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 panel 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 National Fire Protection Association Standard 72-1999 (NFPA 72-1999), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

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

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

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

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

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectric 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 panel. 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 72-1999 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. The 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 72-1999 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°C to 49°C (32°F to 120°F) and at a relative humidity (noncondensing) of 85% at 30°C (86°F) per NFPA, and 93% ± 2% at 32°C ± 2°C (89.6°F ± 1.1°F) per UL. 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 if any problems are anticipated or encountered.

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

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

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

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

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

---

**FCC Warning**

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

**Canadian Requirements**

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

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

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Section 1 Introduction

1.1 About This Manual

This document covers the installation and wiring of various Signaling Line Circuit (SLC) devices, when used with the FireWarden-100.

This document also provides basic information that applies to FireWarden-100 SLC loops in general, such as the branch resistance measurements.

See Section 2.4, “FireWarden-100 Terminal Blocks”, on page 14 for basic panel-end SLC connections. Additional information about each control panel and the modules and detectors referenced in this document, and the part numbers for their manuals, can be found in the respective installation manual as listed in Table 1.2 below.

NOTE: FireWarden-100 SLC devices are not compatible with other Notifier panels; those are documented in the Notifier SLC Manual P/N 51253.

1.2 Reference Documentation

The table below provides a list of documents referenced in this manual, as well as documents for selected other compatible devices. The document series chart provides the current document revision. A copy of this document is included in every shipment.

<table>
<thead>
<tr>
<th>Compatible Conventional Devices (Non-addressable)</th>
<th>Document Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Compatibility Document</td>
<td>15378</td>
</tr>
<tr>
<td>Fire Alarm Control Panel (FACP) and Main Power Supply Installation</td>
<td>Document Number</td>
</tr>
<tr>
<td>FireWarden-100 Installation Manual</td>
<td>52299</td>
</tr>
<tr>
<td>Power Supplies, Auxiliary Power Supplies &amp; Battery Chargers</td>
<td>Document Number</td>
</tr>
<tr>
<td>FCPS-24 Field Charger/Power Supply Manual</td>
<td>50059</td>
</tr>
<tr>
<td>System Components</td>
<td>Document Number</td>
</tr>
<tr>
<td>RA400Z Remote LED Annunciator Installation Document</td>
<td>156-508</td>
</tr>
<tr>
<td>SLC Loop Devices</td>
<td>Document Number</td>
</tr>
<tr>
<td>B224RB Relay Base Installation Document</td>
<td>156-659</td>
</tr>
<tr>
<td>B501 Standard Base Installation Document</td>
<td>156-357</td>
</tr>
<tr>
<td>B501BH Sounder Base Installation Document</td>
<td>156-0491</td>
</tr>
<tr>
<td>B501BHT Temporal Sounder Base Installation Document</td>
<td>156-1367</td>
</tr>
<tr>
<td>NC-100 Control Module</td>
<td>156-2592</td>
</tr>
<tr>
<td>NMM-100 Monitor Module Installation Document</td>
<td>156-2588</td>
</tr>
<tr>
<td>NMM-100P Mini Monitor Module Installation Document</td>
<td>156-2590</td>
</tr>
<tr>
<td>NC-100R Relay Module Installation Document</td>
<td>156-2593</td>
</tr>
<tr>
<td>ND-100R Duct Detector with Relay</td>
<td>156-2584</td>
</tr>
<tr>
<td>NI-100 Ion Detector Installation Document</td>
<td>156-2585</td>
</tr>
<tr>
<td>NP-100 and NP-100T Photoelectric Detectors Installation Document</td>
<td>156-2586</td>
</tr>
<tr>
<td>NH-100, NH-100R, and NH-100H Thermal Detectors Installation Document</td>
<td>156-2587</td>
</tr>
<tr>
<td>NZM-100 Zone Interface Module Installation Document</td>
<td>156-2591</td>
</tr>
<tr>
<td>Not-BG-12LX Pull Station Installation Document</td>
<td>156-2594</td>
</tr>
</tbody>
</table>

Table 1.1 Reference Documentation
1.3 SLC 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 Style 4 or NStyle 6.

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, “SLC Surge Suppression”, on page 45.

1.4 Polling Protocol

FireWarden-100 uses Classic Loop Interface Protocol (CLIP), which polls devices in sequential order. The number of devices connected is limited to 99 detectors and 99 modules per loop. SLC devices are limited to addresses 1-99 only.

1.5 Devices

1.5.1 Monitor/Zone Interface 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,水流 and supervisory devices.

- NMM-100 Monitor Module.
- NMM-100P Addressable Mini-Monitor Module.
- NZM-100 Zone Interface Module.

1.5.2 Control Modules

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

- NC-100 Control Module

1.5.3 Relay Modules

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

- NC-100R Relay Module

1.5.4 Plug-in Detector Bases

Plug-in detector bases provide a connection between the SLC and a variety of intelligent detectors which are snapped into place. 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)
- Sounder Base - Models B501BH (standard sounder base) and B501BHT (base with temporal sounder)
- Relay Base - Model B224RB relay base
1.5.5 Intelligent Detectors

**NI-100** Addressable, intelligent smoke detector that incorporates an ionization sensing chamber. Designed to provide open area protection.

**NP-100** Analog, addressable intelligent smoke detector that uses a photoelectric sensing chamber. Listed for use in ducts. Designed to provide open area protection. The **NP-100T** adds thermal sensors that will alarm at a fixed temperature of 135°F (57.2°C).

**NH-100** Intelligent thermistor sensing circuit for fast response. Designed to provide open area protection with 50 foot spacing capability. A fixed temperature sensor with 135°F (57.2°C) fixed temperature alarm. The **NH-100R** incorporates a thermal rate of rise of 15°F (8.3°C).

**ND-100R** Low-flow Photoelectric Duct Detector with relay. Extended speed range of 100–4000 FPM (0.5 m/s to 20.3 m/s).

1.5.6 Addressable Manual Pull Stations

The **NOT-BG12LX** is a dual-action pull station that, when activated, provides 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.

1.6 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.

1.7 SLC Performance

SLC performance (Style 4, Style 6) depends on the configuration of the circuit and the components on the circuit.

Wiring style 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. Additional information is broken out in Section 2, “Wiring Requirements”, on page 11, and Section 3, “Shielded Wire Termination”, on page 25.

<table>
<thead>
<tr>
<th>Type of Fault</th>
<th>Style 4</th>
<th>Style 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Open</td>
<td>Trouble</td>
<td>Alarm, Trouble</td>
</tr>
<tr>
<td>Single Ground</td>
<td>Alarm, Trouble (ground)</td>
<td>Alarm, Trouble (ground)</td>
</tr>
<tr>
<td>Short</td>
<td>Trouble</td>
<td>Trouble</td>
</tr>
<tr>
<td>Short and open</td>
<td>Trouble</td>
<td>Trouble</td>
</tr>
<tr>
<td>Short and ground</td>
<td>Trouble</td>
<td>Trouble</td>
</tr>
<tr>
<td>Open and ground</td>
<td>Trouble</td>
<td>Alarm, Trouble</td>
</tr>
<tr>
<td>Communications loss</td>
<td>Trouble</td>
<td>Trouble</td>
</tr>
</tbody>
</table>

- **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.
1.8 LED Operation

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

<table>
<thead>
<tr>
<th>Control Panel</th>
<th>Device</th>
<th>Standby</th>
<th>Activated</th>
</tr>
</thead>
<tbody>
<tr>
<td>FireWarden-100</td>
<td>Monitor Module</td>
<td>Blinks RED</td>
<td>Steady RED</td>
</tr>
<tr>
<td></td>
<td>Control Module</td>
<td>Blinks GREEN</td>
<td>Steady GREEN</td>
</tr>
<tr>
<td></td>
<td>Detector</td>
<td>Blinks RED</td>
<td>Steady RED</td>
</tr>
</tbody>
</table>
Section 2 Wiring Requirements

2.1 Recommended SLC Wiring

Twisted-shielded pair is recommended for the FireWarden-100; maximum resistance is 40 ohms per branch.

To maximize distance on the SLC loop, use the recommended type of wire. Using other wiring types makes the SLC circuit more susceptible to electrical interference and thus reduces its maximum loop length.

<table>
<thead>
<tr>
<th>Wire Type and Limitations</th>
<th>Recommended Max. Distance</th>
<th>Wire Gauge*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twisted-shielded pair.</td>
<td>10,000 ft. (3,048 m)</td>
<td>12 AWG - Belden 9583, Genesis 4410, Signal 98230, WPW D999</td>
</tr>
<tr>
<td></td>
<td>8,000 ft. (2,438.4 m)</td>
<td>14 AWG - Belden 9581, Genesis 4408, Signal 98430, WPW D995</td>
</tr>
<tr>
<td></td>
<td>4,875 ft. (1,485.9 m)</td>
<td>16 AWG - Belden 9575, Genesis 4406 &amp; 4606, Signal 98630, WPW D991</td>
</tr>
<tr>
<td></td>
<td>3,225 ft. (982.98 m)</td>
<td>18 AWG - Belden 9574, Genesis 4402 &amp; 4602, Signal 98300, WPW D975</td>
</tr>
<tr>
<td>Untwisted, unshielded wire, inside conduit or not in conduit.</td>
<td>3,000 ft. (914 m)</td>
<td>12 AWG (3.1 mm²)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 AWG (2.00 mm²)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 AWG (1.30 mm²)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 AWG (0.78 mm²)</td>
</tr>
</tbody>
</table>

Table 2.1 Wiring Recommendations: FireWarden-100

* Notifier brand cable is recommended; see the product catalog available from Paige Electric.

2.2 Two-Wire SLC - Style 4 (Class B)

2.2.1 Measuring Loop Resistance

T-tapping of the SLC wiring is permitted for two-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.

In Figure 2.1, Branches A, B, and C all begin at the SLC terminal, even though Branch B is T-tapped.
Wiring Requirements

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

2.2.2 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 all wire segments. In Figure 2.1 above, the picture on the right shows an SLC with 3 branches. Figure 2.2 below shows the same SLC divided into segments. The total length of the SLC is determined by adding the lengths of Segment 1 + Segment 2 + Segment 3 + Segment 4 + Segment 5. No segment should be summed twice.

Figure 2.1 Measuring DC Resistance of a Two-Wire SLC

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

2.3.1 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 SLC at the last device and measure the resistance at SLC Out. Record resistance and remove the short.
3. Short the SLC at the first device and measure the resistance at SLC return. Record resistance and remove the short.

The maximum DC resistance of the SLC is the higher of 2 and 3.
2.3.2 Measuring 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:
2.4 FireWarden-100 Terminal Blocks

TB1 provides two types of 24 VDC power: Nonresettable and Resettable. TB10 provides connections for the SLC wiring. 198 addresses available per loop (99 detectors and 99 modules).

![Figure 2.5 FireWarden-100 Terminal Blocks]
Section 3 Shielded Wire Termination

The drawing below shows the method of proper termination of the shield.

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 “shield” terminal on the SLC terminal block.

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

CAUTION: Do not let the shield drain wire or the shield foil touch the system cabinet or be connected to earth ground at any point.
Section 4 NFPA 72 Style 4 and Style 6 SLC Circuits

4.1 Overview

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

• NFPA 72 Style 4
• NFPA 72 Style 6

4.2 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.

![Diagram of Basic NFPA Style 4 SLC](SLC-style4.png)

Figure 4.1 Basic NFPA Style 4 SLC
4.3 NFPA Style 6 SLC

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

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

Figure 4.2 Basic NFPA Style 6 SLC
Section 5 Monitor Modules

5.1 Description

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

For more information on the individual module specifications refer to the Installation Instructions that are provided with this device. For information on transponders, refer to the specific transponder manual.

5.1.1 NMM-100 Monitor Module

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

5.1.2 NZM-100 Zone Interface Module

Similar to the NMM-100, except it is used to monitor compatible two-wire, 24 volt, conventional (non-addressable) smoke detectors on a Style B (Class B) or Style D (Class A) IDC.

5.1.3 NMM-100P Miniature Monitor Module

Intended to monitor a Style B (Class B) IDC, and offered in a smaller package for mounting directly in the electrical box of the device being monitored.

Figure 5.1 NMM-100/NZM-100 Modules

Figure 5.2 Miniature Monitor Module
5.2 Setting an SLC Address for a Module

FireWarden-100 can support module addresses of 01 - 99.

To set an SLC address, use a common screwdriver to adjust the rotary switches on the module to the desired address. The unit shown in Figure 5.3 is set at address “35”. When finished, mark the address on the module face in the place provided.

Figure 5.3 Setting SLC Address on Module
5.3 NMM-100 Wiring Diagram: NFPA Style B IDC

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 the NMM-100 monitor module.

Module installation notes:
1. The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamps @ 24 VDC (nominal).
2. 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
3. Refer to the Device Compatibility Document for compatible smoke detectors.
4. See “Power Considerations” on page 39 for information on supervising 24 VDC power.

![Figure 5.4 Typical Style B IDC Wiring with NMM-100](image-url)
5.4 NMM-100 Wiring Diagram: NFPA Style D IDC

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 the NMM-100 module.

Module installation notes:
1. The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamps @ 24 VDC (nominal).
2. 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
3. Refer to the Device Compatibility Document for compatible smoke detectors.
4. See “Power Considerations” on page 39 for information on supervising 24 VDC power.

![Diagram of NMM-100 Wiring Diagram: NFPA Style D IDC](attachment:SLC-idcD1.cdr)
Module installation notes:

1. The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamps @ 24 VDC (nominal).
2. 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
3. Refer to the Device Compatibility Document for compatible smoke detectors.
5.5 NZM-100 Wiring Diagrams: NFPA Style B IDC

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) IDC using the NZM-100 module.

Module installation notes:

1. The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamps @ 24 VDC (nominal).
2. 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
3. Refer to the Device Compatibility Document for compatible smoke detectors.

Figure 5.6 Typical Style B IDC Wiring with NZM-100
5.6 NZM-100 Wiring Diagrams: NFPA Style D IDC

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 the NZM-100 zone interface module.

Module installation notes:
1. The Initiating Device Circuit (IDC) is supervised and current-limited to 210 microamps @ 24 VDC (nominal).
2. 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
3. Refer to the Device Compatibility Document for compatible smoke detectors.

Figure 5.7 Typical Style D IDC Wiring with the Zone Interface Module
Section 6 Control Modules

6.1 Description

The NC-100 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. For more information on the module specifications refer to the Installation Instructions provided with this device.

6.2 Setting an SLC Address on NC-100 Modules

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 20.

6.3 Wiring a NAC with NC-100 Modules

Figure 6.1 shows the connections to wire a module for powering a 24 VDC NAC.

![Figure 6.1 NC-100 Wiring Connections](SLCMODULE-SIMPLIFIED.WMF)

Note: Module is shown in alarm condition.
6.4 NC-100 Wiring Diagram: Style Y NAC (Two-Wire)

A supervised and power-limited NFPA Style Y (Class B) Notification Appliance Circuit (NAC) using the NC-100 module. Polarized alarm notification appliances are shown connected to the module in a two-wire configuration.

1. See “Power Considerations” on page 39 for information on monitoring 24 VDC power.
2. Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
3. A power supervision relay is required only on the last module of the power run.
4. Do not T-Tap or branch a Style Y circuit.
5. Terminate the circuit across the last device using a UL-listed End-of-Line Resistor 47K, 1/2-watt, SSD P/N A2143-00 (ELR-47K in Canada).
6. Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.
7. Refer to Device Compatibility Document for compatible notification appliances and relays.

![Diagram of NC-100 Wiring Diagram: Style Y NAC (Two-Wire)](image)

Module polarities are shown in alarm condition

Figure 6.2 NFPA Style Y Notification Appliance Circuit
6.5 NC-100 Wiring Diagram: Style Z NAC (Four-Wire)

A supervised and power-limited NFPA Style Z (Class A) Notification Appliance Circuit (NAC) using the NC-100 module. Polarized alarm notification appliances are shown connected to the module in a four-wire configuration.

1. See “Power Considerations” on page 39 for information on supervising 24 VDC power.
2. Each module can control 2 amps of resistive load (on electronic devices) or 1 amp of inductive load (on mechanical bells and horns).
3. A power supervision relay is required only on the last module of the power run.
4. Do not T-Tap or branch a Style Z circuit.
5. Do not loop wiring under the screw terminals of any notification appliance. To maintain supervision, break the wire run at each device.
6. Refer to the Device Compatibility Document for compatible notification appliances and relays.

Module polarities are shown in Alarm.

Figure 6.3 NFPA Style Z Notification Appliance Circuit
Section 7 Relay Module

7.1 Description

The NC-100R module is an addressable module that provides two isolated sets of 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)

For more information on the module specifications refer to the Installation Instructions provided with this device. For information on transponders, refer to the specific transponder manual.

7.2 Setting an SLC address for the NC-100R Module

Each module is factory preset with an address of “00.” To set an SLC address refer to Section 5.2, “Setting an SLC Address for a Module”, on page 20.

7.3 Wiring the NC-100R Relay Module (Form-C Relay)

The figure below shows the NC-100R module wired to the Control Panel.

![Figure 7.1 Relay Module Wiring Connections](SLC_frmC.wmf)

Figure 7.1 Relay Module Wiring Connections
Section 8 Intelligent Detector Bases

8.1 Description

The B501 and B710LP Detector Bases, the B224RB plug-in relay detector base, and the B501BH sounder base provide the connection between the SLC and a variety of intelligent detectors.

For more information refer to the Installation Instructions documents provided with these devices.

8.2 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 20.

8.3 Wiring a Detector Base

Figure 8.1 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 base wiring is identical to the B501, except there is no shield terminal.

Figure 8.1 Wiring of a B501 Detector Base
8.4 Wiring a Relay Base

Figure 8.2 shows typical wiring of a B224RB plug-in relay detector base connected to an SLC.

Figure 8.2 Wiring of a B224RB plug-in relay detector base
8.5 Wiring a Sounder Base

Figure 8.3 shows typical wiring of the B501BH sounder base.

*Grouping of up to 6 model B501BHT temporal tone sounder bases.

Figure 8.3 Wiring of the B501BH Sounder Base
Section 9 Addressable Manual Pull Station

9.1 Description

The Not-BG-12LX is an addressable manual pull station with a key-lock reset feature. For more information refer to the *Installation Instructions* document provided with this device.

9.2 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 20.

9.3 Wiring a Manual Pull Station

Typical wiring for the Not-BG-12LX Manual Pull Station to an SLC.

![Figure 9.1 Wiring the Not-BG-12LX Pull Station to an SLC](image-url)
Appendix A: Power Considerations

A.1 Supplying Power to 24 VDC Detectors and NACs

Resistance and Size
To determine the maximum allowable resistance that can be tolerated in supplying power to 24 VDC four-wire devices and NACs, use the calculations below. These simplified equations assume that the devices are at the end of a long wire run. With the computed resistance and using the manufacturers specifications for the desired wire, select the proper gauge wire for the power run.

For Four-Wire Detectors:

\[ R_{\text{max}} = \frac{(V_{\text{ms}} - V_{\text{om}})}{(N)(I_s) + (N_a)(I_a) + (I_r)} \]

For NACs:

\[ R_{\text{max}} = \frac{(V_{\text{ms}} - V_{\text{om}})}{(N_b)(I_b)} \]

Where:

- \( R_{\text{max}} \) = maximum resistance of the 24 VDC wires
- \( V_{\text{ms}} \) = minimum supply voltage (see Table A.1 below)
- \( V_{\text{om}} \) = minimum operating voltage of the detector or end-of-line relay, whichever is greater, in volts
- \( N \) = total number of detectors on the 24 VDC supply circuit
- \( I_s \) = detector current in standby
- \( N_a \) = number of detectors on the 24 VDC power circuit which must function at the same time in alarm
- \( I_a \) = detector current in alarm
- \( I_r \) = end-of-line relay current
- \( N_b \) = number of Notification Appliance Devices
- \( I_b \) = 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 power supplies are listed below:

<table>
<thead>
<tr>
<th>FACP</th>
<th>Vms</th>
<th>Power Supply</th>
<th>Vms</th>
</tr>
</thead>
<tbody>
<tr>
<td>FireWarden-100</td>
<td>18.96</td>
<td>FCPS-24S6/FCPS-24S8</td>
<td>19.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FCPS-24</td>
<td>18.7</td>
</tr>
</tbody>
</table>

Table A.1 Minimum Supply Voltage

A.2 Supervising 24 VDC Power

There are options for supervising 24 VDC power, as discussed below.

- Power Supervision Relay
- Using the NC-100 module without relay
A.2.1 Power Supervision Relay

Power used to supply 24 VDC detectors, notification appliances (using the NC-100) and two wire detectors (using the NZM-100) 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.

See Figure A.1 and Figure A.2. Refer to the Device Compatibility Document for compatible notification appliances and relays.

![Figure A.1 Supervised 24 VDC Circuit](SLC-psr.cdr)
Supervising 24 VDC Power

Figure A.2 Alternate: 2-Address Method of Supervising a 24 VDC Circuit
A.2.2 Using the NC-100 Module Without Relay

An alternate method of supervising 24 VDC power fed to the Notification Appliance Circuit of the NC-100 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 NC-100 modules. The control panel supervises this circuit, which can be either a Style Y or Style Z.

Style Y NAC Power Wiring

Program the NAC from the control panel for general alarm. (Refer to the programming manual or programming section of the FACP documentation for instructions.) Note that if the NAC is a coded output, the NC-100 output will be coded as well.

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.
- Remove internal resistor on each NC-100 (see instructions in Figure 6.4 on page 28).

Connect the NAC power as follows:

![Diagram of Style Y NAC Power Wiring](SLC-nacY1.cdr)

Note: Drawing shows power wiring only; SLC Wiring not shown.

Figure A.3 NFPA Style Y NAC Power (Alternate)
Style Z NAC Power Wiring (Alternate)

Program the NAC from the control panel for general alarm. (Refer to the programming manual or programming section of the FACP documentation for instructions.) Note that if the NAC is a coded output, the NC-100 output will be coded as well.

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.
- Remove internal resistor on each FCM-1 (see instructions in Figure 6.4 on page 28).

Connect the NAC power as follows:

Note: Drawing shows power wiring only; SLC Wiring not shown.

Figure A.4 NFPA Style Z NAC Power (Alternate)
Appendix B: SLC Surge Suppression

B.1 Introduction

There are one primary and three secondary UL–listed 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-30** 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 surge suppressors 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.

![Diagram of SLC Surge Suppression](image-url)
B.2 Installation

Mounting of the primary surge suppressor must be 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.

B.2.1 Wiring Diagram for FireWarden-100

DTK-2LVL-P-F Connections

PLP-42N Connections

NOTE: Use 12 AWG (3.1 mm²) to 18 AWG (0.78 mm²) 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**

- **SLC Loop**
- **SLC Terminal Block**
  - B+
  - A+
  - B-
  - A-
  - A shield
  - B shield

**Optional 4-wire Return Loop**
- Style 6 (Class A)
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Limited Warranty

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