Security Services Inc.

One Town Center Road
Boca Raton, FL 33431
(561) 988-3600
FAX: (561) 988-3675

The ADT SLC Signaling Line Circuit Manual

Document 51348

8/29/00 **Revision: A**

PN 51348:A ECN 00-394

Fire Alarm System Limitations

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

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 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.

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 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.

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Introduction

Scope

This document covers the installation and wiring of various Signaling Line Circuit (SLC) devices, when used with the following ADT Fire Alarm Control Panels:

Unimode 2020/1010	Unimode II w/ AIM
Unimode 300/400	

This document also provides basic information that applies to ADT SLC loops in general, such as the branch resistance measurements.

Additional information about each control panel and the modules and detectors referenced in this document can be found in the respective installation manual as listed in Table 1, “Reference Documentation,” on page 11.

Overview

Communication between the control panel and intelligent and addressable initiating, monitor, and control devices takes place through a Signaling Line Circuit (SLC), which can be wired to meet the requirements of NFPA Style 4, Style 6, or Style 7.

Devices

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 Style 7 circuit.

Monitor Modules

These addressable modules 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.

Control Modules

Through these addressable modules, the control panel can selectively activate Notification Appliance Circuits (NAC).

Relay Modules

This addressable module provides the control panel with a dry-contact output for activating a variety of auxiliary devices.

Transponders

ADT-XP5-M - Supervises five Class-B addressable Initiating Device Circuits which monitor normally open contact initiating devices.

ADT-XP5-C - Acts as a NAC or a speaker/telephone circuit (Class B only) or a Form-C relay.

XP Series - (XPP-1, XPC-8, XPM-8 & XPZ-8) Provides the FACP with an efficient multiplex subsystem capability. It communicates with the FACP and functions as a data-gathering panel for alarm Initiating Device Circuits (IDC) and as a remote switching center for Notification Appliance Circuits (NAC), telephone circuits or relays.

For information on connecting these transponders to the SLC, refer to the *ADT XP5 Series Manual* or the *ADT XP Transponder Manual*.

Plug-in Detector Bases

These bases provide a connection between the SLC and a variety of intelligent detectors which are snapped into place. Standard bases and isolator bases are used depending upon which NFPA SLC style is required. Standard and isolator bases are used depending upon which NFPA SLC style is required. Sounder and relay bases are similar to standard bases, but have sound or relay capabilities.

Standard Base - Models B501(standard small diameter base) and B710LP (standard large diameter base)

Isolator Base - Model B224BI isolator base

Sounder Base - Models B501BH (standard sounder base) and B501BHT (base with temporal sounder)

Relay Base - Model B224RB relay base

Intelligent Detectors

1351ADT - Analog, addressable, low profile intelligent smoke detector that incorporates an ionization sensing chamber. Designed to provide open area protection.

2351ADT - Same as 1351ADT, but uses a photoelectric sensing chamber. The **2351TADT** adds thermal sensors that will alarm at a fixed temperature of 135° F. Designed to provide open area protection.

5351ADT - Intelligent thermistor sensing circuit for fast response. Designed to provide open area protection with 50 foot spacing capability. The **5351RADT** incorporates a thermal rate of rise of 15°F (9.4°C).

DH300PADT - Photoelectric smoke detector designed to detect smoke in an air duct. Model **DH300PRADT** contains housing and relay.

Manual Pull Stations

When activated, provides an addressable location to the control panel.

Reference Documentation

The table below gives a list of document sources containing additional information regarding a Signaling Line Circuit:

For information on...	Refer to...	Part Number
Unimode 2020/1010	Installation Manual	51167
Unimode 300/400	Installation Manual	50708
Unimode II	Installation Manual	A15583
Compatible Devices	Device Compatibility Document	51352
Transponders	XP5 Series Manual XP Transponder Manual	51175 50928
ADT-NBG-12LX	Installation Instructions	51241
System Sensor Documentation		
M300MADT Monitor Module	Installation Instructions	A300-02-00
M301MADT Mini Monitor Module	Installation Instructions	A300-04-00
M302MADT Monitor Module	Installation Instructions	A300-03-00
M300CADT Control Module	Installation Instructions	A300-07-00
M300DADT Control Module	Installation Instructions	A300-10-00
M300RADT Relay Module	Installation Instructions	A300-01-00
M500X Isolator Module	Installation Instructions	D500-37-00
DH300PADT Duct Detector	Installation Instructions	156-0019-00R
DH300RPADT Duct Detector, with housing & relay	Installation Instructions	156-0049-00
1351ADT Ion Detector	Installation Instructions	A300-06-00
2351ADT & 2351TADT Photo	Installation Instructions	A300-05-00
5351ADT Thermal Detector	Installation Instructions	A300-08-00
5351RADT Rate of Rise Sensor	Installation Instructions	A300-09-00
3251 Multi-Sensor Detector	Installation Instructions	D200-57-00
B501 Standard Base	Installation Instructions	N550-02-00
B501BH Sounder Base	Installation Instructions	N550-02-00
B501BHT Sounder base w/ temporal sounder	Installation Instructions	N550-02-00
B501B-FTX Base for H2351CADT only	Installation Instructions	D200-74-00
B210LP Flanged Base	Installation Instructions	D250-01-00
B224BI Isolator Base	Installation Instructions	N450-15-00
B224RB Relay Base	Installation Instructions	N450-16-01
RA400Z Remote LED Annunciator	Installation Instructions	D220-01-00

Table 1 Reference Documentation

SLC Capacity

The individual control panel determines the capacity of devices that can be incorporated into an SLC. See the specific installation manual for this information.

SLC Performance

SLC performance depends on the type of circuit: Style 4, Style 6, or Style 7.

Note: SLC operation meeting Style 7 requirements isolates each device on the SLC from faults that may occur on the SLC.

Wiring style requirements are determined by national and local codes. Consult with the Authority Having Jurisdiction before wiring the SLC.

The table below lists the trouble conditions that result when a fault exists on an SLC.

Type of Fault	Style 4	Style 6	Style 7
Open	Trouble	Alarm/Trouble	Alarm/Trouble
Ground	Alarm/Trouble	Alarm /Trouble	Alarm/Trouble
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 indicates a trouble signal will be generated at the control panel during the abnormal condition.
- Alarm/Trouble indicates an alarm signal can be transmitted to the control panel during the abnormal condition.

Table 2 SLC Performance

LED Operation

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

		LED Indication	
Control Panel	**Device**	**Standby**	**Activated**
Unimode 2020 Unimode 1010 Unimode 300/400	Monitor Module Control Module Detector	Blinks RED Blinks GREEN Blinks RED	RED continous GREEN continous RED continous
ADT-AIM-200	Monitor Module Control Module Detector	Blinks RED Blinks GREEN Blinks RED	RED continous Blinks GREEN RED continous

Surge Suppression

At least one secondary surge protector must be used with each SLC wiring pair whenever SLC wiring runs outside the building. For detailed information refer to "Appendix B: Surge Suppression" on page 47.

Wiring Requirements

Overview

It is recommended that all SLC wiring be twisted shielded pair to minimize the effects of electrical interference except when using the LIB-200A or LIB-400 where non-shielded wire is recommended.

Wire size should be no smaller than 18 AWG (1.0 mm^2) and no larger than 12 AWG (3.25 mm^2) wire.

Two-Wire SLC - Style 4 (Class B)

Measuring Loop Resistance

T-tapping of the SLC wiring is permitted for 2-wire Style 4 configurations. The total DC resistance from the control panel to each branch end cannot exceed 40 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.

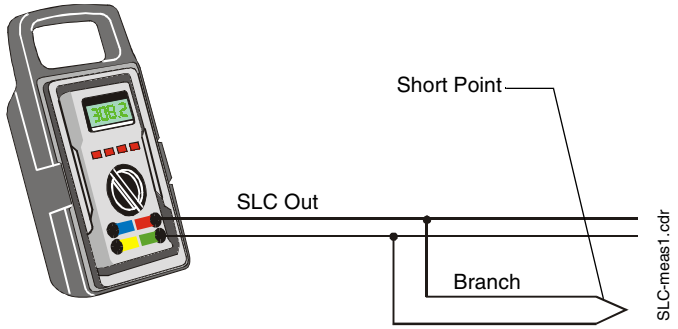


Figure 1 Measuring DC Resistance of a Two-Wire SLC

Measuring 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 + Branch B + Branch C.

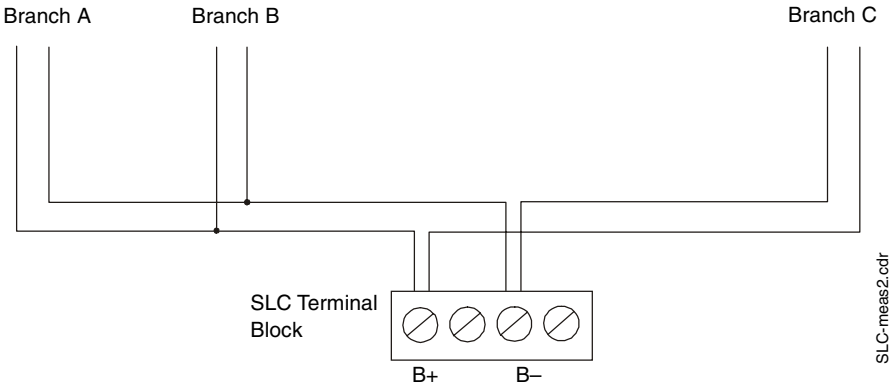


Figure 2 Measuring the Total Wire Length - Two-Wire SLC

Four-Wire SLC Style 6 & 7 (Class A)

Measuring Loop Resistance

The total DC resistance of the SLC pair cannot exceed 40 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.

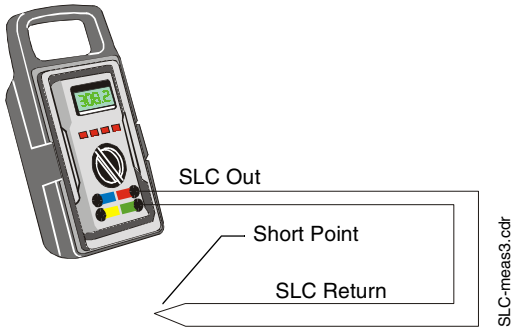


Figure 3 Measuring DC Resistance of a Four-Wire SLC

Measuring Total Wire Length

The total length of wire 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:

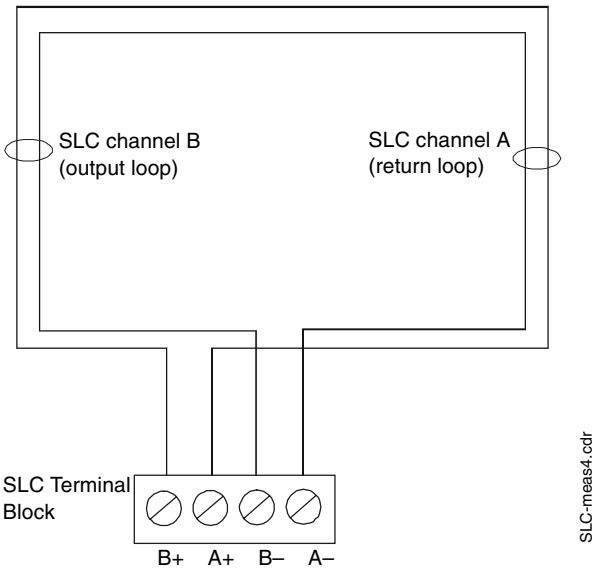


Figure 4 Measuring the Wire Length – Four-Wire SLC

Shielded Wire Termination for Reduction of Radiated Emissions

Overview

The drawings below show four methods of proper termination of the shield, depending on the type of conduit used:

- No-conduit
- Full-conduit
- Partial-conduit
- Floating Shield

Shielding of the SLC is not recommended in all applications. Refer to the "Floating Shield" section for specific instances where it is not recommended.

Use of good wiring practice consistent with local electrical codes is expected.

No-Conduit

Scrape the paint on the cabinet to bare metal to provide a good electrical connection. Connect the shield drain wire to the connector screw as shown below. Do not allow the shield drain wire to enter the system cabinet.

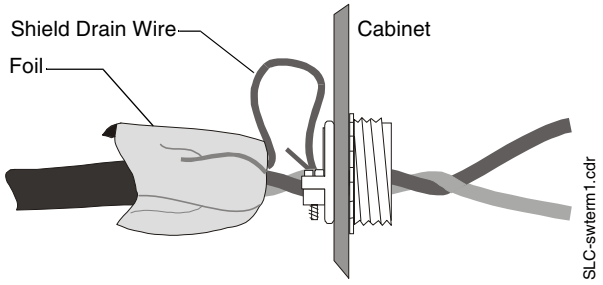


Figure 5 Shield Termination – No Conduit

Full-Conduit

Connect the metal conduit to the cabinet by using the proper connector. Feed the shielded wire through the conduit, into the control box. The shield drain wire must be connected to the "reference" or "shield" terminal on the SLC terminal block, or connected to the negative side of the loop if there is no "reference" or "shield" terminal on the SLC terminal block. Do not let the shield drain wire or the shield foil touch the system cabinet or be connected to earth ground at any point.

Example at right illustrates shield drain wire connection to an SLC terminal block with a "reference" connection.

Example at right illustrates shield drain wire connection to an SLC terminal block without a "reference" or "shield connection.

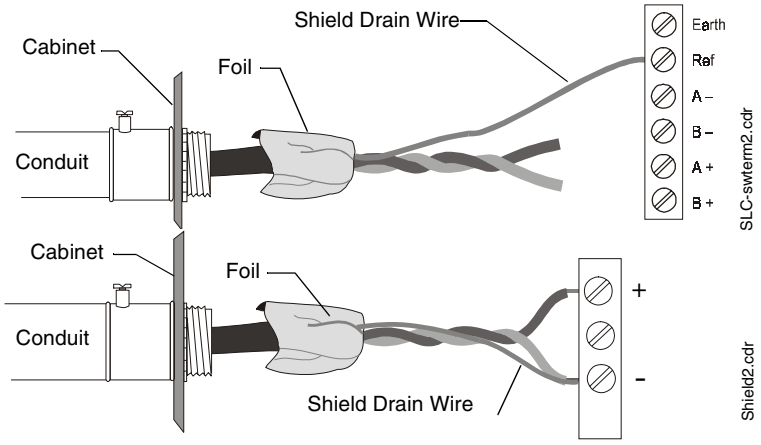


Figure 6 Shield Termination – Full Conduit

Note: For Style 6 or Style 7 SLC wiring, connect one end of the shield to the reference/negative side of the respective channel.

Partial-Conduit

If the length of conduit from the control panel cabinet exceeds 20 feet (6.1 meters), terminate the shield as shown. If using a metal box, you must use a metal conduit.

Connect the shielded wire to the junction box by using a proper connector. Scrape the paint on the cabinet to bare metal to provide a good electrical connection. Connect the metal conduit between the junction box and the cabinet by using the proper connectors.

Feed the twisted-pair wire into the junction box, through the conduit, into the cabinet box. Within the junction box, connect the appropriate wires together using wire nuts. Connect the shield drain wire to the junction box, at the end of the conduit run, as shown below.

Do not allow the shield drain wire to enter the system cabinet or the conduit.

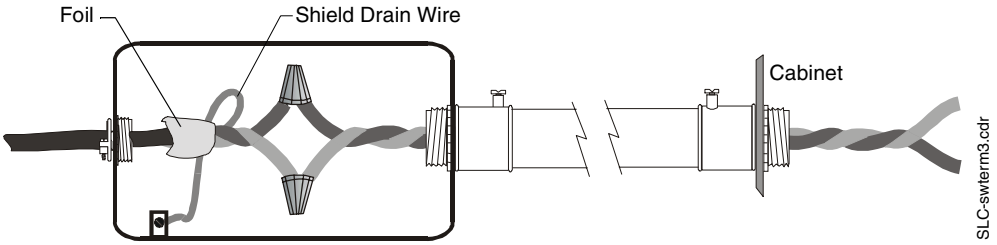


Figure 7 Shield Termination – Partial Conduit

Floating Shield

Where shielding of the SLC is not recommended (when using the LIB-200A or LIB-400):

1. The SLC is less than 3000 feet (914.4 meters).
2. The shield is divided into floating segments of less than 1000 feet (304.8 meters).

To divide the shield wire into floating segments, cut shield even with jacket and tape as shown:

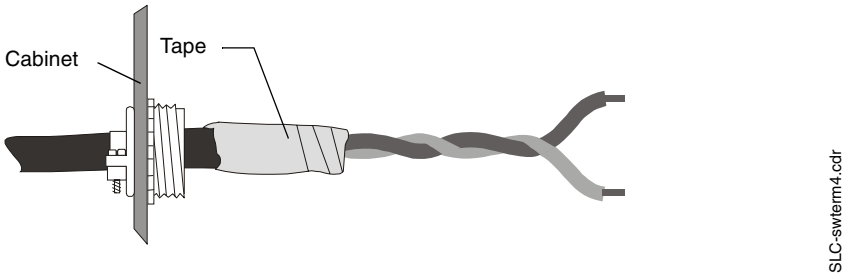


Figure 8 Floating the Shield

SLC Circuits without Isolators

Overview

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

- NFPA Style 4
- NFPA Style 6

NFPA Style 4 SLC

NFPA Style 4 requirements can be met by using the diagram below.

- T-tapping of the SLC wiring is allowed for Style 4 configuration.

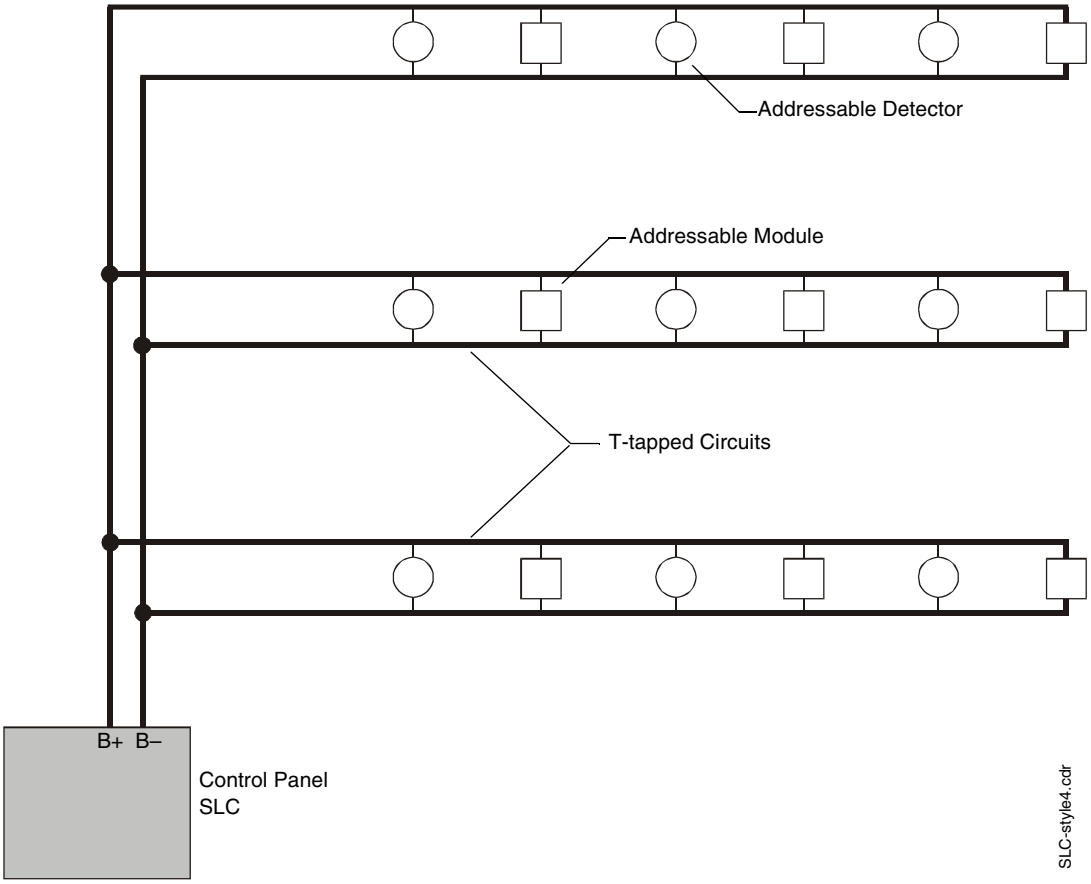


Figure 9 Basic NFPA Style 4 SLC

NFPA Style 6 SLC

NFPA Style 6 requirements can be met by using the diagram below.

- T-tapping of the SLC wiring is NOT allowed for Style 6 configuration.

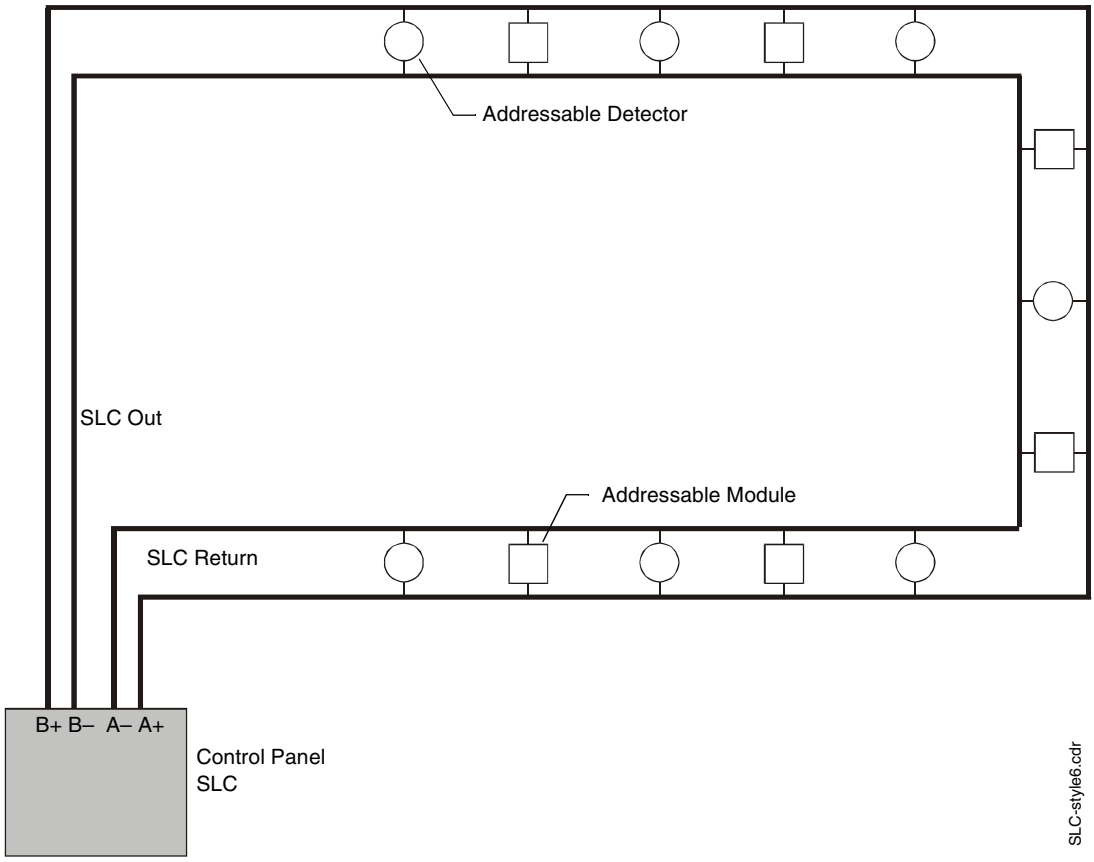


Figure 10 Basic NFPA Style 6 SLC

SLC Circuits with Isolators

Overview

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

- Fault Isolator Module M500X
- Isolator Detector Bases

A Fault Isolator Module on both sides of a device, or the combination of an Isolator Base and Isolator Module are required to comply with NFPA Style 7 requirements.

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. Due to the heavy current draw of the 3251 Multi-Sensor Detector the maximum number of these detectors that can be installed between isolator modules is reduced to two (2). Isolator modules will not function properly when these limits are exceeded.

When more than 100 Isolator Modules and/or Bases 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.

Fault Isolator Module - M500X

The module continuously monitors the circuit connected to terminals 3(–) and 4(+). Upon powerup, 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.

Wiring an Isolator Module

The figure below shows typical wiring of an Isolator Module:

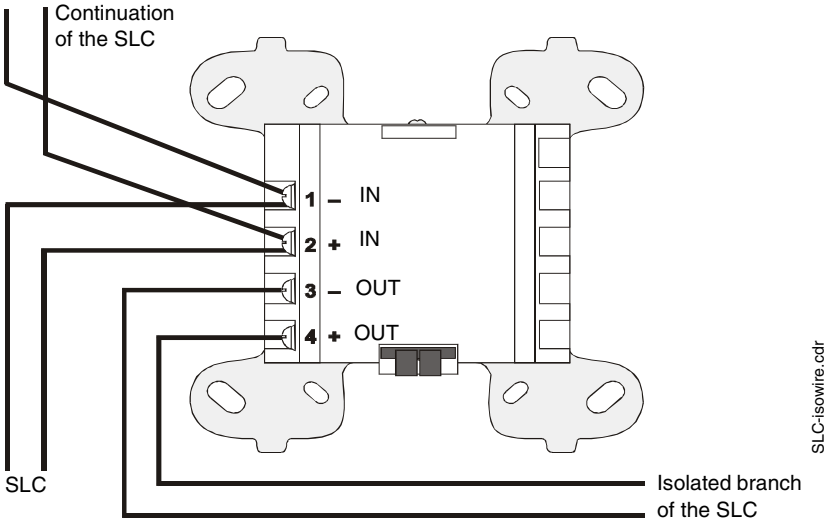


Figure 11 Wiring an M500-X Module

Isolator Detector Bases

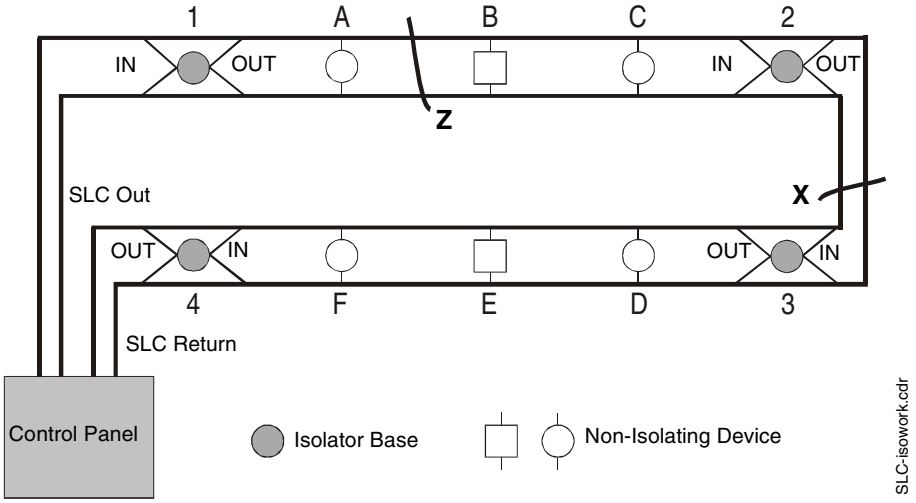
Isolator detector bases prevent an entire communications loop from being disabled when a short circuit occurs. This is accomplished by isolating that part of the loop containing the short from the remainder of the circuit. These bases also automatically restore the entire loop when the cause of the short circuit is corrected.

B224BI and **B524BI** are intelligent isolator bases for smoke detectors.

How an Isolator Base Works

If a fault occurs at point “Z”, devices A, B, & C will cease to function and display a trouble warning at the control panel. Devices D, E, & F will remain normal. Isolator bases 1 through 4 will remain normal as isolator base ‘1’ will be served by ‘SLC Out’ and isolator bases ‘4, 3, & 2’ will be served by ‘SLC Return’.

If a fault occurs at point “X”, devices A through F will remain normal. Only the device in isolator base 2 ceases to function..



Note: Refer to Figure 30 for an illustration of “IN” and “OUT” isolator base wiring.

Figure 12 Isolator Base Circuit

For information on wiring an isolator base refer to "Wiring an Isolator Base" on page 40.

NFPA Style 4 SLC Using an M500X Module

A variation of a Style 4 operation using isolator modules to protect each branch of the SLC. Refer to Figure 11 on page 19 for M500X wiring.

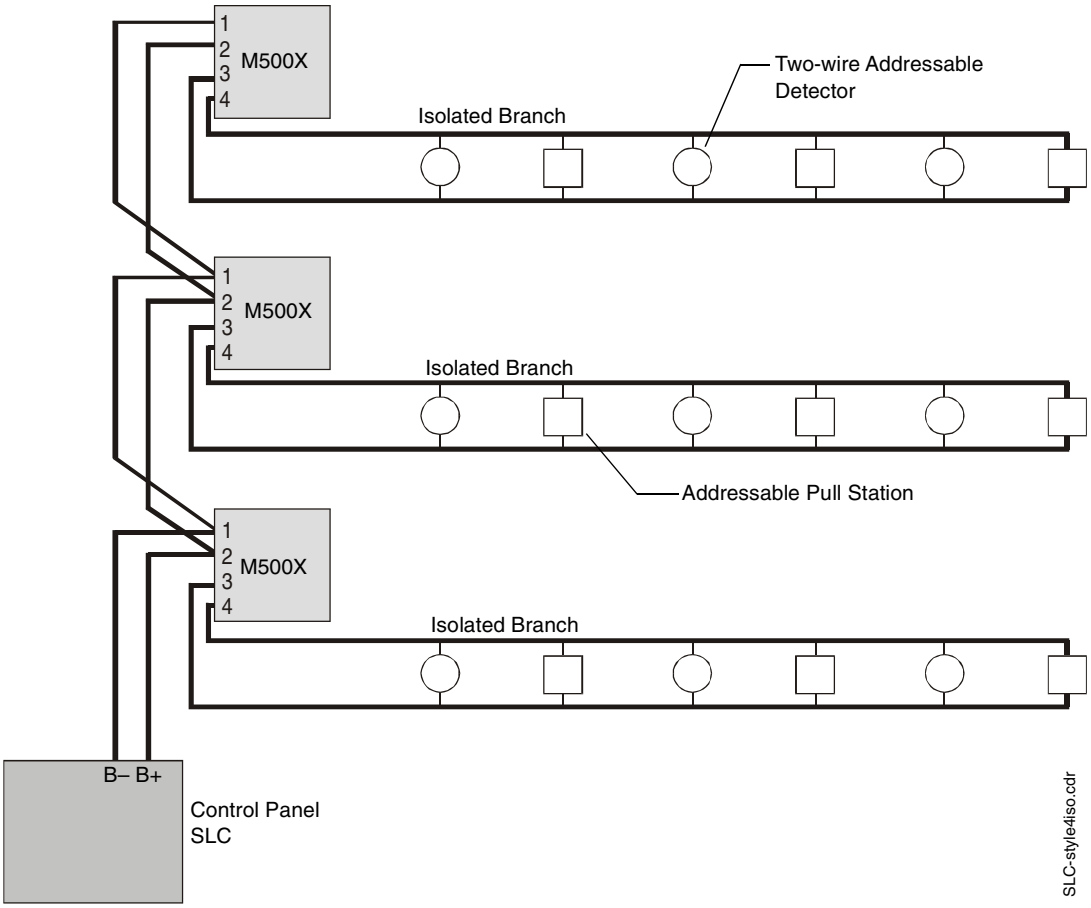


Figure 13 NFPA Style 4 SLC using M500X modules

NFPA Style 6 SLC Using M500X Modules

A variation of Style 6 operation using isolator modules to protect a section of the SLC. By flanking each group of devices with an M500X 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 affect 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 Style 6 configuration.
- M500X modules shall be within 20 feet (6.1 meters) of device and use metal conduit.

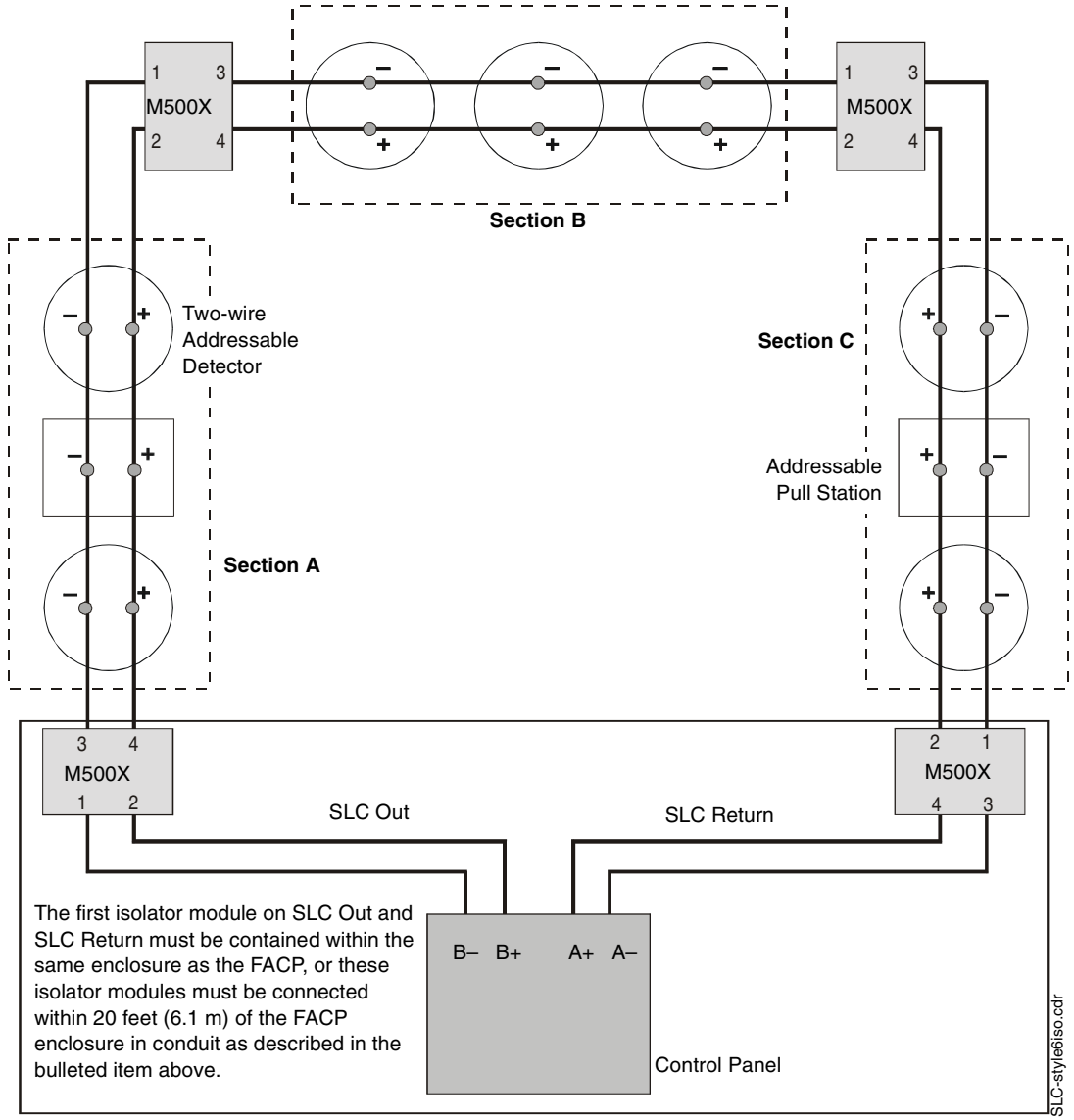


Figure 14 NFPA Style 6 SLC using M500X Modules

NFPA Style 7 SLC Using Isolating Devices

Style 7 operation requires using a combination of isolator detector bases and isolator modules or isolator modules before and after a non-isolator device. Flanking each device with an isolator provides fault protection to all other devices on the loop.

- T-tapping is NOT allowed for Style 7 configuration.
- When a non-isolator base or pull station is used, install M500X modules on both sides of devices.
- When an isolator base is used in conjunction with an isolator module, install isolator module after the base.
- Connections between isolator bases and the device they isolate must be in conduit, within 20 feet (6.1 m).

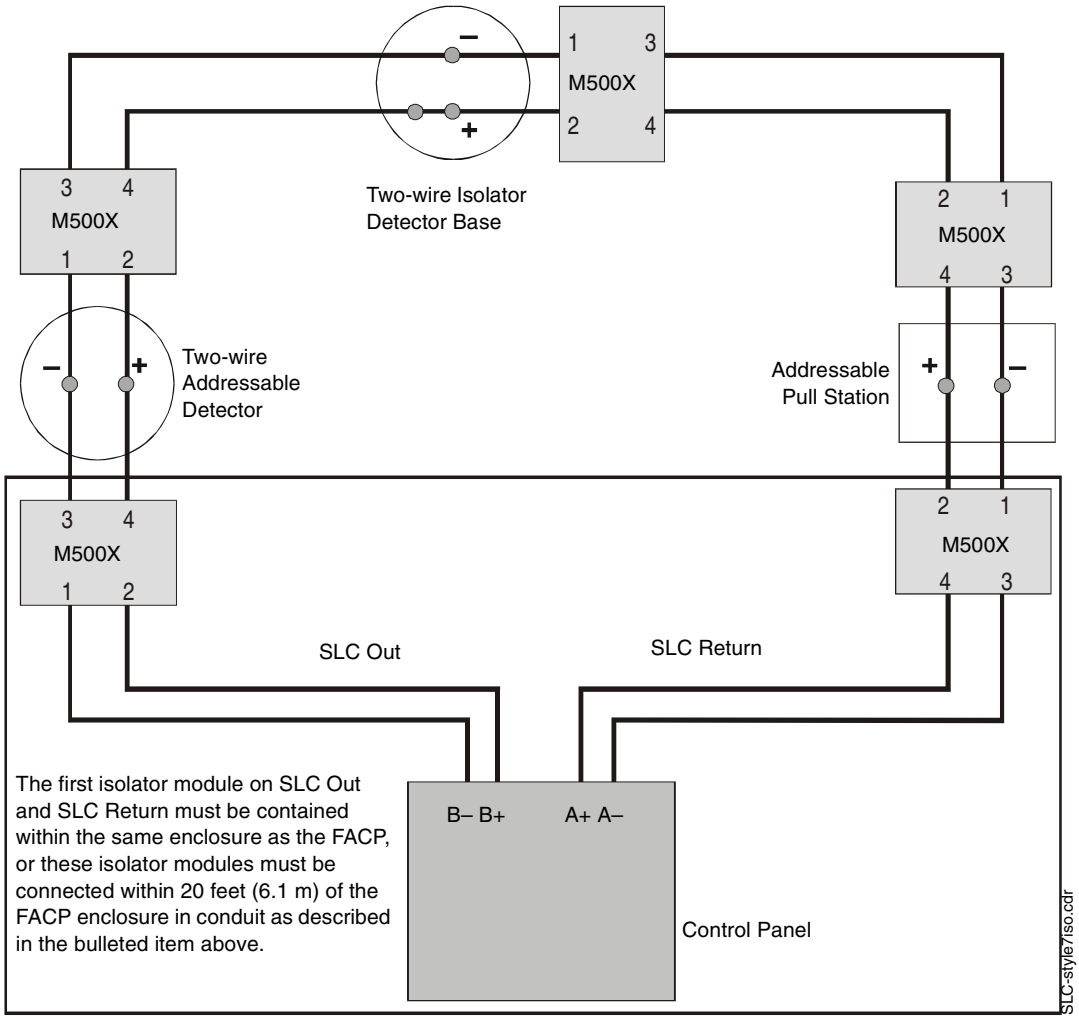


Figure 15 NFPA Style 7 SLC

Notes

Monitor Modules

Description

These addressable modules monitor conventional contact-type alarm initiating devices. You can configure supervised module circuits as NFPA Style B (Class B) or Style D (Class A) Initiating Device Circuits. 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 provides with this device.

M300MADT Monitor Module

An addressable module that monitors either a Style B (Class B) or Style D (Class A) IDC of dry-contact input devices.

M300DADT Dual Monitor Module

Similar to the M300MADT Module, except intended for use in intelligent two-wire systems providing two independent two-wire IDCs at two separate, consecutive addresses.

M302MADT Monitor Module

Similar to the M300MADT, except it is used to monitor a single IDC of two-wire smoke detectors.

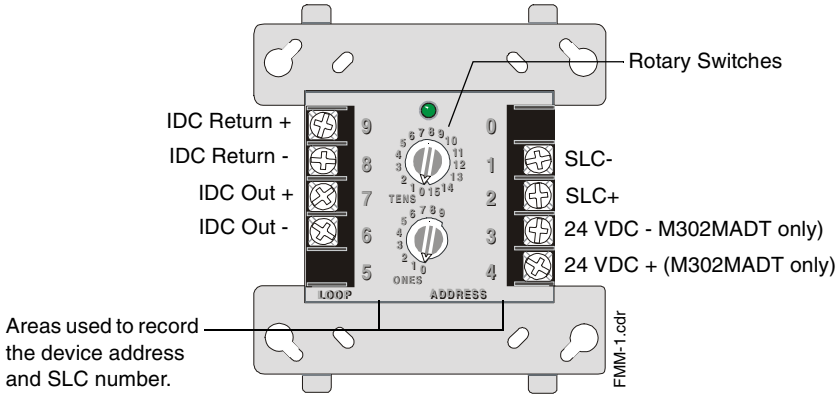


Figure 16 M300MADT/M302MADT Modules

M301MADT Monitor Module

Functionally and electrically identical to an M300MADT, but offered in a smaller package for mounting directly in the electrical box of the device being monitored.

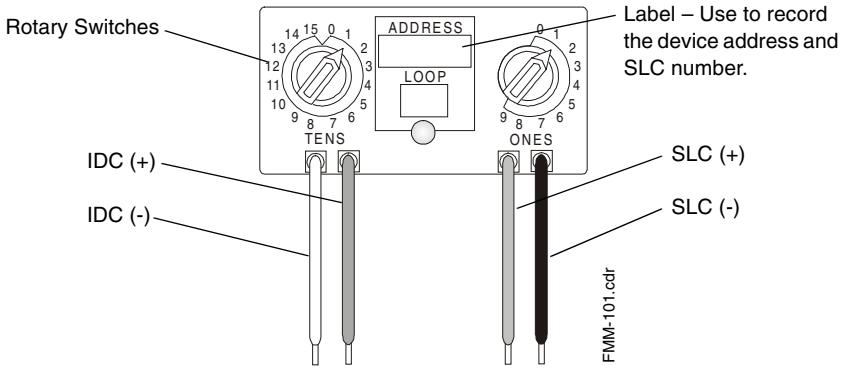


Figure 17 M301MADT Module

Installation

When installing any of the modules, note the following:

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

4. The IDC provides the following services (do not mix):
   - Fire alarm service
   - Automatic and manual waterflow alarm service with normally open contact devices
   - Sprinkler supervisory service with normally open contact devices
   - Security service

Setting an SLC address for a Module

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

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

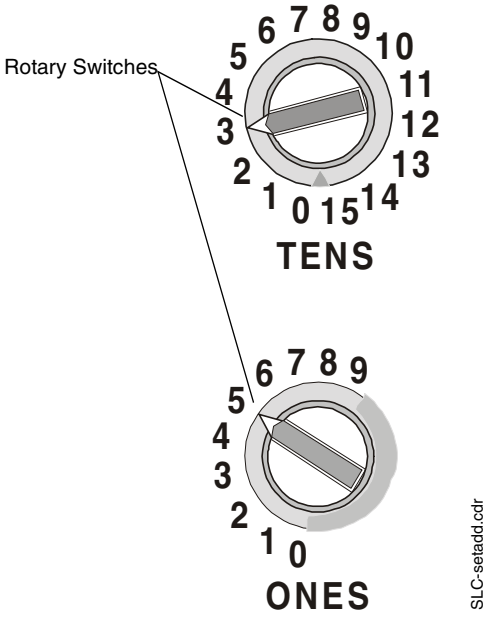


Figure 18 Setting SLC Address on Module

M300MADT Wiring Diagrams

Following are wiring diagrams that depict NFPA Style B (Class B) and D (Class A) Initiating Device Circuits (IDCs) using M300MADT monitor modules.

Wiring a NFPA Style B IDC with an M300MADT

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.

The figure below shows typical wiring for a supervised and power-limited NFPA Style B (Class B) Initiating Device Circuit using an M300MADT module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.

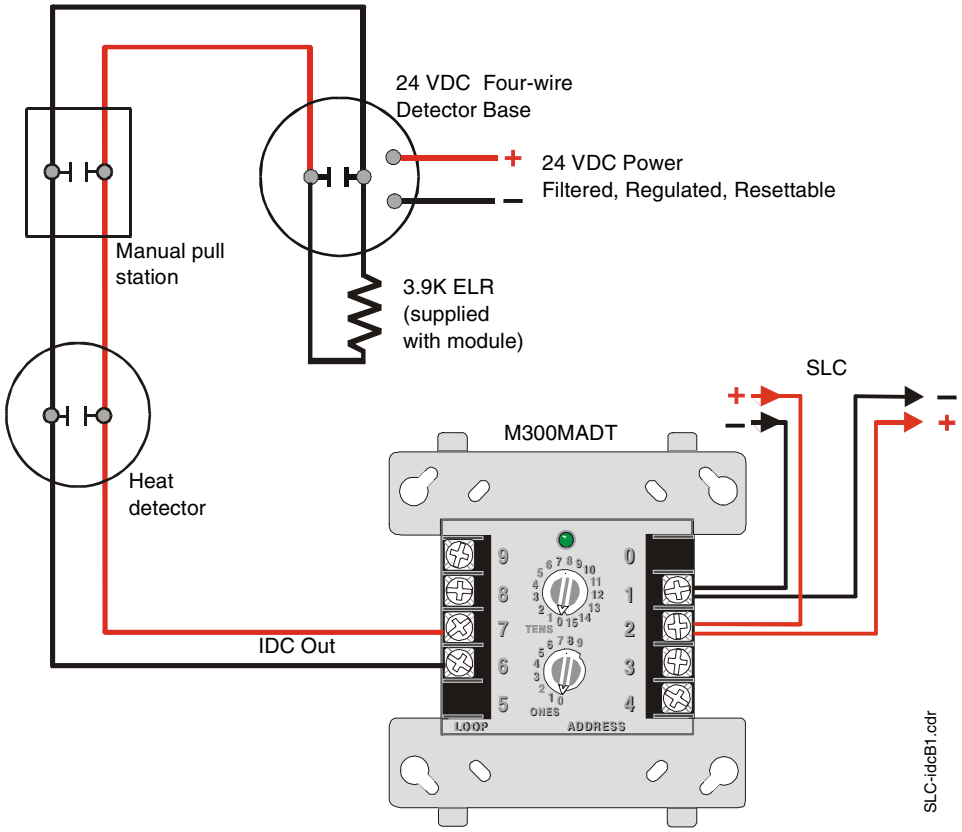


Figure 19 Typical Style B IDC Wiring with M300MADT

Wiring a NFPA Style D IDC with an M300MADT

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.

The figure below shows typical wiring for a supervised and power-limited NFPA Style D (Class A) IDC using an M300MADT module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.

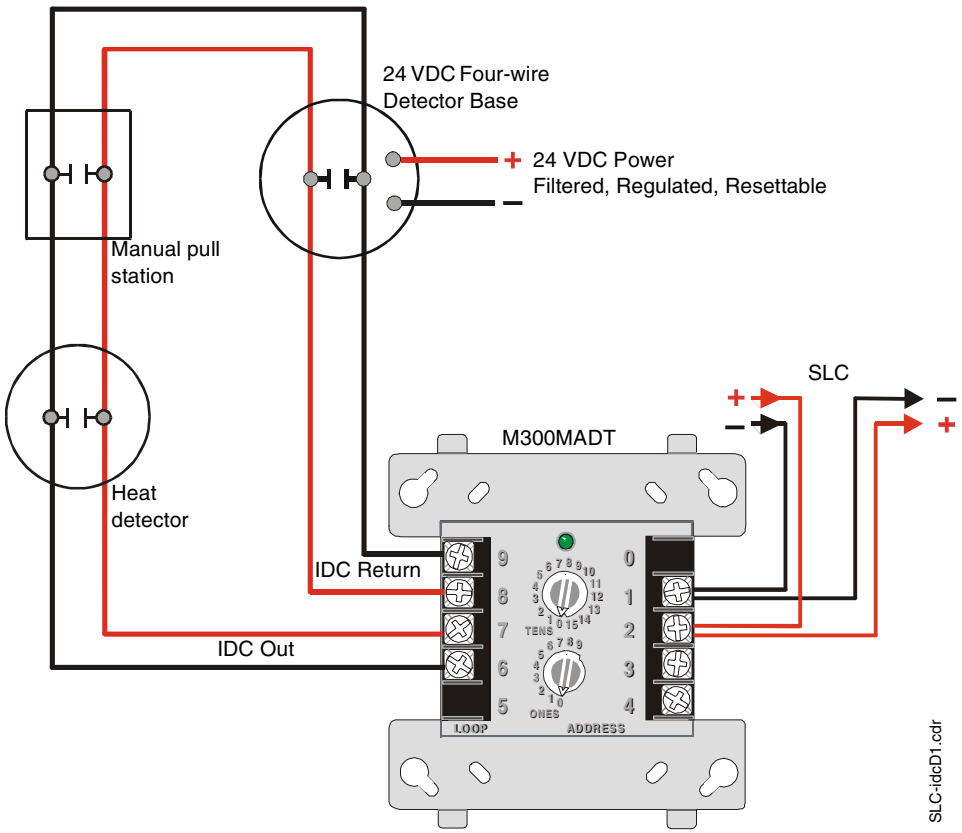


Figure 20 Typical Style D IDC Wiring with M300MADT

M300DADT Wiring Diagrams

Following is a wiring diagram that concerns NFPA Style B Initiating Device Circuits using M300DADT dual monitor modules.

Wiring a NFPA Style B IDC with an M300DADT

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

Use the rotary switches on the module to set it to the required SLC address. Each dual module takes two addresses on the SLC. Circuit 'L' responds to the address set on rotary switches. Circuit 'H' will automatically respond at the next higher address. Use caution to avoid duplicate addressing of modules on the system.

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

The figure below shows typical wiring for a supervised and power-limited NFPA Style B (Class B) Initiating Device Circuit using an M300DADT module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.

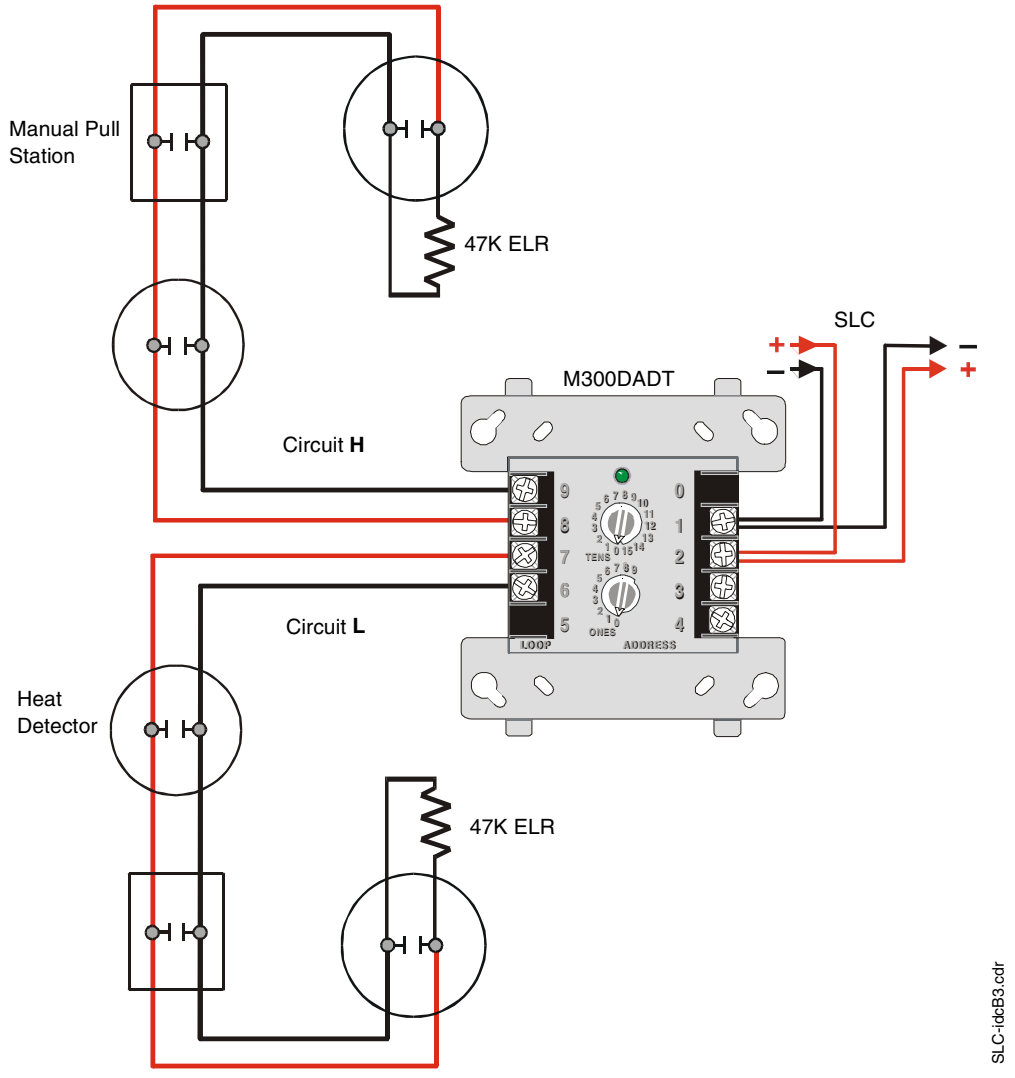


Figure 21 Typical Style B IDC Wiring with M300DADT

M302MADT Wiring Diagrams

Following are wiring diagrams that concern NFPA Style B and D Initiating Device Circuits using M302MADT monitor modules.

Wiring a NFPA Style B IDC with an M302MADT

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.

The figure below shows typical wiring for a supervised and power-limited NFPA Style B (Class B) Initiating Device Circuit using an M302MADT module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.

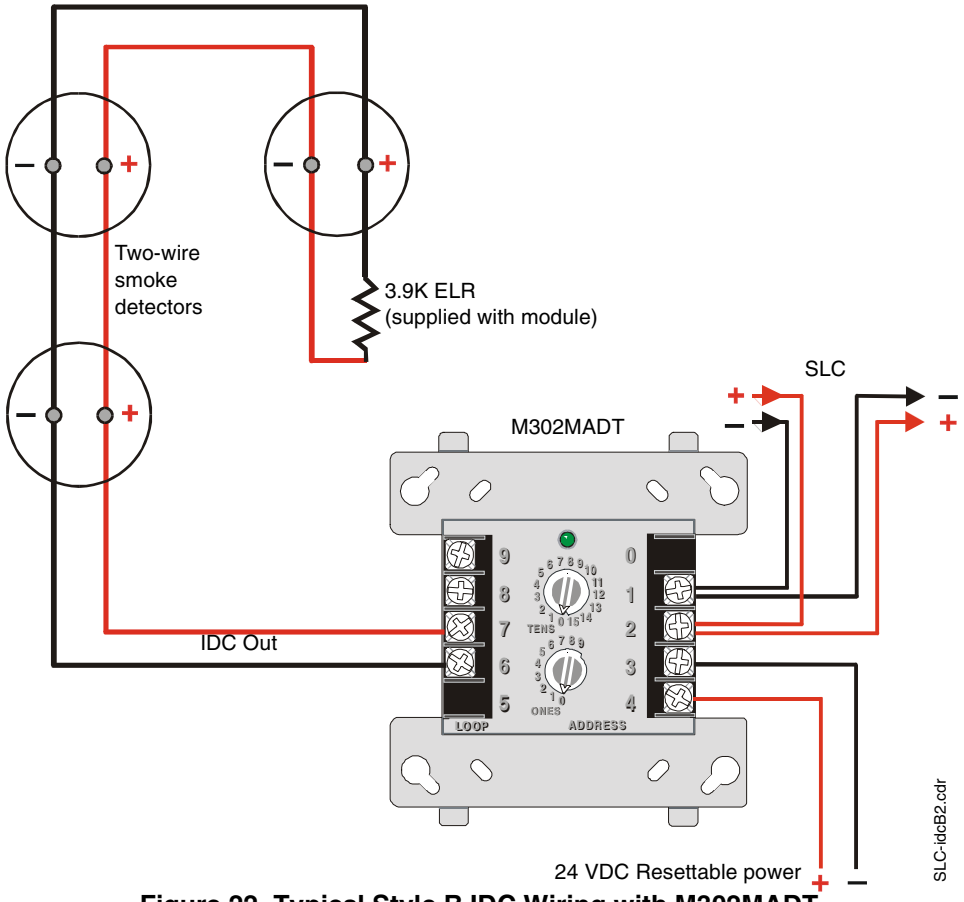


Figure 22 Typical Style B IDC Wiring with M302MADT

Wiring a NFPA Style D IDC with an M302MADT

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.

The figure below shows typical wiring for a supervised and power-limited NFPA Style D (Class A) Initiating Device Circuit using an M302MADT module.

- Refer to the *Device Compatibility Document* for compatible smoke detectors.
- See "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.

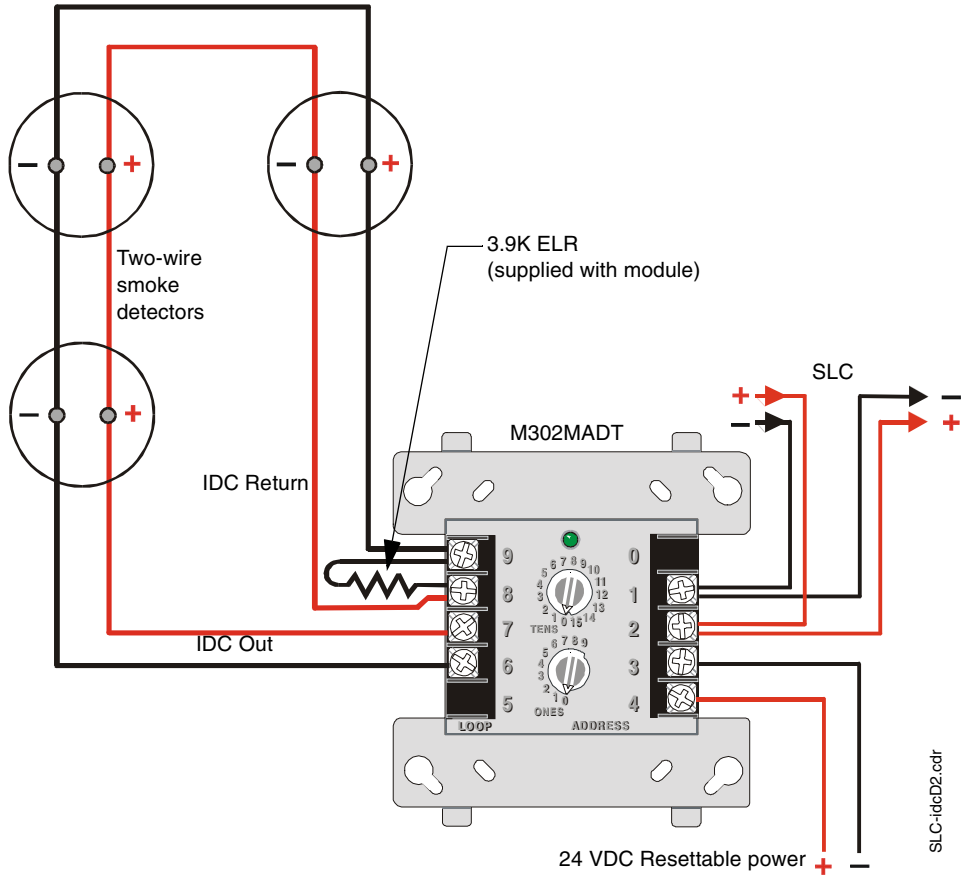


Figure 23 Typical Style D IDC Wiring with M302MADT

Notes

Control Modules

Description

The M300CADT module is an addressable module that can be used for monitoring and switching 24 VDC Notification Appliance Circuit (NAC) power for NFPA Style Y (Class B) and NFPA Style Z (Class A) circuits. It has a resistor on the back (refer to Figure 25) that must be removed when the M300CADT is used on an FFT-7 or FFT-7S telephone circuit.

Note: For more information on the module specifications refer to the *Installation Instructions* provided with this device.

Installation

Setting an SLC address for an M300CADT Module

Each module is factory preset with an address of "00." To set an SLC address refer to "Setting an SLC address for a Module" on page 26.

Wiring a Notification Appliance Circuit (NAC) with an M300CADT

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

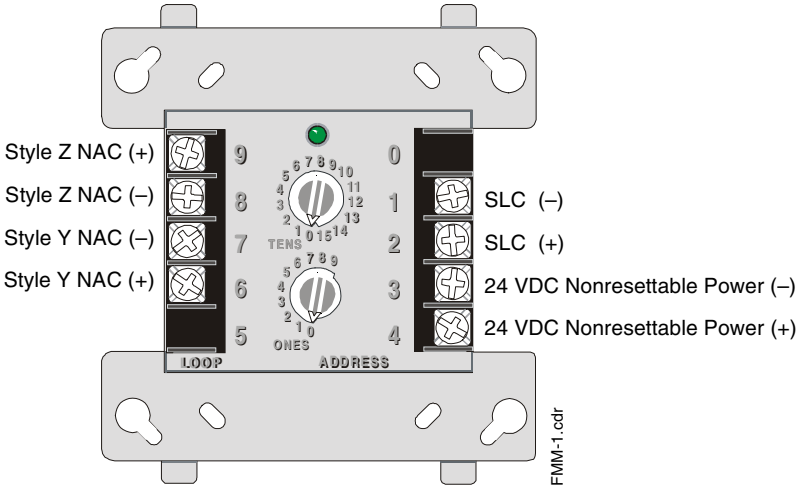


Figure 24 M300CADT Wiring Connections

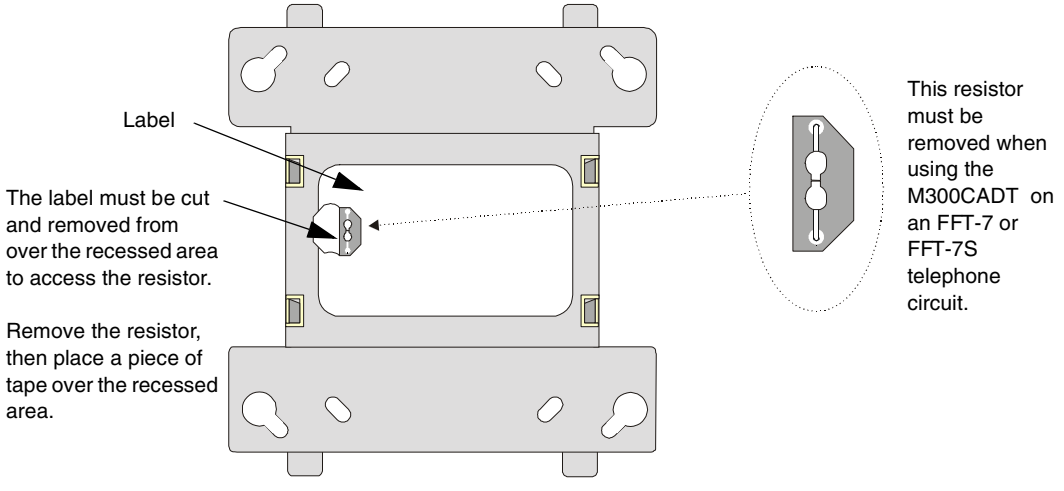


Figure 25 M300CADT Rear View - Resistor Location

Wiring an M300CADT Module

This section contains instructions and diagrams for wiring a Signaling Line Circuit with an M300CADT as a Notification Appliance Circuit.

Wiring a Style Y NAC (Two-Wire)

A supervised and power-limited NFPA Style Y (Class B) NAC using an M300CADT module. Polarized alarm notification appliances are shown connected to the module in a two-wire configuration.

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

- See "Appendix A: Power Considerations" on page 43 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).
- A power supervision relay is required only on the last module of the power run.
- Do not T-Tap or branch a Style Y circuit.
- Terminate the circuit across the last device using an End-of-Line Resistor 47K, 1/2-watt, P/N SSD A2143-00 (ELR-47K in Canada).
- Do not loop wiring under the terminals of any notification appliance. To maintain supervision, break the wire run at each device.

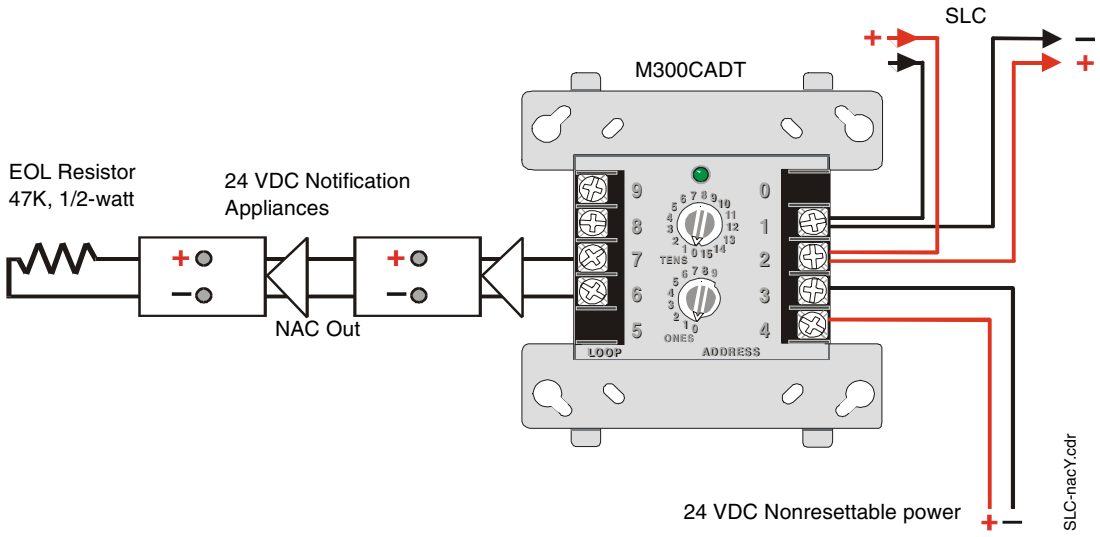


Figure 26 NFPA Style Y Notification Appliance Circuit

Wiring a Style Z NAC (Four-Wire)

A supervised and power-limited NFPA Style Z (Class A) NAC using an M300CADT 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 "Appendix A: Power Considerations" on page 43 for information on supervising 24 VDC power.
- Each module can control 2 amps of resistive load (on electronic devices) or 1amp of inductive load (on mechanical bells and horns).
- A power supervision relay is required only on the last module of the power run.
- Do not T-Tap or branch a Style Z circuit.
- A Power Supervision Relay is required only on the last module of the power run.
- Do not loop wiring under the terminals of any notification appliance. To maintain supervision, break the wire run at each device.

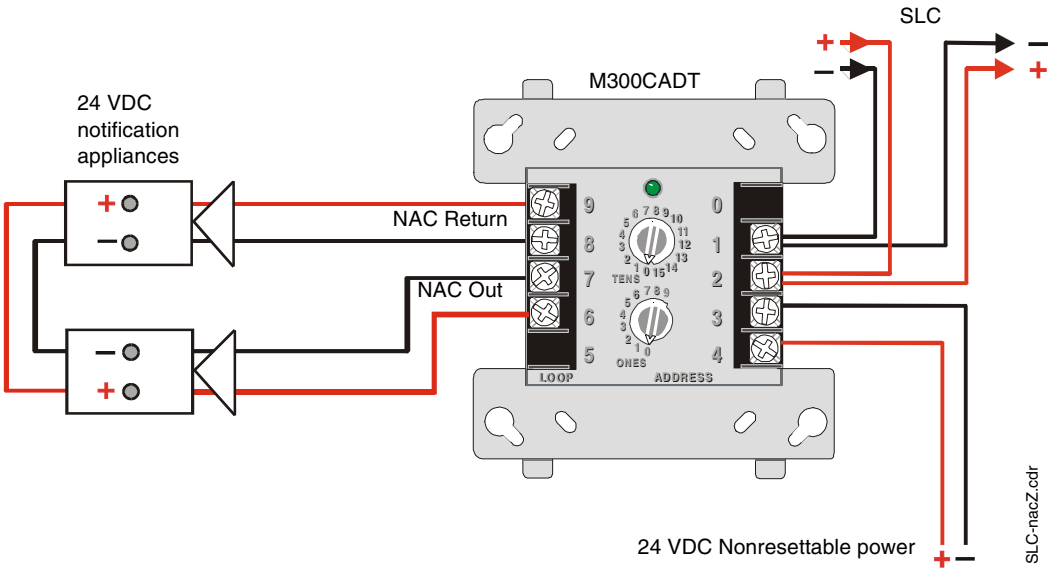


Figure 27 NFPA Style Z Notification Appliance Circuit

Notes

Relay Module

Description

The M300RADT module is an addressable module that provides Form-C relay contacts.

Ratings for the dry relay contacts on a Form-C module are:

- Resistive - 2 amps @ 30 VDC
- Inductive - 1 amp @ 30 VDC (0.6pf)
- Pilot Duty - 0.5 amp @ 125 VAC (0.35pF)

Note: For more information on the module specifications refer to the *Installation Instructions* provided with this device.

Installation

Setting an SLC address for an M300RADT Module

Each module is factory preset with an address of "00." To set an SLC address refer to "Setting an SLC address for a Module" on page 24.

Wiring an M300RADT Module (Form-C Relay)

The figure below shows an M300RADT module wired to the Control Panel:

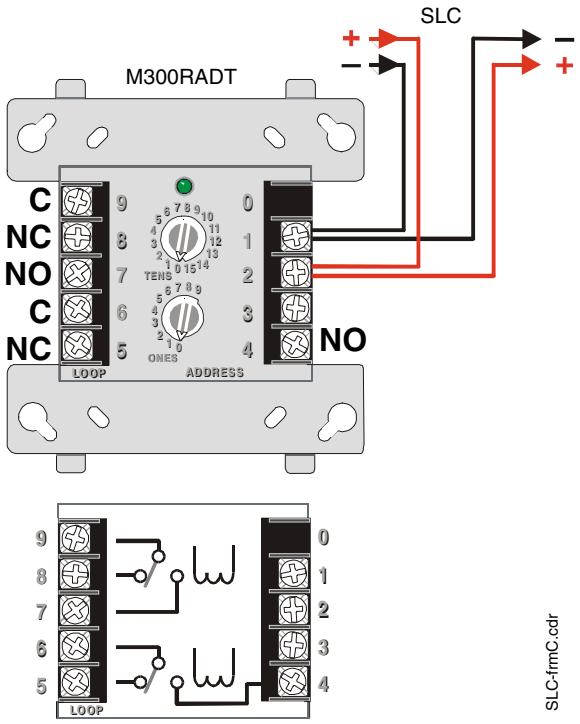


Figure 28 M300RADT Wiring Connections

Notes

Intelligent Detector Bases

Description

The **B501** and **B210LP** Detector Bases provide the connection between the SLC and a variety of intelligent detectors.

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

Installation

Wiring a Detector Base

Figure 29 shows typical wiring of a B501 detector base connected to an SLC. An optional **RA400Z** Remote LED Annunciator is shown connected to the base.

Note: The B210LP base wiring is identical to the B501B, except there is no SHIELD terminal.

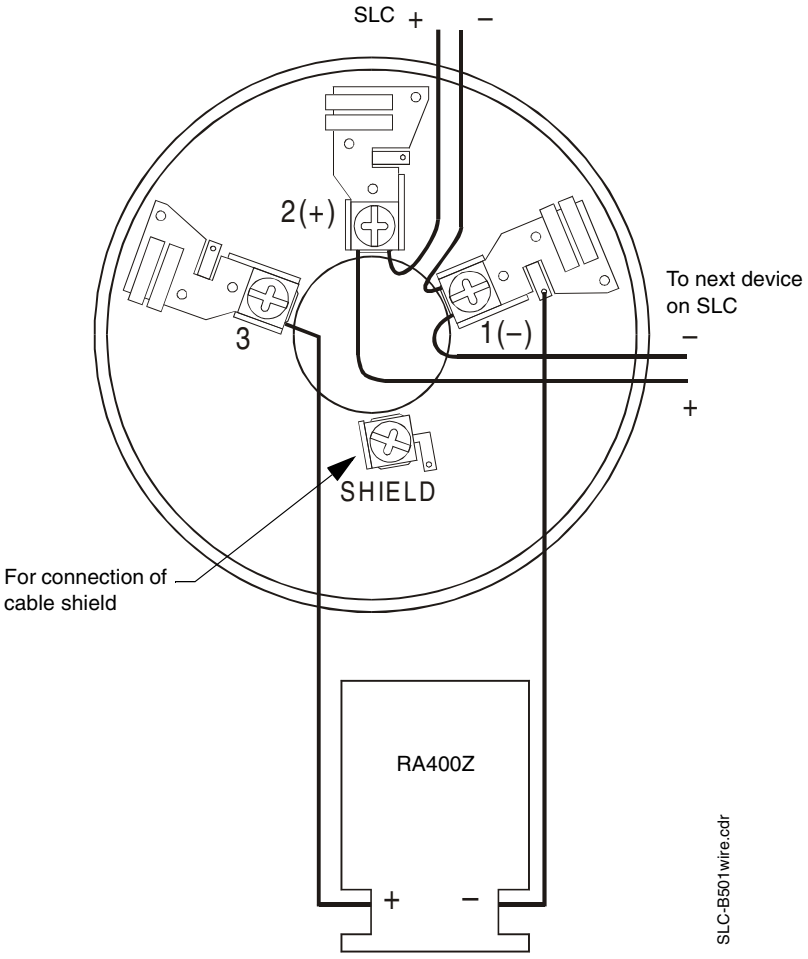


Figure 29 Wiring of a B501B Detector Base

Wiring an Isolator Base

The Isolator Base will isolate its detector from short circuits that occur on the SLC connected at terminals 1 and 2. It will not isolate its installed detector from short circuits that occur on the SLC connected at terminals 3 and 4. In Style 7 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 firgure below.

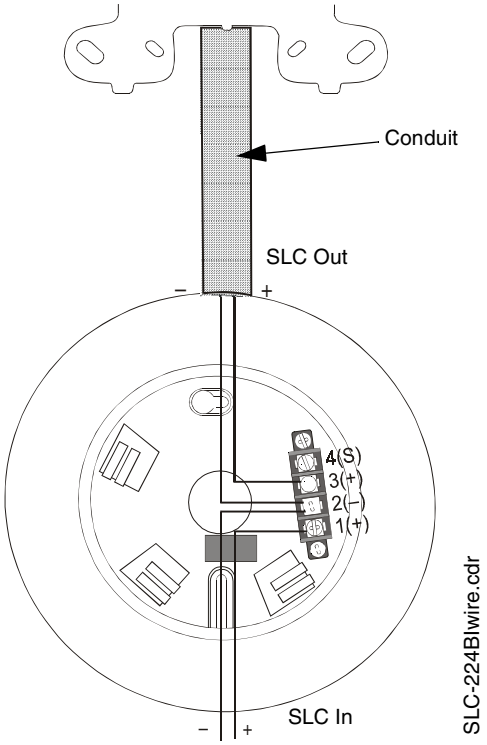


Figure 30 Wiring an Isolator Base

Setting the Detector Address

Each intelligent detector head is factory preset with an address of “00.” To set an SLC address refer to "Setting an SLC address for a Module" on page 26.

Addressable Manual Pull Station

Description

The **ADT-NBG-12LX** is an addressable manual pull station with a key-lock reset feature.

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

Installation

Setting an SLC address

Each unit is factory preset with an address of “00.” To set an SLC address refer to "Setting an SLC address for a Module" on page 26.

Wiring a Manual Pull Station

Typical wiring for a ADT-NBG-12LX Manual Pull Station to an SLC:

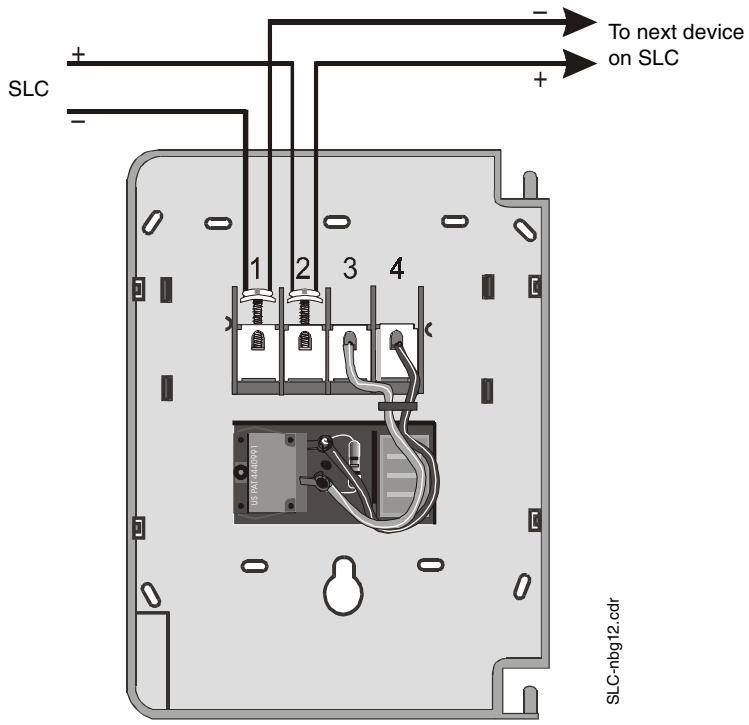


Figure 31 Wiring of an ADT-NBG-12LX Pull Station to an SLC

Notes

Appendix A: Power Considerations

Supplying Power to 24 VDC Detectors

Resistance and Size

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

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

Where:

Rmax = maximum resistance of the 24 VDC wires
Vms = minimum supply voltage (see Table 3 below)
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

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

Power Supply	Vms
FCPS-24	19.1
MPS-24A	19.6
MPS-24B	20.1
MPS-400	19.23

Table 3 Minimum Supply Voltage

Supervising 24 VDC Power

Power used to supply 24 VDC detectors, notification appliances (using the M300CADT) and two wire detectors (using the M302MADT) 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 inline with the supervised circuit of any intelligent module.

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 as to not disrupt the operating capability of all the devices on that circuit. The relay can be installed inline with any leg (+ or –) of the supervised NAC or IDC circuit, either a two or a four-wire style.

The drawing below illustrates this concept.

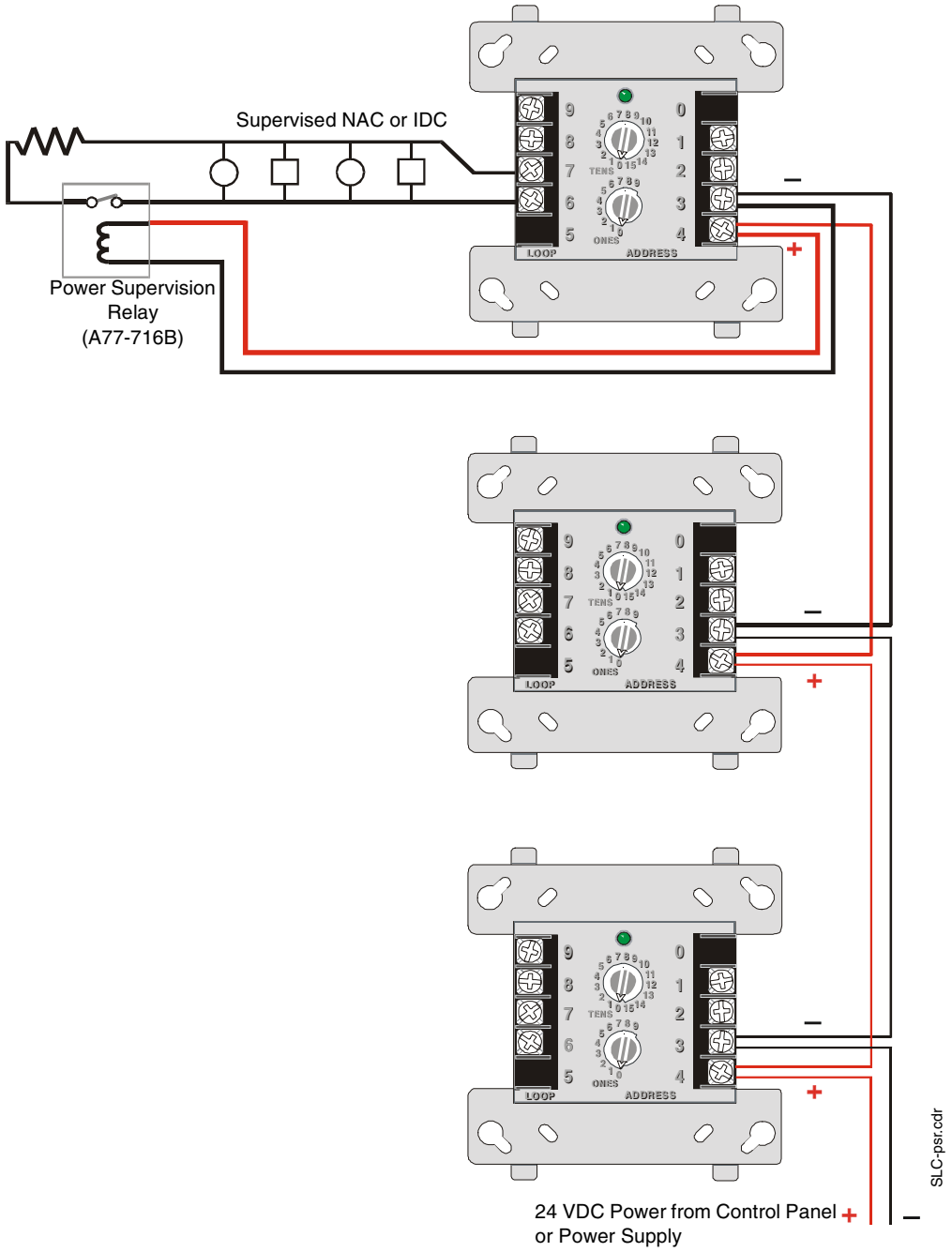


Figure 32 Supervised 24 VDC Circuit

Supervising 24 VDC Power to Notification Appliances

An alternate method of supervising 24 VDC power fed to the Notification Appliance Circuit of the M300CADT module eliminates the need for a power supervision relay. This method uses a Notification Appliance Circuit from the control panel or power supply to supply power to the M300CADT modules. The control panel supervises this circuit, which can be either a Style Y or Style Z.

Style Y NAC Power Wiring

Program the Main Power Supply NAC for general alarm. (Refer to the programming manual or programming section of your FACP documentation for instructions.) Note that if the NAC is a coded output, the M300CADT module will be coded as well.

Note: Refer to the *Device Compatibility Document* for compatible notification appliances.

- The circuit is supervised and power-limited.
- In this circuit, an external ELR **is** required at end of the NAC circuit.
- Refer to the respective control panel installation manual for NAC terminal block connection information and ELR value.

Connect the NAC power as follows:.

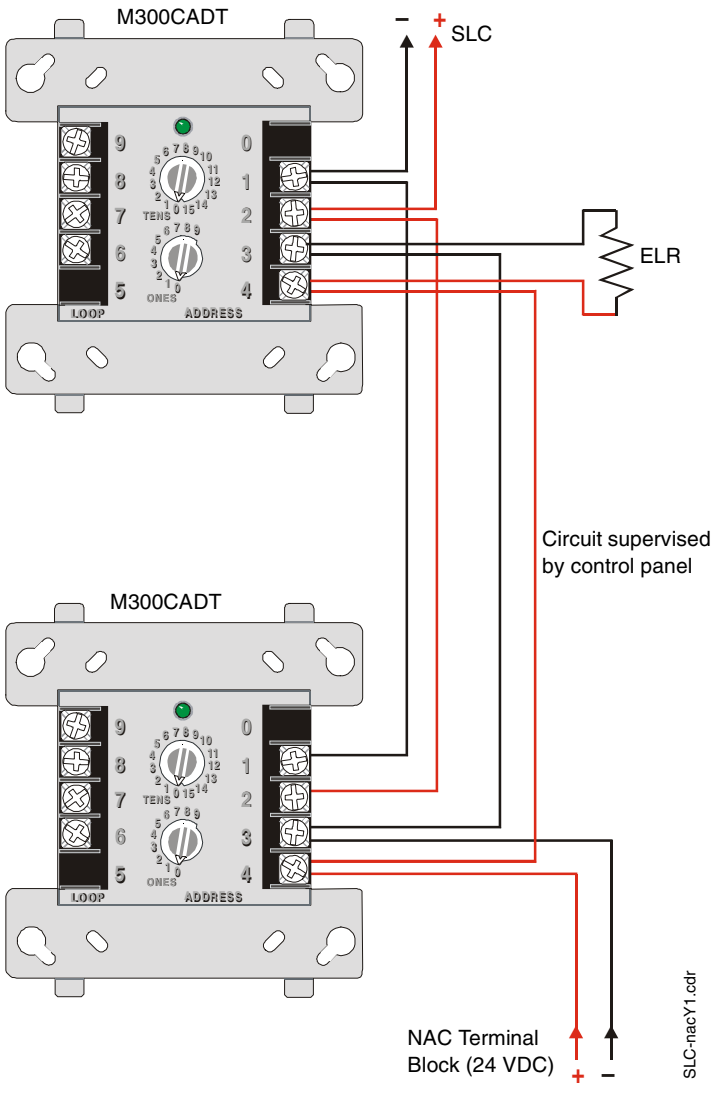


Figure 33 NFPA Style Y NAC Power (Alternate)

Style Z NAC Power Wiring

Program the Main Power Supply NAC for general alarm. (Refer to the programming manual or programming section of your FACP documentation for instructions.) Note that if the NAC is a coded output, theM300CADT module will be coded as well.

Note: Refer to the *Device Compatibility Document* for compatible notification appliances.

- The circuit is supervised and power-limited.
- In this circuit, an external ELR is **not** required at end of the NAC circuit.
- Refer to the respective control panel installation manual for NAC terminal block connection information.

Connect the NAC power as follows:

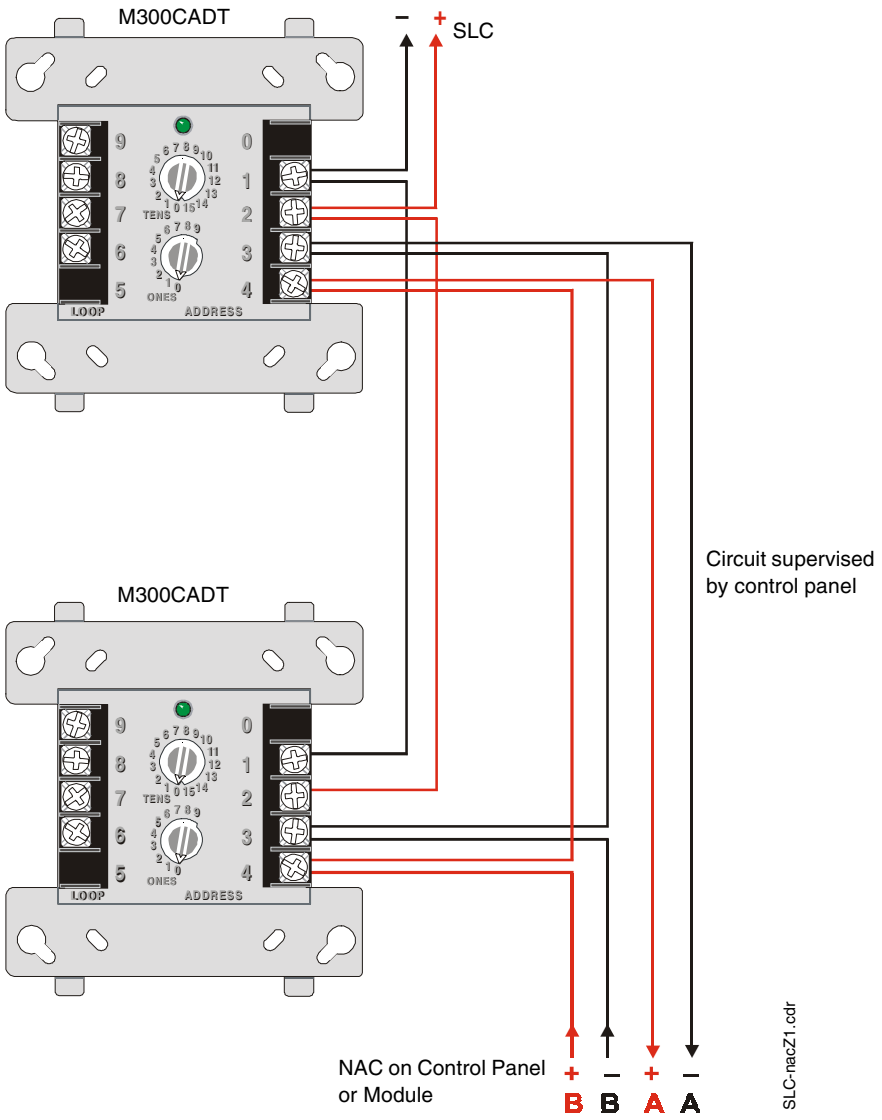


Figure 34 NFPA Style Z NAC Power (Alternate)

Appendix B: Surge Suppression

Introduction

There is one primary and there are three secondary surge protectors approved for use with the FACP's listed in this appendix

Primary Surge Protector:

- **326-2M** TII Station Protector

Secondary Surge Protectors:

- **DTK-2LVLP-F** Diversified Technology Group, Inc. 1720 Starkey Rd. Largo, FL 33771 (727) 812-5000
- **SLCP-030** EDCO 1805 N.E. 19th Ave. Ocala, FL 34470 (352) 732-3029
- **PLP-42N** Northern Technologies, Inc. 23123 E. Madison Ave. Liberty Lake, WA 99019 (800) 727-9119

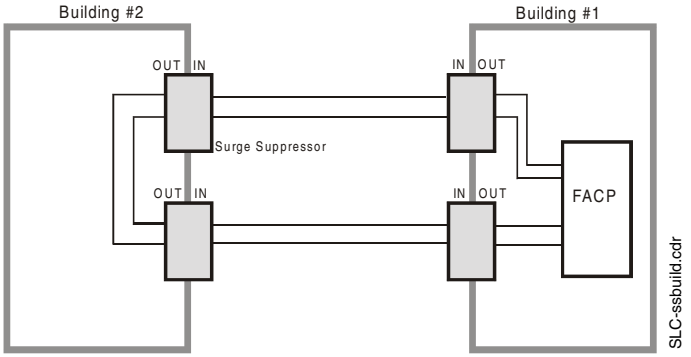
Note: For detailed information refer to the installation documentation supplied with the unit.

One primary surge protector must be used with each SLC wiring pair whenever SLC wiring runs outside the building.

- Install primary protection only as shown in this document.
- Refer to NEC Article 800 and local building code requirements.

Additional primary surgesuppressors may be added as required by the NEC. Add these additional suppressors in series with the SLC wiring at the building entry/exit.

Wiring connected to the surge suppressor output must remain within the building while wiring connected to the surge suppressor input may be routed outside the building as shown below.



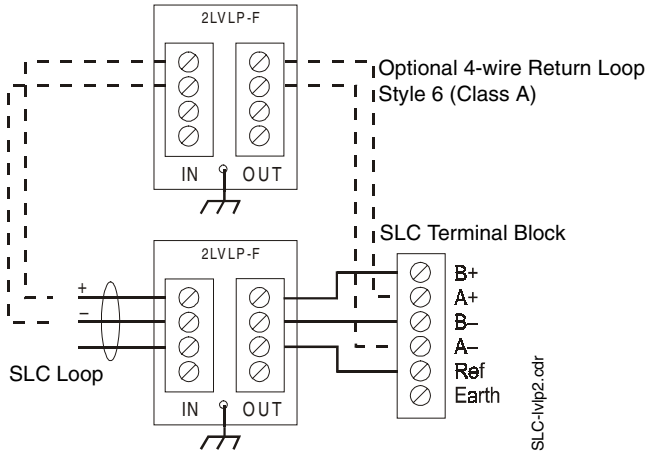
Installation

Mounting is inside the FACP enclosure or in a separate enclosure listed for fire protective signaling use.

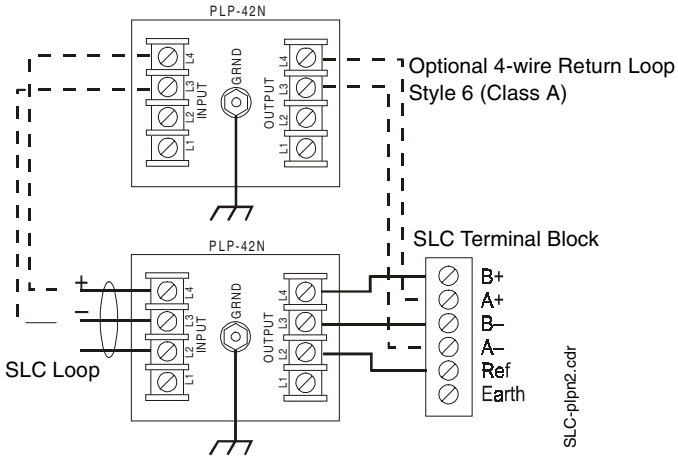
- Locate on an available stud and secure with nut.
- Unit is connected in series with the SLC Loop to protect the Control Panel.
- Provide a common ground to eliminate the possibility of a differential in ground potentials.

Unimode 300/400

DTK-2LVLP-F Connections

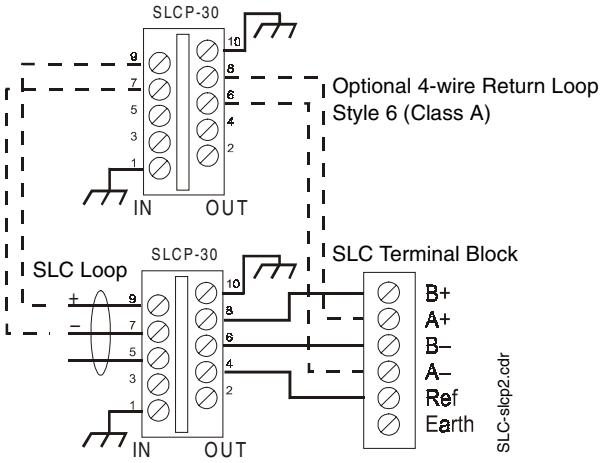


PLP-42N Connections



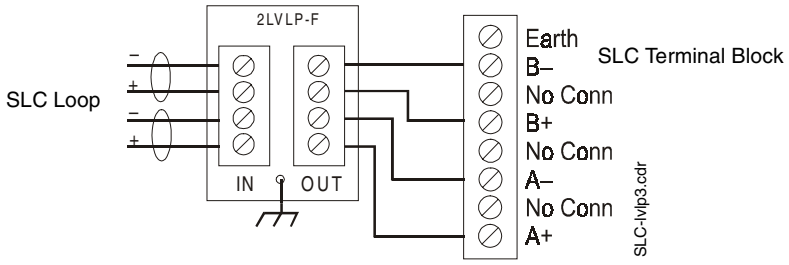
Note: Use 12AWG (3.25mm^2) to 18AWG (0.75mm^2) wire with crimp-on connectors to connect the unit's ground terminal to equipment ground. Wire length must be minimized to provide best protection

SLCP-030 Connections



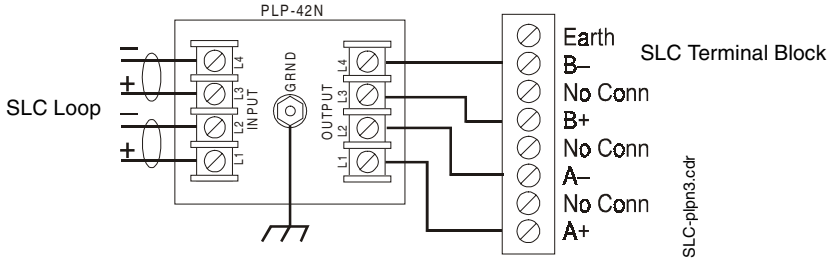
Unimode 2020/1010 (LIB-200A or LIB-400)

DTK-2LVLP-F Connections



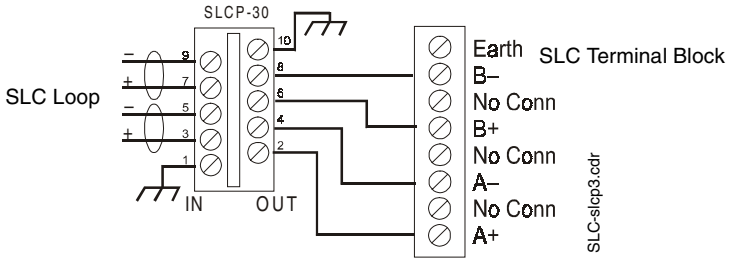
Note: Do not connect shield (if present) to surge protector or fire panel.

PLP-42N Connections



Note: Use 12AWG (3.25mm^2) to 18AWG (0.75mm^2) wire with crimp-on connectors to connect the unit's ground terminal to equipment ground. Wire length must be minimized to provide best protection. Do not connect shield (if present) to surge protector or fire panel.

SLCP-030 Connections



Note: Do not connect shield (if present) to surge protector or fire panel.

Numerics

A

B

C

D

E

F

G

I

J

K

L

M

N

P

R

S

T

U

W

X