TRIGA

Intelligent Control Panel
SLC

Wiring Manual

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6/20/2022 Rev: A
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Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) 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.

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises 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. This document can be found at http://www.systemsensor.com/appguides/. 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, chimneys, even wet or humid areas 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, such as air conditioning vents.
- 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.).

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, compromising its ability to report a fire.

Audible warning devices such as bells, horns, strobes, speakers and displays 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:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- 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 to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises 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 life safety 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 panel. It is essential to use only equipment listed for service with your control panel.

Alarm Signaling Communications:

- **IP connections** rely on available bandwidth, which could be limited if the network is shared by multiple users or if ISP policies impose restrictions on the amount of data transmitted. Service packages must be carefully chosen to ensure that alarm signals will always have available bandwidth. Outages by the ISP for maintenance and upgrades may also inhibit alarm signals. For added protection, a backup cellular connection is recommended.
- **Cellular connections** rely on a strong signal. Signal strength can be adversely affected by the network coverage of the cellular carrier, objects and structural barriers at the installation location. Utilize a cellular carrier that has reliable network coverage where the alarm system is installed. For added protection, utilize an external antenna to boost the signal.
- **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 alarm signaling connections are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety 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 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 as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

Limit-F-2020

Installation Precautions

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

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 manuals are read and understood.

CAUTION - System Re-acceptance 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. Re-acceptance 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 0-49º C/32-120º F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°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 its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º 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.

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 interference, 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, or 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.

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.

Units with a touchscreen display should be cleaned with a dry, clean, lint free/microfiber cloth. If additional cleaning is required, apply a small amount of Isopropyl alcohol to the cloth and wipe clean. Do not use detergents, solvents, or water for cleaning. Do not spray liquid directly onto the display.

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.

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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 devices pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when devices are 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 or her 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 present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

Please include the following information:

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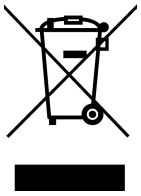


This symbol (shown left) on the product(s) and / or accompanying documents means that used electrical and electronic products should not be mixed with general household waste. For proper treatment, recovery and recycling, contact your local authorities or dealer and ask for the correct method of disposal.

Electrical and electronic equipment contains materials, parts and substances, which can be dangerous to the environment and harmful to human health if the waste of electrical and electronic equipment (WEEE) is not disposed of correctly.

Table of Contents

Section 1: Introduction

1.1 Scope

This document describes the operation, installation and wiring of various Signaling Line Circuit (SLC) devices when used with the TR-2100/ECS and TR-75 control panels. It also provides basic information that applies to SLC loops in general, such as the branch resistance measurements.

Additional information about the specific control panel and the modules and detectors referenced in this document can be found in the respective installation manual as listed in Section 1.1.1, “Reference Documentation”.

1.1.1 Reference Documentation

The table below accommodates a list of document sources containing additional information regarding the devices used on a Signaling Line Circuit:

For information on...	Refer to...	Part Number
TR-2100, TR-2100ECS Control Panels	Instruction Manual	LS10143-003TR-E
TR-75 Control Panel	Instruction Manual	LS10147-004TR-E
Compatible Devices	Device Compatibility Document	LS10167-006TR-E
Wireless Sensor Network	Instruction Manual	LS10036-000TR-E
TR-PULL-SA Pull Station	Installation Instructions	I56-6995
TR-PULL-DA Pull Station	Installation Instructions	I56-6994
TR-MONITOR Monitor Module	Installation Instructions	I56-6979
TR-MONITOR-10 Monitor Module	Installation Instructions	I56-6980
TR-MINIMON Mini Monitor Module	Installation Instructions	I56-6978
TR-ZONE Monitor Module	Installation Instructions	I56-6985
TR-ZONE-6 Interface Module	Installation Instructions	I56-6986
TR-MONITOR-2 Dual Monitor Module	Installation Instructions	I56-6981
TR-CONTROL Control Module	Installation Instructions	I56-6975
TR-CONTROL-6 Control Module	Installation Instructions	I56-6976
TR-RELAY Relay Module	Installation Instructions	I56-6982
TR-RELAY-6 Relay Module	Installation Instructions	I56-6983
TR-RELAYMON-2 Multiple Input/Output Module	Installation Instructions	I56-6984
TR-ISO Isolator Module	Installation Instructions	I56-6977
ISO-6 Isolator Module	Installation Instructions	I56-4096TRG-002
TR-PTIR-W/-IV Multi-criteria Detector*	Installation Instructions	I56-6969
TR-FIRE-CO-W/-IV Fire/CO Detector*	Installation Instructions	I56-6970
TR-PHOTO-CO-W Photo/CO Detector	Installation Instructions	
TR-PHOTO-W/-IV Photo Detector	Installation Instructions	I56-6971
TR-PHOTO-T-W/-IV Photo Detector	Installation Instructions	I56-6973
TR-PHOTO-R-W/-IV Photo Detector Remote Capable	Installation Instructions	I56-6972
TR-HEAT-W/-IV Heat Detector (135°)	Installation Instructions	I56-6974
TR-HEAT-ROR-W/-IV Heat Detector w/ROR	Installation Instructions	I56-6974
TR-HEAT-HT-W/-IV Heat Detector (190°)	Installation Instructions	I56-6974
TR-OSI-RI Intelligent Beam Detector	Installation Instructions	E56-6987
TR-DNR/W Intelligent, non-relay, low-flow photoelectric duct detector housing	Installation Instructions	I56-3051TRG-012
TR-B501, B501-WHITE, B501-IV, and B501-BL Detector Bases	Installation Instructions	I56-3738TRG-004
TR-B200S-WH, TR-B200S-IV Sounder Detector Bases	Installation Instructions	I56-3387TRG-009
TR-B200S-LF-WH, TR-B200S-LF-IV Low Frequency Sounder Detector Bases	Installation Instructions	I56-4151TRG-005
TR-B200SR-WH, TR-B200SR-IV Sounder Detector Bases	Installation Instructions	I56-3392TRG-011
TR-B200SR-LF-WH, TR-B200SR-LF-IV Low Frequency Sounder Detector Bases	Installation Instructions	I56-4152TRG-005
TR-B224RB-WH, TR-B224RB-IV Relay Detector Bases	Installation Instructions	I56-3737TRG-006
TR-B224BI-WH, TR-B224BI-IV Isolator Detector Bases	Installation Instructions	I56-3736TRG-005
TR-B300-6, TR-B300-6-IV Detector Base	Installation Instructions	I56-6566TRG-001

* Listed for use in Open Area Protection Applications per UL 268 7th Edition requirements.

1.2 Overview

Communication between the control panel and intelligent addressable monitor and control devices takes place through a Signaling Line Circuit (SLC), which can be wired to meet the requirements of NFPA Class A, Class B, or Class X.

1.3 Devices

1.3.1 Isolator Modules

Isolator Modules permit a zone of detectors and modules to be fault isolated from the remainder of the SLC loop, allowing critical components to function in the event of a circuit fault. Isolator modules are required to meet the requirements of an NFPA Class X circuit.

TR-ISO - Single fault isolator module

TR-ISO-6 - Six fault isolator module

1.3.2 Monitor Modules

Addressable modules that allow the control panel to monitor entire circuits of conventional alarm initiating devices, such as manual pull stations, smoke detectors, heat detectors, waterflow and supervisory devices.

TR-MONITOR - Monitor a Class B or Class A circuit of dry-contact input devices.

TR-MONITOR-10 - Monitor ten (10) Class B or five (5) Class A normally open contact device circuits.

TR-MINIMON - Same as the **TR-MONITOR** except offered in a smaller package for mounting with Class B wired devices. This module does not have an LED.

TR-ZONE - Monitors a single IDC of two-wire smoke detectors.

TR-ZONE-6 - Addressable module that provide an interface between the control panel and six (6) Class B or three (3) Class A IDCs of two-wire smoke detectors.

TR-MONITOR-2 - Similar to **TR-MONITOR**, but provide for two independent Class B IDCs.

1.3.3 Control Modules

Through the **TR-CONTROL** addressable control module, the control panel can selectively activate a Notification Appliance Circuit (NAC).

TR-CONTROL-6 - Similar in operation to the TR-CONTROL, except it can activate six (6) Class B or three (3) Class A NACs.

1.3.4 Relay Modules

The **TR-RELAY** addressable relay module provide the control panel with a dry-contact output for activating a variety of auxiliary devices.

TR-RELAY-6 - Similar in operation to the TR-RELAY, except it provides six (6) Form-C relays.

1.3.5 Multiple Input/Output Modules

The **TR-RELAYMON-2** addressable multiple input/output module monitors two (2) Class B input devices and provides two (2) independent Form-C relay contacts.

1.3.6 Intelligent Detectors

TR-PTIR-W/-IV - Multi-criteria smoke sensor that combines a photoelectric sensing chamber and 135°F (57.2°C) fixed temperature heat detection. The sensor uses addressable communication to transmit smoke density and other information to the control panel. It adjusts its detection parameters and alarm threshold depending on the ambient conditions it samples in its environment.

TR-HEAT-W/-IV - Addressable 135° fixed temperature heat detector using a thermistor sensing circuit for fast response. **TR-HEAT-ROR-W/-IV** incorporate a thermal rate of rise of 15° F (9.4° C)/minute.

TR-HEAT-HT-W/-IV - Addressable 190° fixed temperature heat detector using a thermistor sensing circuit for fast response.

TR-PHOTO-W/-IV - Addressable photoelectric smoke detector which provide smoke sensing utilizing optical sense technology. The **TR-PHOTO-T-W/-IV** include a 135° F fixed thermal sensor. The **TR-PHOTO-R-W/-IV** is a low profile, intelligent, photoelectric sensor that is remote test capable. For use with DNR(W). This model is available in ivory with -IV added to the model name.

TR-FIRE-CO-W/-IV - Addressable device that provides both fire and carbon monoxide (CO) detection. It combines four separate sensing elements in one unit (smoke, CO, light/flame, and heat) to sense multiple components of a fire. The detector's electrochemical sensing cell creates a separate signal for life safety CO detection. This model is available in ivory with -IV added to the model name.

TR-DNR(W) - Innovair Flex, intelligent, non-relay, low flow, photoelectric duct detector housing. This requires the TR-PHOTOR-W/-IV photoelectric smoke detector. Accommodates the installation of the TR-RELAY relay module. The **TR-DNRW** is a watertight housing.

TR-OSI-RI - Addressable long range projected beam smoke detector designed to provide open area protection.

TR-CO-W - Intelligent, plug-in type Intelligent CO sensor. The sensor transmits an analog representation of carbon monoxide density over a communication line to a control panel.

TR-PHOTO-CO-W - A plug-in type multi-criteria smoke sensor that offers a photoelectric sensing chamber combined with a carbon monoxide (CO) sensor.

1.3.7 Manual Pull Stations

The **TR-PULL-DA** is a dual-action pull station, and the **TR-PULL-SA** is a single action pull station, that, when activated, provide an addressable identification and its location to the control panel. An addressable monitor module is mounted inside the pull station to facilitate servicing and replacement.

1.3.8 Wireless Gateway

TRW-GI - The wireless gateway acts as a bridge between a group of wireless fire devices and an SLC loop on the TR-2100/ECS or TR-75. It is powered by the SLC loop or by a regulated, external 24VDC UL listed power supply. Available wireless devices include a photo detector, an Acclimate detector, a fixed-temperature heat detector, a rate-of-rise heat detector, and a monitor module. For details about wireless devices, system setup, and operation, see the *SWIFT™ Smart Wireless Integrated Fire Technology Instruction Manual*.

NOTE: The TRW-GI, as part of the wireless network, has been tested for compliance with the Federal Communications Commission (FCC) requirements of the United States Government. It has not been evaluated for use outside the USA. Use of this system outside the USA is subject to local laws and rules to which this product may not conform. It is the sole responsibility of the user to determine if this product may be legally used outside the USA.

1.4 SLC Capacity

The protocol selected for an SLC loop determines the maximum number of devices that can be handled by the loop. Within those limits, the individual control panel may have additional restrictions. See the specific installation manual for this information.

1.5 SLC Performance

SLC performance depends on the type of circuit (Class A, Class B, or Class X) and the components on the circuit.

NOTE: SLC operation meeting Class X requirements isolates each device on the SLC from faults that may occur within other areas of the SLC.

Wiring Class requirements are determined by national and local codes. Consult with the Authority Having Jurisdiction before wiring the SLC. The table below (derived from NFPA 72-1999) lists the trouble conditions that result when a fault exists on an SLC.

Type of Fault	Class B	Class A	Class X
Single Open	Trouble	Alarm, Trouble	Alarm, Trouble
Single Ground	Alarm, Trouble (ground)	Alarm, Trouble (ground)	Alarm, Trouble (ground)
Short	Trouble	Trouble	Alarm, Trouble
Short and open	Trouble	Trouble	Trouble
Short and ground	Trouble	Trouble	Alarm, Trouble
Open and ground	Trouble	Alarm, Trouble	Alarm, Trouble
Communications loss	Trouble	Trouble	Trouble
• Trouble - The control panel will indicate a trouble condition for this type of fault. • Alarm - The control panel must be able to process an alarm input signal in the presence of this type of fault.			

Table 1.1 SLC Performance

1.6 Surge Suppression

The TR-2100/ECS and TR-75 have built-in surge suppressors for all field wiring. No additional surge suppression is necessary.

1.7 LED Operation

The table below lists the LED operation on the various devices on an SLC.

Device	Standby	Activated
Monitor Module	Blinks RED	Steady RED
Control Module	Blinks GREEN	Steady GREEN
Detector	Blinks RED	Steady RED

Table 1.2 LED Operation

Section 2: Wiring Requirements

2.1 Wire Sizing

The SLC requires use of a specific wire type, depending on the mode of operation, to ensure proper circuit functioning. Wire size should be no smaller than 18 AWG (0.75 mm^2) and no larger than 12 AWG (3.25 mm^2) wire. The wire size depends on the length of the SLC circuit. It is recommended that all SLC wiring be twisted-pair to minimize the effects of electrical interference.

2.1.1 Wiring Requirements

While shielded wire is not required, it is recommended that all SLC wiring be twisted-pair to minimize the effects of electrical interference. Use Table 2.1 to determine the specific wiring requirements for the SLC.

Wire Requirements	Distance in Feet (meters)	Wire Type
RECOMMENDED: Twisted-unshielded pair, 12 to 18 AWG (3.31mm^2 to 0.82 mm^2).	12,500 ft. (3,810 m) 9,500 ft. (2895.6 m) 6,000 ft. (1,828.8 m) 3,700 ft. (1,127.76 m)	12 AWG (3.31 mm^2) 14 AWG (2.08 mm^2) 16 AWG (1.31 mm^2) 18 AWG (0.82 mm^2)
Untwisted, unshielded wire, in conduit or outside of conduit.	5,000 ft. (1,528 m) 3,700 ft. (,127.76 m)	12 to 16 AWG (3.31^2 mm to 1.31 mm^2) 18 AWG (0.82 mm)
Twisted, shielded pair Note: • Shields must be isolated from ground • Shields should be broken at each device	5,000 ft. (1524 m) 3,700 ft. (1,127.76 m)	12 to 16 AWG (3.31 mm^2 to 1.31 mm^2) 18 AWG (0.82 mm^2)
Note: Maximum total capacitance of all SLC wiring (both between conductors and from any conductor to ground) should not exceed 0.5 µF.		

Table 2.1 SLC Wiring Requirements for Triga Modules

2.1.2 Wire Sizing for TR-6815

The SLC requires use of a specific wire type, depending on mode of operation, to ensure proper circuit functioning. Wire size should be no smaller than 18 AWG (0.075 mm) and no larger than 12 AWG (3.25 mm) wire. The wire size depends on the length of the SLC circuit. It is recommended that all wiring be twisted-pair to minimize the effects of electrical interference shield termination.

2.2 Measuring Resistance & Length

2.2.1 Two-Wire SLC - Class B

Loop Resistance

T-tapping of the SLC wiring is permitted for 2-wire Class B configurations. The total DC resistance from the control panel to each branch end cannot exceed 50 ohms. Measure DC resistance as detailed and shown below:

1. With power removed, short the termination point of one branch at a time and measure the DC resistance from the beginning of the SLC to the end of that particular branch.
2. Repeat this procedure for all remaining branches in the SLC.

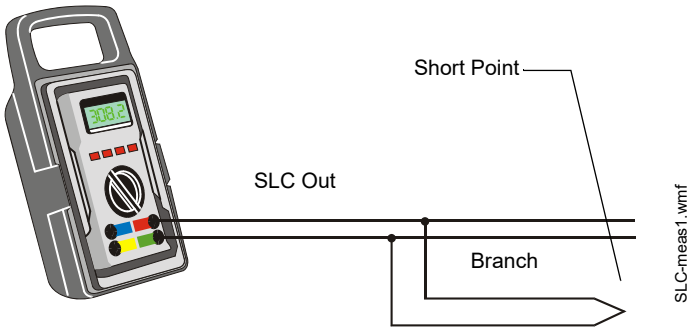


Figure 2.1 Measuring DC Resistance of a Two-Wire SLC

Total Wire Length

The total wire length of all combined branches of one SLC cannot exceed the limits set forth in each system's instruction manual. Determine the total length in each SLC by summing the wire lengths of all branches of one SLC.

In the following figure, the total length of the SLC is determined by adding the lengths of Branch A plus Branch B plus Branch C.

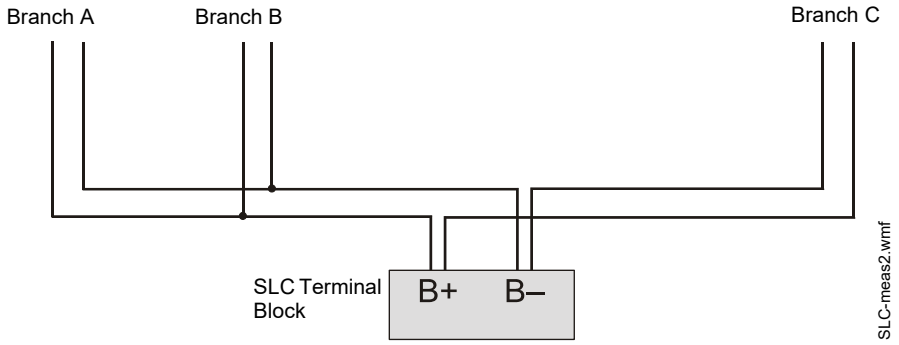


Figure 2.2 Measuring the Total Wire Length - Two-Wire SLC

2.2.2 Four-Wire SLC Class A and Class X

Loop Resistance

The total DC resistance of the SLC pair cannot exceed 50 ohms. Measure DC resistance as detailed and shown below.

1. Disconnect the SLC channel B (Out) and SLC channel A (Return) at the control panel.
2. Short the two leads of SLC channel A (Return).
3. Measure the resistance across the SLC channel B (Out) leads.

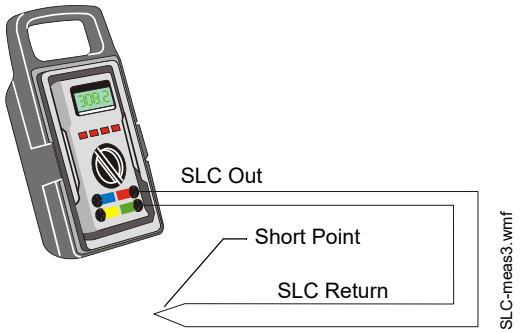


Figure 2.3 Measuring DC Resistance of a Four-Wire SLC

Total Wire Length

The total wire length in a four-wire SLC cannot exceed the limits set forth in each system's instruction manual. The figure below identifies the output and return loops from SLC terminal on the control panel:

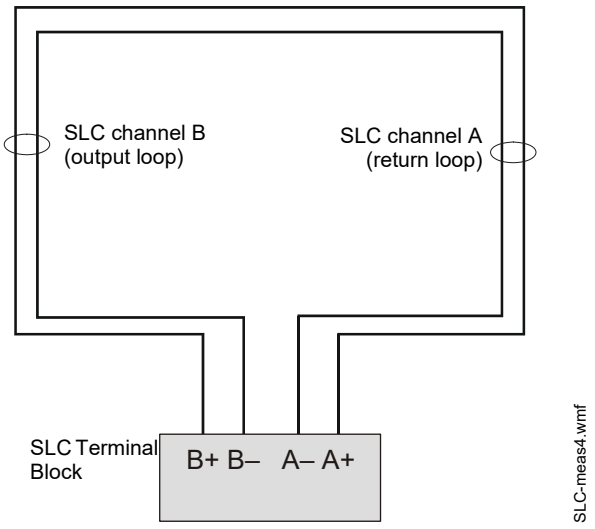


Figure 2.4 Measuring the Wire Length – Four-Wire SLC

2.3 Terminal Blocks

The terminal blocks on the board that concern the SLC circuit are described below. For more information on this subject, refer to the control panel's Instruction Manual.

2.3.1 TR-75

24 VDC power may be supplied by a remote power supply such as the Honeywell HPF-PS6/10. The wiring class of the external power source must match the wiring class of the device being powered.

TB2 provides connections for the SLC wiring.

The SLC supports 75 detectors and 75 modules.

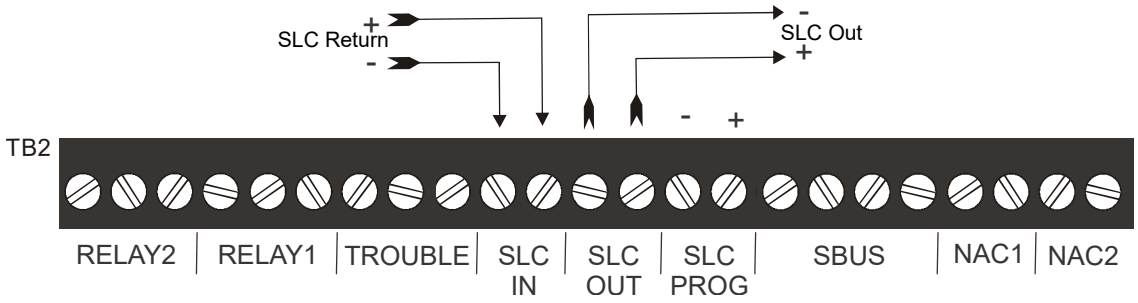


Figure 2.5 TR-75 Terminal Block

2.3.2 TR-2100/ECS

24 VDC power may be supplied by a remote power supply such as the Honeywell HPF-PS6/10. The wiring class of the external power source must match the wiring class of the device being powered.

TB2 provides connections for the SLC wiring.

The SLC supports 159 detectors and 159 modules.

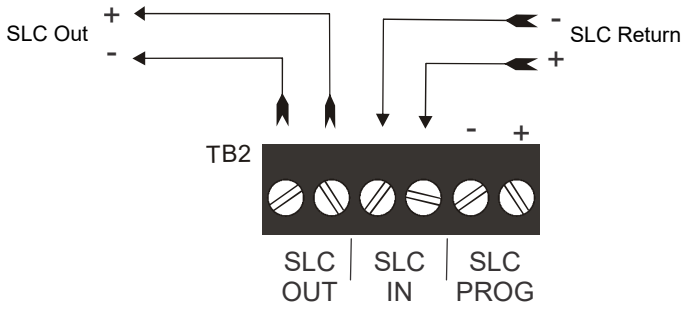


Figure 2.6 TR-2100/ECS Terminal Block

Section 3: SLC Circuits without Isolators

3.1 Overview

This chapter concerns itself with the two Classes of circuits that do not require isolation devices:

- NFPA Class B
- NFPA Class A

3.2 NFPA Class B SLC

NFPA Class B requirements can be met by using the diagram below.

- T-tapping of the SLC wiring is allowed for Class B configuration.

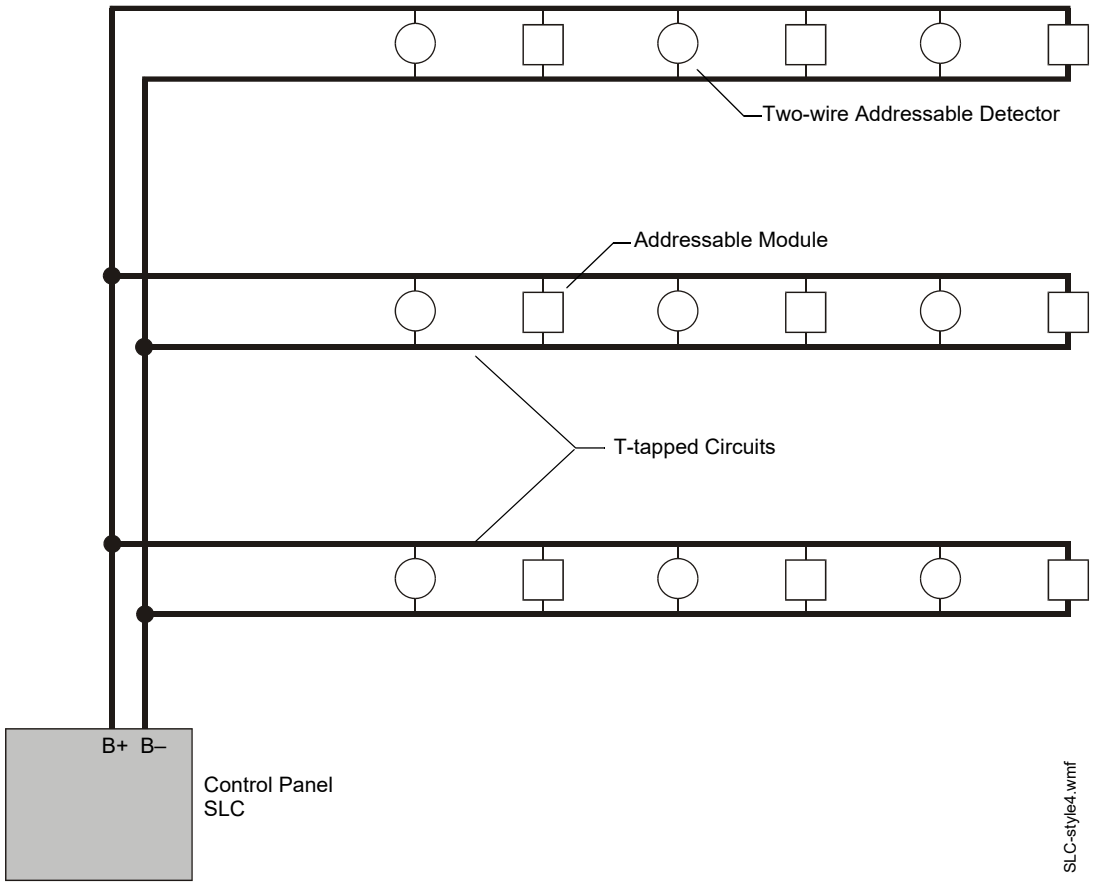


Figure 3.1 Basic NFPA Class B SLC

3.3 NFPA Class A SLC

NFPA Class A requirements can be met by using the diagram below.

- T-tapping of the SLC wiring is NOT allowed for Class A configuration.

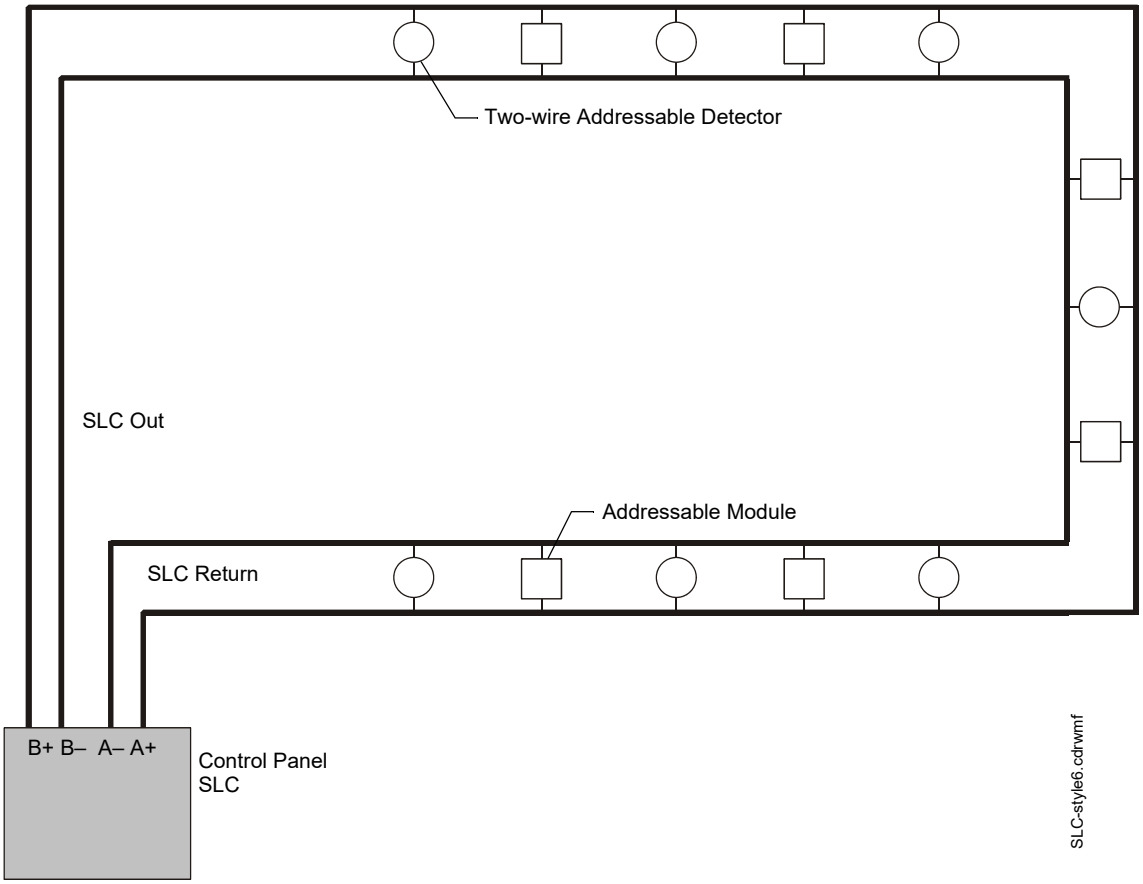


Figure 3.2 Basic NFPA Class A SLC

Section 4: SLC Circuits with Isolators

4.1 Fault Isolator Devices

There are three isolator devices used to protect critical elements of the SLC from faults on other SLC branches or segments.

- Fault Isolator Module: **TR-ISO**
- Six Fault Isolator Module: **TR-ISO-6**
- Isolator Detector Base: **TR-B224BI-WH/-IV**

A Fault Isolator Module on both sides of a device, or the combination of Isolator Base and Isolator Module is required to comply with NFPA Class X requirements.

CAUTION: MAXIMUM ADDRESSABLE DEVICES

- If relay or sounder bases are not used, a maximum of 25 addressable devices can be connected between Isolator Modules and/or Bases. When relay or sounder bases are used, the maximum number of addressable devices that can be connected between Isolators is reduced to seven. Isolator modules will not function properly when these limits are exceeded.
- When more than 100 Isolator Modules are connected to an SLC loop, the address capacity of the loop is reduced by two (2) addresses for every isolator device in excess of 100.

4.1.1 Isolating an SLC Branch

The module continuously monitors the circuit connected to terminals 3(–) and 4(+). Upon power-up, an integral relay is latched on. The module periodically pulses the coil of this relay. A short circuit on the SLC resets the relay. The module detects the short and disconnects the faulted SLC branch or segment by opening the positive side of the SLC (terminal 4). This isolates the faulty branch from the remainder of the loop preventing a communication problem with all other addressable devices on the remaining branches (labeled “Continuation of the SLC” in the figure below). During a fault condition, the control panel registers a trouble condition for each addressable device which is isolated on the SLC segment or branch. Once the fault is removed, the module automatically reapplies power to the SLC branch or segment.

4.1.2 Wiring an Isolator Module

TR-ISO Module

The figure below shows typical wiring of an TR-ISO Isolator Module.

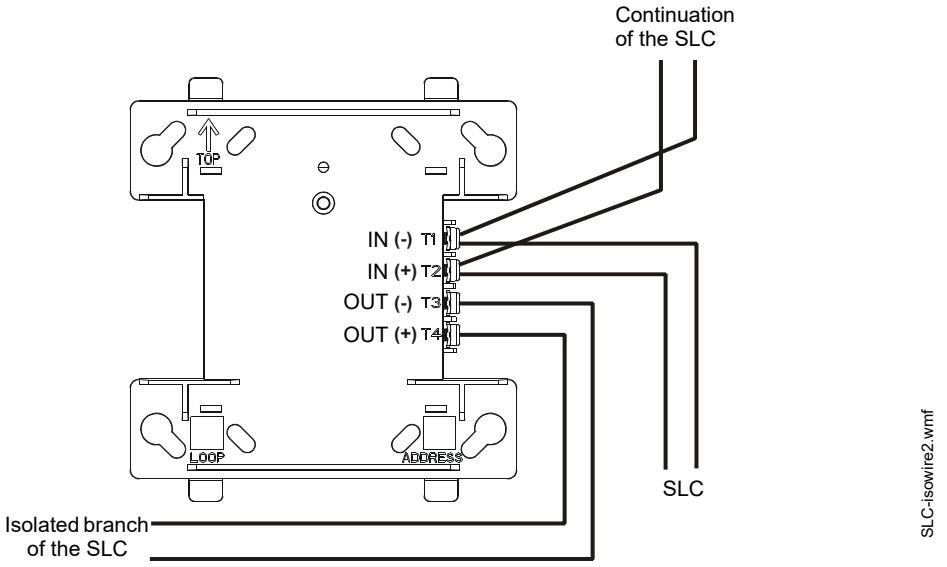


Figure 4.1 Wiring a TR-ISO Module

TR-ISO-6 Module

The figure below shows typical wiring of a TR-ISO-6 Isolator Module.

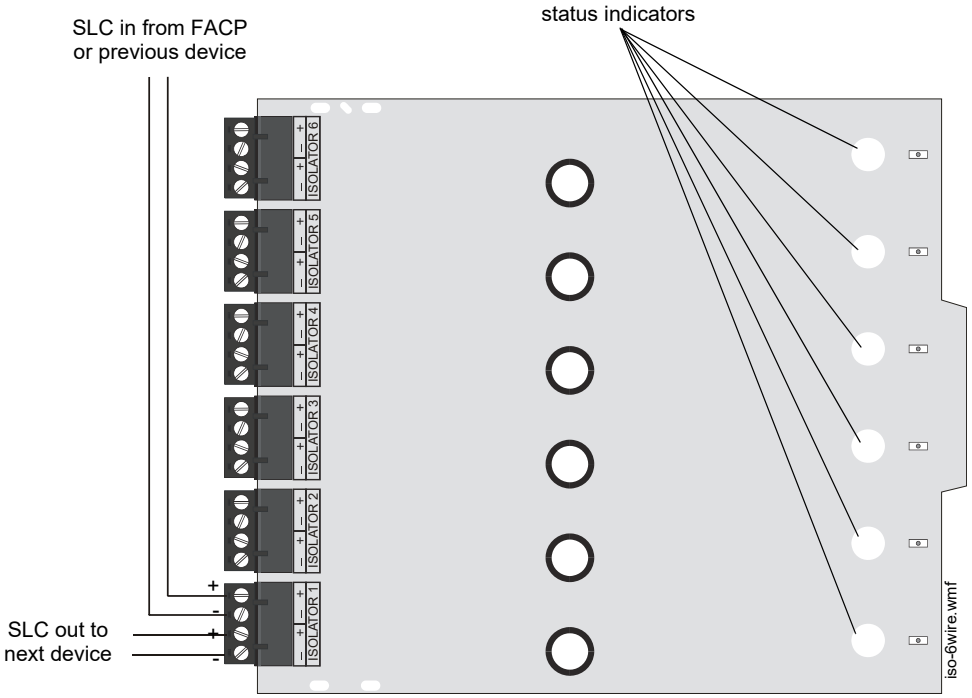


Figure 4.2 Wiring a TR-ISO-6 Module

4.2 NFPA Class B SLC Using Isolator Modules

A variation of a Class B operation using a TR-ISO isolator module to protect each branch of the SLC is shown below. Refer to Figure 4.1 for TR-ISO wiring and to Section 4.1 for limitations.

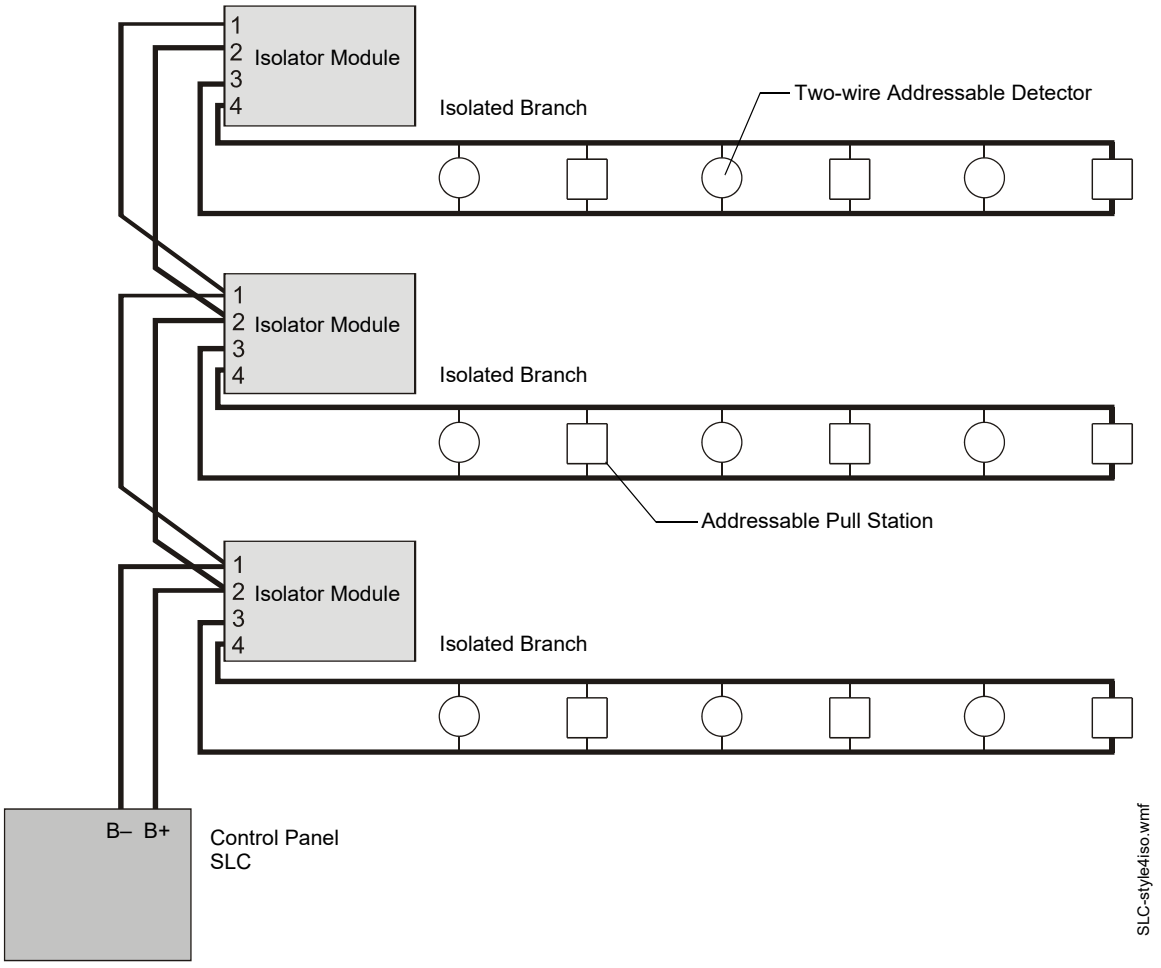


Figure 4.3 NFPA Class B SLC Using TR-ISO Isolator Module

A variation of a Class B operation using a TR-ISO-6 isolator module to protect each branch of the SLC is shown below. Each terminal on the TR-ISO-6 acts as a single TR-ISO module. Refer to Figure 4.2 for ISO-6 wiring and to Section 4.1 for limitations. Note that the ISO-6 cannot accept two wires at one pin. Wire Class B SLC loops as shown in the figure below.

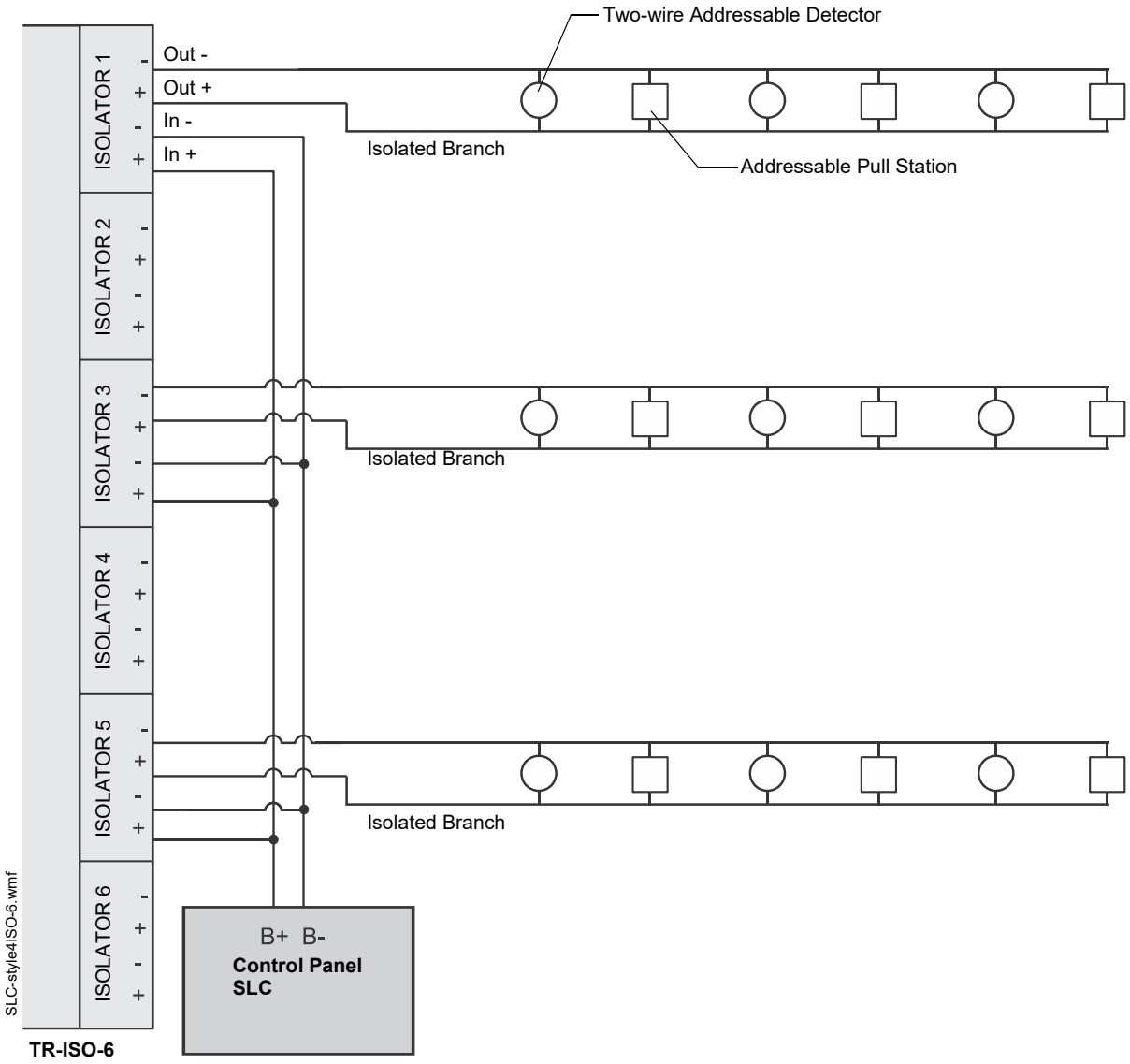


Figure 4.4 NFPA Class B SLC Using a TR-ISO-6 Isolator Module

4.3 NFPA Class A SLC Using Isolator Modules

A variation of Class A operation using isolator modules to protect a section of the SLC. By flanking each group of devices with an TR-ISO fault isolator module, each group is protected from faults that may occur in the other groups. For example, a fault in Section B will not effect Sections A & C. The isolator modules on either side of Section B will open the loop. Section A will still operate from power on the SLC Out side and Section C will operate from the SLC Return side.

- A combination of isolator modules and isolator bases may be used.
- T-tapping is NOT allowed within the Class A configuration.
- Isolator modules shall be within 20 feet (6.1 meters) of device and must be enclosed in metal conduit.

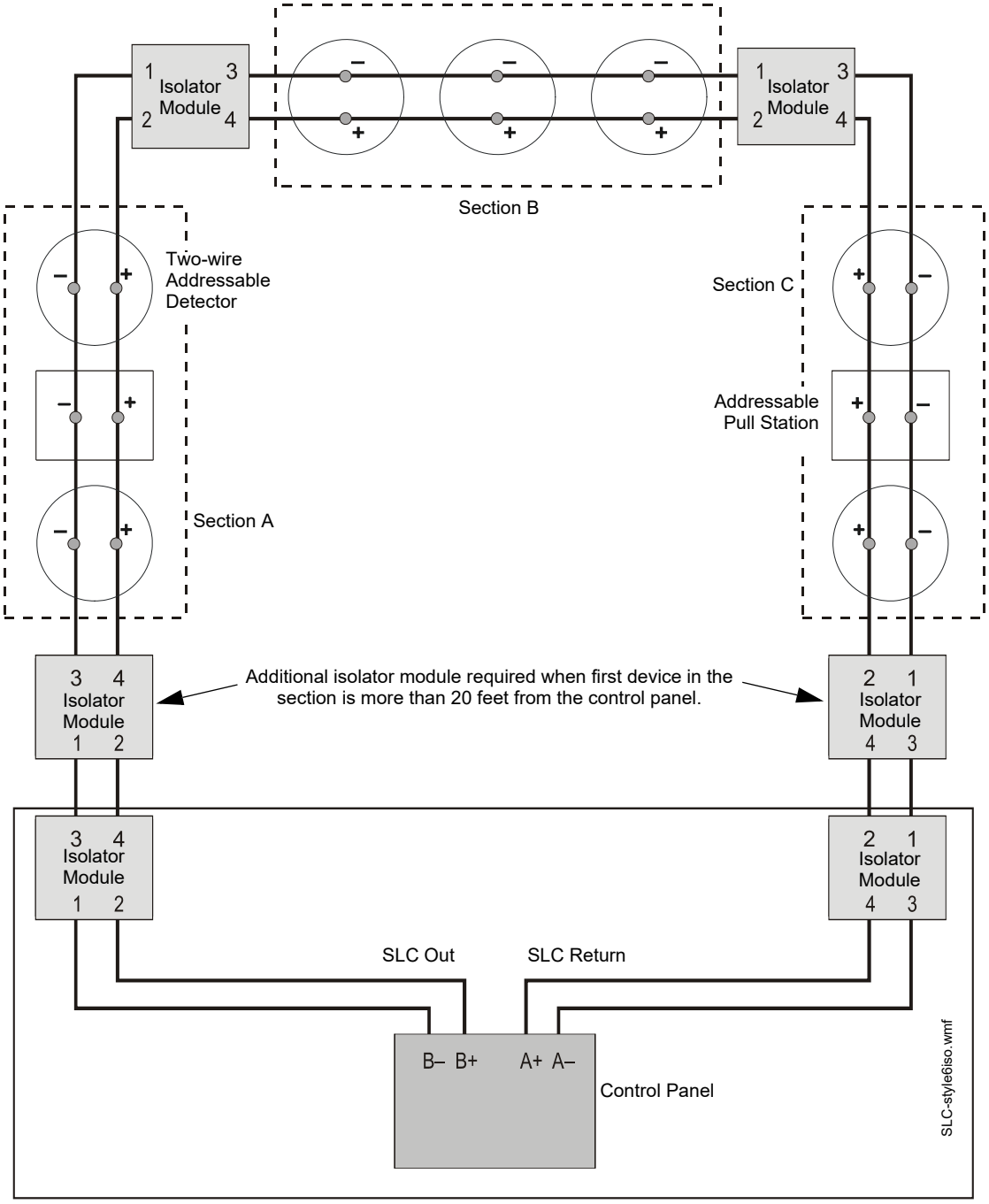


Figure 4.5 NFPA Class A SLC Using Isolator Modules

4.4 NFPA Class X SLC Using Isolator Modules

Class X operation requires using isolator modules (or a combination of isolator modules and isolator bases) before and after each device. Flanking each device with an isolator provides fault protection to all other devices on the loop.

- T-tapping is NOT allowed within the Class X wiring configuration.
- When a detector base or pull station is used, install isolator modules on both sides of the device.
- Connections between isolator modules and the device they isolate must be “close-nippled” conduit, within 3 feet (91.44 cm).

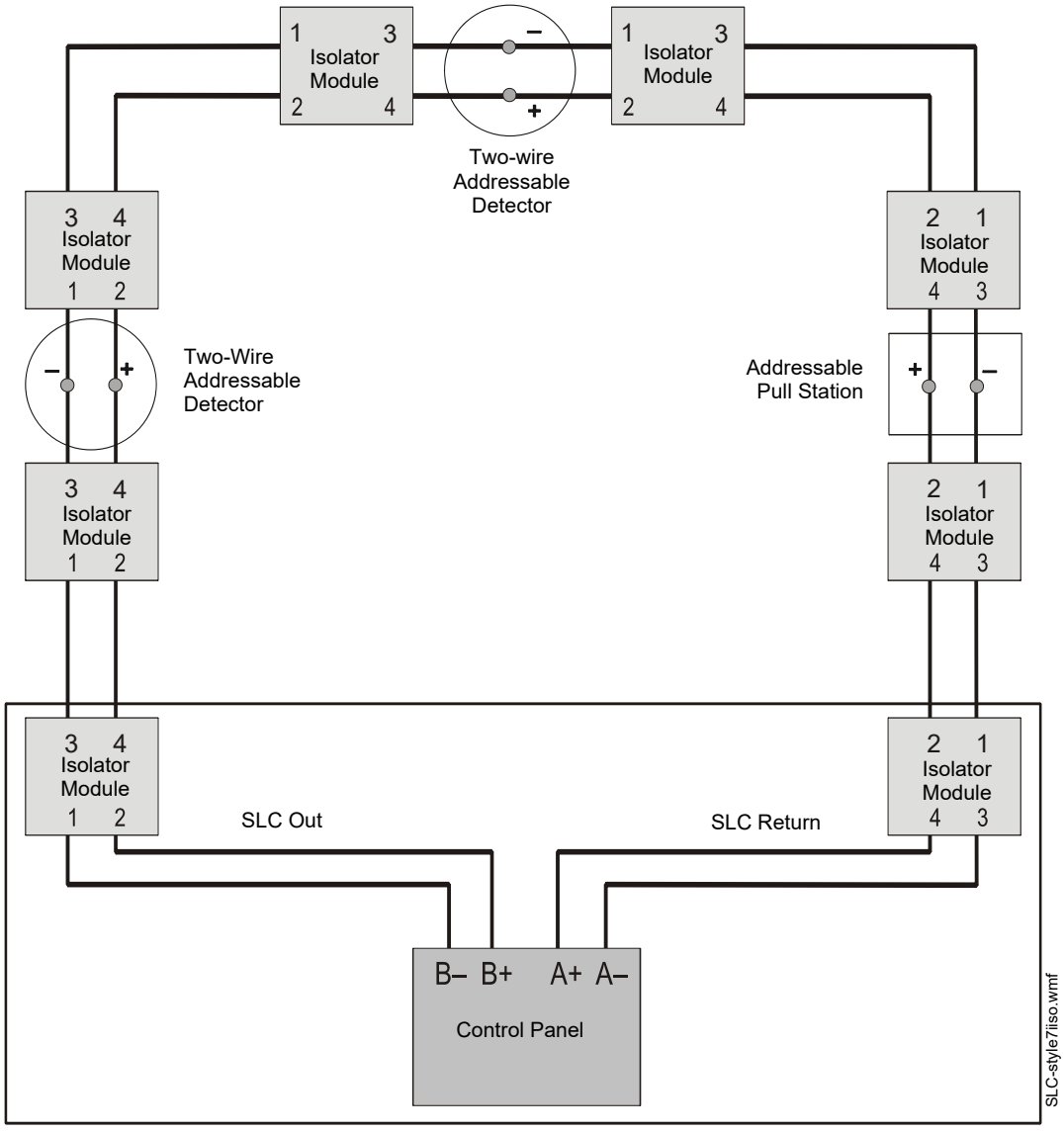


Figure 4.6 NFPA Class X SLC Using Isolator Modules

Section 5: Monitor Modules

5.1 Descriptions

These addressable modules monitor conventional contact-type alarm initiating devices. You can configure module circuits as an NFPA Class B or Class A Initiating Device Circuits (IDC). There is no limit to the number of contact-type devices installed on a monitor module circuit.

NOTE: For more information on the individual module specifications refer to the Installation Instructions that are provided with these devices.

5.1.1 Addressable Monitor Modules

TR-MONITOR Monitor Module

This is an addressable module that monitors either a Class B or Class A circuit of dry-contact input devices. This module is capable of participating in degraded mode where supported by the FACP.

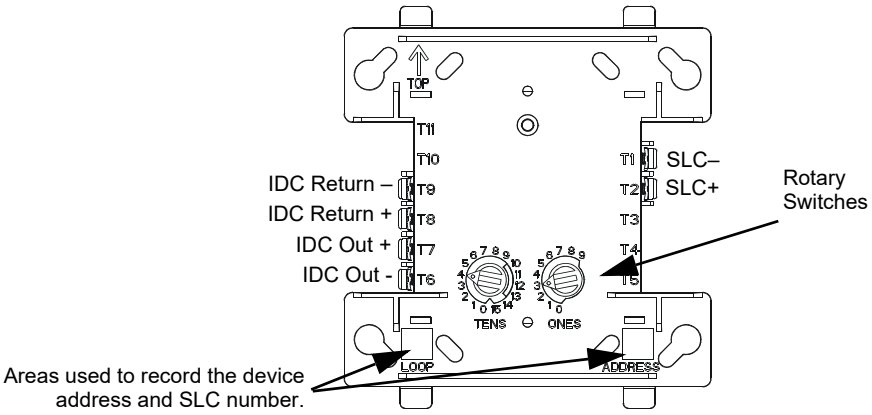


Figure 5.1 TR-MONITOR Monitor Module

TR-MONITOR-10 Monitor Module

This is an addressable monitor module intended to interface between the FACP and up to ten (10) Class B or five (5) Class A IDCs containing normally open contact devices.

This type of module is contained in a TR-ACB cabinet. The TR-ACB can accommodate up to 2 modules.

See the *Installation Instructions* provided with module for proper installation into a cabinet.

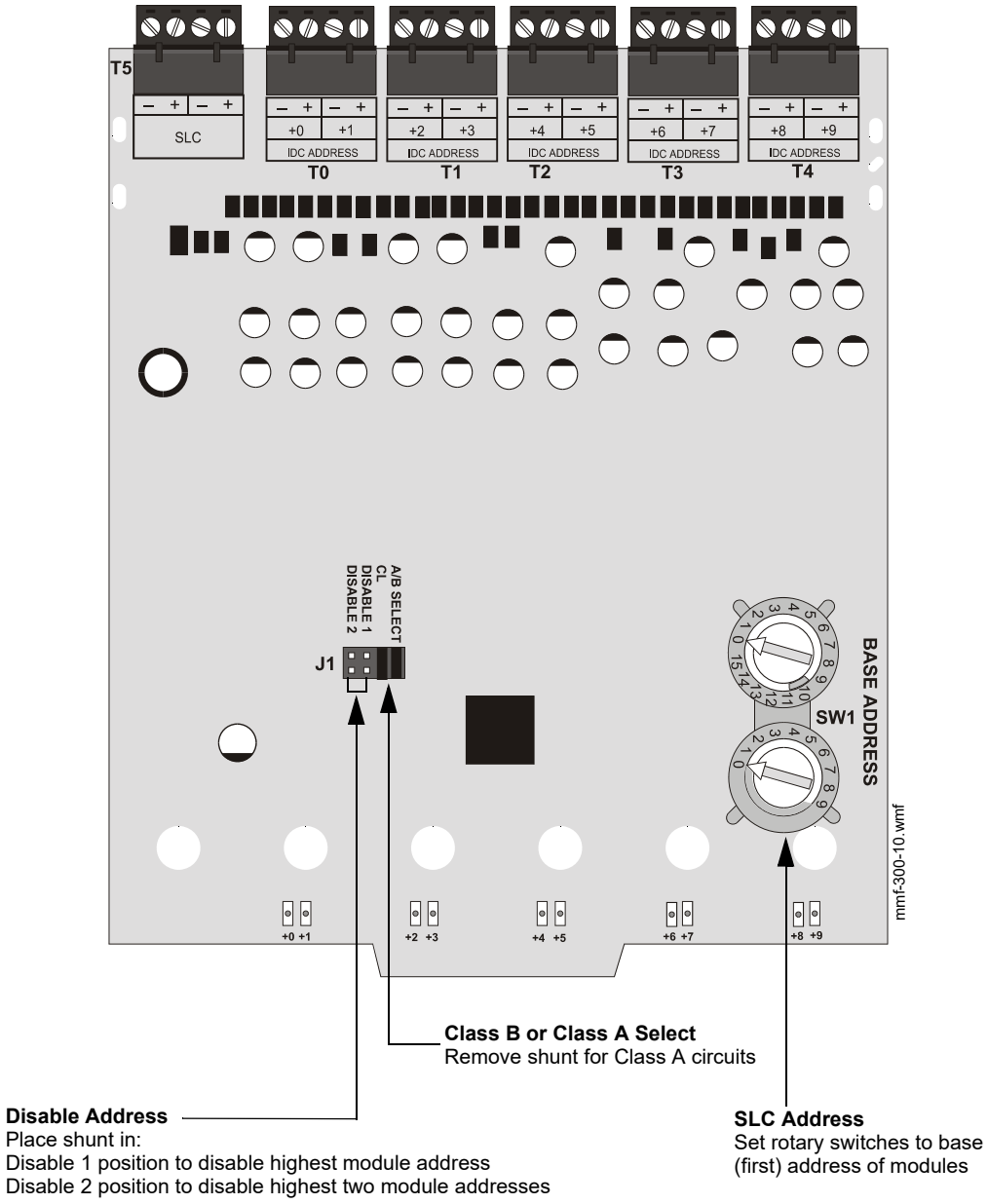


Figure 5.2 TR-MONITOR-10 Monitor Module

5.1.2 Zone Interface Modules

TR-ZONE Module

Similar to the TR-MONITOR, this module is used to monitor a single IDC of UL listed compatible two-wire 24 volt conventional smoke detectors. Refer to the *Device Compatibility Document* for a list of compatible detectors.

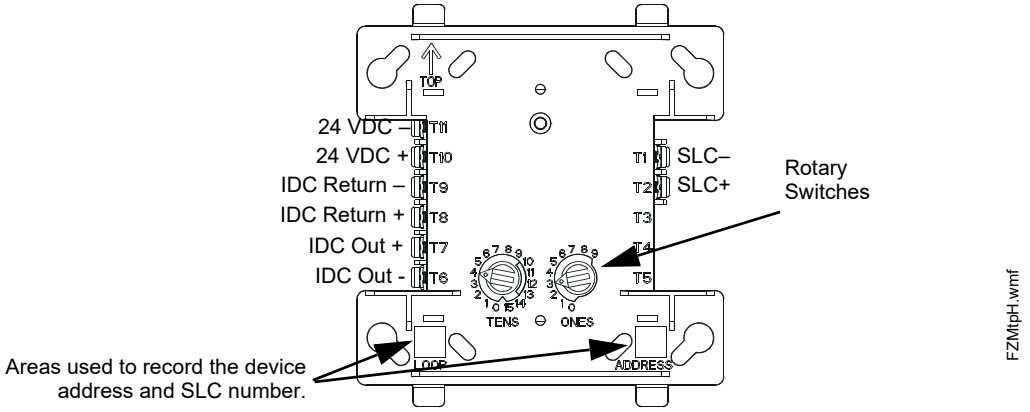


Figure 5.3 TR-ZONE Interface Module

TR-ZONE-6 Interface Module

This monitor module is intended to interface between the FACP and a conventional alarm system with up to six (6) Class B or three (3) Class A IDCs containing normally open contact devices.

This type of module is contained in a TR-ACB cabinet. The TR-ACB can accommodate up to 2 modules.

See the *Installation Instructions* provided with module for proper installation into cabinet.

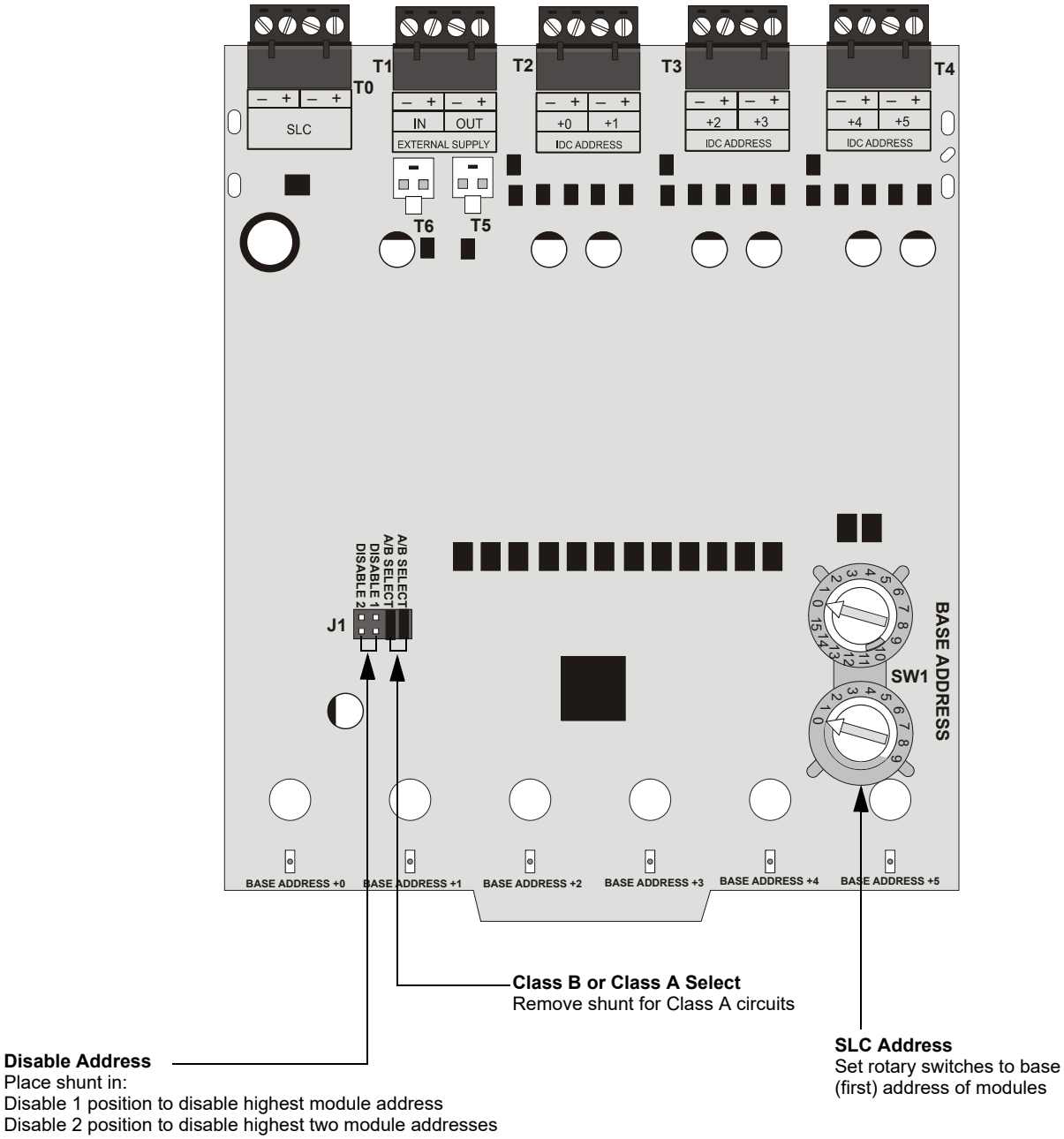


Figure 5.4 TR-ZONE-6 Interface Module

5.1.3 Dual Monitor Module

TR-MONITOR-2 Module

The TR-MONITOR-2 is similar to the TR-MONITOR but provides for two independent 2-wire IDCs at two separate, consecutive addresses.

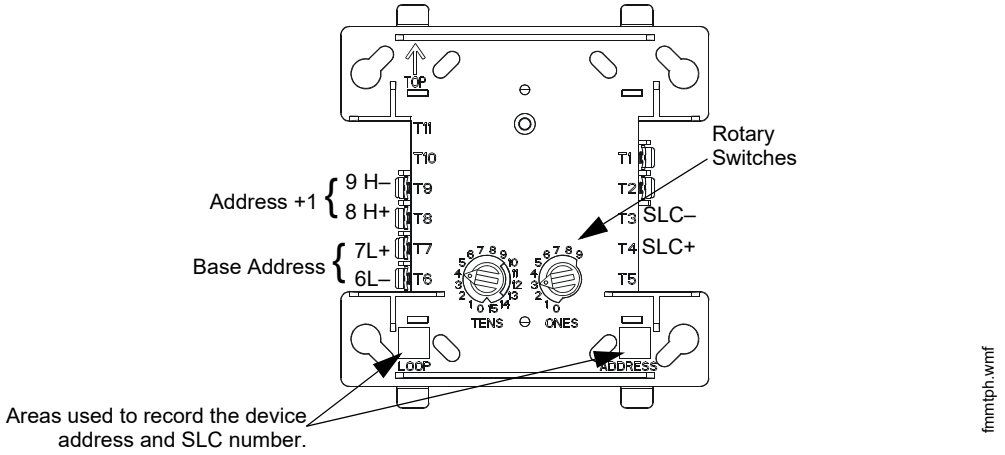


Figure 5.5 TR-MONITOR-2 Dual Monitor Module

5.1.4 Mini Monitor Module

TR-MINIMON Monitor Module

The TR-MINIMON is functionally and electrically identical to an TR-MONITOR, but is offered in a smaller package for mounting directly in the electrical box of the Class B device being monitored.

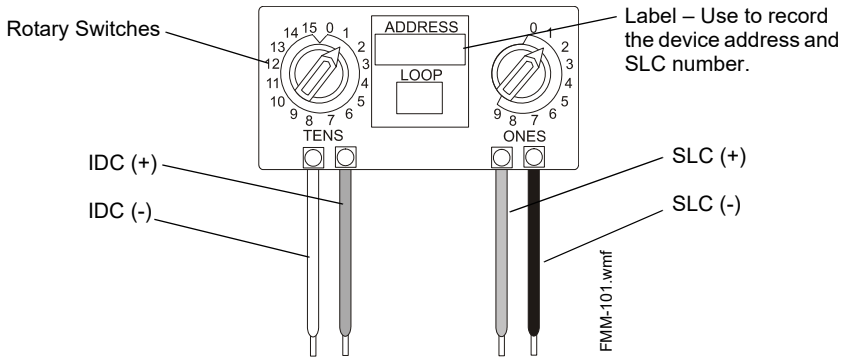


Figure 5.6 TR-MINIMON Mini Monitor Module

5.2 Installation

When installing any of these modules, DO NOT mix the following services that the IDC provides:

- Fire alarm service
- Automatic and manual waterflow alarm service with normally open contact devices
- Sprinkler supervision with normally open contact devices

5.2.1 Setting the SLC Address for a Single Point Module

Each module can be set to one of 159 addresses (01-159) and is factory preset with an address of "00".

NOTE: The TR-75 can support addresses 01 - 75. The TR-2100/ECS can support module addresses 01 - 159. The plastic stop located on the Tens switch must be removed to set addresses above 99.

To set an SLC address, use a screwdriver to adjust the rotary switches on the module to the desired address. The module below is set at "35". When finished, mark the address on the module face in the place provided.

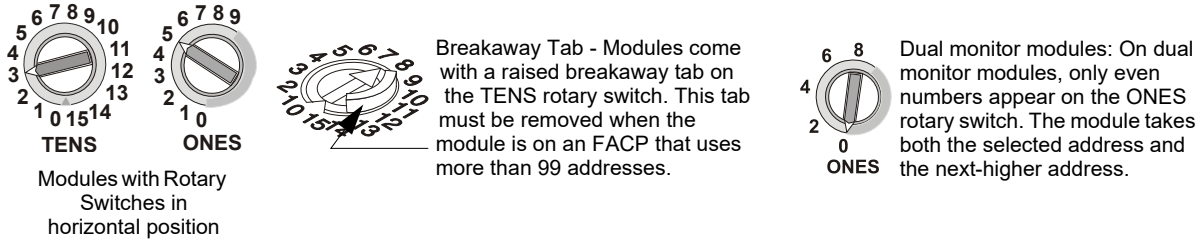


Figure 5.7 Setting an SLC Address on a Single Point Module

5.2.2 Setting the SLC Address for a Multi-Point Module

The SLC address of a multi-point module is set in the same fashion as a single-point module.

In Class B operation, each TR-MONITOR-10, TR-ZONE-6, TR-CONTROL-6, and TR-RELAY-6 module is set to a base address. The remaining module points are automatically assigned to the next higher SLC addresses. For example, if the base address of an TR-MONITOR-10 is set to 28, the next module points will be addressed to 29, 30, 31, 32, 33, 34, 35, 36 and 37.

In Class A operation, alternate module points are paired together, resulting in a total of five module points. For example, if the base address of an TR-MONITOR-10 is set to 28, then 30, 32, 34 and 36 will be automatically assigned to the remaining module points and 29, 31, 33, 35 and 37 are available for use by other modules.

NOTE: The TR-75 can support addresses 01 - 75. The TR-2100/ECS can support module addresses 01 - 159. The plastic stop located on the Tens switch must be removed to set addresses above 99.

To set an SLC address, use a common screwdriver to adjust the rotary switches on the module to the desired address. The module below is set at "28".

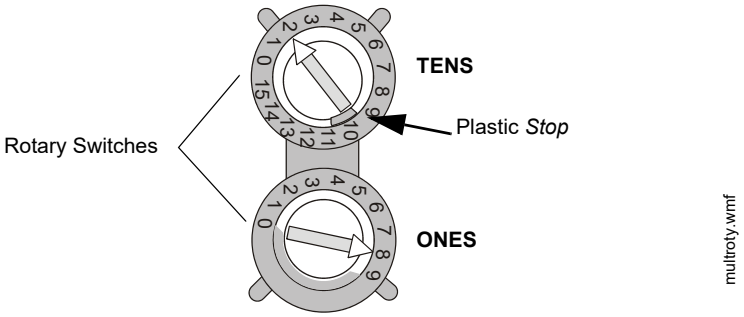


Figure 5.8 Setting an SLC Address on a Multi-Point Module

5.3 TR-MONITOR Wiring Diagrams

Following are wiring diagrams that depict NFPA Class B and Class A Initiating Device Circuits (IDCs) using TR-MONITOR monitor modules.

The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamperes @ 24 VDC (nominal).

5.3.1 Wiring an NFPA Class B IDC with a TR-MONITOR

Connect the SLC wiring to the module terminals 1 (–) and 2 (+).

Each module takes one address on the SLC. Use the rotary switches on the module to set it to the required SLC address. Refer to "Setting the SLC Address for a Single Point Module" on page 28.

The figure below shows typical wiring for a supervised and power-limited NFPA Class B IDC using an TR-MONITOR module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Power Considerations" on page 57 for information on supervising 24 VDC power.
- The wiring class of the external power source must match the wiring class of the device being powered.

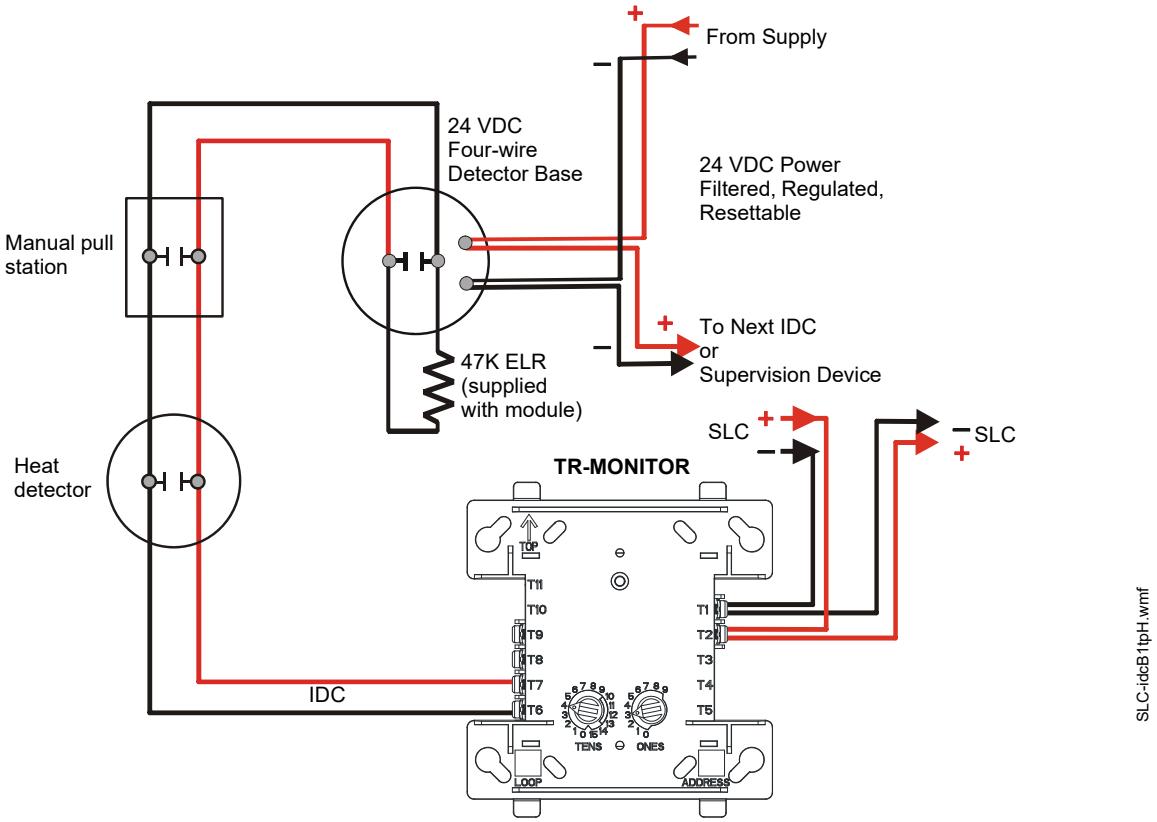


Figure 5.9 Typical Class B IDC Wiring with a TR-MONITOR

5.3.2 Wiring an NFPA Class A IDC with a TR-MONITOR

Connect the SLC wiring to the module terminals 1 (–) and 2 (+).

Each module takes one address on the SLC. Use the rotary switches on the module to set it to the required SLC address. Refer to “Setting the SLC Address for a Single Point Module” on page 28.

The figure below shows typical wiring for a supervised and power-limited NFPA Class A IDC using an TR-MONITOR module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See “Power Considerations” on page 57 for information on supervising 24 VDC power.
- The wiring class of the external power source must match the wiring class of the device being powered.

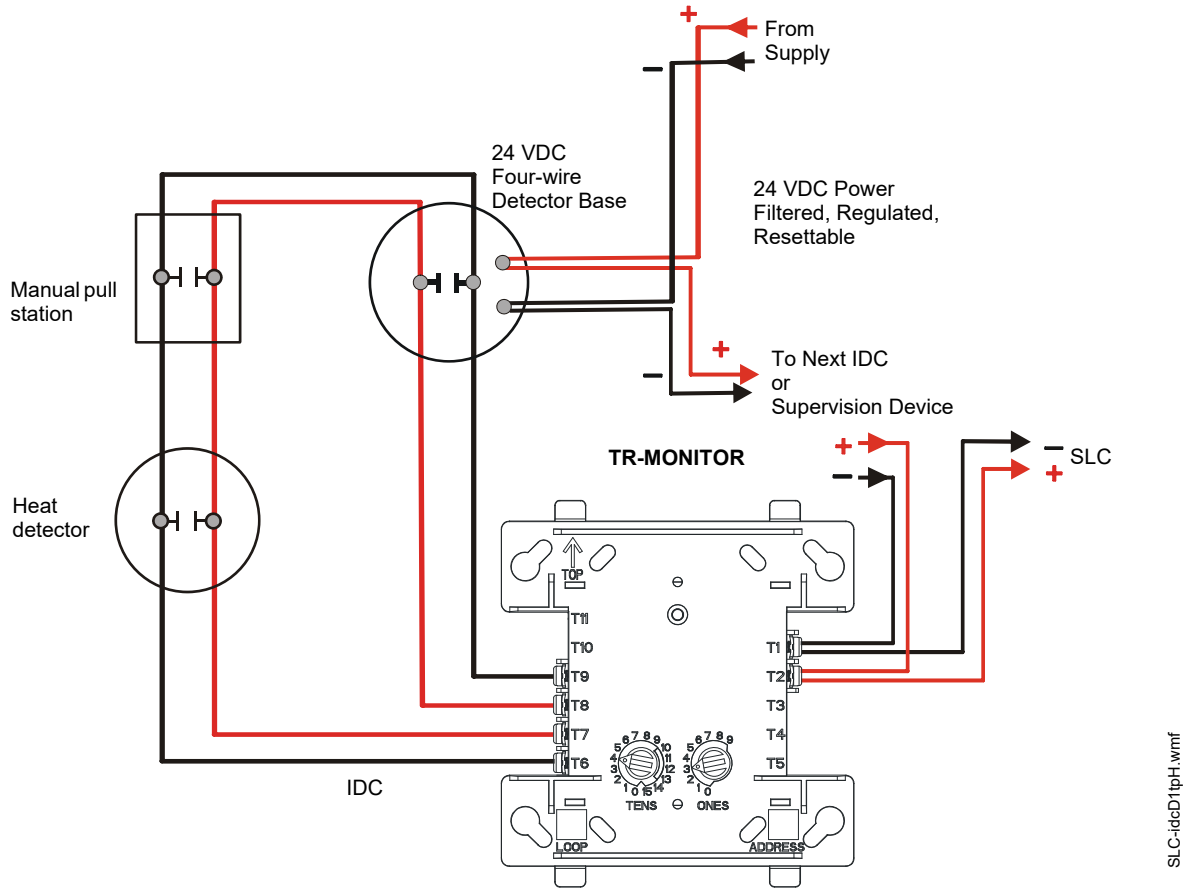


Figure 5.10 Typical Class A IDC Wiring with a TR-MONITOR

5.4 TR-MONITOR-10 Wiring Diagrams

Following are wiring diagrams that depict NFPA Class B and Class A Initiating Device Circuits (IDCs) using TR-MONITOR-10 monitor modules.

The Initiating Device Circuit (IDC) is supervised and current-limited to 1.0 milliampere @ 24 VDC (nominal).

5.4.1 Wiring an NFPA Class B IDC with a TR-MONITOR-10

Connect the SLC wiring to the module terminals T5 as shown below.

Use the rotary switches on the module to set the base SLC address. Each module takes ten addresses on the SLC. The remaining module points are automatically assigned to the next nine higher addresses. Refer to “Setting the SLC Address for a Multi-Point Module” on page 28.

DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to non-existent addresses.

The figure below shows typical wiring for a supervised and power-limited NFPA Class B IDC using an TR-MONITOR-10 module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See “Power Considerations” on page 57 for information on supervising 24 VDC power.
- The wiring class of the external power source must match the wiring class of the device being powered.

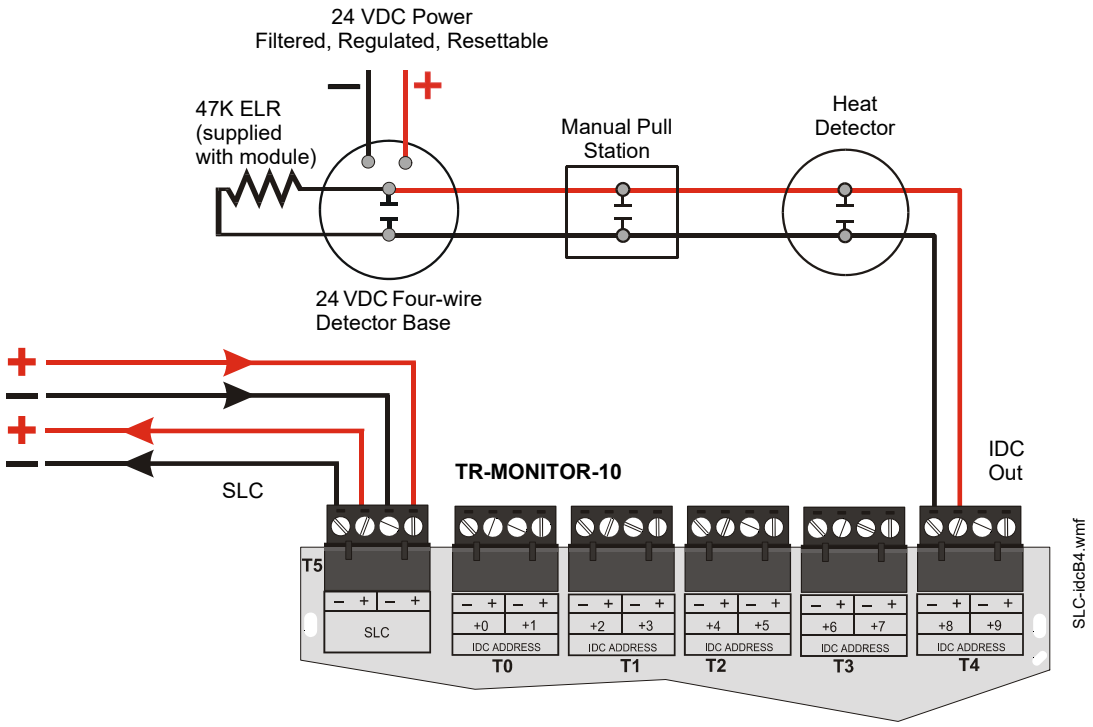


Figure 5.11 Typical Class B IDC Wiring with a TR-MONITOR-10

5.4.2 Wiring an NFPA Class A IDC with a TR-MONITOR-10

Connect the SLC wiring to the module terminals T5 as shown below.

Use the rotary switches on the module to set the base SLC address. Each module takes five alternating addresses on the SLC. The remaining module points are automatically assigned to the next four higher addresses. (Example: 28, 30, 32, 34 and 36). Refer to "Setting the SLC Address for a Multi-Point Module" on page 28.

DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to non-existent addresses.

The figure below shows typical wiring for a supervised and power-limited NFPA Class A IDC using an TR-MONITOR-10 module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Power Considerations" on page 57 for information on supervising 24 VDC power.
- The wiring class of the external power source must match the wiring class of the device being powered.

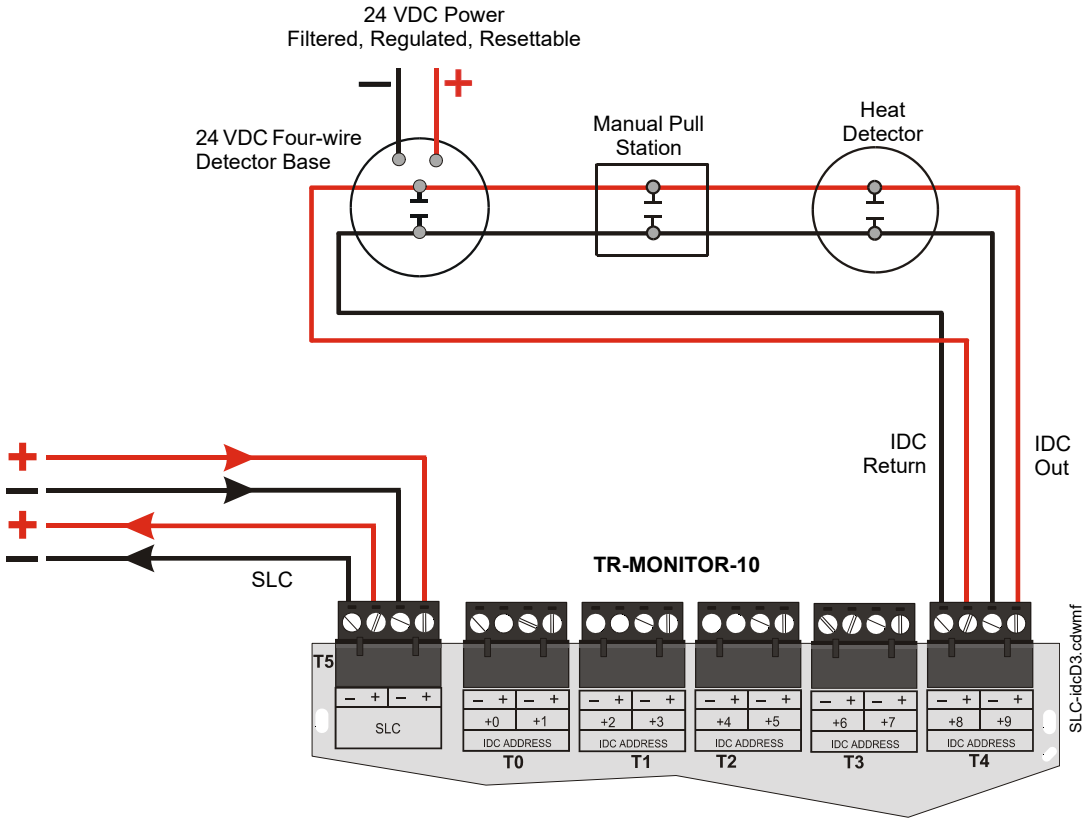


Figure 5.12 Typical Class A IDC Wiring with a TR-MONITOR-10

5.5 TR-MONITOR-2 Wiring Diagrams

Following is a wiring diagrams that depict NFPA Class B Initiating Device Circuits (IDCs) using TR-MONITOR-2 Dual Monitor Modules.

5.5.1 Wiring an NFPA Class B IDC with a TR-MONITOR-2

Connect the SLC wiring to the module terminals 1 (–) and 2 (+).

Use the rotary switches on the module to set it to the SLC address. Each dual module takes two addresses on the SLC. Circuit 'L' corresponds to the address set on the rotary switches, which will be an even number. Circuit 'H' will automatically respond to the next higher address, which will be an odd number. Use caution to avoid duplicate addressing of modules on the system. Refer to "Setting the SLC Address for a Single Point Module" on page 28.

Each IDC (H & L) is power limited to 230 microamperes @ 24 VDC.

The figure below shows typical wiring for a supervised and power-limited NFPA Class B IDC using an TR-MONITOR-2 module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Power Considerations" on page 57 for information on supervising 24 VDC power.

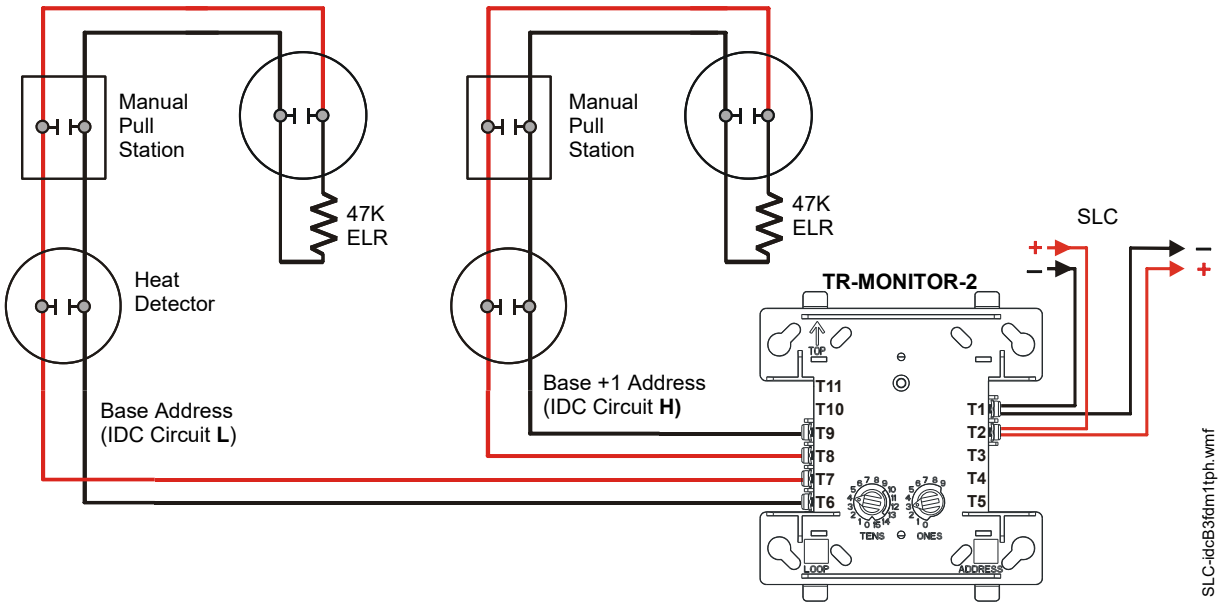


Figure 5.13 Typical Class B IDC Wiring with a TR-MONITOR-2

5.6 TR-ZONE Wiring Diagrams

Following are wiring diagrams that concern NFPA Class B and Class A Initiating Device Circuits (IDCs) using TR-ZONE Zone Interface Modules.

5.6.1 Wiring an NFPA Class B IDC with a TR-ZONE

Connect the SLC wiring to the module terminals 1 (–) and 2 (+).

Each module takes one address on the SLC. Use the rotary switches on the module to set it to the required SLC address. Refer to “Setting the SLC Address for a Single Point Module” on page 28.

The IDC is supervised and power limited to 230 microamperes @ 24 VDC.

The figure below shows typical wiring for a supervised and power-limited NFPA Class B IDC using an TR-ZONE module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- 24 VDC power must be provided from a UL listed power supply for fire protection use. This power is inherently supervised by the module.
- See “Power Considerations” on page 57 for information on 24 VDC power.

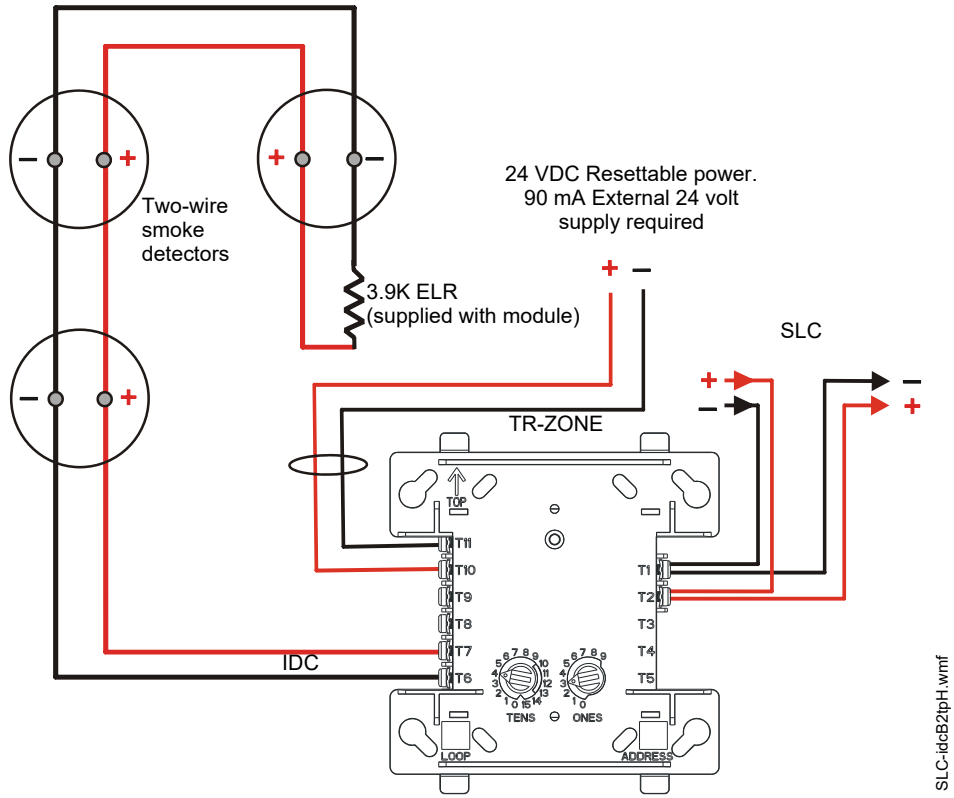


Figure 5.14 Typical Class B IDC Wiring with a TR-ZONE

5.6.2 Wiring a NFPA Class A IDC with a TR-ZONE

Connect the SLC wiring to the module terminals 1 (–) and 2 (+).

Each module takes one address on the SLC. Use the rotary switches on the module to set it to the required SLC address. Refer to "Setting the SLC Address for a Single Point Module" on page 28.

The figure below shows typical wiring for a supervised and power-limited NFPA Class A IDC using an TR-ZONE module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- 24 VDC power must be provided from a UL listed power supply for fire protection use. This power is inherently supervised by the module.
- See "Power Considerations" on page 57 for information on 24 VDC power.

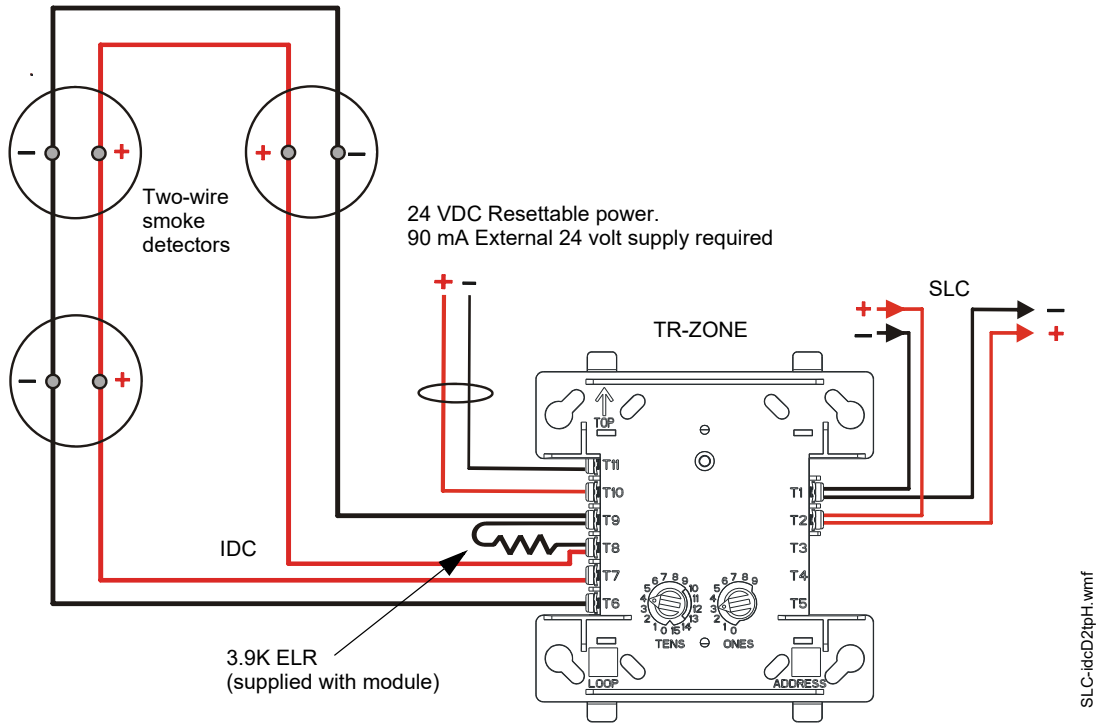


Figure 5.15 Typical Class A IDC Wiring with a TR-ZONE

5.7 TR-ZONE-6 Wiring Diagrams

Following are wiring diagrams that concern NFPA Class B and Class A Initiating Device Circuits (IDCs) using TR-ZONE-6 monitor modules.

5.7.1 Wiring an NFPA Class B IDC with a TR-ZONE-6

Connect the SLC wiring to the module terminals T0 as shown below.

Use the rotary switches on the module to set the base SLC address. Each module takes six addresses on the SLC. The remaining module points are automatically assigned to the next five higher addresses. Refer to “Setting the SLC Address for a Multi-Point Module” on page 28.

DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to nonexistent addresses.

The figure below shows typical wiring for a supervised and power-limited NFPA Class B IDC using a TR-ZONE-6 module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- 24 VDC power must be provided from a UL listed power supply for fire protection use. This power is inherently supervised by the module.
- See “Power Considerations” on page 57 for information on 24 VDC power.

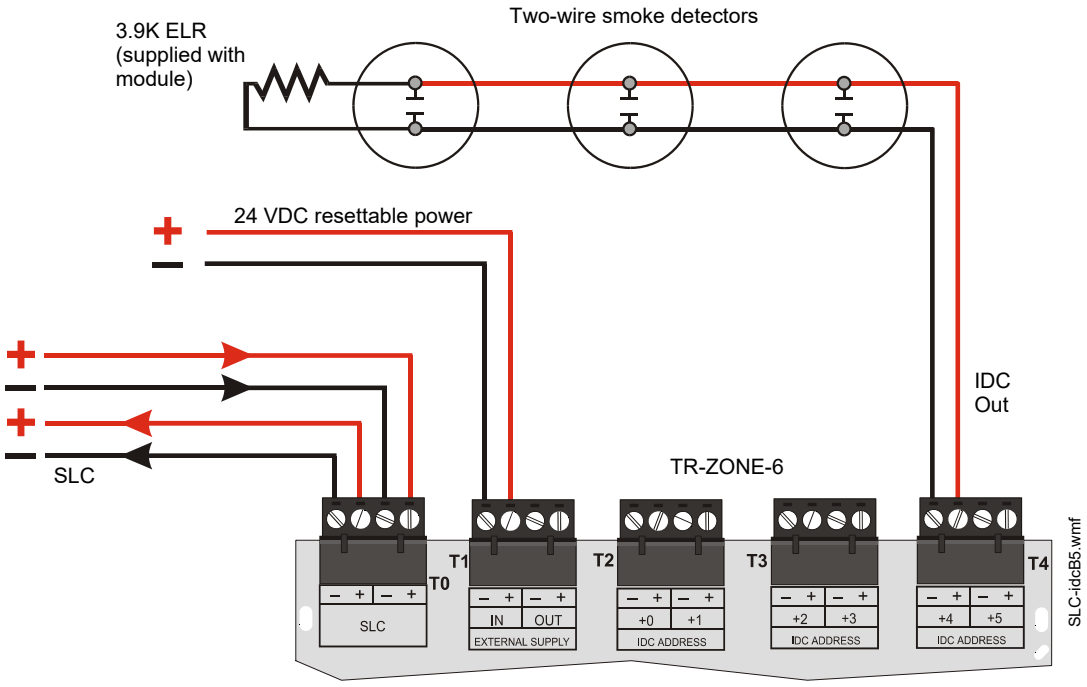


Figure 5.16 Typical Class B IDC Wiring with a TR-ZONE-6

5.7.2 Wiring an NFPA Class A IDC with a TR-ZONE-6

Connect the SLC wiring to the module terminals T0 as shown below.

Use the rotary switches on the module to set it to the SLC addresses. Each module takes three alternating addresses on the SLC. The remaining module points are automatically assigned to the next two higher addresses. (Example: 28, 30 and 32). Refer to "Setting the SLC Address for a Multi-Point Module" on page 28.

DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to non-existent addresses.

The figure below shows typical wiring for a supervised and power-limited NFPA Class A IDC using a TR-ZONE-6 module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- 24 VDC power must be provided from a UL listed power supply for fire protection use. This power is inherently supervised by the module.
- See "Power Considerations" on page 57 for information on 24 VDC power.

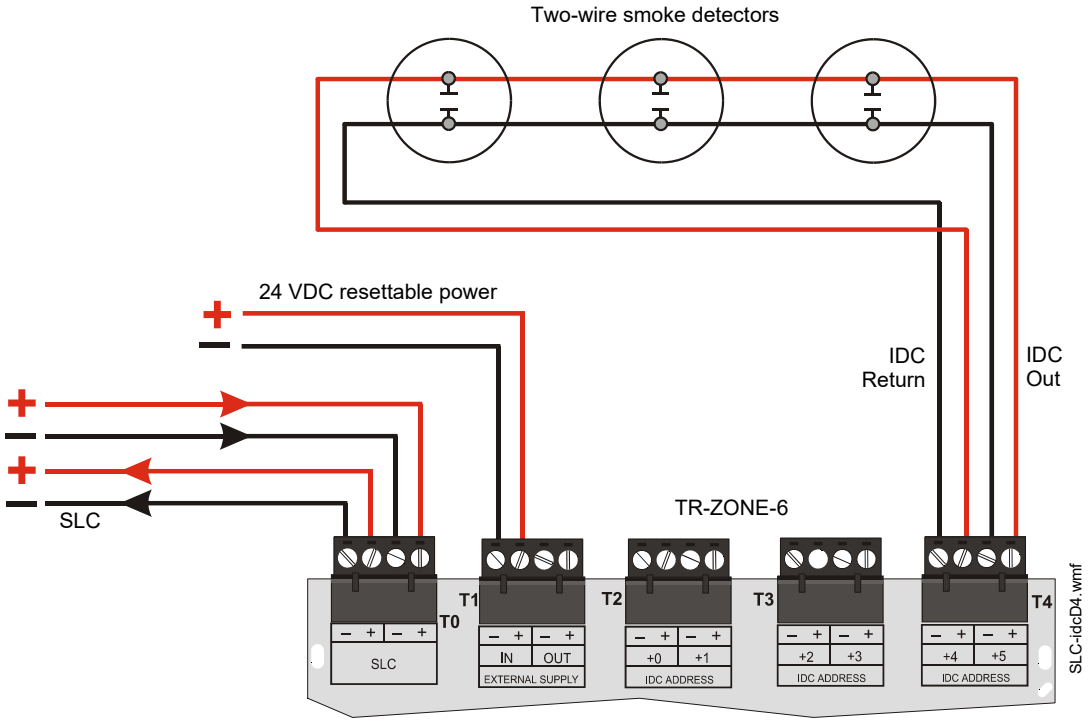


Figure 5.17 Typical Class A IDC Wiring with a TR-ZONE-6

Section 6: Control Modules

When using a Control Module as a Notification Appliance Circuit (NAC), the isolation described in the section titled Section 4, “SLC Circuits with Isolators” which begins on page 17, is required or Riser Conductors must be installed in accordance with the survivability from attack by fire requirements in National Fire Alarm Code, NFPA 72.

6.1 Description

The TR-CONTROL and TR-CONTROL-6 are addressable modules that can be used for monitoring and switching 24 VDC Notification Appliance Circuit (NAC) power for NFPA Class B and NFPA Class A circuits.

Ratings for the relay contacts on the modules are:

Current Rating	Maximum Voltage	Load Description	Application
2 A	25 VAC	Inductive (PF = 0.35)	Non-Coded
3 A	30 VDC	Resistive	Non-Coded
2 A	30 VDC	Resistive	Coded
0.46 A	30 VDC	Inductive (L/R = 20ms)	Non-Coded
0.7 A	70.7 VAC	Inductive (PF = 0.35)	Non-Coded
0.9 A	125 VDC	Resistive	Non-Coded
0.5 A	125 VAC	Inductive (PF = 0.75)	Non-Coded
0.3 A	125 VAC	Inductive (PF = 0.35)	Non-Coded

NOTE: For more information on module specifications, refer to the Installation Instructions provided with these devices.

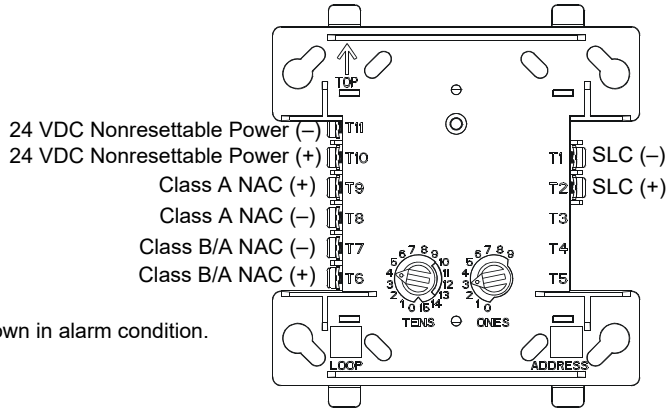
6.2 TR-CONTROL Installation

6.2.1 Setting an SLC address for a TR-CONTROL Module

Each module is factory preset with an address of “00”. To set an SLC address refer to “Setting the SLC Address for a Single Point Module” on page 28.

6.2.2 Wiring a Notification Appliance Circuit (NAC) with a TR-CONTROL

The figure below shows the connections to wire a module for powering a 24 VDC NAC:



NOTE: Module polarities are shown in alarm condition.

Figure 6.1 TR-CONTROL Wiring Connections

6.3 Wiring a TR-CONTROL Module

This section contains instructions and diagrams for wiring a Signaling Line Circuit with TR-CONTROL as a Notification Appliance Circuit (NAC).

6.3.1 Wiring a Class B NAC (Two-Wire) with Addressable Control Modules

A supervised and power-limited NFPA Class B NAC using a TR-CONTROL module. Polarized alarm notification appliances are shown connected to the module in a two-wire configuration. Refer to the *Device Compatibility Document* for compatible notification appliances and relays.

- See “Power Considerations” on page 57 for information on monitoring 24 VDC power.
- Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
- 24 VDC power must be provided from a UL listed power supply for fire protection use.
- A power supervision relay is required only on the last module of the power run.
- Do not T-tap or branch a Class B circuit.

- Terminate the circuit across the last device using an End-of-Line Resistor 47K, 1/2-watt, P/N SSD A2143-00.
- Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.

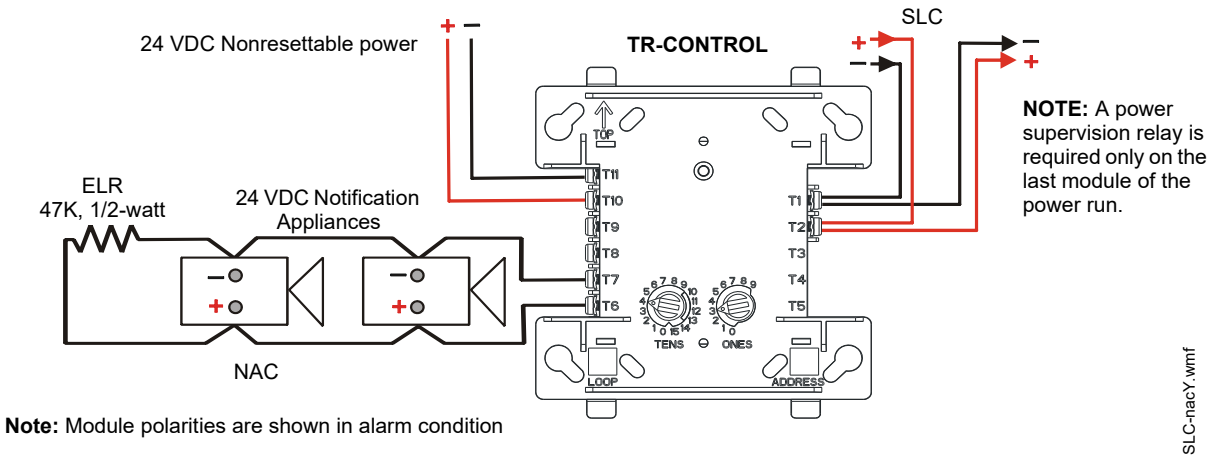


Figure 6.2 NFPA Class B Notification Appliance Circuit

6.3.2 Wiring a Class A NAC (Four-Wire) with Addressable Control Modules

A supervised and power-limited NFPA Class A NAC using a TR-CONTROL module. Polarized alarm notification appliances are shown connected to the module in a four-wire configuration.

NOTE: Refer to the *Device Compatibility Document* for compatible notification appliances and relays.

- See “Power Considerations” on page 57 for information on monitoring 24 VDC power.
- Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
- 24 VDC power must be provided from a UL listed power supply for fire protection use.
- A power supervision relay is required only on the last module of the power run.
- Do not T-tap or branch a Class A circuit.
- Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.

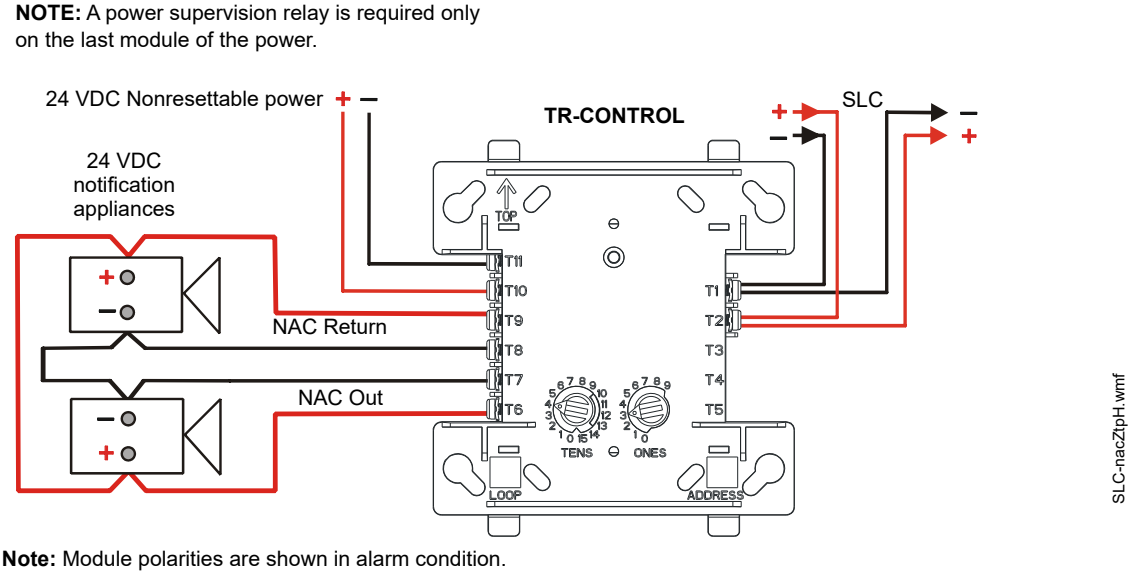


Figure 6.3 NFPA Class A Notification Appliance Circuit

6.4 TR-CONTROL-6 Installation

6.4.1 Cabinet Installation

This type of module is contained in a TR-ACB cabinet. The TR-ACB can accommodate up to 2 modules.

See the *Installation Instructions* provided with module for proper installation into cabinet.

6.4.2 Setting an SLC address for an TR-CONTROL-6 Module

In "Class A" operation each TR-CONTROL-6module can be set to one of 154 base addresses (01-154). The remaining module points are automatically assigned to the next five higher SLC addresses. For example, if the base address is set to 28, the next five module points will be addressed to 29, 30, 31, 32 and 33.

In "Class A" operation alternate module points are paired together, resulting in a total of three module points. For example, if the base address is set to 28, then 30 and 32 will be automatically assigned to the remaining module points and 29, 31 and 33 are available to be used for other modules on the SLC.

DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to non-existent addresses.

NOTE: The TR-75 can support addresses 01 - 75. The TR-2100/ECS can support module addresses 01 - 159. The plastic stop located on the Tens switch must be removed to set addresses above 99.

To set an SLC address, use a common screwdriver to adjust the rotary switches on the module to the desired address. See Figure 6.4 on page 41.

NOTE: For use with the TR-2100/ECS, remove the stop on the upper rotary switch.

6.4.3 Setting NACs as Class B or Class A

To use this module for Class B operation ascertain that a small shunt is installed on the "A/B SELECT" set of pins. (As shipped).

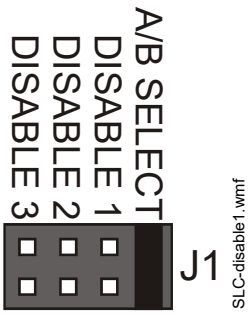
To use this module for Class A operation remove the small shunt from the "A/B SELECT" set of pins. See drawing below and Figure 6.4 on page 41.

6.4.4 Disabling Unused Module Addresses

A shunt is used, in conjunction with a pin block, to disable a maximum of three (3) unused module addresses. If two module addresses are disabled, the lowest four addresses will be functional, while the highest two will be disabled. For example, if the shunt is placed on 'DISABLE 2' and the base address is set to 28, the module addresses will be assigned to 28, 29, 30 and 31.

In Class A operation, placing a small shunt on 'DISABLE 3' will disable all three addresses. Placing it on 'DISABLE 2' will disable two out of three addresses.

To disable addresses, securely place one of the supplied small shunts onto the desired set of pins. See drawing and Figure 6.4 on page 41.



6.4.5 Short Circuit Protection

Protection is disabled for each module address when there is a large shunt installed on the corresponding pins of the pin block (as shipped, all six addresses are disabled).

When enabled, the module will not switch power supply if a short circuit condition exists on a NAC.

To enable "Short Circuit Protection" for an address, remove the large shunt from the corresponding pins of the pin block. See Figure 6.4 on page 41. Place unused shunts on single pin to store on board for future use.

6.4.6 Features Not Supported

The "Synchronization" and "Power Supply Monitoring" features are not supported at this time.

6.4.7 Circuit Board Information

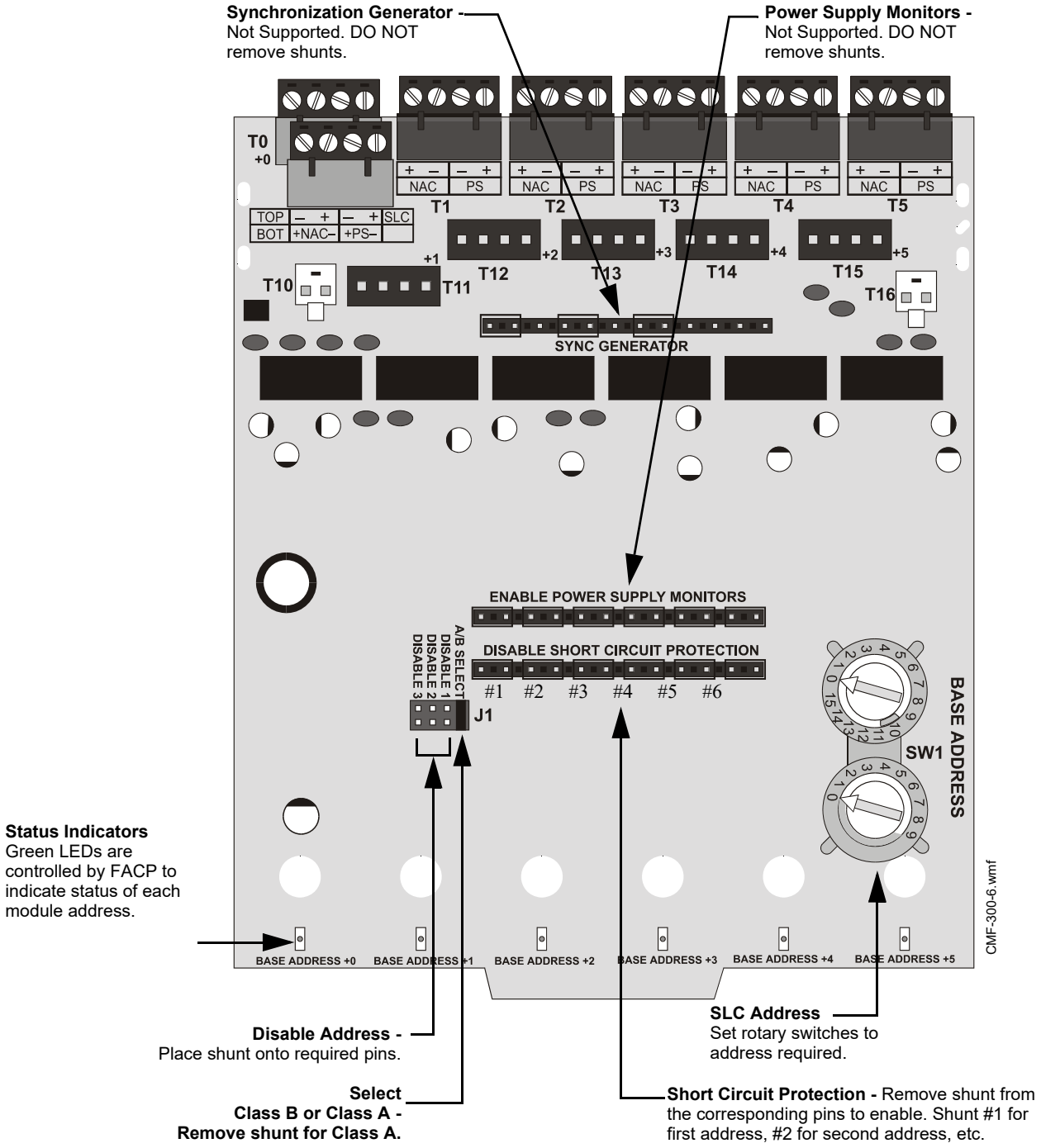


Figure 6.4 TR-CONTROL-6 Control Module Settings

6.5 Wiring a TR-CONTROL-6 Module

This section contains basic instructions and diagrams for wiring a Signaling Line Circuit with a TR-CONTROL-6 as a Notification Appliance Circuit (NAC).

For more detailed information on wiring a TR-CONTROL-6 Control Module, refer to the Installation Instructions provided with the module. Included in these instructions are wiring diagrams concerning a single power supply being shared by multiple NACs and audio NAC configurations.

6.5.1 Wiring a Class B NAC (Two-Wire)

A supervised and power-limited NFPA Class B NAC with a single power supply dedicated to a single NAC using a TR-CONTROL-6 module. Polarized alarm notification appliances are shown connected to the module in a two-wire configuration.

NOTE: Refer to the *Device Compatibility Document* for compatible notification appliances and relays.

- See “Power Considerations” on page 57 for information on monitoring 24 VDC power.
- Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
- 24 VDC power must be provided from a UL listed power supply for fire protection use.
- A power supervision relay is required only on the last module of the power run.
- Do not T-tap or branch a Class B circuit.
- Terminate the circuit across the last device using an End-of-Line Resistor 47K, 1/2-watt, P/N SSD A2143-00.
- Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.

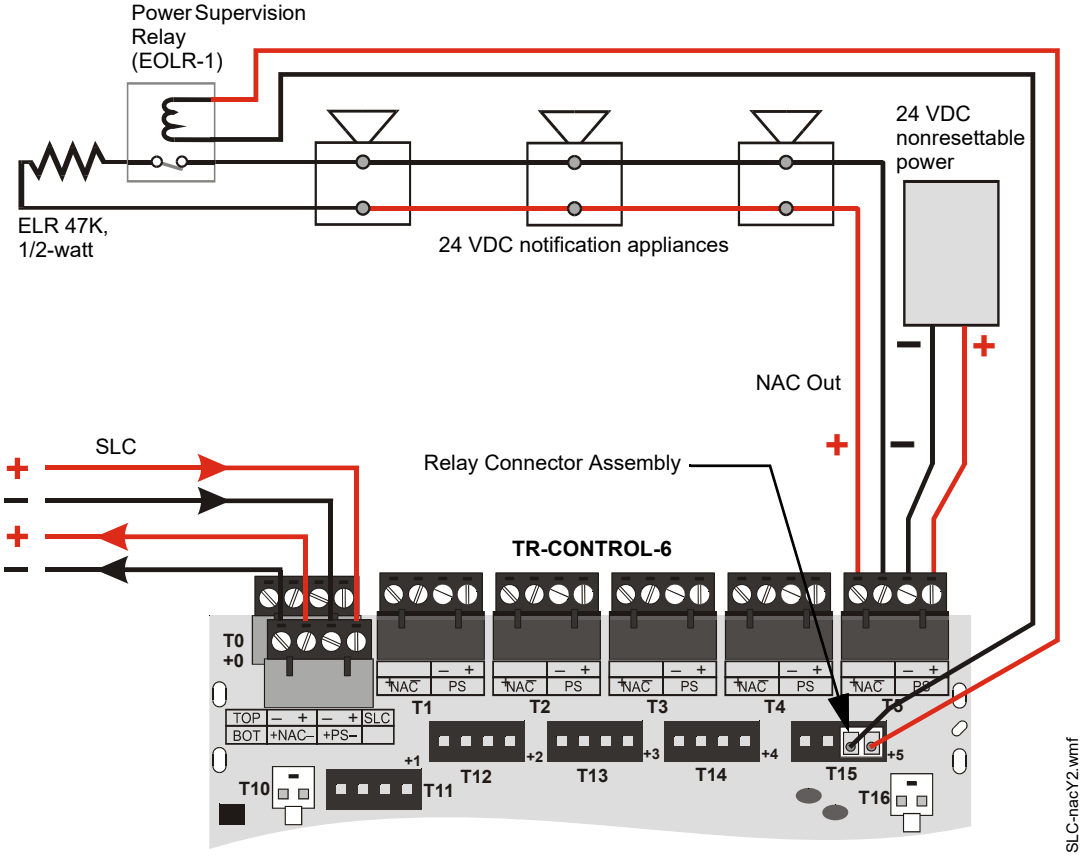


Figure 6.5 NFPA Class B Notification Appliance Circuit

6.5.2 Wiring a Class A NAC (Four-Wire)

A supervised and power-limited NFPA Class A NAC with a single power supply dedicated to a single NAC using a module. Polarized alarm notification appliances are shown connected to the module in a four-wire configuration.

NOTE: Refer to the *Device Compatibility Document* for compatible notification appliances and relays.

- See “Power Considerations” on page 57 for information on monitoring 24 VDC power.
- Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
- 24 VDC power must be provided from a UL listed power supply for fire protection use.
- A power supervision relay is required only on the last module of the power run.
- Do not T-tap or branch a Class A circuit.
- Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.

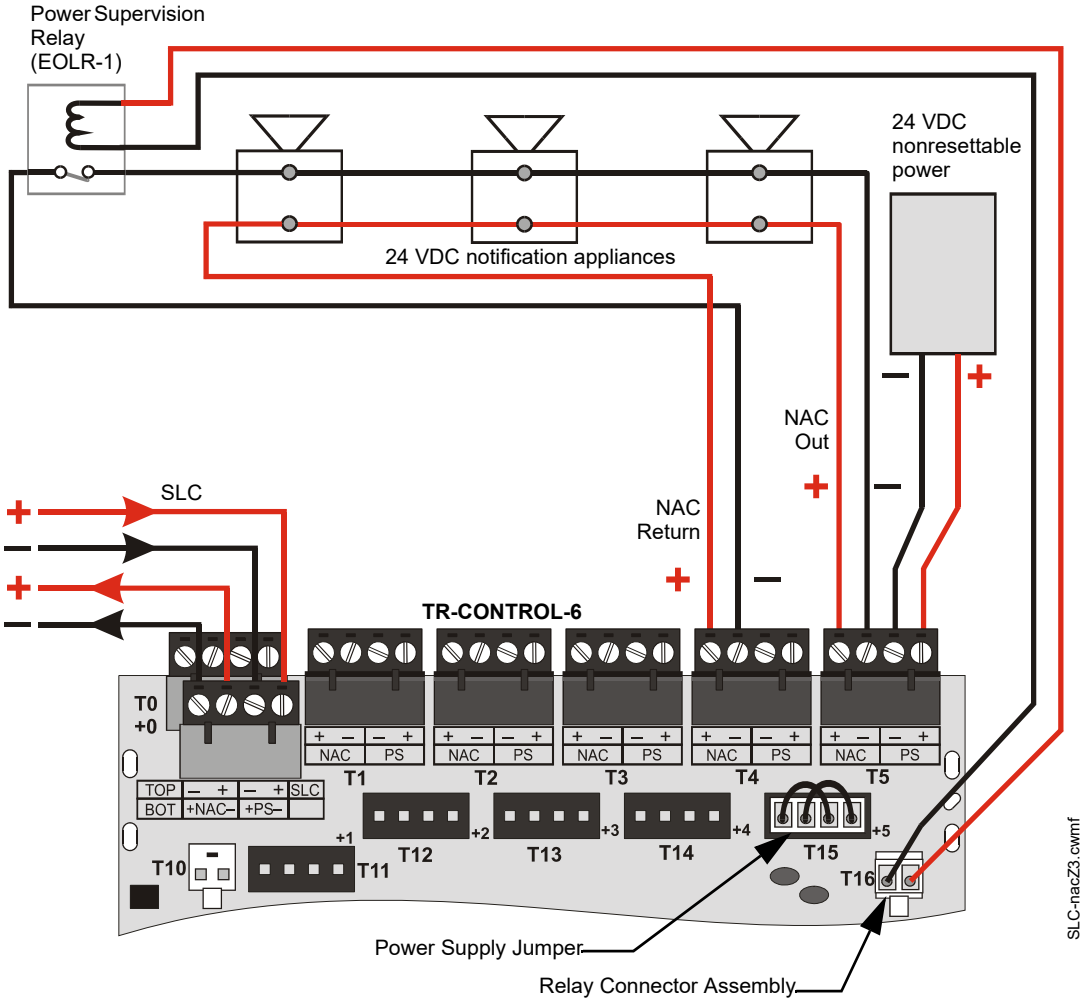


Figure 6.6 NFPA Class A Notification Appliance Circuit

Section 7: Relay Modules

7.1 Description

The TR-RELAY and TR-RELAY-6 modules are addressable module that provide Form-C relay contacts.

Ratings for the relay contacts on the modules are:

Current Rating	Maximum Voltage	Load Description	Application
2 A	25 VAC	Inductive (PF = 0.35)	Non-Coded
3 A	30 VDC	Resistive	Non-Coded
2 A	30 VDC	Resistive	Coded
0.46 A	30 VDC	Inductive (L/R = 20ms)	Non-Coded
0.7 A	70.7 VAC	Inductive (PF = 0.35)	Non-Coded
0.9 A	125 VDC	Resistive	Non-Coded
0.5 A	125 VAC	Inductive (PF = 0.75)	Non-Coded
0.3 A	125 VAC	Inductive (PF = 0.35)	Non-Coded

NOTE: For more information on the module specifications refer to the *Installation Instructions* provided with these devices.

7.2 TR-RELAY and TR-RELAY-6 Installation & Wiring

7.2.1 Setting an SLC address for a TR-RELAY Module

Each module is factory preset with an address of "00". To set an SLC address, refer to "Setting the SLC Address for a Single Point Module" on page 28.

7.2.2 Wiring a TR-RELAY Module (Form-C Relay)

The figure below shows TR-RELAY module wired to the Control Panel:

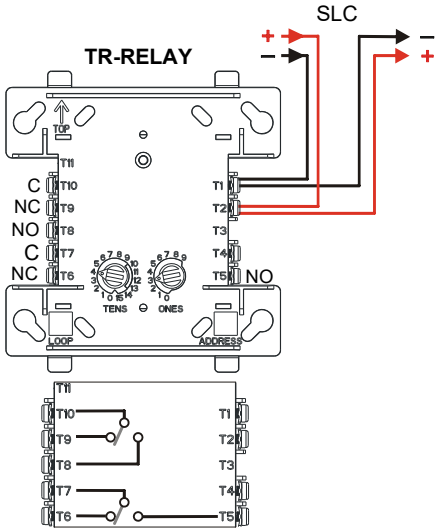


Figure 7.1 TR-RELAY Wiring Connections

7.3 TR-RELAY-6 Circuit Board Information

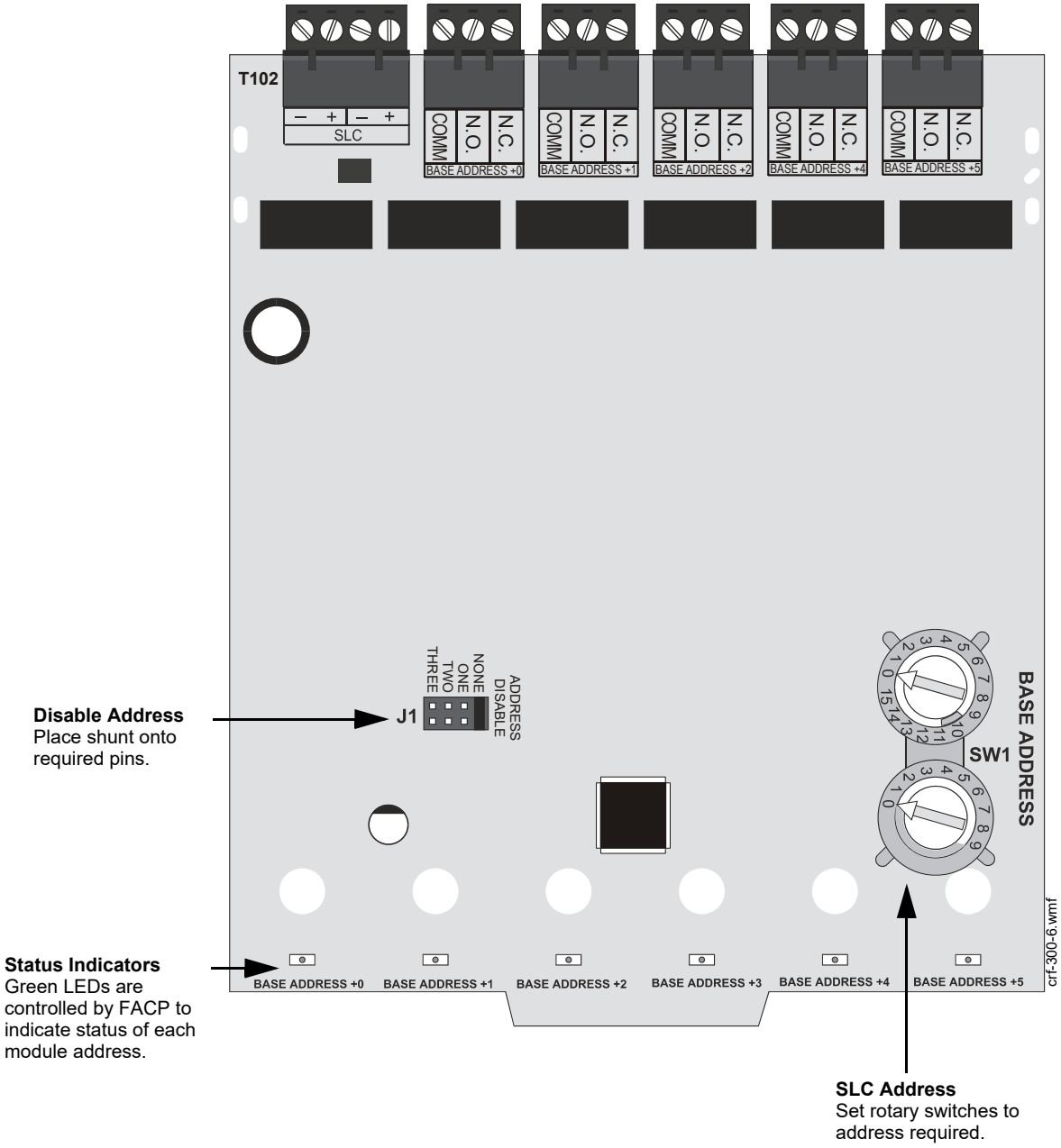


Figure 7.2 TR-RELAY-6 Control Relay Module

7.4 TR-RELAY-6 Installation & Wiring

7.4.1 Cabinet Installation

This type of module is contained in a TR-ACB cabinet. The TR-ACBcan accommodate up to 2 modules.

See the *Installation Instructions* provided with module for proper installation into cabinet.

7.4.2 Setting an SLC address for a TR-RELAY-6 Module

Each TR-RELAY-6 module can be set to one of 154 base addresses (01-154). The remaining module points are automatically assigned to the next five higher SLC addresses. For example, if the base address is set to 28, the next five module points will be addressed to 29, 30, 31, 32 and 33.

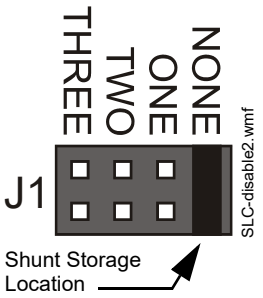
DO NOT set the lowest address above 66 (for the TR-75) or 150 (for the TR-2100/ECS) as the other module points will be assigned to non-existent addresses.

NOTE: The TR-75 can support addresses 01 - 75. The TR-2100/ECS can support module addresses 01 - 159. The plastic stop located on the Tens switch must be removed to set addresses above 99.

7.4.3 Disabling Unused Module Addresses

A shunt is provided on the circuit board to disable a maximum of three (3) unused module addresses. If two module addresses are disabled, the lowest four addresses will be functional, while the highest two will be disabled. For example, if the shunt is placed on 'TWO' and the base address is set to 28, the module addresses will be assigned to 28, 29, 30 and 31.

To disable addresses, remove the shunt from its storage location and securely place it onto the desired set of pins. See illustration.



7.4.4 Wiring a TR-RELAY-6 Module (Form-C Relay)

The figure below shows a TR-RELAY-6 module wired to the Control Panel.

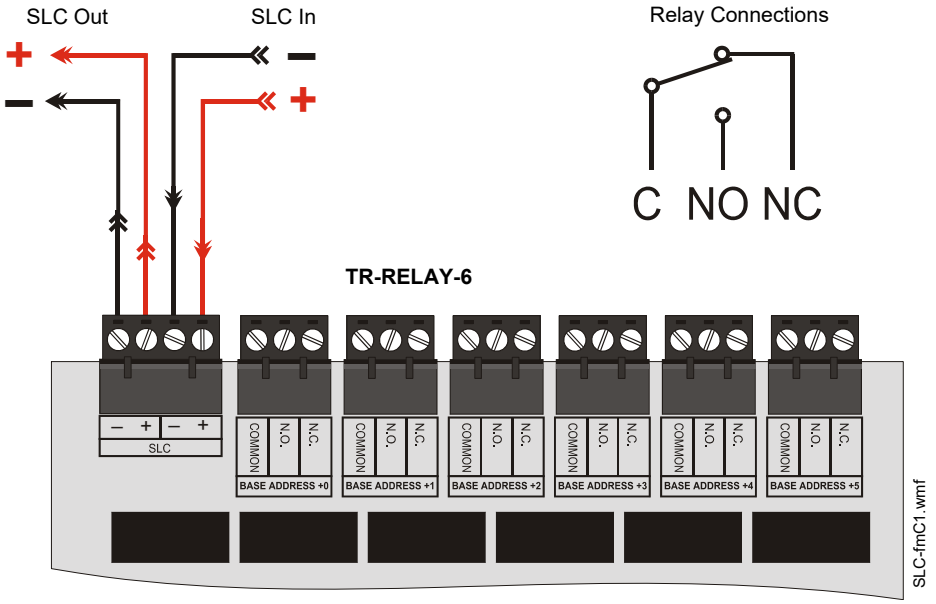


Figure 7.3 TR-RELAY-6 Wiring Connections

Section 8: Multiple Input/Output Modules

8.1 Description

The TR-RELAYMON-2 is an addressable module that functions as two individual relay control modules (two isolated sets of Form-C relay contacts) and two Class B monitor modules.

Ratings for the relay contacts on the module are:

Load Description	Application	Maximum Voltage	Current Rating
Inductive (PF = 0.35)	Non-Coded	25 VAC	2.0 A
Resistive	Non-Coded	30 VDC	3.0 A
Resistive	Coded	30 VDC	2.0 A
Inductive (L/R = 20ms)	Non-Coded	30 VDC	0.46 A
Inductive (PF = 0.35)	Non-Coded	70.7 VAC	0.7 A
Resistive	Non-Coded	125 VDC	0.9 A
Inductive (PF = 0.75)	Non-Coded	125 VAC	0.5 A
Inductive (PF = 0.35)	Non-Coded	125 VAC	0.3 A

NOTE: For more information on the module specifications refer to the *Installation Instructions* provided with these devices.

8.2 TR-RELAYMON-2 Installation & Wiring

8.2.1 Setting an SLC address for a TR-RELAYMON-2 Module

Each module is factory preset with an address of "00". To set an SLC address, use a screwdriver to adjust the rotary switches on the module to the desired address. Each module can use up to four (4) addresses. The base address selected via the rotary address switches will be assigned to relay output #1 from 00 to 156. The module will automatically assign the next three addresses as appropriate to monitored input #1, relay output #2, and monitored input #2.

8.2.2 Wiring a TR-RELAYMON-2 Module (Form-C Relay)

The figure below shows a TR-RELAYMON-2 module wired to the control panel.

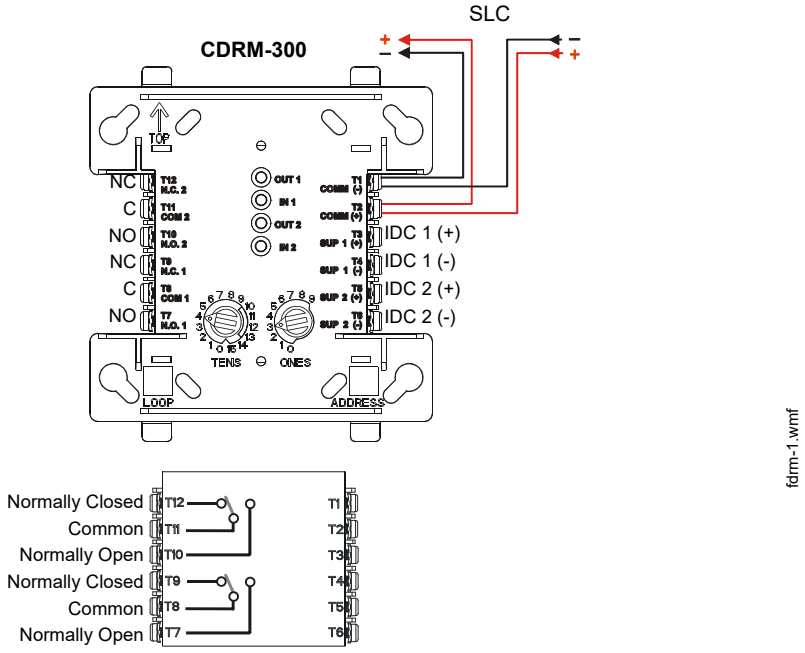


Figure 8.1 TR-RELAYMON-2 Wiring Connections

Section 9: Intelligent Detector Bases and Wireless Gateway

9.1 Description

The following bases provide connection between the SLC and these detector heads:

- TR-HEAT-W/-IV, TR-HEAT-ROR-W/-IV, TR-HEAT-HT-W/-IV Thermal Detectors
- TR-PHOTO-W/-IV, TR-PHOTOR-W/-IV, TR-PHOTO-T-W/-IV Photoelectric Smoke Detectors

The TR-**B501(-WHITE/-BL/-IV)** and **TR-B300-6(-IV)** bases are standard plug-in detector bases.

The **TR-B200S(-WH/-IV), TR-B200S-LF(-WH/-IV), TR-B200SR(-WH/-IV),** and **TR-B200SR-LF(-WH/-IV)** Sounder Detector Bases include a horn that will sound when the sensor's visible LEDs are latched on for approximately 10 seconds.

If the TR-2100/ECS or TR-75 control panel is set with Alarm Verification ON (enabled), the sounder will activate at the end of the verification cycle, providing an alarm is verified, approximately 10 seconds after the sensor's LEDs are latched on. If Alarm Verification is OFF (disabled), the sounder will activate when the sensor's visible LEDs are latched on for approximately 10 seconds.

The TR-**B224RB(-WH/-IV)** Relay Detector Base includes Form-C latching relay contacts for the control of an auxiliary function. The relay operates 12 seconds (nominally) after activation of the sensor head remote annunciator output.

The TR-**B224BI(-WH/-IV)** Isolator Detector Base prevents an entire communications loop from being disabled when a short circuit occurs.

TRW-GI Wireless Gateway acts as a bridge between a group of wireless fire devices and an SLC loop on the TR-2100/ECS or TR-75. The gateway can be powered by the SLC loop or by a regulated, external UL-listed, 24VDC power supply. See Section 9.7.

NOTE: When using a Wireless Gateway on the SLC loop, the panel cannot have ANY modules (wired or wireless) in the address range from 140 to 159.

For details about the wireless network and its devices, see the *SWIFT® Smart Wireless Integrated Fire Technology Instruction Manual #LS10036-000TR-E.*

9.2 Setting the Detector Address

Each intelligent detector is factory preset with an address of "00." To set an SLC address, use a common screwdriver to adjust the rotary switches on the detector to the desired address (see "Setting the SLC Address for a Single Point Module" on page 28). When finished, mark the address in the place provided on the base and the detector.

9.3 Wiring an Detector Base

Typical wiring of a detector base (**B501 Series** shown) connected to an SLC is shown in the figure below. An optional **TR-RA100Z** Remote LED Annunciator is shown connected to the detector.

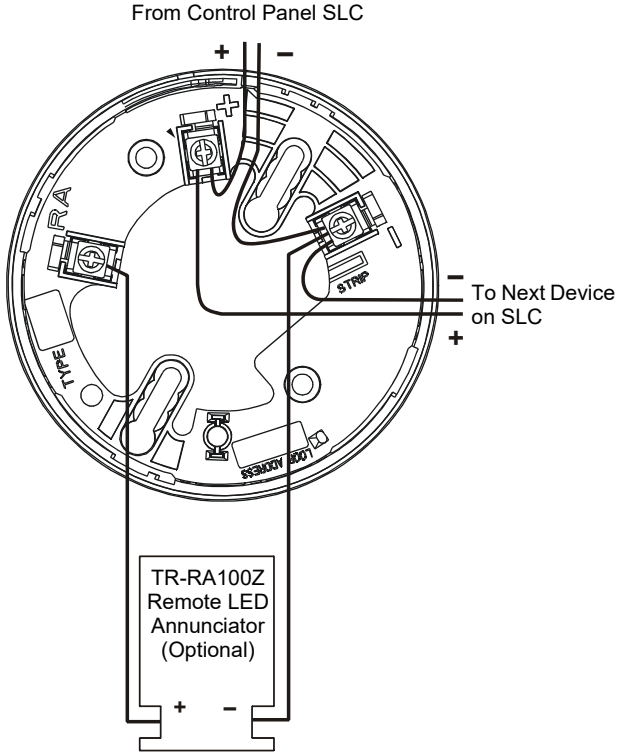


Figure 9.1 Wiring a TR-B300-6 or TR-B501 Series Detector Base

9.4 Wiring an Isolator Base

The **TR-B224BI** Isolator Base will isolate its detector from short circuits that occur on the SLC connected at terminals 2 and 3. It will not isolate its installed detector from short circuits that occur on the SLC connected at terminals 1 and 2. In Class X applications, the loss of a single detector during a short circuit is not acceptable, and an isolator module must be installed as shown in the figure below.

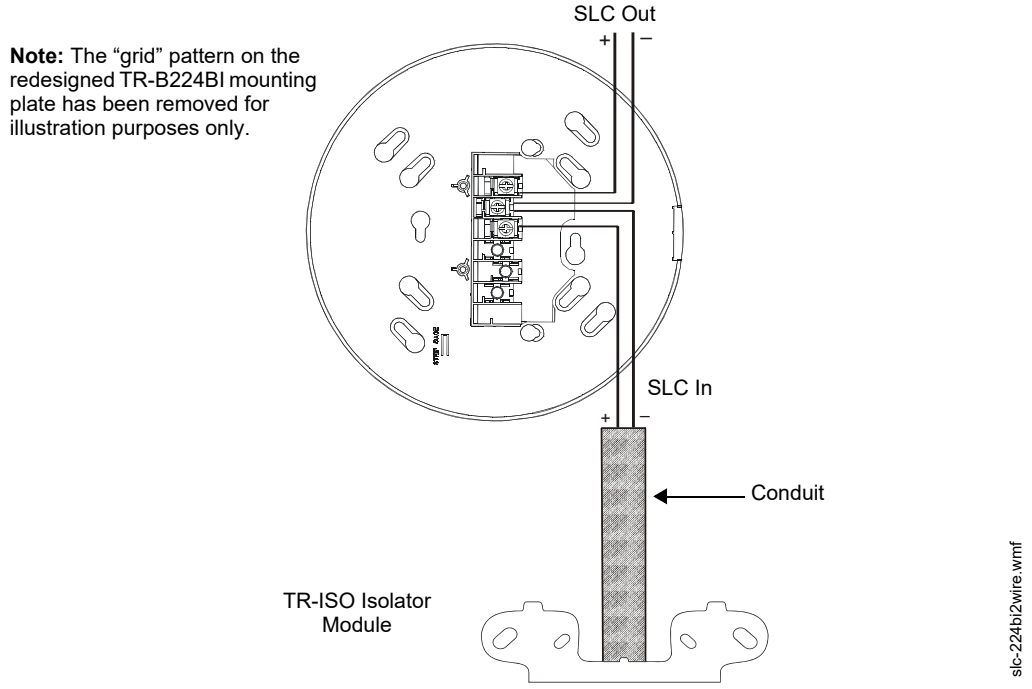


Figure 9.2 Wiring a TR-B224BI Isolator Base Mounting Plate

9.5 Wiring a Relay Base

Figure 9.3 shows typical wiring of a TR-B224RB plug-in relay detector base connected to an SLC.

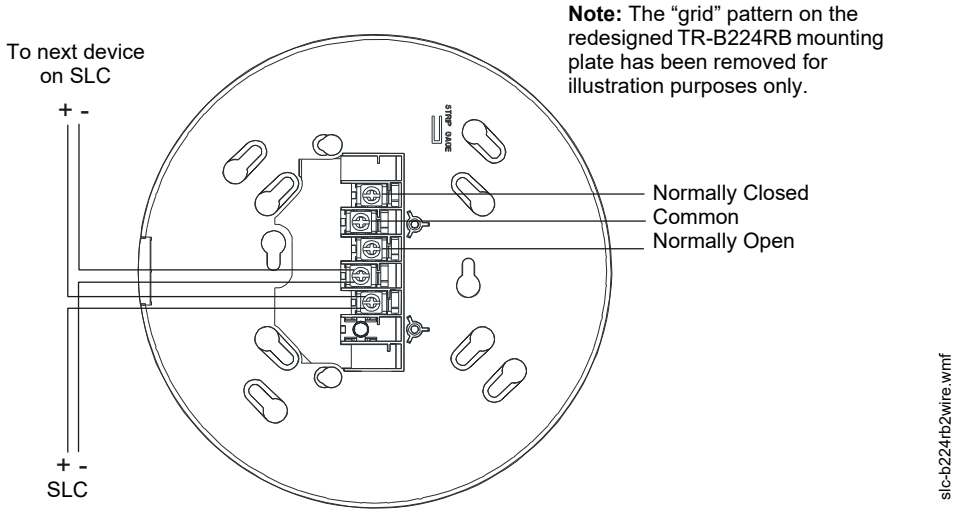


Figure 9.3 Wiring of a TR-B224RB Relay Base Mounting Plate

9.6 Wiring a Sounder Base

Figure 9.4 shows typical wiring of the **TR-B200S, TR-B200S-LF, TR-B200SR**, or **TR-B200SR-LF** Sounder Base.

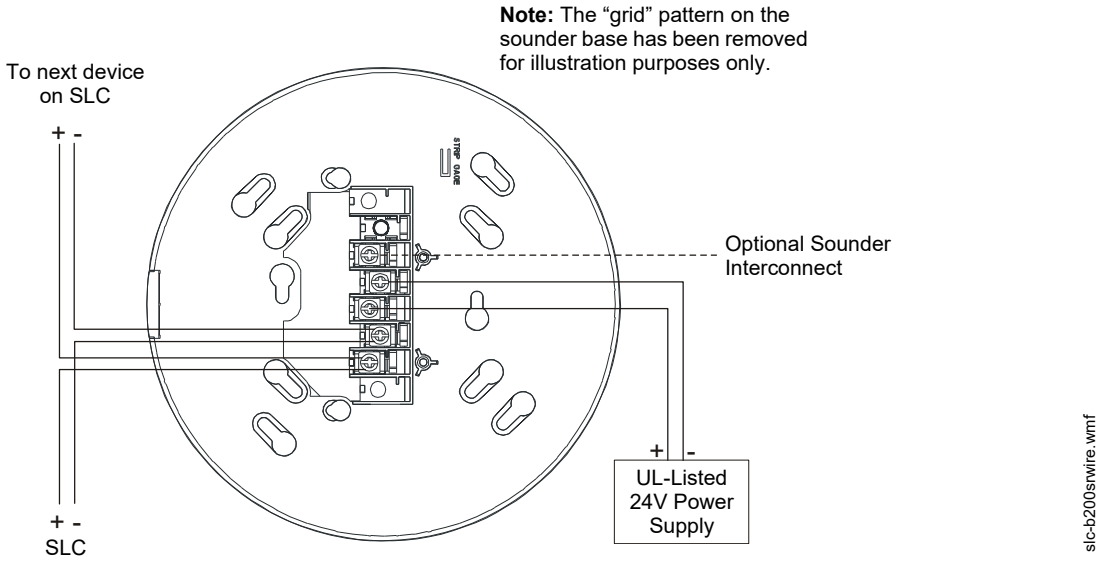


Figure 9.4 Wiring of a TR-B200S, TR-B200S-LF, TR-B200SR, or TR-B200SR-LF Sounder Base

NOTE: For more detailed wiring on the sounder base, refer to the device's installation instructions.

9.7 Wiring the TRW-GI

NOTE: The TRW-GI, as part of the wireless network, has been tested for compliance with the Federal Communications Commission (FCC) requirements of the United States Government. It has not been evaluated for use outside the USA. Use of this system outside the USA is subject to local laws and rules to which this product may not conform. It is the sole responsibility of the user to determine if this product may be legally used outside the USA.

9.7.1 SLC Connections

NOTE: It is recommended to use the same wire gauge if there are multiple connections to the same terminal.

The TRW-GI Wireless Gateway acts as a bridge between a group of wireless fire devices and a SLC loop on the TR-2100/ECS or TR-75. It is powered by the SLC loop or by a regulated, external 24VDC UL-listed power supply. Available wireless devices include a photo detector, a photo/heat detector, a fixed-temperature heat detector, a rate-of-rise heat detector, and a monitor module. For details about wireless devices, system setup, and operation, see the *SWIFT® Smart Wireless Integrated Fire Technology Instruction Manual.*

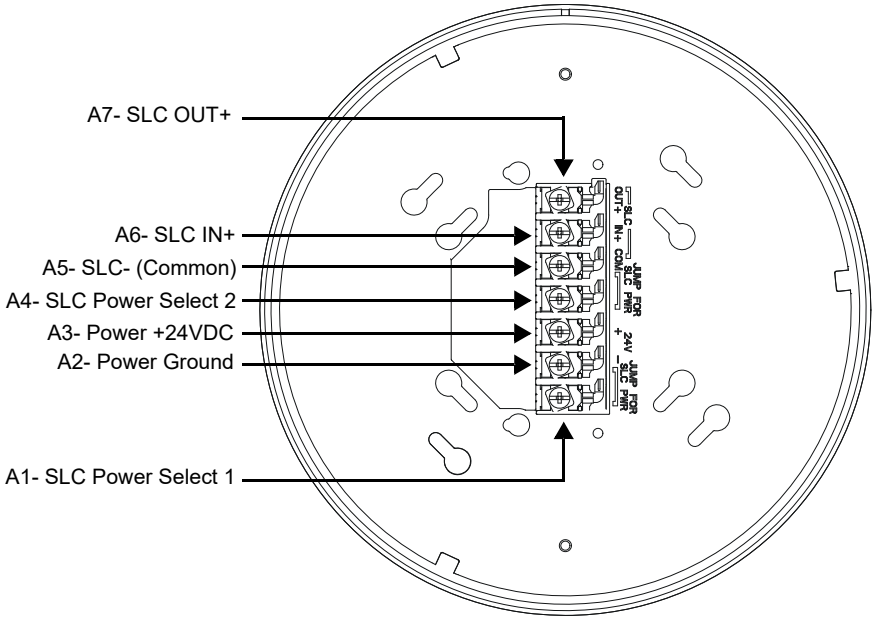


Figure 9.5 TRW-GI Mounting Plate - Terminal Layout

9.7.2 TRW-GI Powered by the SLC

The TRW-GI provides isolation of short circuits on the SLC in Class A installations. SLC connections are power-limited by the panel. An interruption in the SLC that causes a loss of power at the TRW-GI for more than 100ms may result in a trouble condition and loss of fire protection provided by the wireless devices for approximately 15 minutes. Use of a regulated, external +24VDC power source (not SLC power) is recommended for installations that require fire protection in the presence of short circuits, including Class A applications and applications that use isolator modules. Figure 9.6 shows typical wiring of a Wireless Network Gateway connected to an SLC when power is supplied by the SLC loop

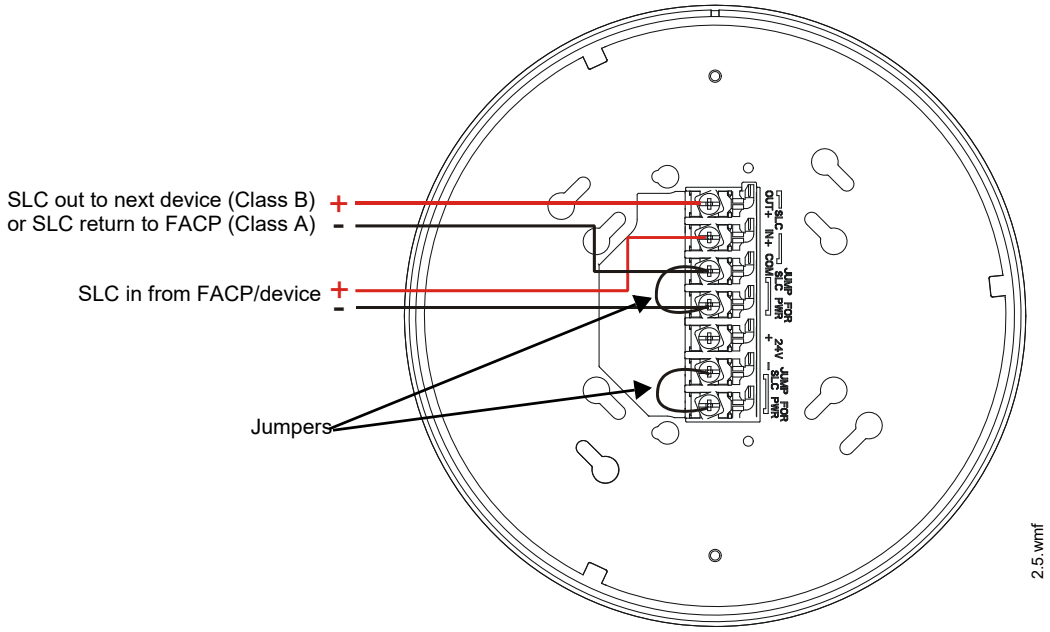


Figure 9.6 TRW-GI Powered by the SLC

9.7.3 TRW-GI Powered by a Regulated, External +24VDC Power Source

The TRW-GI provides isolation of short circuits of the SLC in Class A installations. SLC connections are power-limited by the panel. +24VDC must be power-limited by the source.

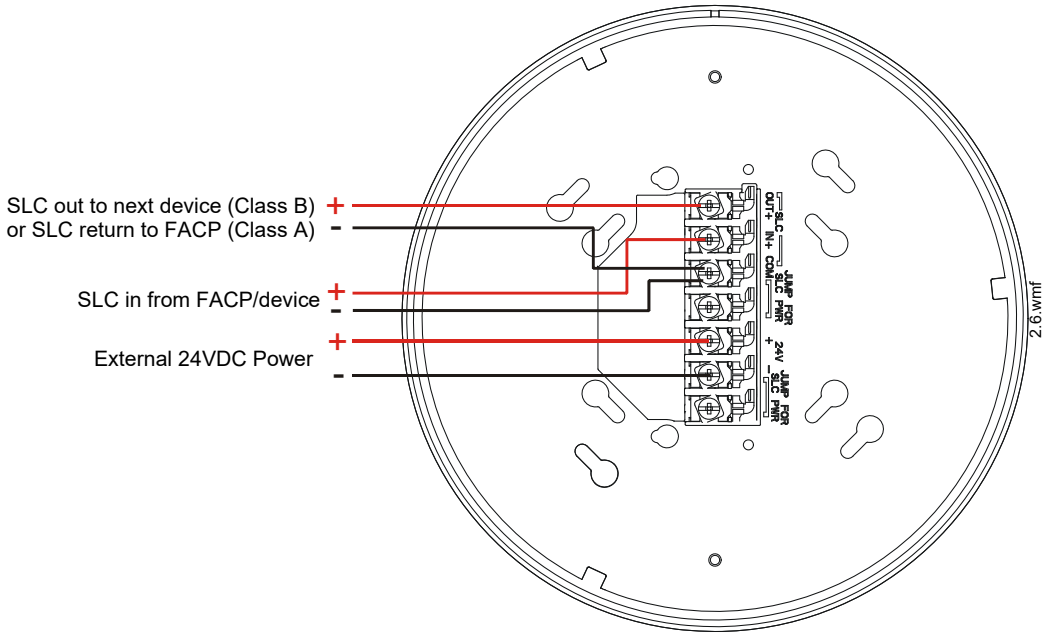


Figure 9.7 TRW-GI Powered by a Regulated, External Source

Notes

Section 10: Addressable Beam Detectors

10.1 Description

The **TR-OSI-RI** is an intelligent, addressable projected beam smoke detector, designed for protecting open areas with high and sloping ceilings and wide-open areas, where spot type smoke detectors are difficult to install and maintain.

NOTE: This section provides basic wiring and addressing information For **critical information** on device installation, operation and alignment, refer to the *Installation Instructions* provided with these devices.

10.2 Installation and Wiring

10.2.1 Setting an SLC Address for a Beam Detector

Each beam detector is factory preset with an address of "00." To set an SLC address, use a common screwdriver to adjust the address rotary code switches on the detector to the desired address (refer to "Setting the SLC Address for a Single Point Module" on page 28).

10.2.2 Wiring a Beam Detector

Typical wiring of an **TR-OSI-RI** beam detector connected to an SLC is illustrated in the figure below.

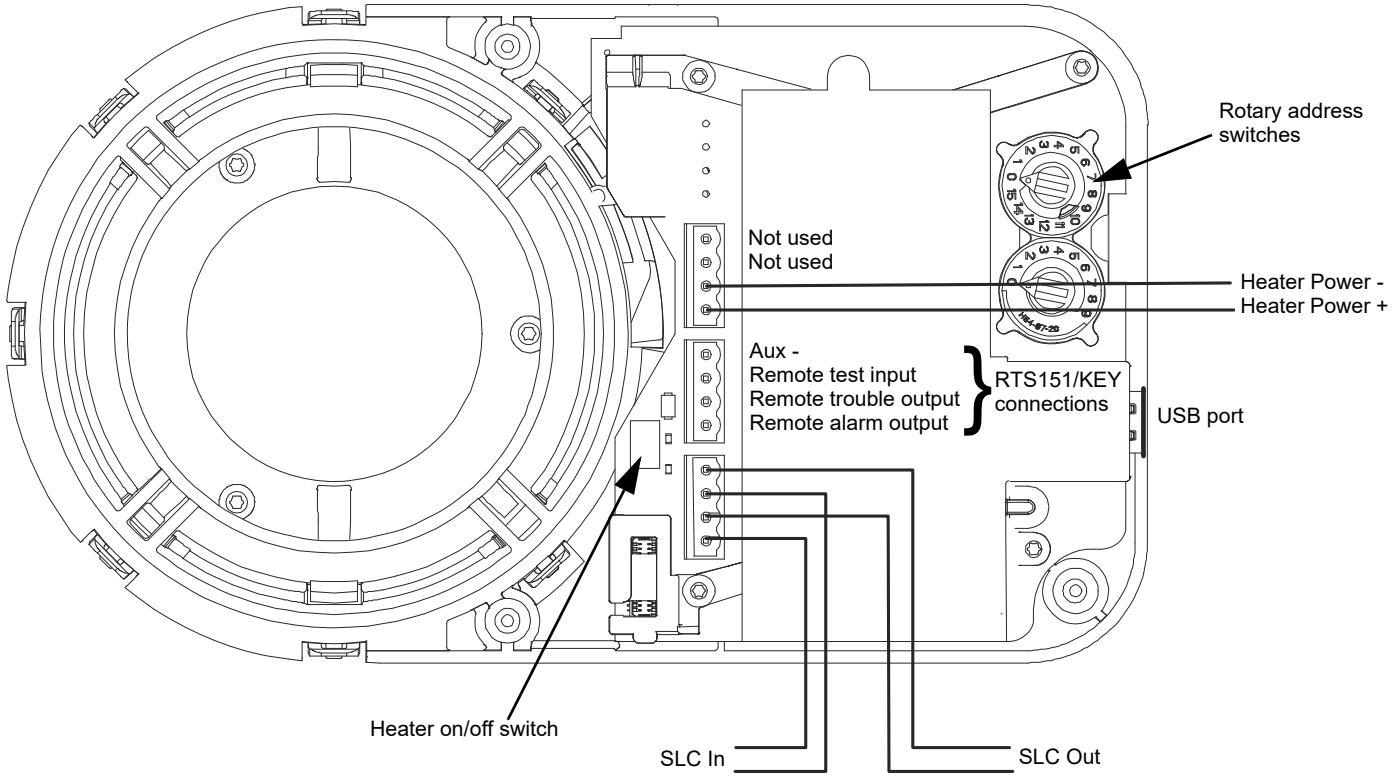


Figure 10.1 TR-OSI-RI Beam Detector Terminal Block Wiring

Section 11: Addressable Manual Pull Station

11.1 Description

The **TR-PULL-DA and TR-PULL-SA** are addressable manual pull stations with a key-lock reset feature.

NOTE: For more information refer to the *Installation Instructions* provided with this device.

11.2 Installation

11.2.1 Setting an SLC address

Each unit is factory preset with an address of "00." To set an SLC address refer to "Setting the SLC Address for a Single Point Module" on page 28 for.

11.2.2 Wiring a TR-PULL-DA Manual Pull Station

Figure 11.1 shows typical wiring for a **TR-PULL-DA** Manual Pull Station to an SLC:

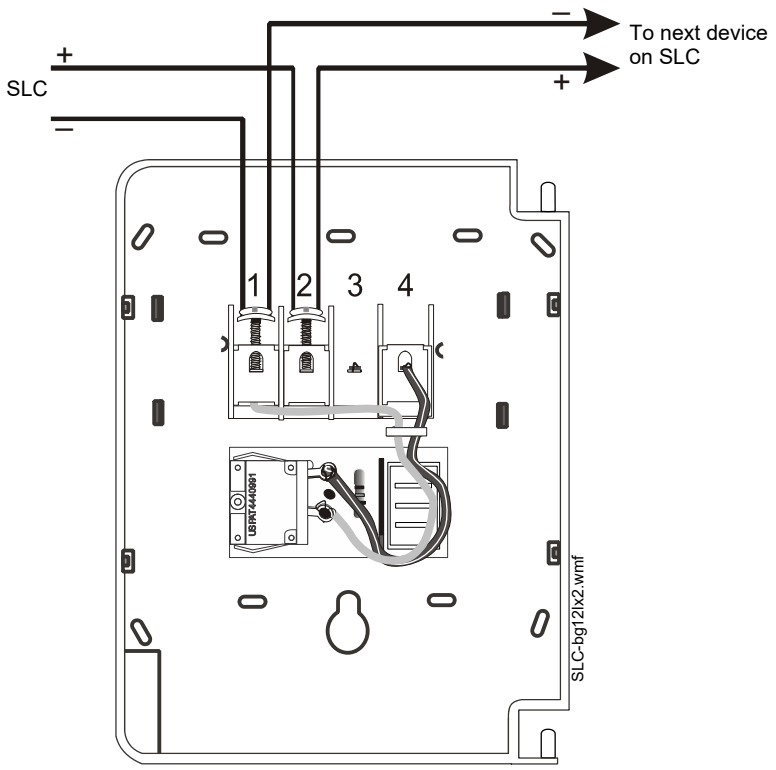


Figure 11.1 Wiring of a TR-PULL-DA Pull Station to an SLC

11.2.3 Wiring a TR-PULL-SA Manual Pull Station

Figure 11.2 shows typical wiring for a **TR-PULL-SA** Manual Pull Station to an SLC:

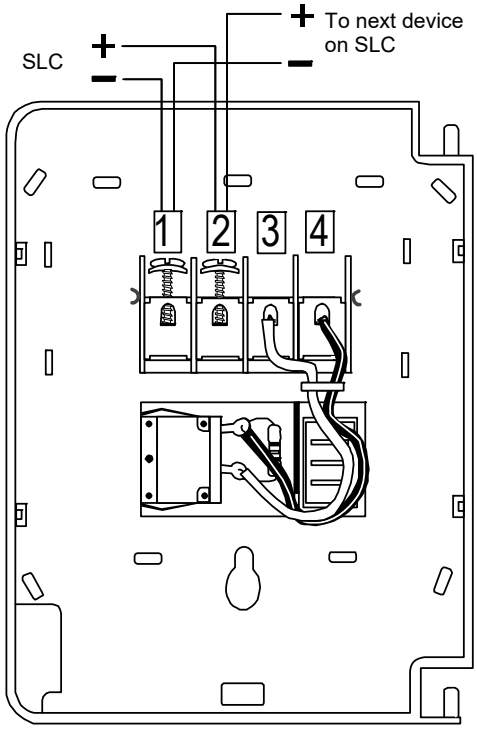


Figure 11.2 Wiring of a TR-PULL-SA Pull Station to an SLC

Appendix A: Power Considerations

A.1 Supplying Power to 24 VDC Detectors and NACs

A.1.1 Resistance and Size

To determine the minimum resistance that can be tolerated in supplying power to 24 VDC 4-wire devices and NACs, use the calculation below. Use this resistance to select the proper gauge wire for the power run from the manufacturer's specifications for the desired wire.

For Four-Wire Detectors:

$$Rmax = \frac{(Vms - Vom)}{(N)(Is) + (Na)(Ia) + (Ir)}$$

For NACs:

$$Rmax = \frac{(Vms - Vom)}{(Nb)(Ib)}$$

Where:

Rmax = maximum resistance of the 24 VDC wires
Vms = minimum supply voltage
Vom = 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
Is = detector current in standby
Na = number of detectors on the 24 VDC power circuit which must function at the same time in alarm
Ia = detector current in alarm
Ir = end-of-line relay current
Nb = number of Notification Appliance Devices
Ib = Notification Appliance current when activated

NOTE: This simplified equation assumes that the devices are at the end of a long wire run.

The minimum supply voltages produced by Triga power supplies are listed below:

FACP	Vms	Power Supply	Vms
TR-2100ECS	19.4	HPF-PS6	20.3
TR-2100	19.4	HPF-PS10	20.29
TR-75	19.9	TR-RPS1	18.7

A.2 Supervising 24 VDC Power

Power used to supply 24 VDC detectors, notification appliances (using the TR-CONTROL), and two wire detectors (using the TR-ZONE) can be supervised with a power supervision relay. This relay, energized by the 24 VDC power itself, is installed at the end of each respective power run and wired in-line with the supervised circuit of any intelligent module.

24 VDC power must be provided from a UL-listed power supply for fire protection use.

When power is removed from the relay, the normally closed contacts open the supervised circuit, generating a trouble condition. Therefore, the relay needs to be installed at the end of the supervised circuit, so it will not disrupt the operating capability of all the devices on that circuit. The relay can be installed in-line with any leg (+ or –) of the supervised NAC circuit, either a Class B or a Class A circuit.

The drawing below illustrates this concept.

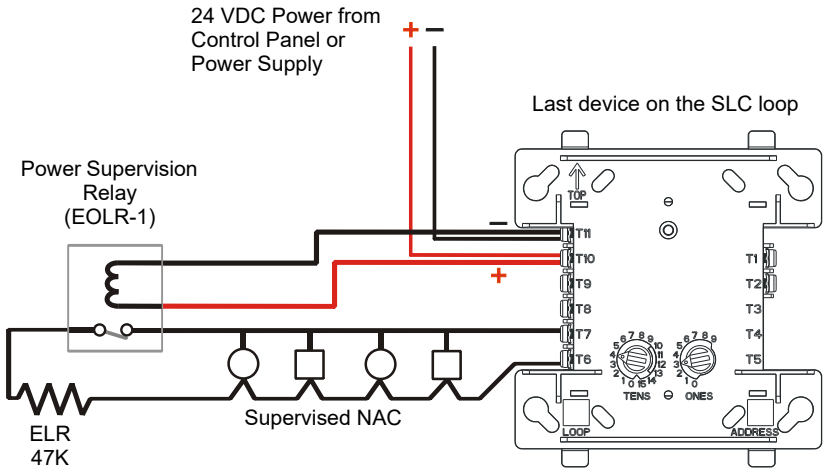


Figure A.1 Supervised 24 VDC Circuit

An alternate method is shown below.

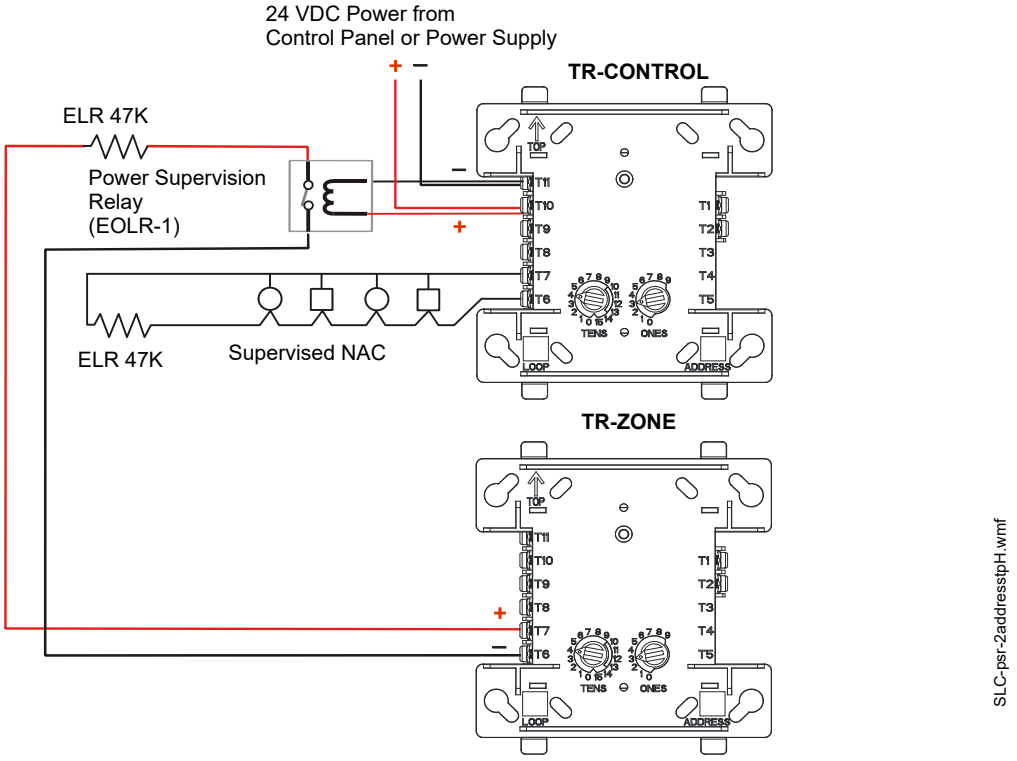


Figure A.2 Alternate: 2-Address Method of Supervising a 24 VDC Circuit

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