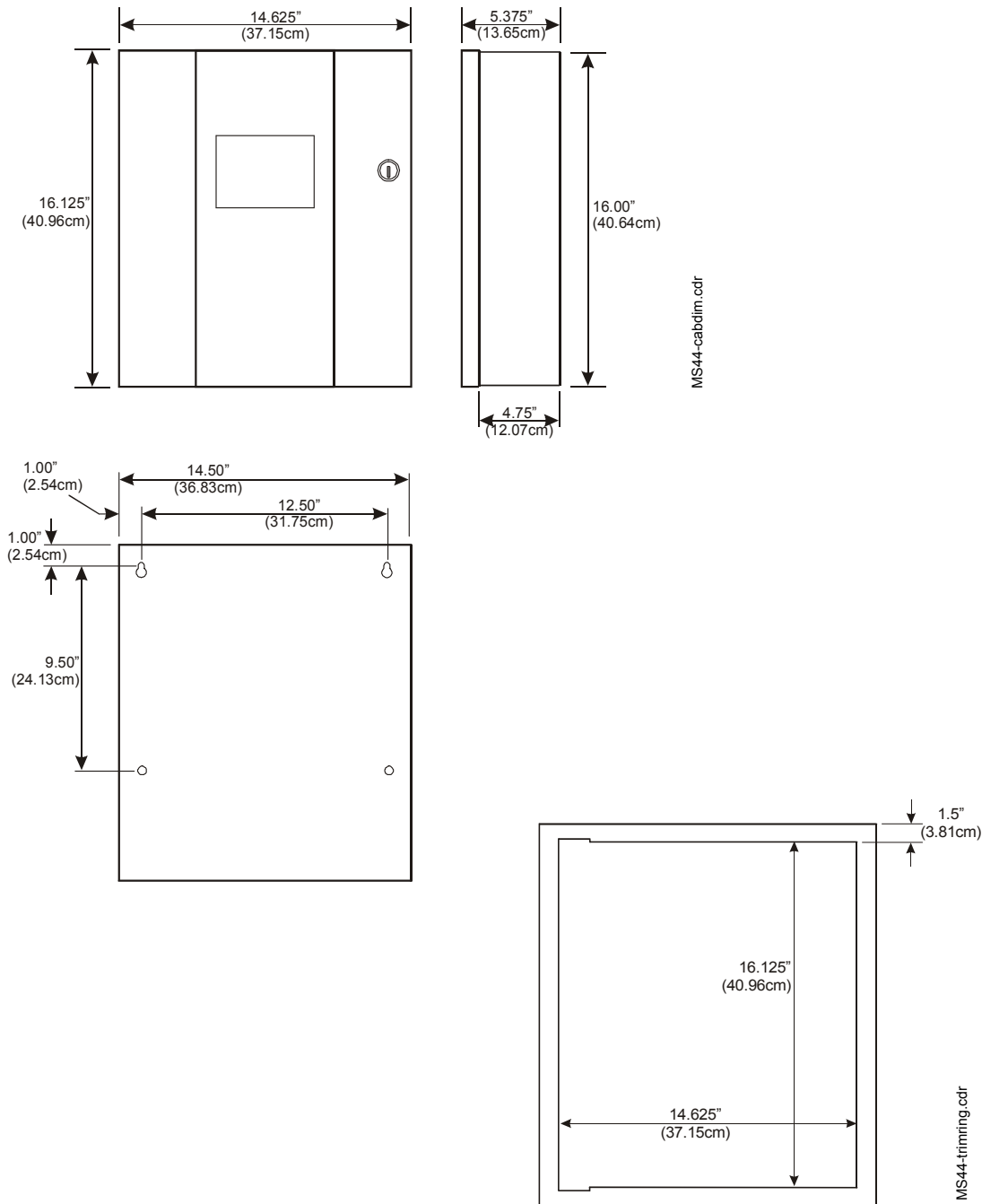


Figure 2 Cabinet Mounting Dimensions

Reinstallation of Circuit Board

Reinstall the printed circuit board as follows:

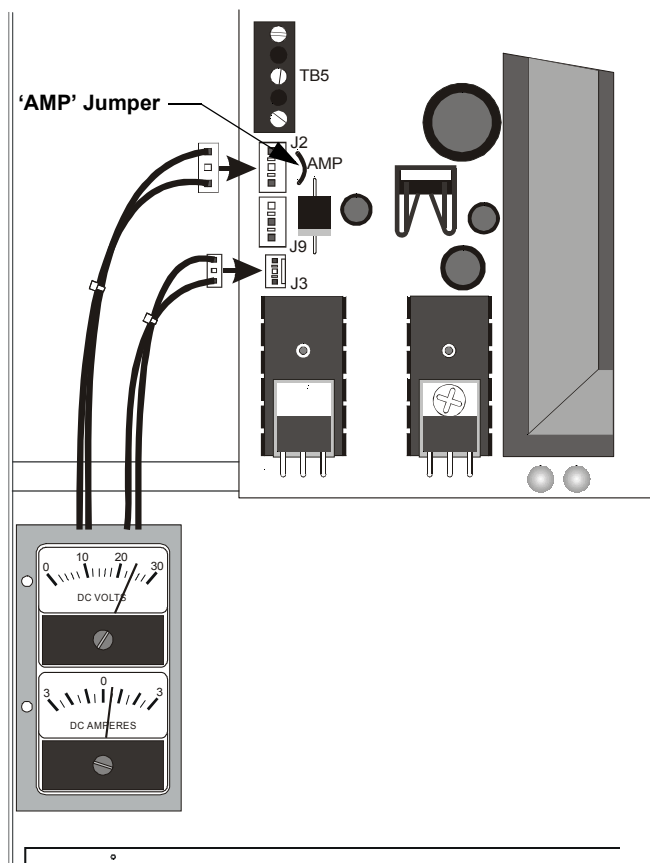
Step	Action
1	Position circuit board over stand-offs on backbox rail and secure with four (4) phillips screws. Tighten securely.
2	Connect transformer wires to J1 connector on circuit board.

Installing Optional Voltmeter/Ammeter

To monitor battery voltage and battery charging current, a 4XMM Meter Module is required. To install the power meter module follow the steps below:

Step	Action
1	Cut the jumper wire labeled “AMP”.
2	Secure the module to the backbox with the hardware provided. Refer to Product Installation Drawing (PID) for detailed instructions.
3	Connect meter cable P2 to connector J2 on the main circuit board.
4	Connect meter cable P3 to connector J3 on the main circuit board.

The figure below shows the mounting location and connections for the Voltmeter/Ammeter.



MS44-mm1nst.cdr

Figure 3 Mounting and Connecting the Meters

Power Connections



WARNING: Do not apply any type power to this control panel until all connections have been made and verified.

AC Connections

Disconnect (open) the circuit breaker in the AC main breaker panel and tag it "Out of Service".

Note: Refer to "Power-Up Procedure" on page 32 before closing AC breaker.

Primary power required for the PAR-3 and PAR-3C control panels is 110/120 VAC, 50/60 Hz, 1.2 amps and for the PAR-3E is 220/240 VAC, 50/60 Hz, 0.6 amps.

Overcurrent protection for this circuit must comply with Article 760 of the National Electrical Code (NEC) and/or local codes. Use #14 AWG (2.00 mm²) or larger wire with 600V insulation rating.

A separately fused and protected power connection to the panel should be supplied to prevent voltage fluctuation and interruption of power.

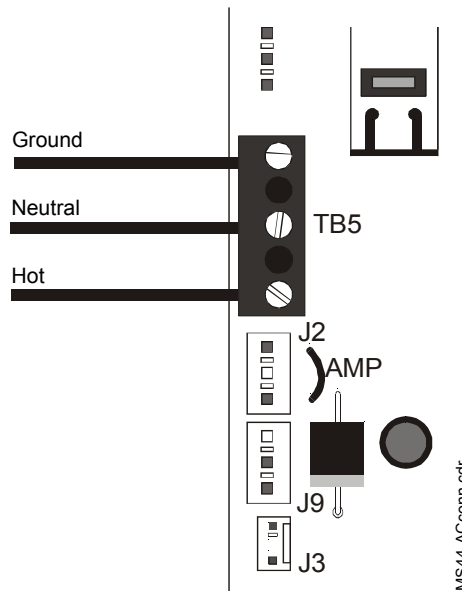


Figure 4 AC Power Connections

Battery (DC) Connections



WARNING: Battery contains sulfuric acid which can cause severe burns to the skin and eyes and can destroy fabrics. If contact is made with sulfuric acid, immediately flush the skin or eyes with water for 15 minutes and seek immediate medical attention.



CAUTION: Do NOT connect the battery interconnect wire at this time. Make this connection AFTER initial system primary power connection.

Place batteries into bottom of cabinet as shown below. See "Appendix A: Secondary Power Calculations" on page 39 for calculation of correct battery rating.

Note: Batteries are shipped separately and should be mounted only after the cabinet has been installed, the conduit connected, and all wiring pulled, tested, and made ready to be terminated.

Continued on the next page...

Observe polarity when connecting the batteries. Connect the battery cable (p/n 75203 or 75202, depending on terminal size of battery) to terminal J9 on the main circuit board using the plug-in connector provided. Connect red wire to positive (+) terminal and black wire to negative (–) terminal on opposing batteries. Do NOT connect battery interconnect wire at this time.

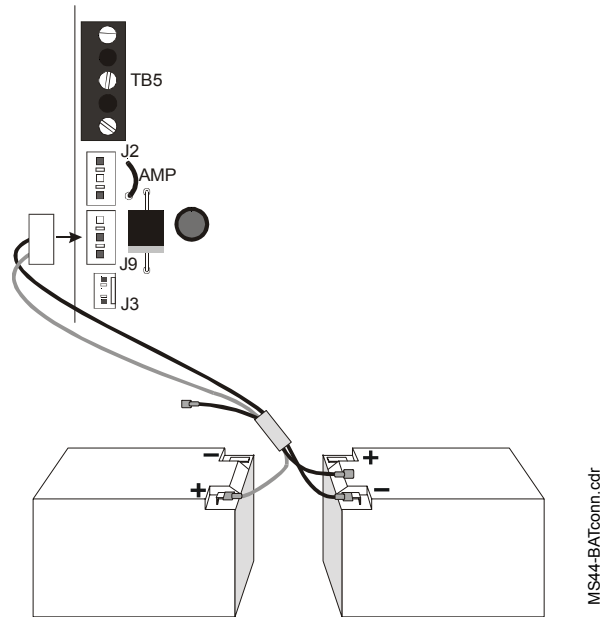


Figure 5 Battery Installation and Connection

Power-limited Wiring Requirements

Power-limited and nonpower-limited circuit wiring must remain separated in the cabinet. All power-limited circuit wiring must remain at least 0.25 in (6.35 mm) away from any nonpower-limited circuit wiring. Furthermore, all power-limited circuit wiring and nonpower-limited circuit wiring must pass through separate knockouts and/or conduits.

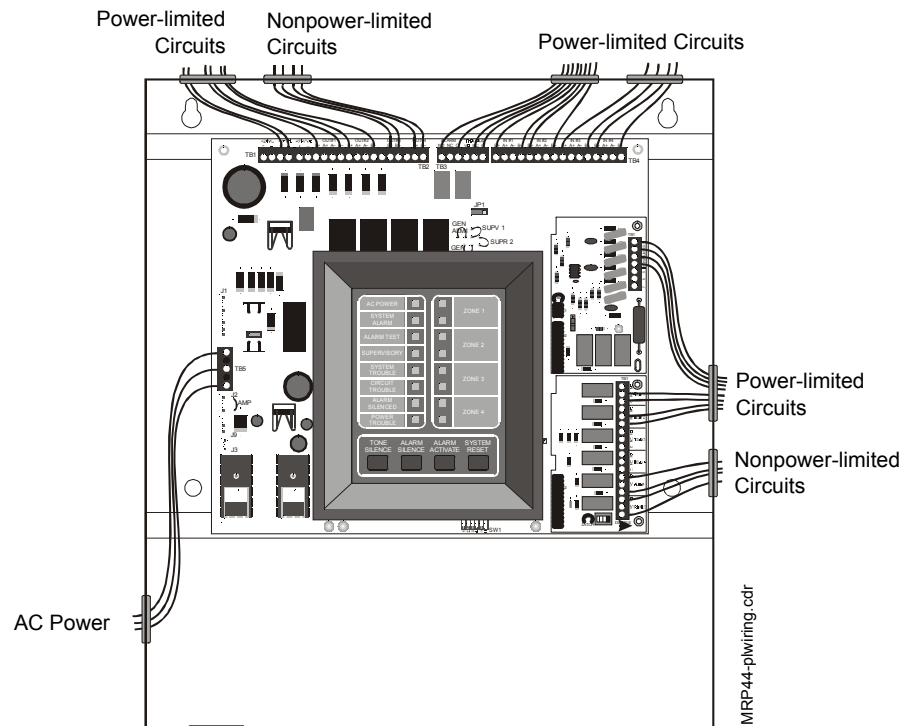


Figure 6 Power-limited Wiring Requirements

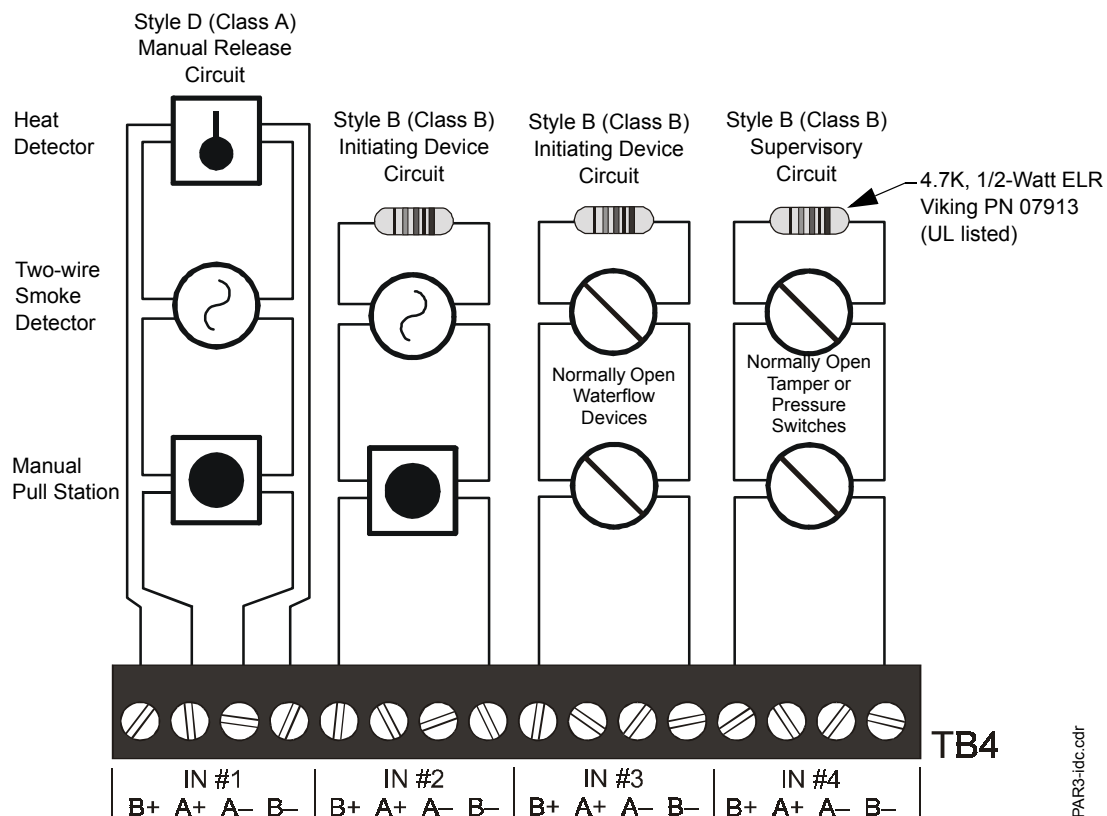
Initiating Device Circuits

The control panel provides four (4) Initiating Device Circuits (#1, #2, #3 and #4) and they may be configured as either Style D (Class A) or Style B (Class B). Circuit #1 is a Manual Release Circuit.

Initiating devices include: Heat, Photoelectric and Ionization type detectors, Manual Pull Stations and Waterflow alarm devices.

Note: Refer to the "Appendix B: Compatible Devices" on page 41 for compatible devices.

- Wire all alarm initiating devices sequentially for proper supervision.
- Observe polarity when connecting polarized devices.
- All circuits are supervised and power-limited.
- Leave dummy load resistor (provided) on all unused circuits.



Note: Silk screen printing on circuit board moved to bottom for clarity

Figure 7 Initiating Device Circuits

PAR3-ldc.cdr

Four-Wire Smoke Detector Connections

A maximum of 200mA is available from the 24VDC Resettable Power circuit on TB1 (+24VR terminals). Any power that is drawn from the 24VDC Nonresettable Power on TB2 (+24VNR terminal) must be subtracted from available resettable power. See "Specifications" on page 13 and "Powering External Devices" on page 24.

Note: Refer to the "Appendix B: Compatible Devices" on page 41 for suitable 4-wire smoke detectors.

Notes on Style D (Class A) and Style B (Class B) field wiring:

1. The Power Supervision Relay coil leads must be connected to the last detector base 24V screw terminals.
2. Calculation of the maximum allowable resistance in the 24VDC resettable power wiring:

$$R_{max} = \frac{(20.6 - V_{om})}{(N \times I_s) + (N_a \times I_a) + (I_r)}$$

Where:

R_{max} = maximum resistance of the 24 VDC wires

V_{om} = minimum operating voltage of the detector or end-of-line relay, whichever is greater, in volts

N = total number of detectors on the 24 VDC supply circuit

I_s = detector current in standby

N_a = number of detectors on the 24 VDC power circuit which must function at the same time in alarm

I_a = detector current in alarm

I_r = end-of-line relay current

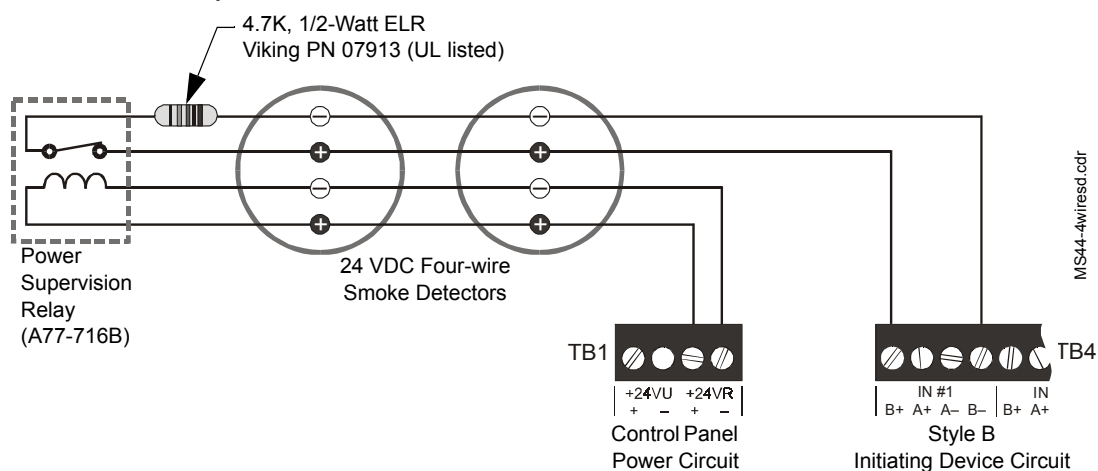


Figure 8 Typical Connection for Four-Wire Smoke Detectors

Output Circuits

Notification Appliance Circuits

The control panel provides two Style Z (Class A) or Style Y (Class B) Notification Appliance Circuits, which are supervised and power-limited.

Each circuit is capable of 1.5 amps of current. Total current drawn from both NACs and both Releasing Circuits (see "Releasing Circuits" on page 23) cannot exceed 2.25 amps.

Note: Refer to the "Appendix B: Compatible Devices" on page 41 for suitable devices.

- For DIP switch configuration, see "Setting Mode of Operation" on page 30.
- For non-silenceable service on NAC#1, see "Non-Silenceable Service" on page 36.
- Unused circuits must be connected with a dummy load as shown.

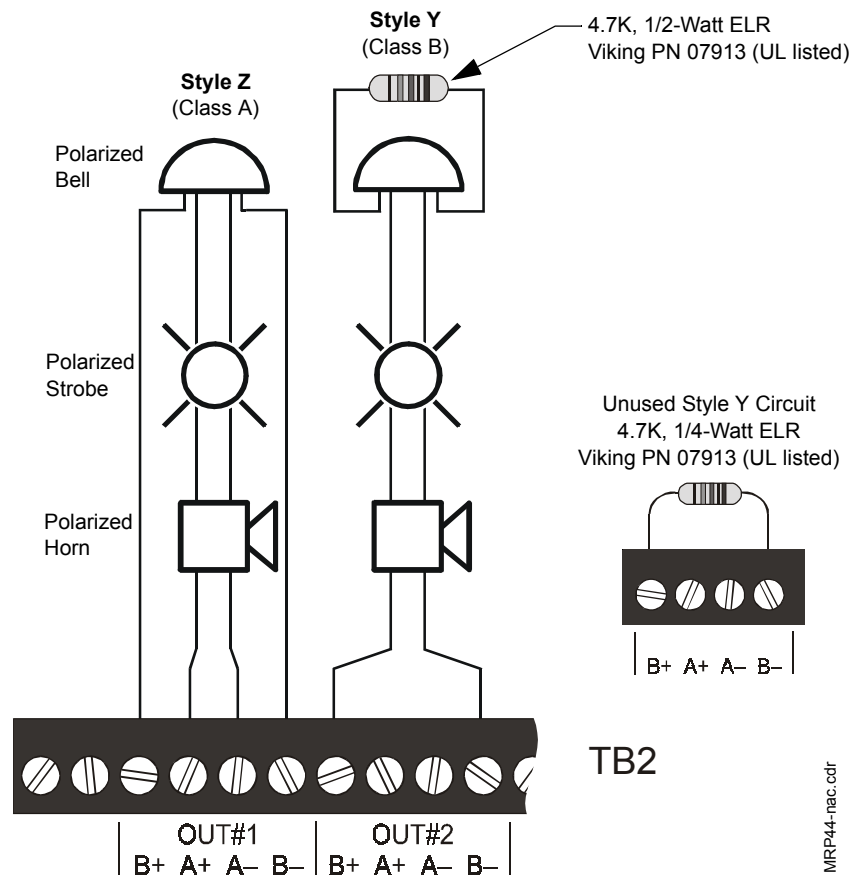


Figure 9 Notification Appliance Circuits

Releasing Circuits



CAUTION: To prevent accidental discharge, connect releasing devices after initial panel tests are completed.

The control panel provides two Style Y (Class B) Releasing Circuits, which are nonpower-limited.

Note: All wiring must follow the requirements as specified under "Power-limited Wiring Requirements" on page 19.

Each circuit is capable of 1.5 amps of current. Total current drawn from both Releasing Circuits and both NACs (see "Notification Appliance Circuits" on page 22) cannot exceed 2.25 amps.

- UL listed and FM approved releasing devices must be used.
- Unused circuits must be connected with a dummy load as shown.

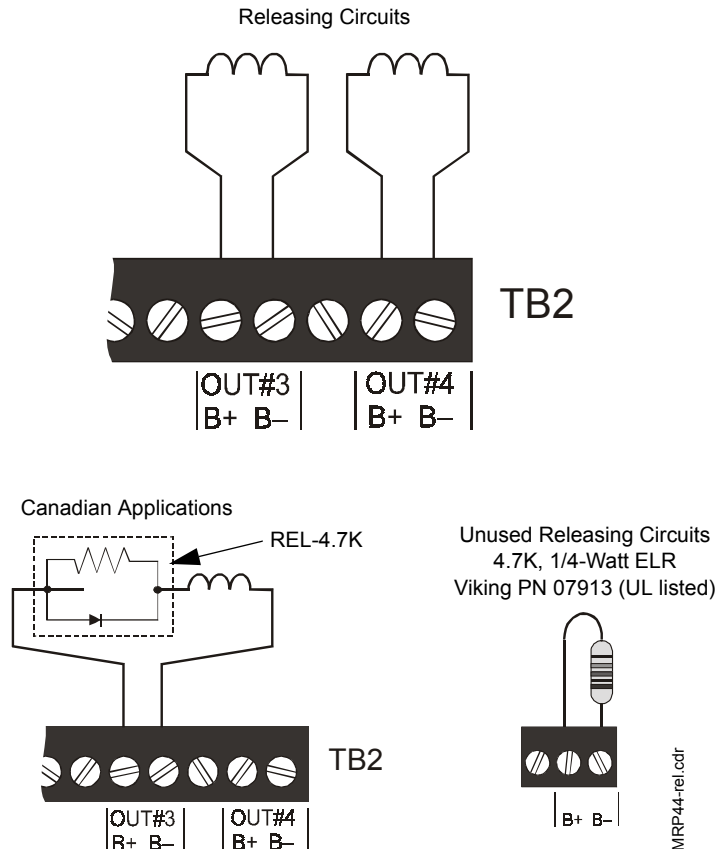


Figure 10 Releasing Circuits

Wiring must be configured to maintain a minimum voltage of 20.4 VDC on releasing Circuits. Calculation of maximum allowable resistance:

$$R_{\max} = \frac{20.6 \text{ VDC} - 20.4 \text{ VDC}}{I_s}$$

Where:

R_{max} = maximum allowable resistance of wiring

I_s = Solenoid current

Alarm Relay Circuit

One Form-C dry contact alarm relay is provided in the basic panel for controlling supplementary devices. Contacts are rated 2 amps at 30 VDC and 0.5 amps at 30 VAC (resistive) and are non-silenceable when an alarm occurs.

Trouble Relay Circuit

One Form-C dry contact trouble relay is provided in the basic panel for controlling supplementary devices. It is rated 2 amps at 30 VDC and 0.5 amps at 30 VAC (resistive) and will restore to normal when the trouble condition is cleared.

Note: Power connected to these relay contacts must come from a power-limited supply. Power may be obtained from TB1 Terminals 24VU or 24VR and TB2 Terminals 24VNR, or a UL-listed power-limited power supply.

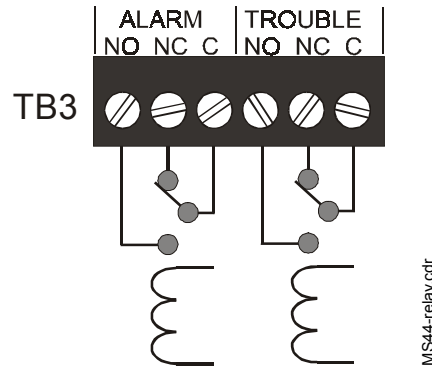


Figure 11 Schematic Representation of Alarm/Trouble Coils & Contacts

Powering External Devices



CAUTION: Several different sources of power can be connected to this panel. Disconnect all sources of power before servicing. The panel and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while this unit is energized.

DC power connections are available from TB1 and TB2 on the control panel as shown below:

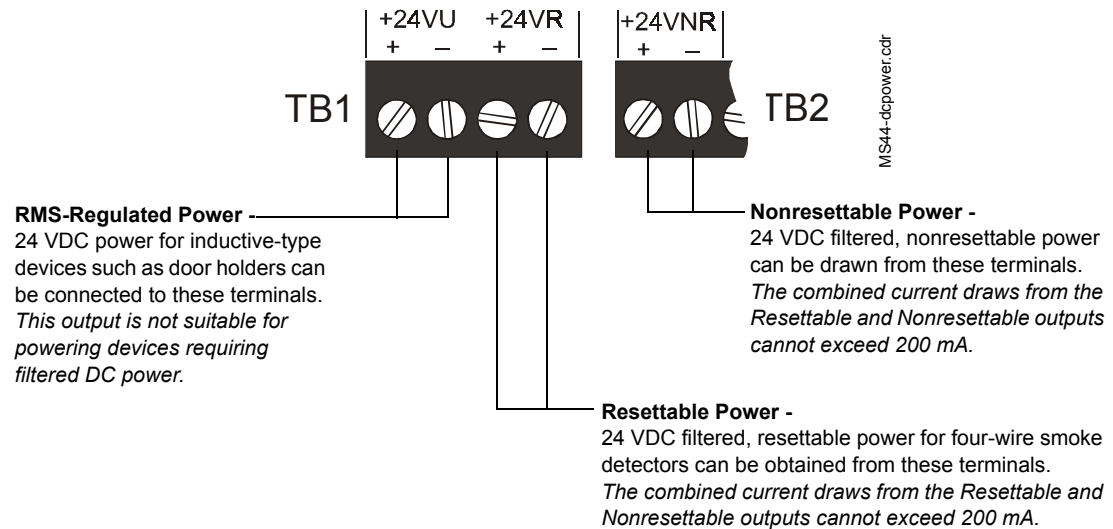


Figure 12 Power Terminals

Optional Modules

Overview

The control panel has two module connectors - J5 (upper position) and J8 (lower position). Three modules are available for the panel and they can be used in any combination, including duplicate modules. The corresponding option jumper must be cut before installation of an optional module, to enable module supervision.

Note: The PAR-3 includes one (1) Zone Relay Module (4XZM).

- The 4XZM Zone Relay and the 4XTM Transmitter Modules can be installed in either position.
- The 4XLM Interface Module must be installed in the lower position only.

Installation - Upper Position

To install either the 4XZM or 4XTM module in the upper position follow these instructions:

Step	Action
1	Cut jumper 'OPT1' on main circuit board.
2	Insert the two stand-offs into the holes located on the right-side edge of the main board. Secure with nuts and tighten securely.
3	Align the pins of J5 (and J4) connectors on the main board with the holes on the underside of the J2 (and J1) connector on the optional board. Carefully press down on the optional board until the pins are through the connectors and it rests on the stand-offs.
4	Secure optional board to stand-offs with screws. Tighten securely.
5	Affix the terminal identification label (provided with the module) on the back surface of the backbox, aligning it with the terminals on the module.

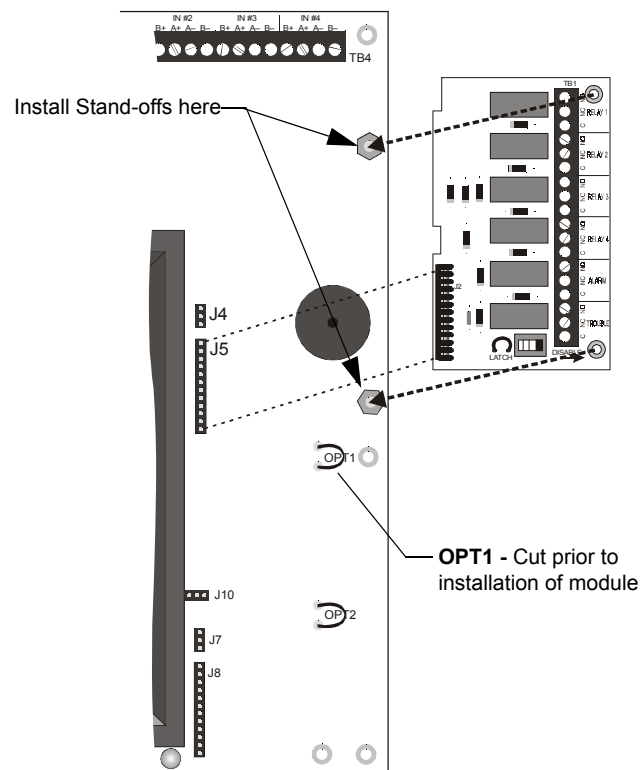


Figure 13 Module Installation - Upper Position

Installation - Lower Position

To install either the 4XTM, 4XZM or 4XLM module in the lower position follow these instructions:

Step	Action
1	Cut jumper 'OPT2' on main circuit board.
2	Remove the lower-right screw securing the main board to the lower rail. Replace with a stand-off and tighten securely.
3	Insert one stand-off into the other hole located on the right-side edge of the main board. Secure with nut and tighten securely.
4	Align the pins of J8 (and J7) connectors on the main board with the holes on the underside of the J2 (and J1) connector on the optional board. Carefully press down on the optional board until the pins are through the connectors and it rests on the stand-offs.
5	Secure optional board to stand-offs with screws. Tighten securely.
6	Affix the terminal identification label (provided with the module) on the back surface of the backbox, aligning it with the terminals on the module.

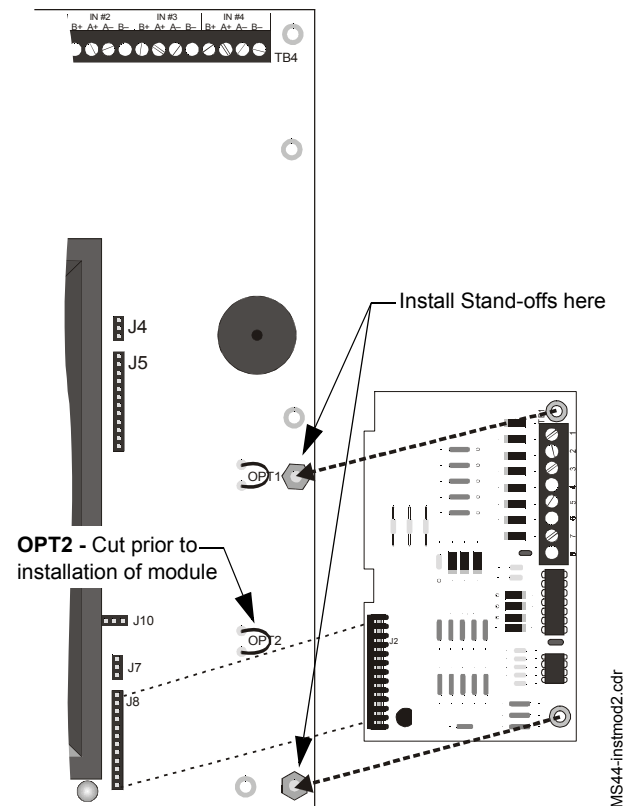


Figure 14 Module Installation - Lower Position

Setup and Configuration

Transmitter Module - 4XTM

Connect a Remote Alarm circuit, Remote Trouble circuit or a Municipal Box to the Transmitter Module as shown below. Polarities shown in activated positions.

Note: Dummy load terminals 6 and 7 (4.7K, 1/4 W resistor) if Municipal Box is not connected.

Note: Remote Alarm, Remote Trouble and Municipal Box wiring can leave the building.

Pushing the Disconnect Switch down will prevent unwanted activation of the Municipal Box during testing of the control panel. The Disconnect LED will remain illuminated while the Municipal Box is disconnected. The System Trouble LED will indicate disconnected and/or Open Circuit conditions on the Municipal Box.

Cut the TBL Jumper to allow the alarm reverse polarity circuit to open on trouble, if no alarm exists.

The wiring of this module must follow the requirements as specified under "Power-limited Wiring Requirements" on page 19.

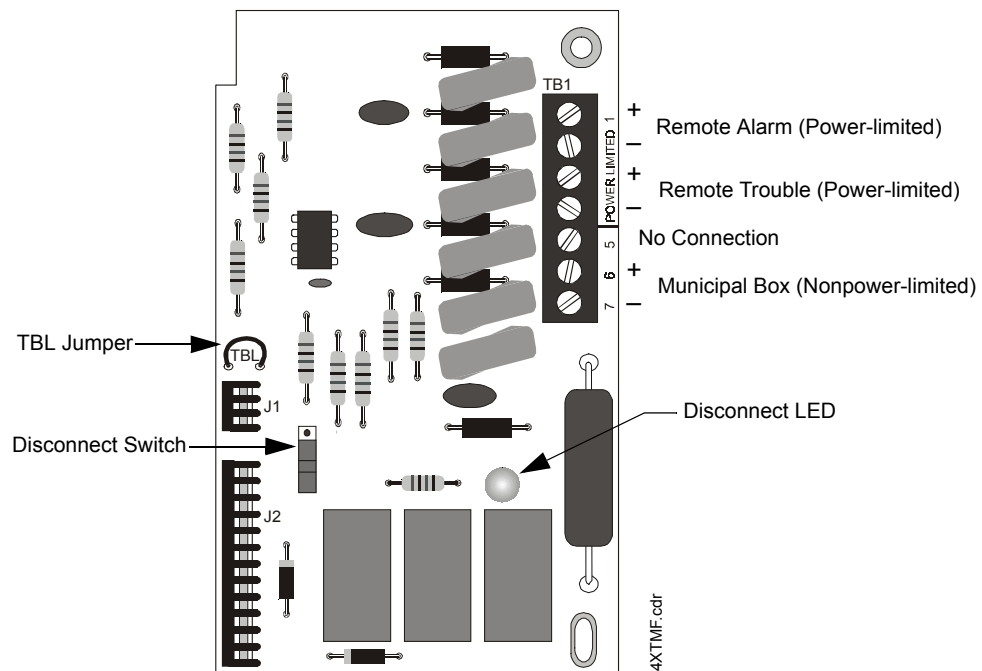


Figure 15 4XTM Configuration

Zone Relay Module - 4XZM

Note: The PAR-3 includes one (1) Zone Relay Module (4XZM).

Relay #1 through #4 on this module will activate with outputs #1 through #4.

For non-latching (silenceable) relay operation, cut the jumper “LATCH”. If this jumper is left intact, the relays will latch upon activation. To disconnect relays entirely, slide the disable switch to the right.

Note: If any dry contacts are to be used as nonpower-limited circuits, write this on the Protected Premises Unit label, located on the door of the control panel.

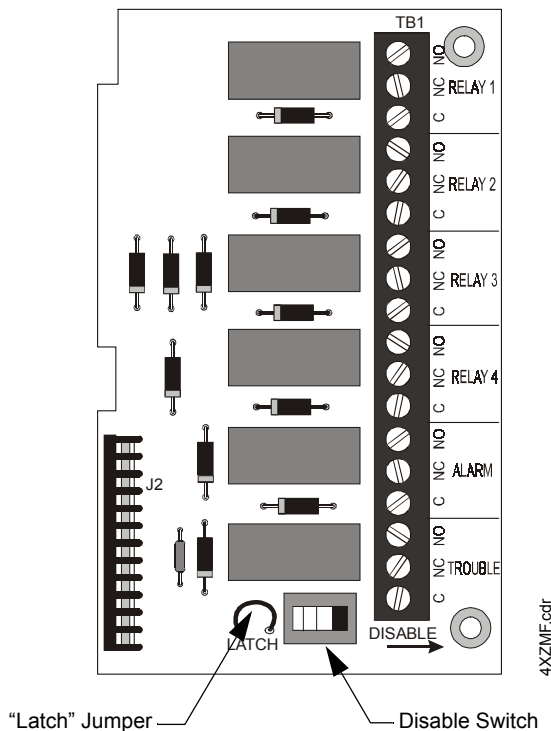


Figure 16 Wiring the Zone Relay Module

The wiring of this module must follow the requirements specified under "Power-limited Wiring Requirements" on page 19.

- If this module is used to drive both nonpower-limited and power-limited circuits, skip one set of dry contacts to maintain the required separation between circuit types.
- If this module is used to drive both nonpower-limited and power-limited relays that are *next to each other*, refer to the figure below which shows the one allowable arrangement.

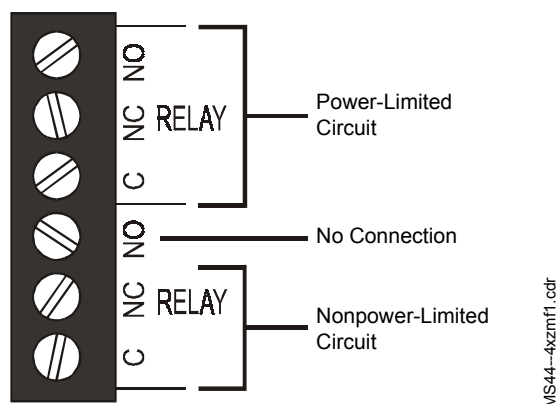


Figure 17 Mixing Power-Limited and Nonpower-Limited Circuits

LED Interface Module - 4XLM

Connect the terminals on TB1 of the LED Interface Module to the corresponding terminals of the RZA-4X Remote Annunciator.

Make wiring connections with system power off.

Maximum wire impedance is 50 ohm per wiring connection.

The wiring of this module must follow the requirements as specified under "Power-limited Wiring Requirements" on page 19.

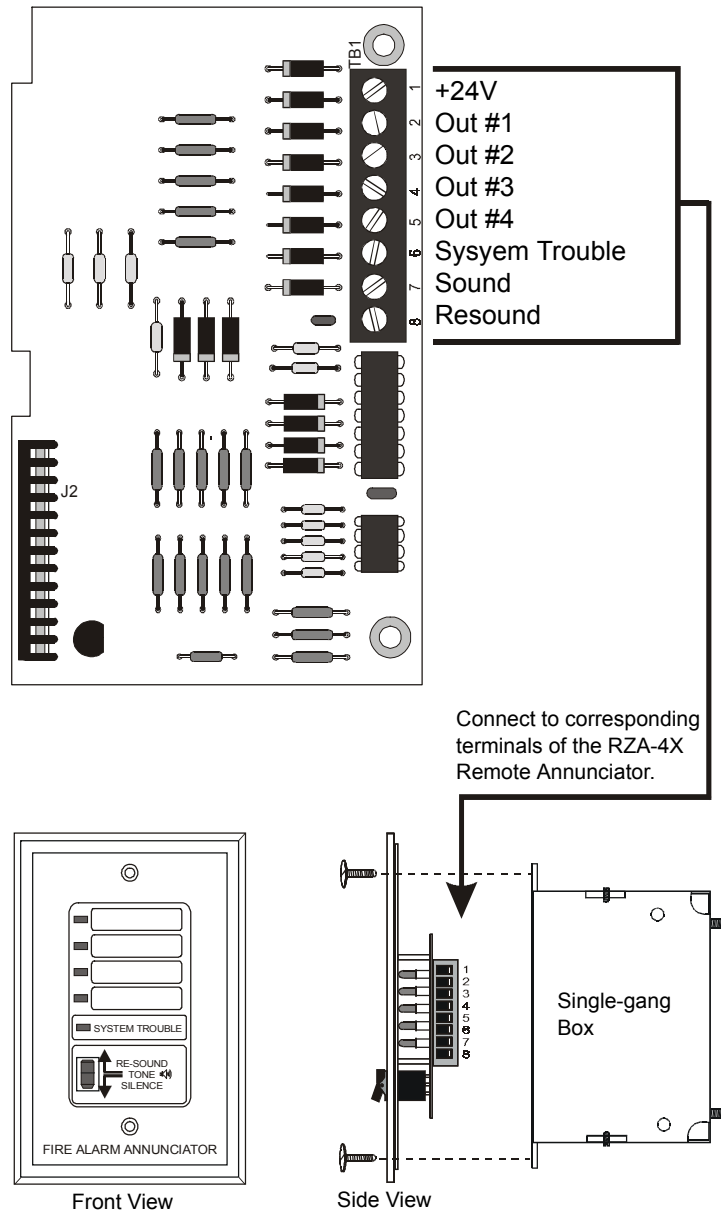


Figure 18 Connection of 4XLM to RZA-4X

Setting Mode of Operation

Select operating mode by setting the SW1 DIP switches as described below.

After any changes are made to the configuration of the switches, the panel must be reset.

For Canadian use, refer to "Sprinkler Supervisory Tracking" on page 36.

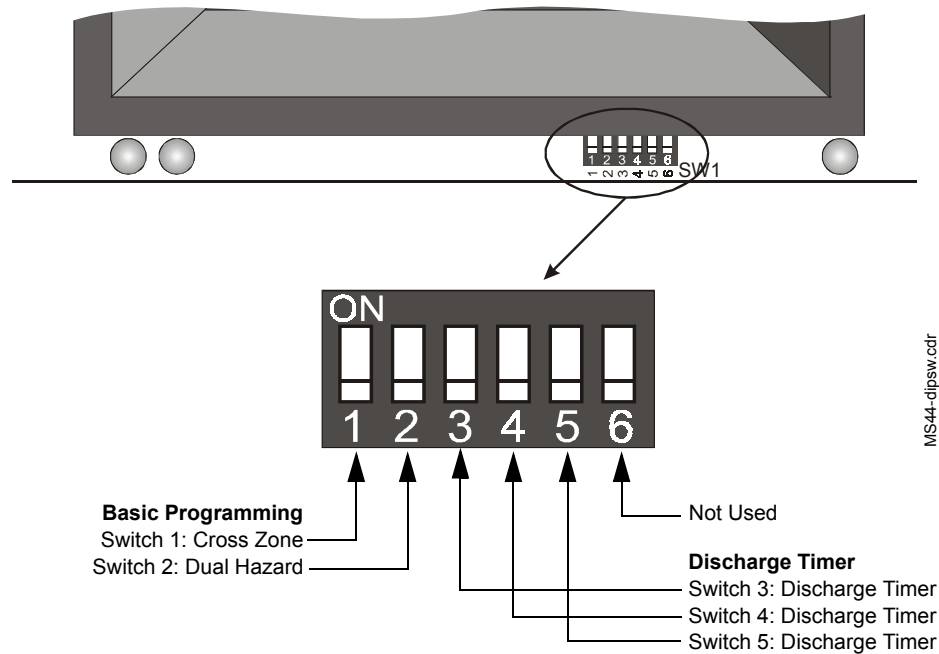


Figure 19 DIP Switch Settings

Basic Program

Select the desired mode of operation and set DIP Switches 1 and 2 per the appropriate column.

	Mode 1 Two Zone Single Hazard	Mode 2 Cross Zone Single Hazard	Mode 3 Combined Release Dual Hazard	Mode 4 Split Release Dual Hazard
Switch 1	OFF	ON	OFF	ON
Switch 2	OFF	OFF	ON	ON
	Output 1 & 3 - Activated by an alarm on <i>either</i> IDC 1 or 2. Output 2 - Activated by a waterflow alarm on IDC 3. Output 4 - Activated by a supervisory condition on IDC 4.	Output 1 - Activated by an alarm on <i>either</i> IDC 1 or 2. Output 2 - Activated by a waterflow alarm on IDC 3. Output 3 - Activated by alarms on <i>both</i> IDC 1 and 2. Output 4 - Activated by a supervisory condition on IDC 4.	Output 1 - Activated by an alarm on <i>either</i> IDC 1 or 2 or a waterflow alarm on IDC 3. Output 2 - Activated by a supervisory condition on IDC 4. Output 3 & 4 - Activated by an alarm on <i>either</i> IDC 1 or 2.	Output 1 - Activated by an alarm on <i>either</i> IDC 1 or 2 or a waterflow alarm on IDC 3. Output 2 - Activated by a supervisory condition on IDC 4. Output 3 - Activated by an alarm on IDC 1. Output 4 - Activated by an alarm on IDC 2.

Note: Output 1 and 2 refer to Notification Appliance Circuits; Output 3 and 4 refer to Releasing Circuits.

Discharge Timer

Select the desired discharge timer setting by setting DIP Switches 3, 4 and 5 accordingly.

- For NFPA 13 and 15 applications timer must be set to “Disabled”.
- For NFPA 16 applications timer may be set to “10 Minutes” or “15 Minutes”.

	Disabled	10 Minutes	15 Minutes
Switch #3	OFF	ON	ON
Switch #4	OFF	ON	ON
Switch #5	OFF	OFF	ON

Note: Timer will always start at Zone 2 normal to alarm transition. Upon timeout, corresponding release circuits will shut off.

Note: Zone 1 will always override timer shutoff (except for Mode #4 - Split Release).

Power-Up Procedure



WARNING: Prior to energizing this panel, notify all personnel and authorities, including any personnel who may be working on, around, or near this unit.



WARNING: Battery contains sulfuric acid which can cause severe burns to the skin and eyes and can destroy fabrics. If contact is made with sulfuric acid, immediately flush the skin or eyes with water for 15 minutes and seek immediate medical attention.



CAUTION: Observe polarity of batteries. Improper connection will cause damage and VOID WARRANTY.

Follow these steps to power-up the FACP:

1. **Conduct Visual Inspection.** A careful visual inspection should be made before applying power to the system. See “Inspection” on page 51.
2. **Notification.** Notify personnel who may be working with the AC power circuits before removing the “Out of Service” tag.
3. **Apply Primary Power.** Switch the circuit breaker to the ‘closed’ position, providing power to the circuit.
 - The green AC power LED will illuminate.
 - The Trouble LED will illuminate until battery power is applied.
4. **Connect Secondary Power.** Connect battery interconnect wire as shown below.
 - The trouble LED will clear. If the trouble light does not clear, refer to "Troubleshooting Table" on page 52.

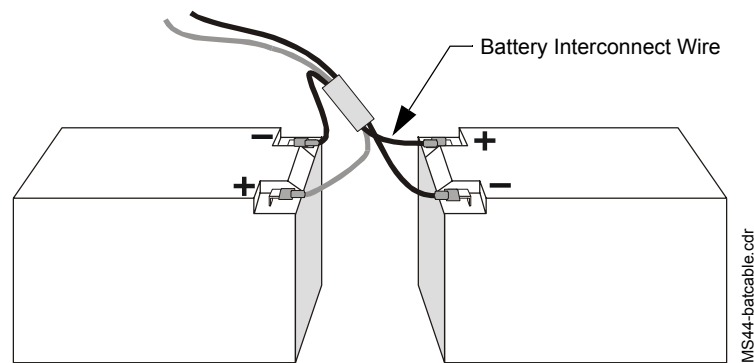


Figure 20 Battery Connections

3. System Operation

System Status LEDs

Alarm, Trouble and Supervisory LEDs will flash on and off until the event(s) has been acknowledged (TONE or ALARM SILENCE), at which point the LED will illuminate steadily.

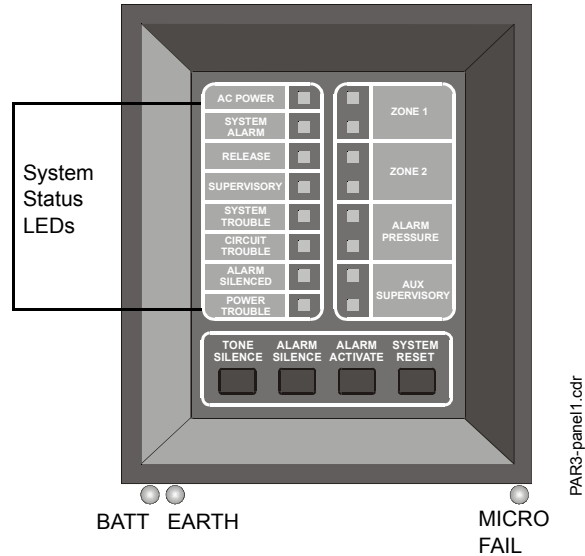


Figure 21 System Status LEDs

AC Power - Green LED that illuminates steadily to indicate presence of AC power.

System Alarm - Red LED that flashes when an alarm occurs.

Release - Red LED that illuminates steadily when release occurs. *After the Discharge Timer has expired, the LED will flash.*

Supervisory - Yellow LED that flashes upon activation of a supervisory device (such as tamper switch) on IDC 4.

System Trouble - Yellow LED that flashes for any trouble condition, including those associated with optional boards.

Circuit Trouble - Yellow LED that flashes for trouble conditions on output circuits (notification and releasing).

Alarm Silenced - Yellow LED that illuminates steadily when the ALARM SILENCE switch has been pushed after an alarm.

Power Trouble - Yellow LED that flashes for low or disconnected batteries and earth fault conditions.

The following LEDs are located below the main panel and are visible only when the panel door is open.

Battery Fail (BATT) - Yellow LED that illuminates steadily on motherboard when battery is low or not detected.

Ground Fault (EARTH) - Yellow LED that illuminates steadily on motherboard during a ground fault condition.

Micro Fail - Yellow LED that illuminates on motherboard when watchdog timer detects microprocessor failure.

Control Switches

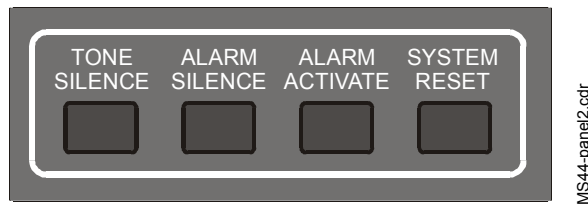


Figure 22 Control Panel Switches

Tone Silence - Pressing this switch acknowledges alarms, troubles and supervisories. The panel has alarm and trouble resound with LED flash of new conditions. The flashing trouble LED(s) illuminate steadily on TONE SILENCE and the piezo turns off. A second trouble will resound the piezo. Trouble conditions are self-restoring. Alarms latch and require pressing SYSTEM RESET to clear. Unless the unit is set for non-latching supervisory service, supervisories latch and require pressing SYSTEM RESET to clear. The piezo has three tones for different conditions (see "Piezo" on page 35).

Alarm Silence - Pressing this switch acknowledges for alarms and supervisories. This switch will silence the local piezo, change any flashing alarm LEDs to steady, and turn off the notification circuits (**not the Releasing Circuits**). The "Alarm Silenced" LED will illuminate. Alarm silence is a latching function and requires pressing SYSTEM RESET to clear.

Note: Releasing Circuits will turn off only if Discharge timer criteria is satisfied (see "Setting Mode of Operation" on page 30).

Alarm Activate - This switch may be used to activate Notification Appliance Circuits (NACs). It also activates the System Alarm Relay. This is a latching function. Pressing ALARM SILENCE silences the NACs and System Alarm Relay, and lights the Alarm Silenced LED. Pressing SYSTEM RESET returns the system to normal.

System Reset - This switch breaks power to all initiating circuits, four-wire smoke detector power and optional boards and will clear any activated output circuits. If any alarm or trouble still exists after reset, they will reactivate the panel. Holding SYSTEM RESET down will perform a LAMP TEST function and will activate the piezo sounder.

Zone Status LEDs

The alarm and/or trouble LED(s) will flash until the event(s) has been acknowledged (TONE or ALARM SILENCE), at which point the LED(s) will illuminate steadily.

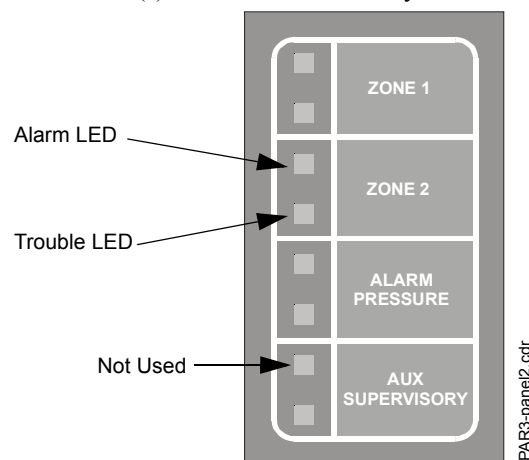


Figure 23 Zone Status LEDs

Piezo

The piezo (local buzzer) generates different tone patterns for different event conditions:

- **Alarm** - Generates a steady tone, no pulse.
- **Trouble** - Pulses one second on, one second off. Repeats 30 pulses per minute.
- **Supervisory** - Pulses one-half second on, one-half second off. Repeats 60 pulses per minute.

Supervisory Service

Initiating Device Circuit #4 is always used for monitoring supervisory devices (such as valve tamper switches). A short circuit on this IDC (activation of a N.O. contact) will cause the Supervisory LED and the Aux Supervisory trouble LED to flash. The piezo will sound one-half-second on, one-half-second off. Pressing TONE SILENCE will silence the piezo and cause the Supervisory LED to illuminate steadily, but the Aux Supervisory trouble LED will continue to flash. Supervisory signals latch and require SYSTEM RESET to clear (unless unit is programmed for non-latching operation). The ALARM SILENCE switch will silence the piezo, causing the Supervisory LED to illuminate steadily and turn off the Supervisory Notification Circuit. An open circuit on Aux Supervisory will be reported as a trouble.

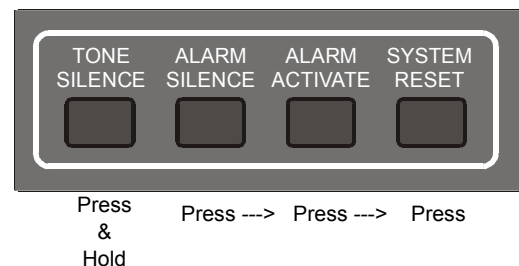
Note: The Initiating Device Circuit for sprinkler supervisory zone can be programmed for tracking operation; latching operation is the default setting. Canadian regulations require latching operation; for programming instructions, see "Sprinkler Supervisory Tracking" on page 36.

Zone Disable

If a zone has been disabled, an alarm that occurs on that zone will flash the red zone LED, but not the piezo or any output circuit. *If both power sources are removed from the system, all zones will be re-enabled upon restoration of power. Disable status will be lost.*

The Zone Disable routine makes use of the four panel switches as follows:

1. Press and hold in the TONE SILENCE switch.
2. With the TONE SILENCE switch held in, press (in sequence) the ALARM SILENCE switch, the ALARM ACTIVATE switch, and then the SYSTEM RESET switch.
3. The Zone 1 Alarm LED will flash.
4. To disable Zone 1, press the SYSTEM RESET switch. The Zone 1 yellow LED will light to show that the zone is disabled.



Note: The SYSTEM RESET switch toggles disable status for the selected zone.

5. To select the next zone, press the ALARM SILENCE switch.
6. To select the previous zone, press the ALARM ACTIVATE switch.
7. When disable selections are complete, release the TONE SILENCE switch.

If any zone has been disabled, the trouble relay will activate and System Trouble LED will flash.

Last Event Recall

Last Event Recall allows the user to display the previous panel status. The Last Event Recall makes use of the four panel switches as follows:

1. Press and hold in the TONE SILENCE switch.
2. With the TONE SILENCE switch held in, press (in sequence) the SYSTEM RESET switch, the ALARM ACTIVATE switch, and then the ALARM SILENCE switch.
3. LEDs will light to indicate the last event recorded in the panel's buffer.
4. Release the TONE SILENCE switch to return to normal operation.

To clear the Last Event buffer, press SYSTEM RESET twice.

Non-Silenceable Service

Notification Appliance Circuit #1 can be programmed as non-silenceable by following these steps:

1. Press and hold in the TONE SILENCE switch.
2. With the TONE SILENCE switch held in, press in sequence the ALARM SILENCE switch, then the ALARM ACTIVATE switch, and finally the ALARM SILENCE switch again.
3. Release the TONE SILENCE switch.

Note: If both primary and secondary power sources are removed from the system, these settings will be lost. When power is restored, Notification Appliance Circuit #1 will default to silenceable operation.

Sprinkler Supervisory Tracking

The Initiating Device Circuit for sprinkler supervisory zone can be programmed for tracking operation; latching operation is the default setting. Canadian regulations require latching operation.

1. Press and hold in the TONE SILENCE switch.
2. With the TONE SILENCE switch held in, press in sequence the ALARM SILENCE switch, then the ALARM ACTIVATE switch, and finally the ALARM ACTIVATE switch again.
3. Release the TONE SILENCE switch.

Note: If both primary and secondary power sources are removed from the system, this setting will be lost. When power is restored, supervisory will default to latching operation.

System Events

Standby Condition

Green LED (AC power on) will be illuminated. All other LEDs (trouble and alarm) are off.

System Trouble Condition

Interruption of any of the electrically supervised circuits will illuminate the System Trouble LED. The Trouble Relay Contacts will transfer. The piezo (local buzzer) will sound one second on, one second off, and repeating until silenced. Silence the piezo by pressing the TONE SILENCE switch. The panel will remain in the trouble state until the trouble condition has been cleared and the panel reset.

Single Zone in Alarm (Cross Zone) Condition

Upon actuation of a single-zone initiating device, a red alarm LED will illuminate to indicate whether Zone 1 or Zone 2 is in alarm.

In addition to the LED, a single-zone alarm will activate the Alarm Relay; the piezo and NAC #1 will start sounding. In alarm condition, the piezo will generate a steady tone. The piezo can be silenced by pressing the trouble silence switch. If the fire is extinguished before a second zone alarm is activated, return the system to normal standby condition by pressing the reset switch inside the panel and holding it for three (3) seconds.

Both Zones in Alarm (Cross Zone) Condition

When the first alarm occurs, the panel will function as described above.

Upon the occurrence of a second alarm, the second alarm LED will illuminate, NAC #2 will energize, and the solenoid valve(s) will energize to activate releasing devices.

Brownout Condition

The total power being provided to the system's power supply should not exceed the current draw during fully loaded panel operation. Brownout circuitry annunciates degradation of the incoming AC voltage supply. A brownout condition is annunciated when the AC power decreases. When the brownout threshold is reached, the system reacts as if AC power is totally lost:

- Battery backup begins supplying power to operate the control panel
- General Trouble Relay contact transfers
- Green AC Power LED turns off
- Yellow System Trouble LED illuminates
- The piezo will sound one second on, one second off, and repeat until the Trouble is cleared.

When the AC voltage returns or increases above the brownout threshold, the green AC Power LED will illuminate. The power supply circuitry will return to primary power functions and begin to recharge the backup battery supply.

Notes

Appendix A: Secondary Power Calculations

Standby Battery Requirements

The Standby Battery Current obtained in the table below represents the amount of current that must be supplied by the secondary power source (batteries) to sustain control panel operation for one hour.

Note: The control panel will support the installation of one or two optional modules, including two of the same type of module. Only one 4XLM can be included in this count.

Device Type	# of Devices		Current (amps)		Total Current (amps)
Main Circuit Board	1	X	0.088	=	0.088
4XZM Zone Relay Module	[]	X	0.008	=	
4XTM Transmitter Module	[]	X	0.011	=	
• Reverse Polarity Alarm output	[]	X	0.005	=	
• Reverse Polarity Trouble output	[]	X	0.005	=	
RZA-4X/4XLM Remote Annunciator	[] (1 max)	X	0.019	=	
4XMM Meter Module	[]	X	0.001	=	
2-wire Detector Heads	[]	X	[] ¹	=	
4-wire Detector Heads	[]	X	[] ¹	=	
End-of-line Relays ²	[]	X	[]	=	
Current Draw from TB2 (nonalarm) ³	[]	X	[]	=	
Standby Battery Current =					amps

1. Refer to the "Appendix B: Compatible Devices" on page 41 for smoke detector standby current.

2. Must use compatible listed Power Supervision Relay.

3. The total standby current must include both the resettable (TB1 - +24VVR terminals) and nonresettable (TB2 - +24VNR terminals) power. Caution must be taken to ensure that current drawn from these outputs during alarm does not exceed maximum ratings specified.

Table 1 Standby Battery Current

Calculating the Battery Capacity

Use this table to determine the battery capacity required by the system.

Standby Battery Current (from Table 1) [] amps	X	Required Standby Time in Hours (typically 24 ¹ , 60 ² or 90 ³ hours) [] hrs	=		Standby Amp Hours
		Enter: 0.25 for 5 minutes in alarm, or 0.50 for 10 minutes in alarm			Alarm ⁴ Amp Hours
		Total Standby and Alarm Load	+		
		Multiply by derating factor	X	1.2	
		Battery size required in AH	=		

1. NFPA 72 Central Station and Local and Proprietary Fire Alarm Systems require 24 hours of standby time.
2. NFPA 72 Auxiliary and Remote Station Fire Alarm Systems require 60 hours of standby time.
3. Factory Mutual Systems require 90 hours of standby for preaction and deluge sprinkler systems.
4. Alarm AH assumes a maximum system draw of 3 amps in alarm for 5 minutes (0.25 AH) or for 10 minutes (0.5AH).

Table 2 Amp Hour Calculations

The battery charger in this panel will charge a maximum of 18 AH of batteries within 48 hours (7 AH minimum). Batteries larger than 12 AH will require a UL-listed battery cabinet (e.g. BB-17).

Select a battery with an equal or greater AH rating than the value obtained in the table above.

Note: Batteries must be lead-acid type.

Appendix B: Compatible Devices

Two-wire Smoke Detectors, UL Listed

Use only the two-wire detectors listed below.

Detector Model	Identifier	Type	Base Model	Identifier	Standby Current (mA)	Detectors per Zone
System Sensor 1400	A	Ionization	n/a	n/a	0.10	20
System Sensor 1451	A	Ionization	B401/B401B/ B406B	A	0.12	15/15/1
System Sensor 1851DH	A	Ionization	DH1851DC	A	0.12	15
System Sensor 2400	A	Photoelectric	n/a	n/a	0.12	15
System Sensor 2400AIT	A	Photo/Isolated Thermal/Horn	n/a	n/a	0.12	15
System Sensor 2400AT	A	Photo/Thermal/Horn	n/a	n/a	0.12	15
System Sensor 2400TH	A	Photo/Thermal	n/a	n/a	0.12	15
System Sensor 2451	A	Photoelectric	B401/B401B/ B406B	A	0.12	15/15/1
System Sensor 2451TH	A	Photo/Thermal	B401/B401B/ B406B	A	0.12	15/15/1
System Sensor 2851DH	A	Photoelectric	DH2851DC	A	0.12	15
System Sensor 1451DH	A	Ionization	DH400	A	0.12	15
System Sensor 2451	A	Photoelectric	DH400	A	0.12	15
Fenwal PSD-7125	P5FE1	Photoelectric	70-201000-001 70-201000-002 70-201000-003 70-201000-005	FE01A FE02A FE03A FE05A	0.10	20
Fenwal PSD-7126	P6FE1	Photo/Thermal	70-201000-001 70-201000-002 70-201000-003 70-201000-005	FE01A FE02A FE03A FE05A	0.10	20
Fenwal CPD-7021	I1FE1	Ionization	70-201000-001 70-201000-002 70-201000-003 70-201000-005	FE01A FE02A FE03A FE05A	0.06	30
Fenwal PSD-7129	P9FE1	Duct	70-211002-000	D22FE1	0.10	1
Fenwal CPD-7021	I1FE1	Duct	70-211002-000	D22FE1	0.06	1
Hochiki SIH-24F	HD-3	Ionization	HS-22D HS-2-RB YBA-M22 HSB-220 HSB-224	HB-3 HB-10 HB-3 HB-56 HB-53	0.04	30
Hochiki SLK-24F	HD-3	Photoelectric	HS-22D HS-2-RB YBA-M22 HSB-220 HSB-224	HB-3 HB-10 HB-3 HB-56 HB-53	0.045	30
Hochiki SLK-24FH	HD-3	Photoelectric	HS-22D HS-2-RB YBA-M22 HSB-220 HSB-224	HB-3 HB-10 HB-3 HB-56 HB-53	0.045	30

Table 3 Two-wire Smoke Detectors

Four-wire Smoke Detectors, UL Listed

Use only the Four-wire detectors listed below.

Detector/Base	Type	Max Standby Current (mA)
System Sensor 2424	Photoelectric	0.10
System Sensor 2424AIT	Photoelectric	0.10
System Sensor 2424AT	Photoelectric	0.10
System Sensor 2424TH	Photoelectric	0.10
System Sensor 2451	Photoelectric	0.10
System Sensor 2451T w/B402 Base	Photoelectric	0.10
System Sensor 1424	Ionization	0.10
System Sensor 1451 w/B402 Base	Ionization	0.10
Fenwal CPD-7021 w/70-201000-005 Base	Ionization	0.10
Fenwal PSD-7125	Photoelectric	0.10
Fenwal PSD-7126 w/70-201000-005 Base	Photoelectric	0.10
Gentex 824	Photoelectric	0.50
Gentex 824T	Photoelectric	0.50
Gentex 824CP	Photoelectric	0.50
Gentex 824CPT	Photoelectric	0.50

Table 4 Four-wire Smoke Detectors

Compatible Solenoid Release Valves

Refer to the FM approval guide for automatic water control valves which are compatible with solenoids listed below.

Manufacturer	Model	Voltage	Watts	Amps	NPS	Orifice
Group A						
Skinner	LV2LBX25	24 VDC	11	458 mA	1/2"	5/8"
Group B						
ASCO	T8210A107	24 VDC	16.8	700 mA	1/2"	5/8"
ASCO	R8210A107	24 VDC	16.8	700 mA	1/2"	5/8"
ASCO	8210A107	24 VDC	16.8	700 mA	1/2"	5/8"
Group C						
Star Sprinkler	p/n 5550	24 VDC	part of Model D Deluge Valve			
Group F						
Skinner - 250 psi	73212BN4TNLV NOC322C2	24 VDC	22	0.92	1/2"	1/2'
Group H - 250 psi						
Viking	HV-274-060-001	24 VDC	22.6	0.94	1/2"	3/4"
Group J - 300 psi						
Viking	11591NC	24 VDC	10.0	416 mA	1/2"	9/16"
Viking	11592NC	24 VDC	10.0	416 mA	1/2"	9/16"
Viking	11595NO	24 VDC	10.0	416 mA	1/2"	9/16"
Viking	11596NO	24 VDC	10.0	416 mA	1/2"	9/16"
Group K - 250 psi						
Viking	11601NO	24 VDC	9.0	338 mA	1/2"	3/4"
Viking	11602NO	24 VDC	9.0	338 mA	1/2"	3/4"

Table 5 Solenoid Release Valves

Notification Appliances, UL Listed

Use only the Notification Appliances listed below.

Product	12 VDC	24 VDC
Gentex GXS-4RH, -4BH, -4RL, -4BL Strobes		X
Gentex GX-90S-4RL, -4BL Horn with Strobe		X
Gentex GX-90S-4RH, -4BH Horn with Strobe		X
Gentex SHG-24L Electronic Horn with Strobe		X
System Sensor MA-12/24D Electronic Sounder	X	X
System Sensor SS12 Strobe	X	
System Sensor SS12LO Strobe	X	
System Sensor SS24 Strobe		X
System Sensor SS24LO Strobe		X
System Sensor SS24LOC Ceiling Strobe (SS24LOBC - beige)		X
System Sensor SS24M Strobe		X
System Sensor SS24MC Ceiling Strobe		X
System Sensor MASS12D Electronic Sounder/Strobe	X	
System Sensor MASS12LO Electronic Sounder/Strobe	X	
System Sensor MASS24D Electronic Sounder/Strobe		X
System Sensor MASS24LO Electronic Sounder/Strobe		X
System Sensor MASS24LOC Electronic Ceiling Sounder/Strobe		X
System Sensor MASS24LOLA Electronic Sounder/Strobe w/Fuego lens		X
System Sensor MASS24M Electronic Sounder/Strobe		X
System Sensor MASS24MC Electronic Ceiling Sounder/Strobe		X
System Sensor PA400R Sounder	X	X
System Sensor PS12LO Add-on Strobe	X	
System Sensor PS24LO Add-on Strobe		X
System Sensor SS1215ADA Signaling Strobe	X	
System Sensor SS2415ADA Signaling Strobe		X
System Sensor SS2475ADA Signaling Strobe		X
System Sensor SS24110ADA Signaling Strobe		X
System Sensor MASS1215ADA Sounder/Signaling Strobe	X	
System Sensor MASS2415ADA Sounder/Signaling Strobe		X
System Sensor MASS2475ADA Sounder/Signaling Strobe		X
System Sensor MASS24110ADA Sounder/Signaling Strobe		X
System Sensor SP1R2415ADA Speaker/Signaling Strobe		X
System Sensor SP1R2475ADA Speaker/Signaling Strobe		X
System Sensor SP1R24110ADA Speaker/Signaling Strobe		X
System Sensor V4R2415ADA Speaker/Signaling Strobe		X
System Sensor V4R2475ADA Speaker/Signaling Strobe		X
System Sensor V4R24110ADA Speaker/Signaling Strobe		X
System Sensor SP100W Speaker, 8" round grill		X
System Sensor SP101R Speaker, 5" square grill		X
System Sensor SP100W24LOC Ceiling Speaker/Strobe, 8" round grill		X
System Sensor SP101R24LO Speaker/Strobe, 5" square grill (SP101W24LO- white)		X
System Sensor SP101R24M Speaker/Strobe, 5" square grill (SP101W24M- white)		X
System Sensor SP100W24MC Ceiling Speaker/Strobe, 8" round grill		X
System Sensor V400R Speaker, 4" square grill		X

Product	12 VDC	24 VDC
Wheelock 700T-24 Horn with Strobe		X
Wheelock WMT-24-FR, WM1T-24-FR, WM3T-24-FR Strobes		X
Wheelock EH-DL1-WM-24-VF-R, EH-EL1-WM-24-VF-R Electronic Horn Strobes		X
Wheelock AES-DL1-WM-24-VF-R, AES-EL1-WM-24-VF-R Multi-Tone Signals		X
Wheelock MB-G6-24-R Motor Bell, 6" gong		X
Wheelock MB-G10-24-R Motor Bell, 10" gong		X
Wheelock MBS-G6-24-R Motor Bell/Strobe, 6" gong		X
Wheelock MBS-G10-24-R Motor Bell/Strobe, 10" gong		X
Wheelock MIZ-24-WM-VF-R Mini-Horns		X
Wheelock MT-24-WM Horn/Strobe 117cd		X
Wheelock MT-12/24-R Multi Tone Horn		X
Wheelock MT-24-WM-VF-R Strobe/Horn 117cd		X

Table 6 Notification Appliances

Door Holders, UL Listed

Use only the Door Holders listed below.

Product	110 VAC	24 VDC
FM-980 Floor Mount, single		X
FM-986 Surface Wiring		X
FM-998 Concealed Wiring		X
DH150A Floor Mount		X
DH150N Floor Mount	X	
DH154A Flush Mount		X
DH154N Flush Mount	X	
DH158A Surface Mount		X
DH158N Surface Mount	X	

Table 7 Door Holders

Appendix C: NFPA Standard-Specific Requirements

Minimum System Requirements

The control panel has been designed for use in commercial, industrial, and institutional applications and meets the requirements for service under the National Fire Protection Association (NFPA) Standards outlined in this appendix. The minimum system components required for compliance with the appropriate NFPA standard are listed below.

- **Fire Alarm Control Panel.** Contains the main control board, cabinet (backbox and door), main supply transformer and power supply.
- **Batteries.** Refer to "Appendix A: Secondary Power Calculations" on page 39
- **Initiating Devices.** Connected to one of the control panel's Initiating Device Circuits.
- **Notification Appliances.** Connected to one of the control panel's Notification Appliance Circuits.
- **Releasing Devices.** Connected to one of the control panel's Releasing Circuits.

Additional Requirements

The following additional equipment is needed for compliance with the NFPA standards listed below. The relay contacts of this control panel may be used to trip any dialer that is UL listed for Central Station/Remote Station services. The illustrations in this appendix provide examples of possible system configurations.

Note: Applications which require the the NOTI-FIRE 911AC or the Potter EFT-C are not FM approved.

NFPA 72 - Signaling Systems for Central Station Service (Protected Premises Unit)

- **NOTI-FIRE 911AC Digital Alarm Communicator/Transmitter (DACT)** connected to a compatible listed Central Station DACR or Protected Premises Receiving Unit. See "Digital Alarm Communicator/Transmitter - Noti-Fire 911AC" on page 46 for installation instructions for this unit.
- **411UDAC Universal Digital Alarm Communicator** connected to a compatible listed Central Station DACR or Protected Premises Receiving Unit. See "Universal Digital Alarm Communicator - 411UDAC" on page 47 for installation instructions for this unit.

NFPA 72 - Auxiliary Fire Alarm System

- **4XTM Transmitter Module** for connection to a compatible listed Local Energy Municipal Box. See "Local Energy Municipal Box" on page 48 for installation instructions for this unit.

NFPA 72 - Remote Station Fire Alarm System

- **Fire•Lite RS82-9 Remote Station Receiver** connected to a 4XTM Transmitter Module. See "Remote Station Receiver - RS82-9" on page 49 for installation instructions for this unit.
- **NOTI-FIRE 911AC DACT** connected to a compatible listed Central Station DACR. See "Digital Alarm Communicator/Transmitter - Noti-Fire 911AC" on page 46 for installation instructions for this unit
- **411UDAC Universal Digital Alarm Communicator** connected to a compatible listed Central Station DACR. See "Universal Digital Alarm Communicator - 411UDAC" on page 47 for installation instructions for this unit.

NFPA 72 - Proprietary Fire Alarm System

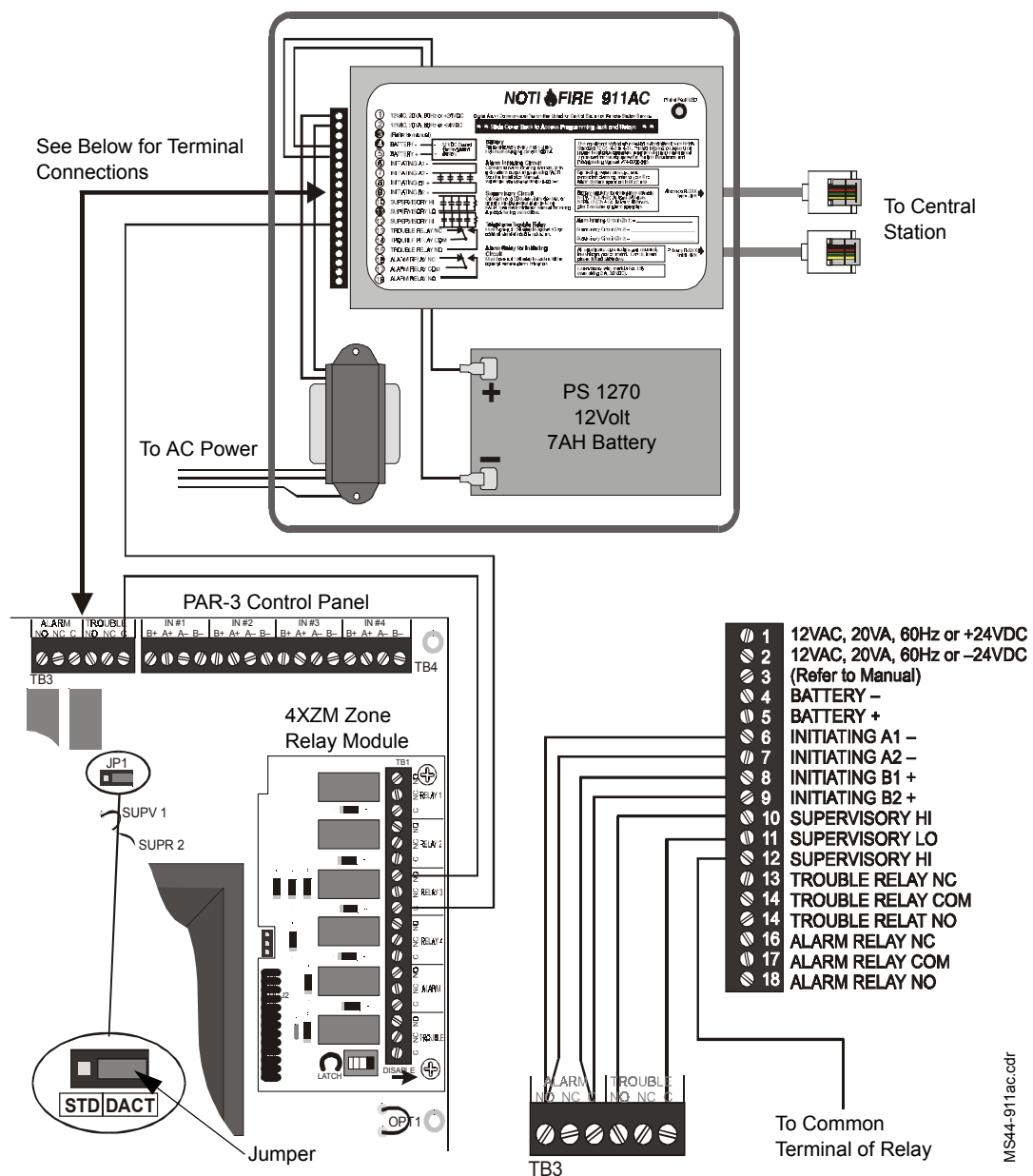
- **Potter EFT-C McCulloh Transmitter.** See "Potter EFT-C McCulloh Transmitter" on page 50 for installation instructions for this unit.

Digital Alarm Communicator/Transmitter - Noti-Fire 911AC

Note: This application is not FM approved

Using the Noti-Fire 911AC DACT for connection to a Central Station Receiver or Protected Premises Receiving Unit.

- AC Wiring for DACT/FACP must be connected to the same circuit.
- If the unit is not mounted in the control panel's backbox all connections must be in conduit, less than 20 ft. (609.6 cm) in length in the same room.
- For additional information refer to the Noti-Fire 911AC Instruction manual.



Place jumper over pins as shown when employing a DACT. This directs the control panel to transmit all trouble conditions except AC LOSS.

Figure 24 DACT Connections

Universal Digital Alarm Communicator - 411UDAC

The following figure illustrates an example of Central Station/Remote Station Receiver or Protected Premises Receiving Unit reporting using a 411UDAC. The relay contacts of the MRP-4424 may be used to trip any dialer listed for Central Station/Remote Station services. For additional information refer to the Instruction Manual for the 411UDAC.

- All connections between the control panel and the 411UDAC must be in conduit, less than 20 feet (6.1 meters) in length in the same room.
- The PAR-3 is non suitable for transmission of a supervisory signal to the DACT.
- Any zone of the 411UDAC can be wired to function as alarm or trouble; the unit must be programmed accordingly. In this example, Zone 1 is wired to the control panel's alarm relay, Zone 2 is wired to the control panel's trouble relay, and Zone 3 is wired to the optional module's supervisory relay.
- AC power is supplied directly to the 411UDAC, not through the control panel. AC wiring for both the 411UDAC and the control panel must be connected to the same AC branch circuit.
- End-of-Line Resistors must terminate all circuits. In this example, Zone 4 is unused and is terminated at the board.
- When employing a DACT, place the JP1 jumper, on the control panel, as shown below. This directs the panel to transmit all trouble conditions except AC LOSS. The DACT must be configured to transmit AC power loss to the central station.

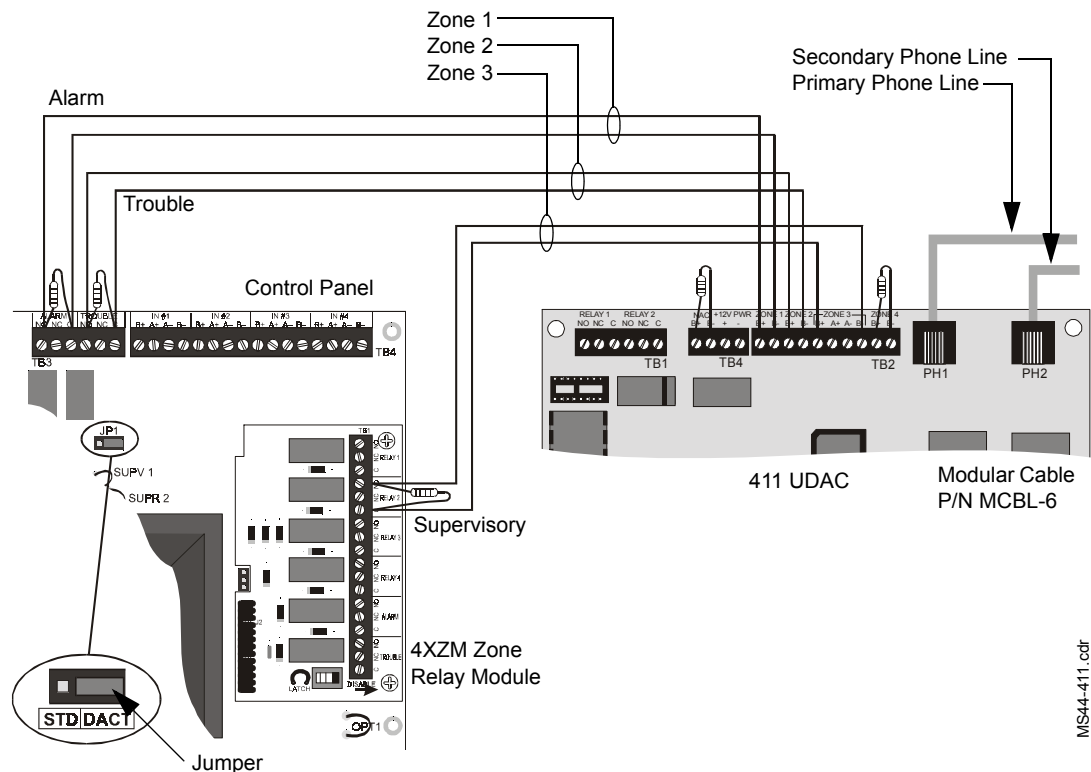


Figure 25 411UDAC Connections

MS44-411.cdr

Local Energy Municipal Box

Using the 4XTM Transmitter Module for connection to a Local Energy Municipal Box.

- The Municipal Box circuit supervises for ground faults and opens (i.e. missing wire) but not for direct short between two wires. It is not a power-limited circuit.
- This application is not suitable for separate transmission of sprinkler supervisory or trouble conditions.
- Maximum loop resistance allowed for wiring from control panel to Municipal Box is 3 ohms.

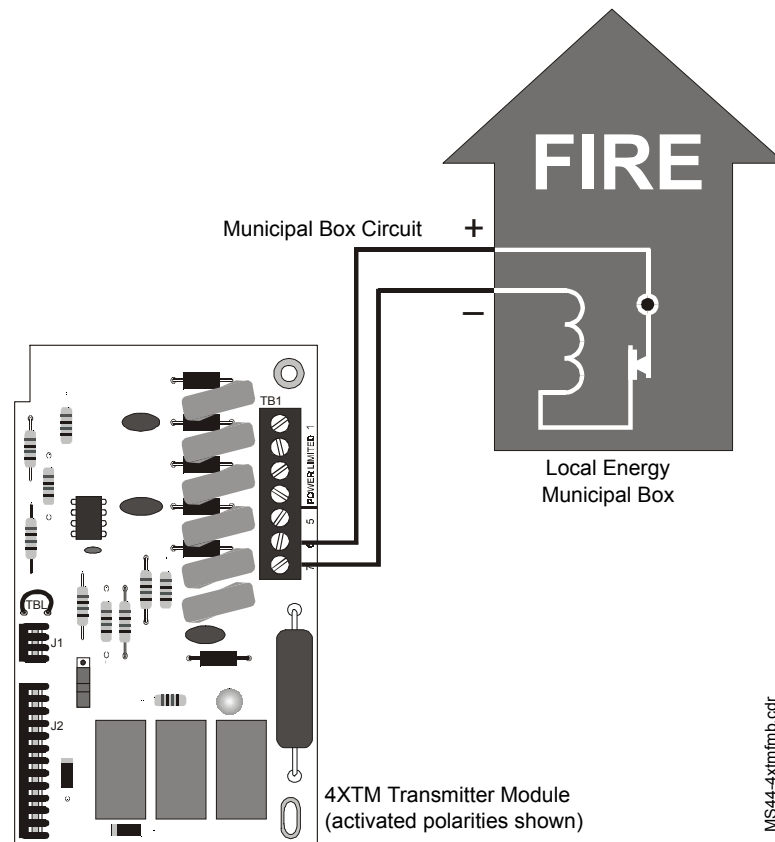


Figure 26 Municipal Box Connection

Remote Station Receiver - RS82-9

Using the 4XTM Transmitter Module for connection to a Fire•Lite RS82-9 Remote Station Receiver.

- Intended for connection to a polarity reversal circuit of a remote station receiving unit having compatible ratings.
- All connections are power-limited and supervised with the exception of the reverse polarity loop.
- Supervision of the loop is the responsibility of the receiver.

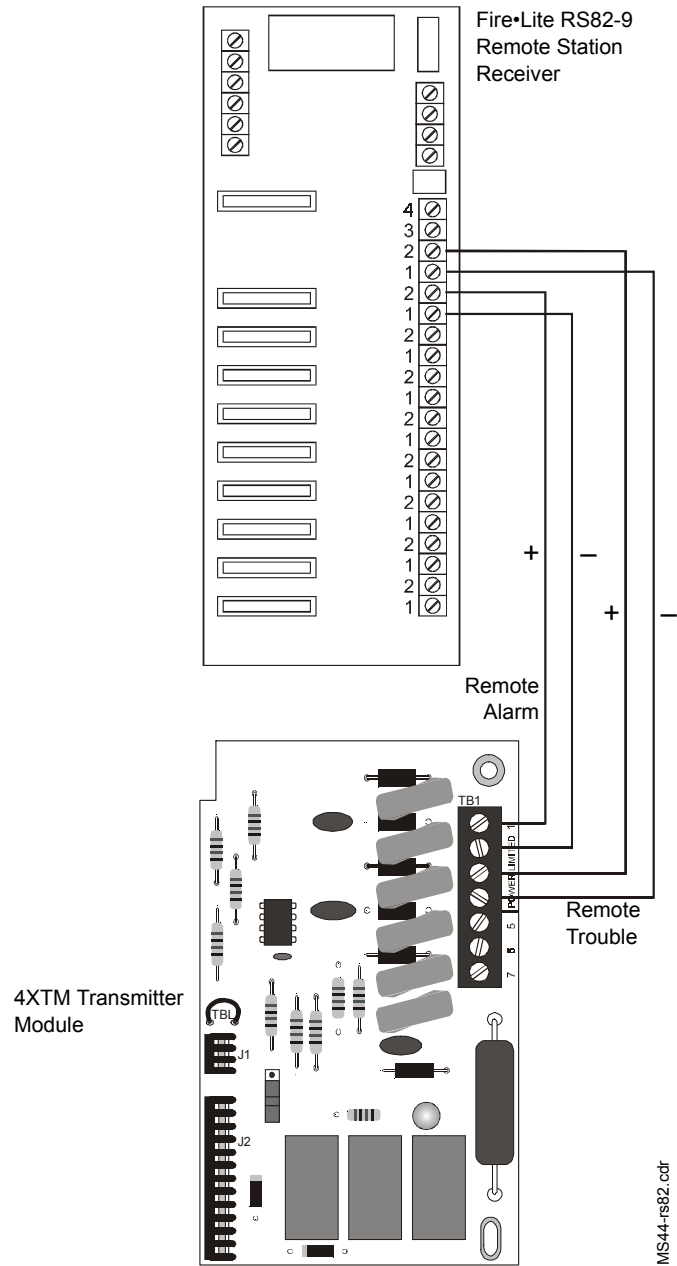


Figure 27 RS82-9 Connections

Potter EFT-C McCulloh Transmitter

Note: This application is not FM approved.

- Connections between control panel and the transmitter are supervised by the transmitter.
- Use transformer model ULT STK. NO. 1000391 (listed, Class 2, 12 V, 10 VA.). See Potter Electric Signal Company Bulletin # 748.
- Form-C Trouble relay which will automatically activate on any trouble condition.
- Form-C Alarm relay programmed to activate on General Alarm.

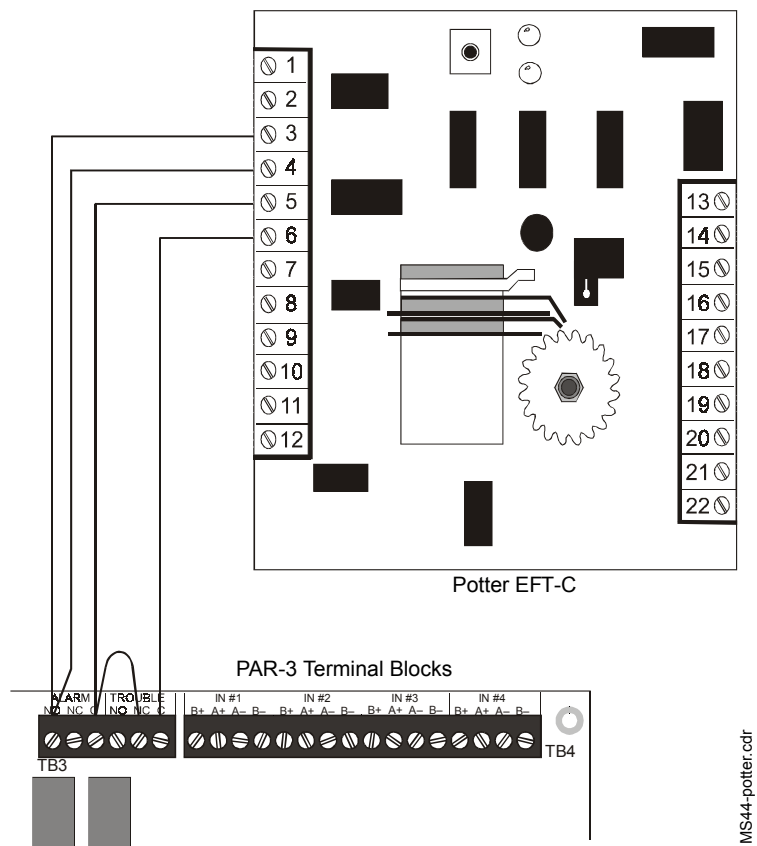


Figure 28 Potter EFT-C Connections

Appendix D: Testing & Maintenance

Testing

Inspection

Perform the following prior to applying power to the system.

- Check the actual wiring hookup with the wiring diagrams.
- Insure that no pieces of wire have fallen into the circuitry.
- Check for missing or damaged parts.

Alarm Test

An initial alarm test should be conducted following installation to determine that all parts of the system are functioning properly. The panels should remain powered for 24 to 36 hours prior to connecting the releasing solenoids. This precaution will avoid false discharges of gas in case of faulty or improperly placed detectors.

To perform an alarm test on the panel follow this procedure

1. Disconnect AC power and battery power.
2. Disconnect the installed solenoid valve circuit leads and connect spare solenoid valves, or connect an end-of-line device to serve as a dummy load.
3. Reconnect AC power and battery power.
4. Initiate a first zone alarm condition by blowing smoke into one of the Zone 1 smoke detectors. This should cause the first zone alarm condition.
 - The alarm relay will energize.
 - The red zone alarm LED will be illuminated.
 - The remote Indicating Circuit #1 audible alarm and the local piezo will start sounding.

Maintenance

A regular schedule of inspection, testing, and maintenance is vital to insure proper and reliable operation of the control panel. The procedures should be performed as required by the local authority having jurisdiction. Refer to NFPA for further details.

Troubleshooting

A troubleshooting table is included on the following page which provides for symptoms, problems and their solutions.

Table 8 Troubleshooting Table

Symptom			Problem		Solution	
AC Power LED ON	System trouble LED ON	Circuit trouble LED ON	Notification appliance circuit trouble		1. Check TB2 for proper connections. 2. Remove all field wiring and install dummy ELR at output circuit. Check for supervisory voltage across it, (Normal -2.3 V), if problem persists, replace circuit board. 3. Removed dummy ELR, reconnect field wiring and measure voltage across output; (trouble-5V, short 0V). 4. Check for ELR at last device. 5. Check field wiring.	
		Any of the right column yellow LEDs flashing	Initiating zone open circuit trouble		1. Check TB4 for proper connections. 2. Remove field wiring for zone in trouble and install dummy ELR (4.7K). If problem persists, replace circuit board. 3. Check for ELR at last device. 4. Check field wiring.	
		Any of the right column yellow LEDs steady ON	Zone disable		1. Check installation manual.	
		Power trouble LED ON	Battery trouble Batt yellow LED ON	Missing or Disconnected	1. Check battery connections.	
				Low or damaged battery	1. Remove batteries, check voltage across charger output (17 to 19V), otherwise replace circuit board. 2. Reconnect batteries, measure battery voltage at battery terminals. If voltage is less than 85% of rated voltage, allow them to charge for 48 hours. 3. If problem persists, replace batteries.	
			Ground fault trouble Earth yellow LED ON		1. Remove field wiring from main panel and optional module(s) (if installed). Install dummy ELR (4.7K). 2. Remove both battery leads. 3. If trouble clears, connect one circuit at the time to pin point the problem. 4. If trouble doesn't clear, replace circuit board.	
			Yellow LED on 4XTM ON	4XTM		1. Move Municipal Box disconnect switch SW1 up.
				OPT1, OPT2 jumper cut		1. Install optional module(s) or replace jumper if module(s) is not used.
				Municipal Box open circuit		1. Install dummy load if Municipal Box option isn't used. 2. Check Municipal Box wiring.
		Any of the right column red LEDs ON		Short on initiating circuit wiring		1. Remove field wiring and install ELR. If trouble clears, look for faulty or incorrectly wired devices.
	Disconnecting Municipal Box switch ON 4XTM does not create a trouble		Jumper for optional modules isn't cut		1. Cut associated jumper OPT1 or OPT2.	
	4XZM: associated LED doesn't activate for alarm, trouble or supervisory conditions		Optional module trouble		1. Make sure module is properly installed. 2. Move disable switch SW1 on 4XZM to the left.	
	RZA-4X piezo doesn't sound for alarm, trouble or supervisory conditions		4XLM		1. Make sure that 4XLM module is installed on J8. 2. Check field wiring.	
	Micro Fail yellow LED ON		Microprocessor damaged		1. Replace circuit board.	
	All RZA-4X LEDs stay ON		Power wasn't removed prior to installation		1. Press system reset.	
AC Power LED OFF	System trouble LED ON		Loss of main power		1. Check incoming power (TB5).	
			Damaged circuit breaker		1. Replace circuit board.	
	Micro Fail yellow LED ON		Microprocessor damaged		1. Replace circuit board.	

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