Introduction

The Isolator2 safely isolates a channel in the event of a wiring fault and monitors the wiring for restoration to normal when the fault is repaired.

It is possible to configure systems using Class A wiring, Class A with zone isolations / DCLC, or Class X wiring that meets NFPA 72 or ULC S524 standards using the Isolator2. See the Wiring section for more instructions.

These usage guidelines feature information on the following Isolator2-type devices:

- A4090-9122 IDNet Isolator2
- A4098-9767E, A4098-9767BA, A4098-9766, A4098-9767 IDNet Isolator2 Bases

Benefits

The Isolator2 features the following benefits over existing technologies:

- Self-restoration when fault is repaired.
- No impact on required operation times of the Fire Alarm Control Unit (FACU) to a fire per agency standards following a wiring fault.

Short circuit

An internal isolation switch in the Isolator2 separates shorted and/or disabled wiring from functioning wiring to optimize the available appliances. The Isolator2 communicates the module status to the control panel so you can identify the shorted wiring location.

Compatibility

For a complete list of compatible devices and minimum requirements, refer to *579-1324AC IDNet Isolator2 Compatibility Chart* and *AC4090-0011 IDNet and Addressable Devices Device Communications Compatibility Chart*.

IDNet Module

IDNet Isolator2-type can only be used on IDNet2-based Modules. They do not function nor are they recognized on prior revisions of IDNet, IDNet+ or IDNet1+.

Firmware requirements

IDNet Isolator2 requires the following firmware:

- 4010ES or 4100ES software revision 6.01 or higher
- 4007ES software revision 6.01 or higher
- IDNet2 or IDNet2+2 firmware revision 3.01 or higher

Existing IDNet Isolators

Even if you can use the Isolator2 with existing addressable IDNet Isolators (A4090-9116) and IDNet Isolator Bases (A4098-9777, A4098-9793), mixing existing isolators with Isolator2 does not meet ULC S524 7th edition. In this mixed fire alarm system, all the Isolator2 performance improvements are not present, see Performance improvements. For explicit limitations when mixing types, see Appendix A - Wiring examples.

If Isolator and Isolator2 devices are present on your IDNet2 channel, follow the strictest requirements from the two installation manuals.

Table 1: IDNet Isloator2 and legacy isolator instruction manuals

	Isolator2 installation instructions	Prior Isolators installation instructions
IDNet Isolators	579-1274AC	574-872AC
IDNet Isolator Base	Use 574-707AC for both Isolator and Isolator2 bases.	

Note: If at least one IDNet Isolator Base (A4098-9777, A4098-9793) or one Addressable IDNet Isolator (A4090-9116) is present on the IDNet channel, the maximum line resistance between the FACU and the isolator and between any two isolators is 10 ohms (780 ft @ 18 AWG). See Figure 1 for an example of a correct application.
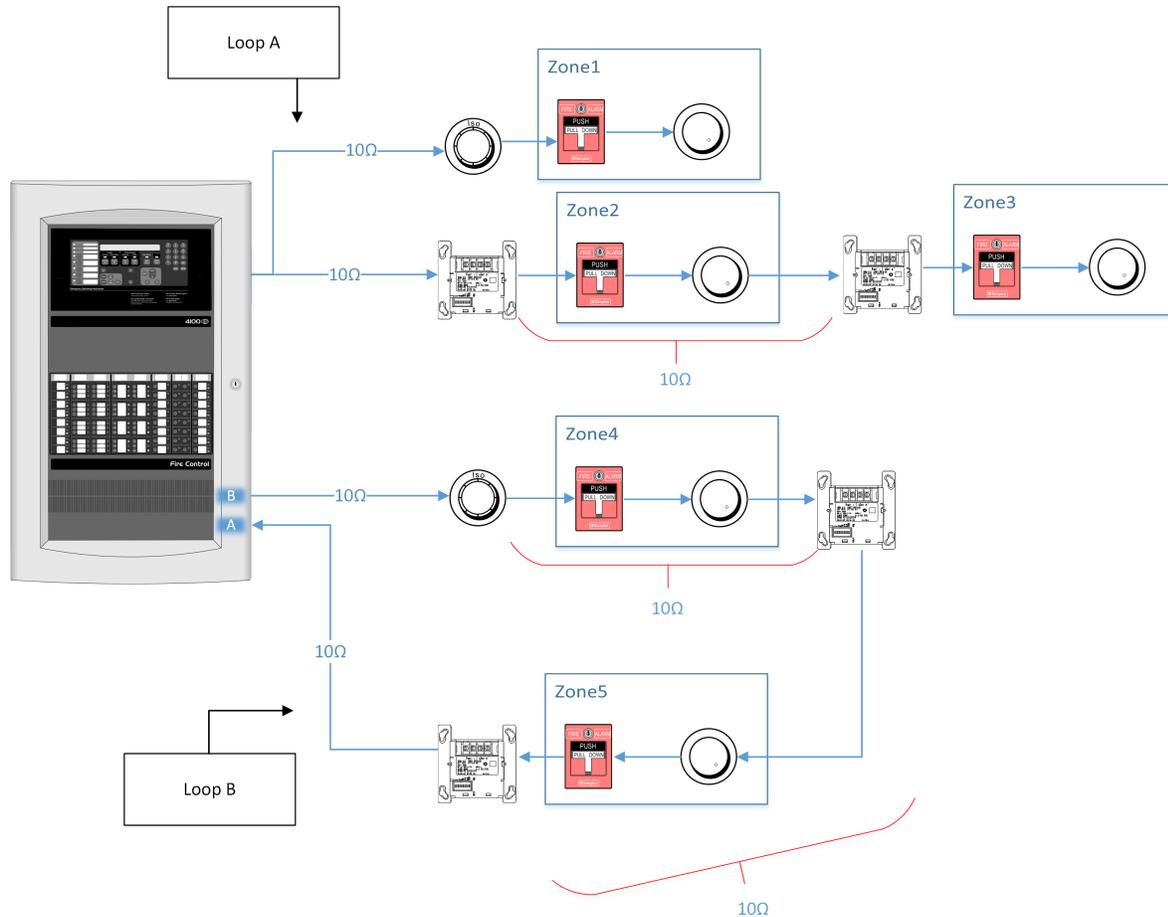
Figure 1: Maximum wire length between isolators is 10 ohm if a 4090-9116, 4098-9777 or 4098-9793 isolator is installed

Configuration

Input/output wiring

You can wire Isolator2 isolators in any direction and you can connect input on either P1 or P2. The direction has no impact on recovery time or performance.

Addressing

If there are remote isolators or isolator bases on the loops, it is recommended to address the isolators in ascending order: start from the B side and assign each successive isolator a higher address than the isolator it precedes. Isolation functionality is not affected by the order of isolator addresses.

- If there is at least one prior remote isolator (A4090-9116) or one prior isolator base (A4098-9777, A4098-9793) on the channel, addressing the isolators as recommended speeds up the system power up any time the IDNet2 is reset.
- If there are only Isolator2 (A4090-9122) or Isolator2 bases (A4098-9766, A4098-9767) on the channel, addressing the isolators as recommended speeds up the Earth Fault Search diagnostic tool.

You can set the address of regular IDNet devices (devices that are not isolators A4090-9116, A4090-9122, A4098-9777, A4098-9793, A4098-9766, A4098-9767) in any order without impact.
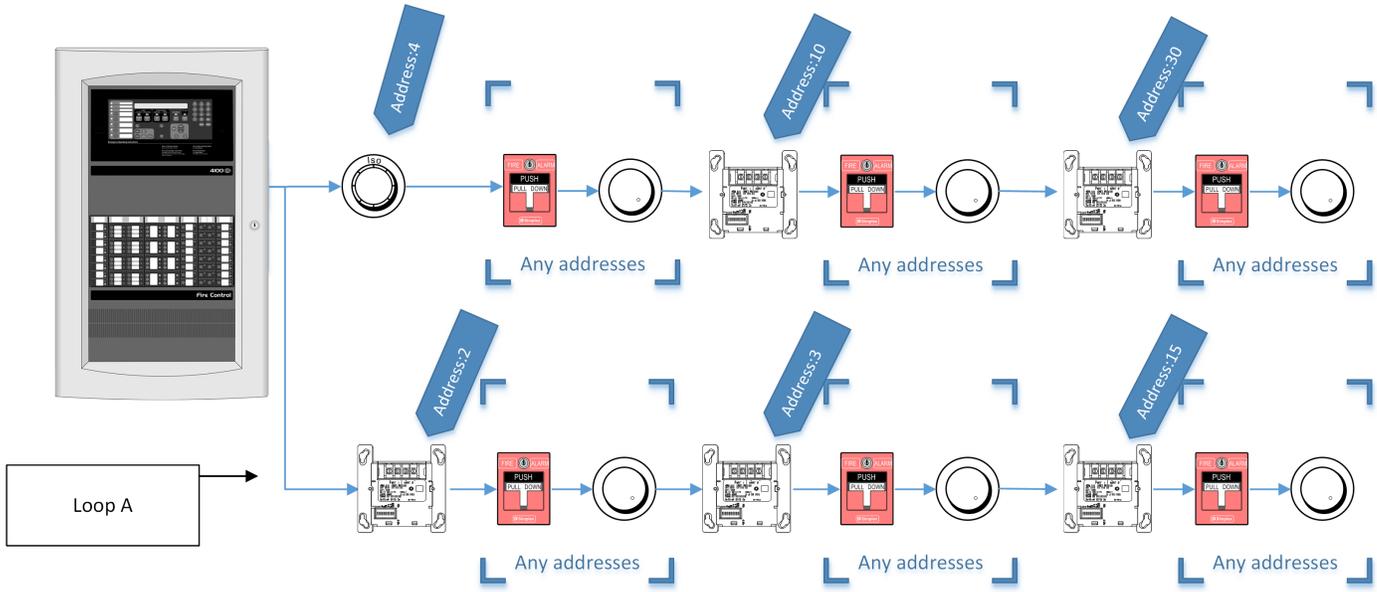
Figure 2: Correct addressing

Explanation: This is the preferred method as isolators are addressed in ascending order through the branches from the B side. Non-isolators devices can be addressed in any way.
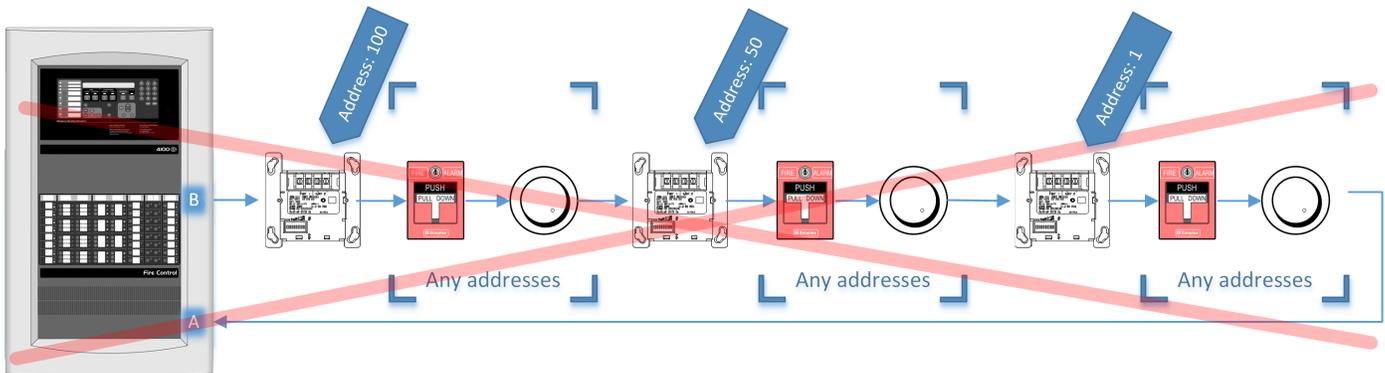

Figure 3: Incorrect addressing

Explanation: This is not the preferred addressing because isolators are not addressed in ascending order (example shows: 100, 50, 1); this will take more time (variable) to complete the automatic Earth Fault Diagnostic.

Maximum Isolators

Table 2 lists the IDNet Isolator2 type, their address, and the unit load draw on an IDNet2 line.

Table 2: IDNet Isolator2 infomation

	Address	Unit load
IDNet Isolator2	1	1
IDNet Isolator2 Base	1	1

When at least one Isolator2-type isolator is present on the channel, you can configure a maximum of 50 isolator addresses for each IDNet2 channel. See the following table for the address count of different devices.

Table 3: Isolator address count

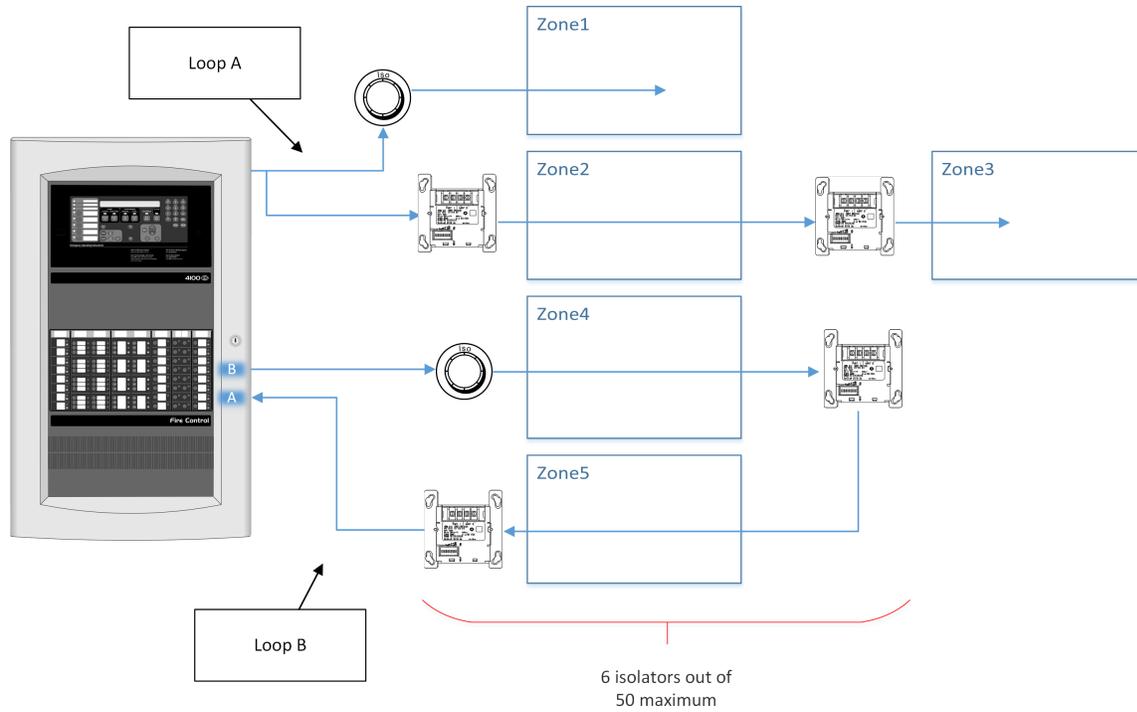| SKU	Name	Isolator address count (Maximum of 50 per IDNet2 channel)
A4090-9122	IDNet Isolator2	1
A4098-9766, A4098-9767	IDNet Isolator2 Base	1
A4090-9116	Addressable IDNet Isolator	1
A4098-9777, A4098-9793	IDNet Isolator Base	1

Figure 4: Counting the maximum number of Isolator2 per IDNet2 channel

Maximum devices

The module specifies the maximum number of devices on an IDNet channel.

When Isolator2 are used, a maximum of 50 IDNet unit loads can be installed adjacent to an Isolator2.

Note: Some IDNet devices take more than one unit load as specified in their installation manual and in the AC4090-0011 *IDNet and Addressable Devices Device Communications Compatibility Chart.* The usual total maximum IDNet devices and unit loads per channel remain.
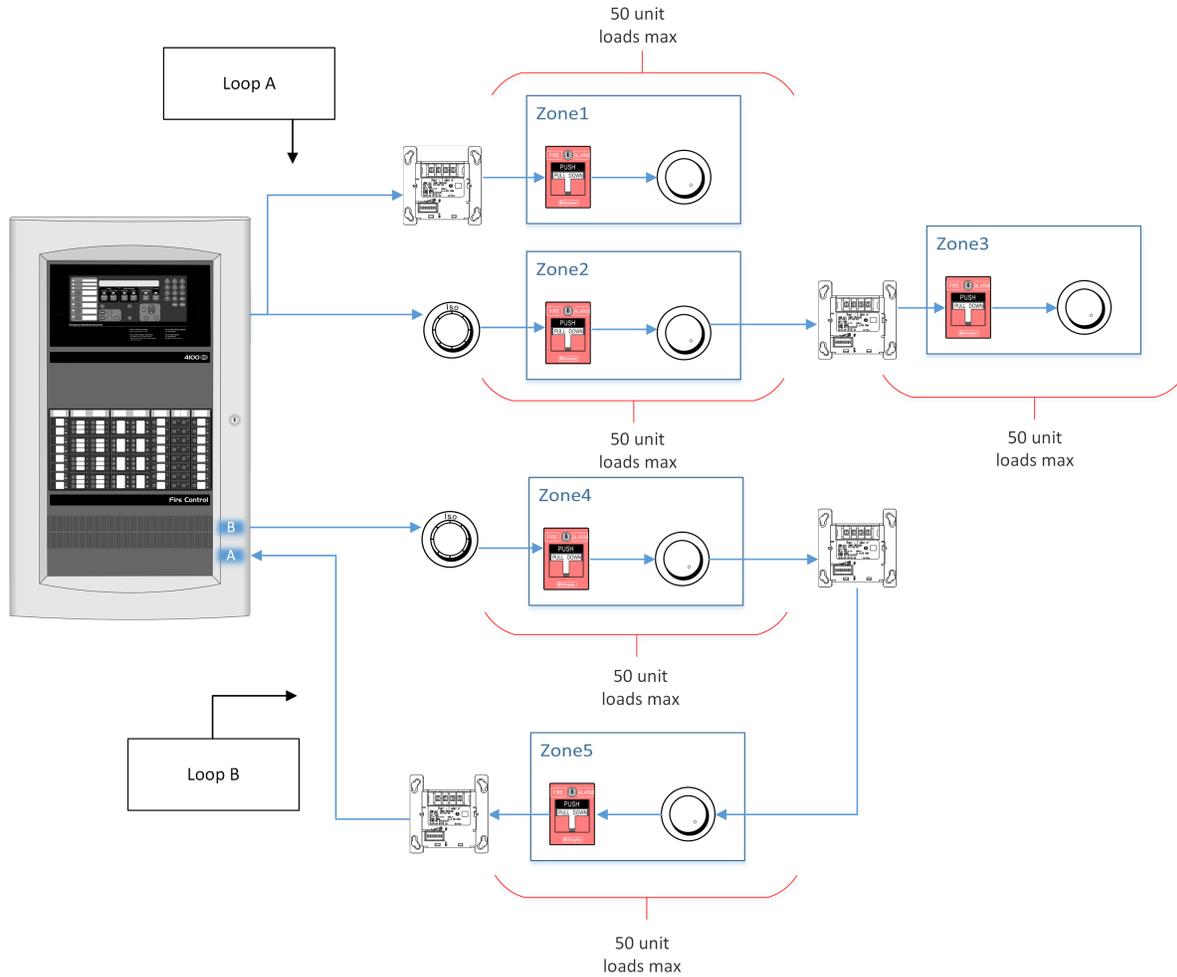
Figure 5: Counting the maximum unit loads between Isolator2

Performance improvements

The Isolator2 features several performance improvements when compared to prior isolators.

Recovery Time

The Isolator2 features a significant improvement to the recovery time of a system during a wiring fault. If all of the channel's isolators are of the Isolator2 type only and if they are installed to maximize performance, an open fault, a short circuit fault or a ground fault in one fire alarm zone will have no distinctive impact on devices in other zones. When faulting a zone, if the wiring class allows it, you should expect no missing or failed devices and you should expect no additional delay in the response from initiating devices in other zones.

Earth Fault Search

The earth fault search time depends on the installed devices. The time to solution varies according to the number of isolators per loops as well as the wiring scheme. The search time is dependent on the distance between the earth fault and the FACU. The maximum expected time on a Class A loop with 50 isolators and where the earth fault is after the last device is less than six minutes. The TrueStart Instrument (TSI) II can take up to 13 minutes in worst case situations.

Startup time

Using the the Isolator2, the IDNet2 channel is operational (initiating devices able to report a fire) quicker than with prior isolators on system power up. This improved time is also noticeable when a long-standing wiring fault clears and the system is brought back to normal operation.

Wiring

In any Class A, B or X style wiring configuration with more than one IDNet loop, it is recommended that the Isolator2 is the first and last device (A and X) on all used loops in order to meet Isolator2 performance on the channel. See the wiring notes for each style for further information.
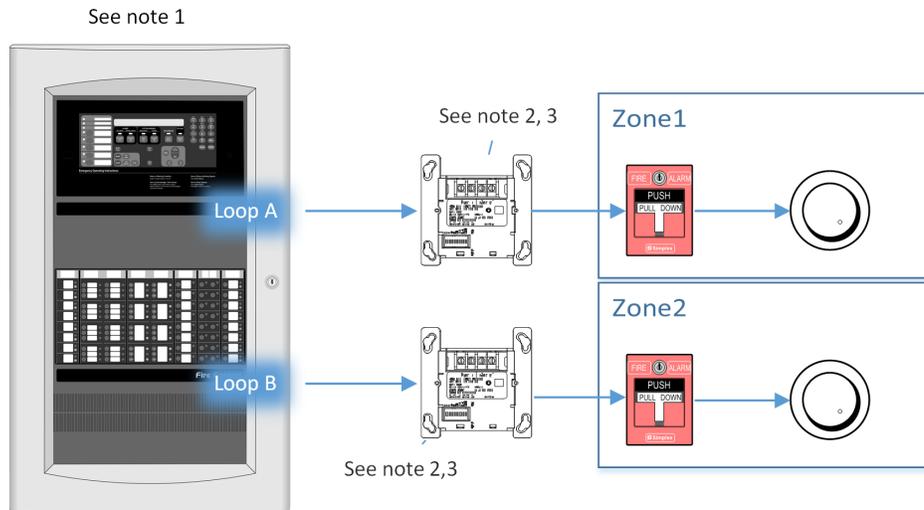
Class B / DCLB

See note 1

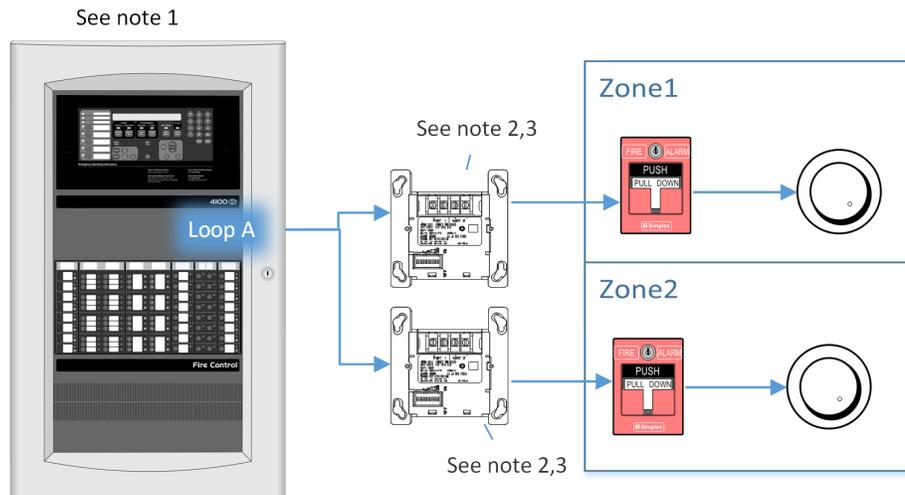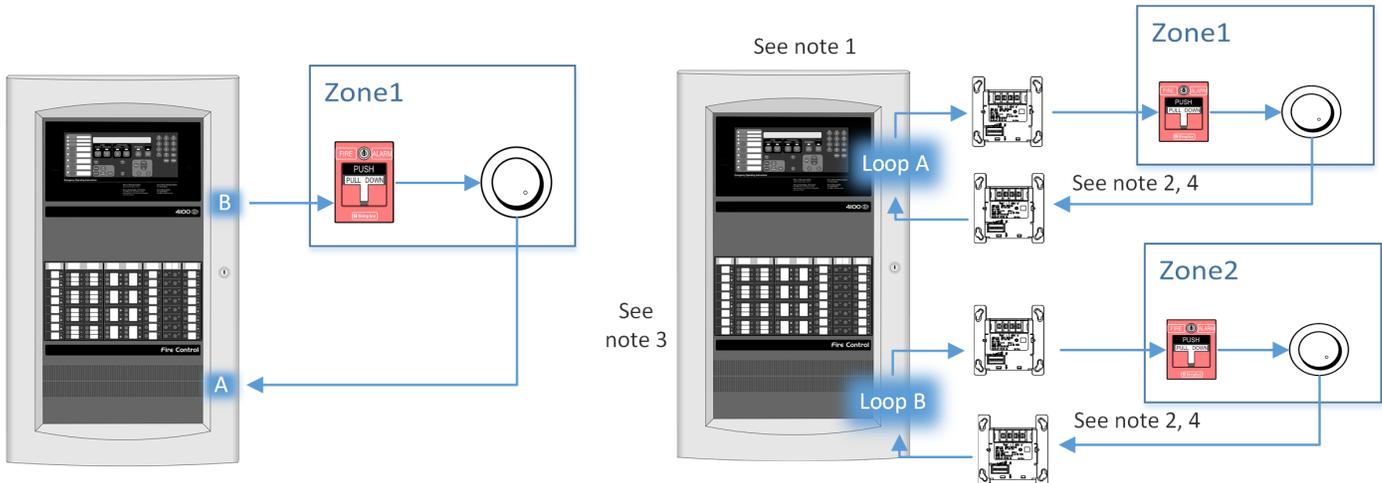Figure 6: Preferred Class B wiring, two loops

See note 1

Figure 7: Preferred Class B wiring, one loop

Note:

1. If a short-circuit fault is adjacent to a FACU (before the first Isolator2), the fault will momentarily deactivate the different loops on the channel while it resolves the issue. This takes less than 10 seconds. After recovery, the initiating devices need to be reconfigured which can take more than 10 seconds.

2. If the momentary delay is not acceptable, such as for meeting ULC S524 7th edition, ensure that short circuit faults can not be created on the FACU's direct output. One way of achieving this is by placing the Isolator2 close-nippled to the FACU. The Isolator2 reacts quicker than the FACU to preserve other zones and other loops of a same IDNet2 channel. Other solutions may exist, consult with your local authority having jurisdiction (AHJ).

3. All isolators should be Isolator2. If one isolator is a prior isolator (A4090-9116, A4098-9777, A4098-9793), the loop's open fault will not meet ULC S524 7th edition and a short circuit will momentarily affect all loops on the IDNet2 channel. Mixing isolator types is not recommended.

Class A / DCLA

In Class A, the presence and placement of the isolators depends on the application.
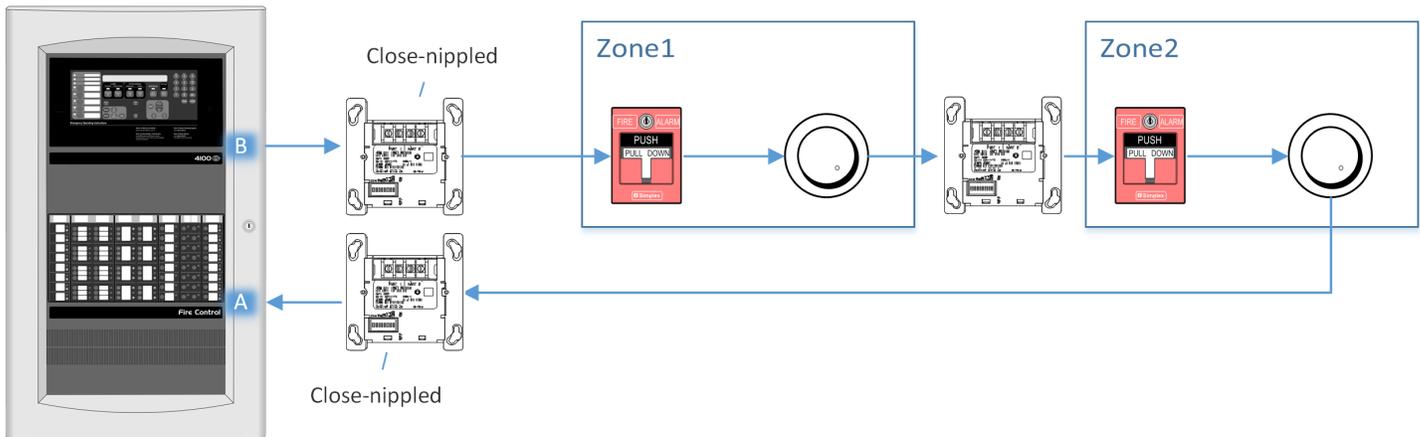
Figure 8: Correct Class A wiring

In a Class A circuit, you do not require an Isolator2 if there is only one IDNet loop. See note 3 when using more than one loop.

Note:

1. If a short-circuit fault is adjacent to a FACU (before the first Isolator2), the fault will momentarily deactivate the different loops on the channel while it resolves the issue. This takes less than 10 seconds. After recovery, it takes more than 10 seconds to reconfigure the initiating devices.

2. If the momentary delay is not acceptable, such as for meeting ULC S524 7th edition, ensure that short circuit faults can not be created on the FACU's direct output. One way of achieving this is by placing the Isolator2 close-nippled to the FACU. The Isolator2 is designed to react more quickly than the FACU to preserve other zones and other loops of a same IDNet2 channel. Other solutions may exist, consult with your local AHJ.

3. While a Class A circuit does not require isolators, the isolation provided by the loops (note 1) is not fast enough for ULC S524 7th edition.

4. All isolators should be Isolator2. If one isolator is a prior isolator (A4090-9116, A4098-9777, A4098-9793), the loop's open fault will not meet ULC S524 7th edition and a short circuit will momentarily affect all loops on the IDNet2 channel. Mixing isolator types is not recommended.

Class A / DCLC with zone isolation

In a Class A with zone isolation circuit, the first and last device of any loop must always be an Isolator2. You must install them close-nippled.

Figure 9: Correct Class A with zone isolation wiring

Class X

In a Class X circuit, only Isolator2-types are permitted on the circuit. You must install the first and last Isolator2 close-nippled to the FACU.
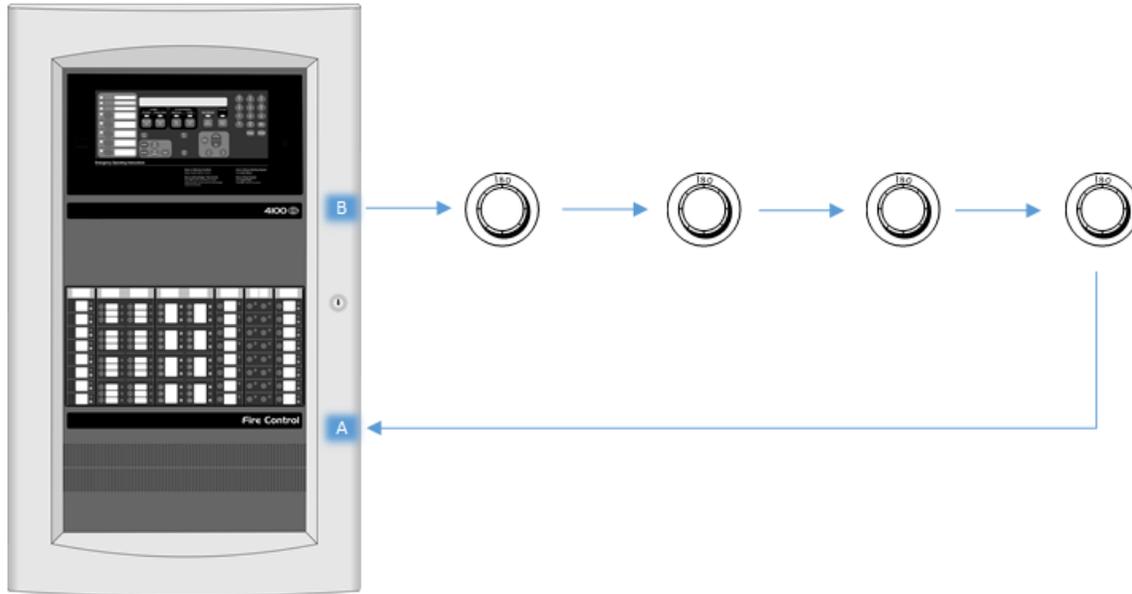
Figure 10: Correct class X wiring

Mounting

4 in. box mounting

Mount the Isolator2 in a 4 in. (102 mm) square box with a 2 1/8 in. (54 mm) minimum depth.

Mount the Isolator2 base to a 4 in. (102mm) square, single-gang, or octagonal electrical box. Refer to *574-707AC 4098 Smoke/Heat Sensor Bases Installation Instructions* for specifics about mounting limitations.

Place the supplied trim cover (4090-9814) over the Isolator2 and 4 in. (102 mm) square box. Alternatively, use a 4 in. (102 mm) square cover plate (RACO 752 or equivalent). Use the plastic trim cover fitted with a light pipe so you can see the LED of the device when the box is closed.
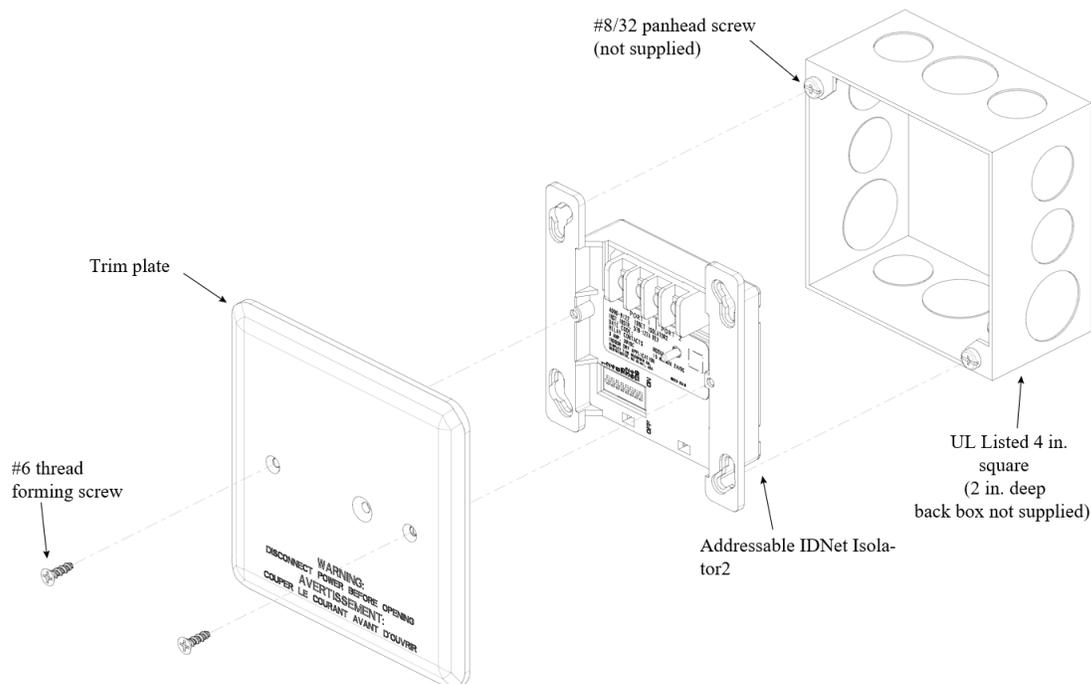

Figure 11: 4 in. box mounting with 4090-9814 trim plate

4 11/16 in. box mounting

Mount the A4090-9122 Isolator2 in a 4 11/16 in. square box using a A4090-9813 adapter plate.

The 4 11/16 in. box can be closed with the Zone Area Module (ZAM) cover:

- 617-345 - beige cover plate (surface)
- 617-343 - beige cover plate (flush)

Retrofit installation

The improved performance is targeted mainly at improving recovery time of life-safety devices. The benefits are also passed on to any equipment that annunciates trouble, supervisory or other priorities. If some devices don't need an improved recovery time because their maximum response time is minimally impacted, they may be left in place. Typically, the devices that are not updated could experience a time-to-annunciate change in state greater than 10 s. Devices with active outputs, such as relays, could default to their reset state during a wiring fault. Each device that needs an update to comply with the newest standards can be evaluated based on its individual performance needs. Overall, the performance in a system utilizing existing devices or drivers with Isolator2-type is at least equal to the former system, and generally has demonstrably faster times.

Table 4: Case A: An existing IDNet Module or device needs to be replaced, compliance with ULC S524 7th edition is not required

Item to replace	Replace with	Note
IDNet module	Same module of any revision	Direct replacement of existing equipment
	IDNet2 of any revision (IDNet are discontinued)	Master software must be updated
IDNet Addressable Isolator / Isolator Base	(Service parts) Same IDNet Addressable Isolator / Isolator Base	Direct replacement of existing equipment
	Isolator2 / Isolator2 Base	Replacing Isolator with Isolator2 requires: • An IDNet2 Module • IDNet2 software version 3.01 (or higher) • Master software version 6.01 4100ES/4010ES, 6.01 4007ES (or higher)
Isolator2 / Isolator2 Base	Isolator2 / Isolator2 Base	Direct replacement of existing equipment
IDNet device	Same Device of any revision	Direct replacement of existing equipment

Case B: Adding equipment, compliance with ULC S524 7th edition is required:

When compliance with ULC S524 7th edition isolator operation is required, the wiring and equipment must adhere to the *IDNet Isolator2 Usage Guidelines* and comply with the product compatibility requirements identified in the *579-1324AC IDNet Isolator2 Compatibility Chart*. Replace any device or module that does not meet the chart. Verify that the wiring schemes follow the compatibility this document, such as having Isolator2 close-nippled when required.

Diagnostics

The following sections explain the diagnostic tools available with the Isolator2.

Status

An LED on the isolator blinks to indicate correct communication with the panel. If there is a communication error with the FACU or if a short circuit is isolated by the device, the LED is ON steady.

Earth Fault Search

The Isolator2 provides Earth Fault Search diagnostic capabilities through the FACU to automatically identify the closest Isolator2 preceding the earth fault.

To complete an Earth Fault Search, complete the following steps:

1. If required, log in at the appropriate level.
2. From the FACU menu, select **Diagnostic**.
3. Select **Earth Fault Search**.
4. Select the IDNet2 card that has the fault and start the test.

The system searches for the fault. It takes one to four seconds per isolator installed on the tested loop; the more devices on the IDNet loop, the longer it takes per isolator. This assumes the isolator addresses are set in ascending order as recommended in the Addressing section.

The panel either reports the Isolator2's address (see note) before the earth fault or, if it can't find the fault, it reports the IDNet2 Module's loop that has the earth fault.

Note: See Appendix A - Wiring examples for more details on systems using both existing IDNet Addressable Isolators and Isolator2s on the same IDNet2.

You can also use the TrueStart Instrument II (TSI II) to perform an Earth Fault Search on an IDNet2 channel with the Isolator or Isolator2. As the TSI II performs more diagnostic tests, expect slightly longer search times.

Manual Control

To manually isolate an Isolator2 in the FACU, complete the following steps:

1. Search for the device's address.
2. Force **OFF** to bypass the device's control and open the Isolator2. This may require an higher access level.
3. Force **ON** to allow the device to close. The Isolator2 tests the line automatically and closes only if it is safe.

Troubleshooting

Table 5: Troubleshooting issues and fixes

Symptom	Trouble	Fix
Isolator2 is "no answer"	1. Address is wrong 2. + and – input connections are inverted	1. Reconfigure the address. **Remember:** DIP Switch values are binary, so position 1 is worth 1, position 8 is worth 128. 2. Verify wiring is compliant with Isolator2 requirements.
Isolator2 cannot be added in the Programmer	1. The IDNet driver is not of the IDNet2-type 2. The Master/Programmer/IDNet2 software is not at the correct version. Refer to 579-1324AC	1. Install an IDNet2-type driver. 2. Update the software to the minimum version required.
ULC S524 7th edition Timing performances are not met	1. Isolators which are not of the Isolator2-type are mixed together on the circuit 2. Wiring requirements are not met (maximum number of devices, Isolator2, length, close-nippled installation) 3. IDNet2 Modules' or IDNet Field Devices' PC Board Assembly revisions are not up to date and limit Class A/X performance	1. Make sure only Isolator2 devices are installed on the line. 2. Verify wiring is compliant with Isolator2 requirements. 3. Verify the "Isolator2 compatible" sticker is on the IDNet2 driver, or verify the 566-XXX assembly revision. Refer to 579-1324AC.
Some devices don't activate quickly after a fault on the line	1. See issue "Timing performances are not met" in this table. 2. Devices lost their supply	1. See issue "Timing performances are not met" in this table. 2. Verify all devices that need to be updated for maximum performance have the appropriate "Isolator2 compatible" sticker applied. Refer to 579-1324AC.
LED is constantly lit	1. Address is wrong 2. Isolator2 is open	1. Reconfigure the address. 2. Verify if a short is present after the Isolator2.
Isolator2 are "output abnormal"	1. A short circuit exists after the Isolator2 2. The polarity +/- is inverted on the Isolator2's output on Class A return	1. Remove short circuit. 2. Verify wiring polarity.
Earth Fault Seach diagnostic reports the wrong device	1. A Mix of prior isolator and Isolator2 is present on the IDNet2 module. 2. The system failed to find the earth fault correctly.	1. Either replace the prior isolator with Isolator2 to get better automation or complete the diagnostic by manually opening the Isolator2. 2. As a failsafe, an Isolator2 upstream would report an earth fault to minimize manual research. Complete the automatic diagnostic by manually opening Isolator2.

Appendix A - Wiring examples

Full performance

You can use any combination of Class B, A, or X wiring circuits. If all isolators are of the Isolator2-type and if the devices directly connected to the FACU are mounted close-nippled, maximum performance will be attained.
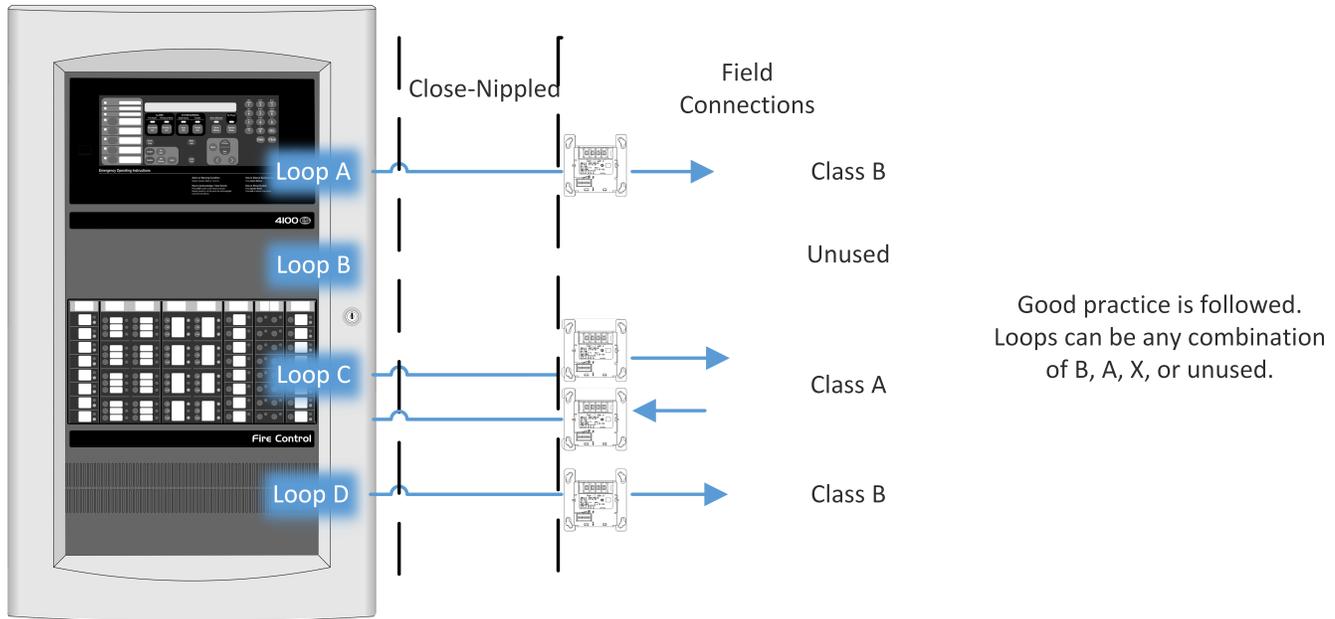
Close-Nippled

Field Connections

Loop A → Class B

Loop B → Unused

Loop C → Class A

Loop D → Class B

Good practice is followed. Loops can be any combination of B, A, X, or unused.

Figure 12: Full performance

Reduced performance

The following setups do not meet ULC S524 7th edition unless modifications are made.

Mixed systems

For optimal performance, avoid mixed systems. Mixing prior isolators and Isolator2 on the same IDNet2 loop performs at least as well as prior setups. In Figure 13, the first device on each loop is an Isolator2, close-nippled. Loop C and D perform at maximum capabilities. Loop A does not have the same performance benefits from Isolator2 because of the presence of prior isolators.
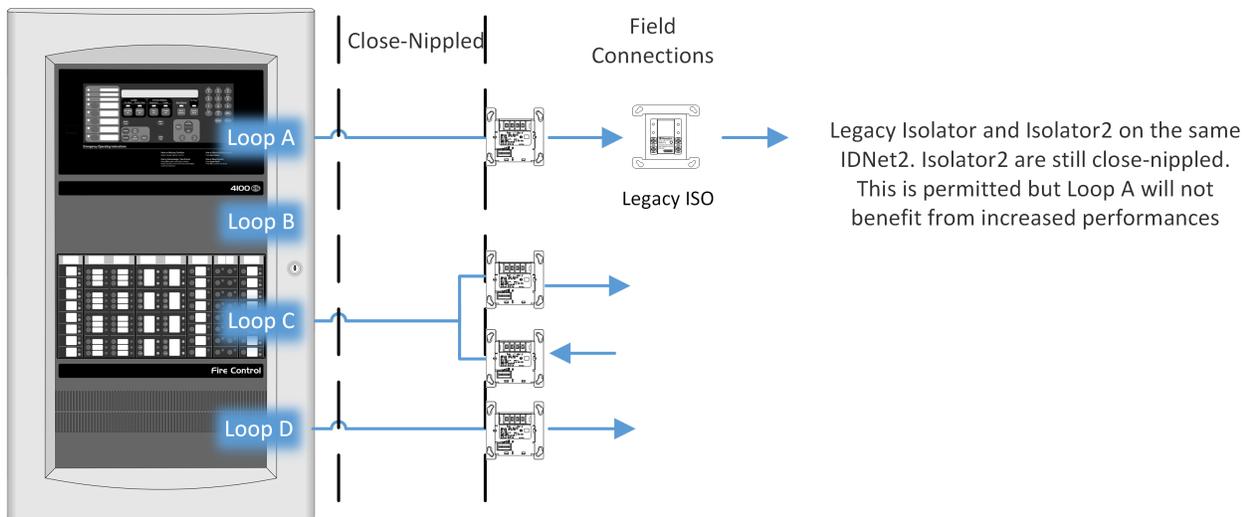
Close-Nippled

Field Connections

Loop A

Legacy ISO

Loop B

Loop C

Loop D

Legacy Isolator and Isolator2 on the same IDNet2. Isolator2 are still close-nippled. This is permitted but Loop A will not benefit from increased performances

Figure 13: Reduced performance

Recommendation: Avoid mixed systems; replace all prior isolators with Isolator2 for increased performances. ULC S524 7th edition can not be met with mixed systems. Providing Isolator2 close-nippled on each loop limits the impact of one loop over another.

Peripheral compatibility

For optimal performance, modify the Supervised IAM (A4090-9001) in Figure 14. If the device is listed to require, but does not have, an "Isolator2 compatible" label, the performance of this particular device does not change and does not benefit from the improved performance of the Isolator2. It only affects this device; all other correct devices on the IDNet2 card benefit from the Isolator2 improved performance.
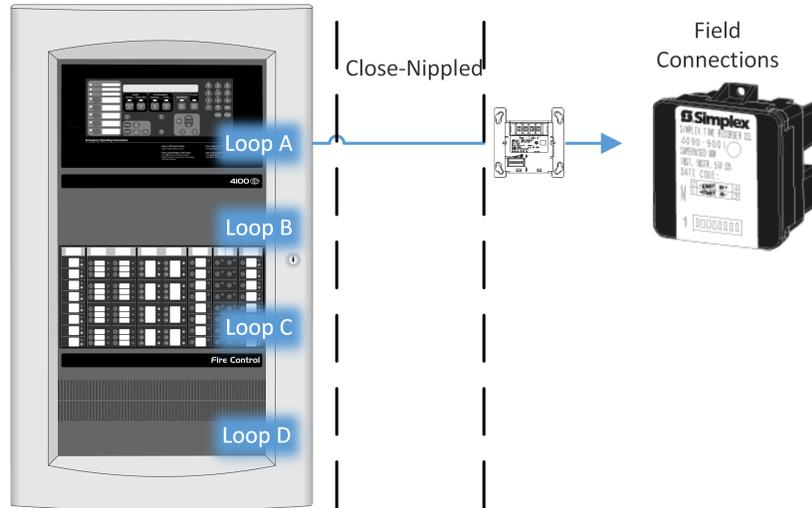
Figure 14: Device without sticker

Recommendation: Replace all active field devices with the most up-to-date versions bearing the "Isolator2 compatible" sticker.

ULC S524 7th edition cannot be met if all equipment on the IDNet channel does not comply to *579-1324AC IDNet Isolator2 Compatibility*

Faults directly on the IDNet2 output

The following Isolator2 is not mounted close-nippled with the FACU. If a short circuit occurs before the Isolator2, performance is degraded for all loops.
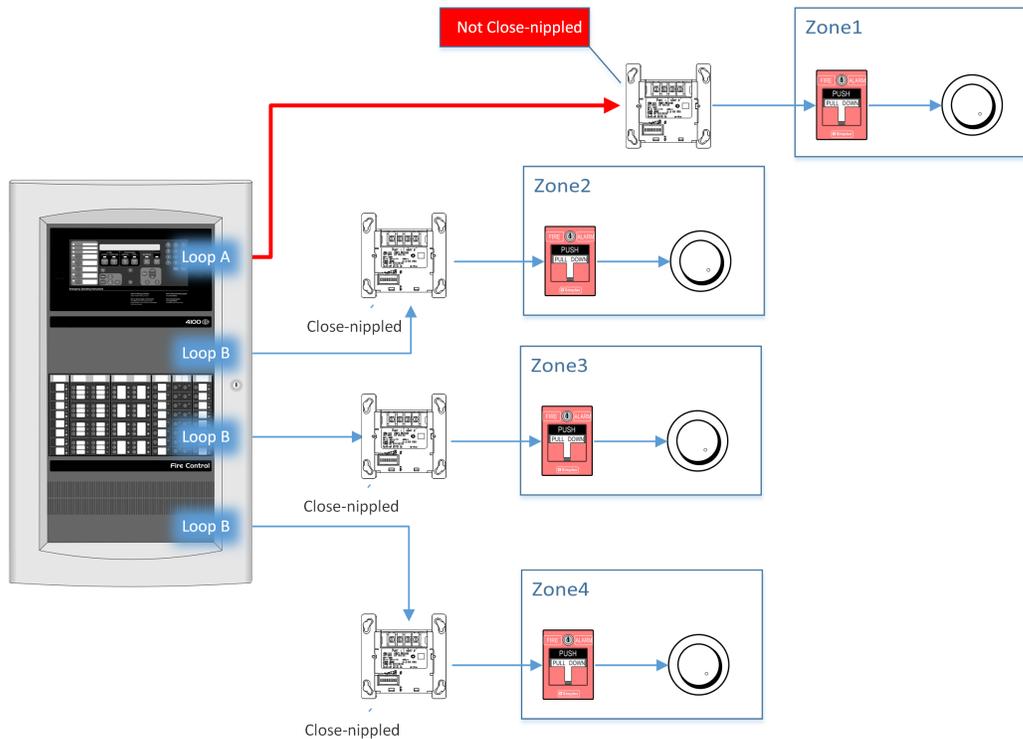

Figure 15: Not mounted close-nippled with FACU

Recommendation: If you configure more than one loop, one way of improving performance and meeting ULC S524 7th edition is by ensuring the devices directly connected to the IDNet2 channel are Isolator2 close-nippled.

Appendix B - recommendations

If legacy isolators are present, the recommended replacements for existing IDNet installations are as follows:

1. IDNet, IDNet+, IDNet1+ Channels:

   - Always replace Isolators with direct replacements (legacy Isolators, NOT Isolator2 isolators). Isolator2 isolators are NOT compatible with IDNet, IDNet+, IDNet1+ Channels and will report a "no answer" trouble on the control unit.

- You can replace devices with either Isolator or Isolator2 compatible devices. Non-isolator devices have no effect on legacy Isolator or system operation.

2. IDNet2 with Non-Isolator2 isolators:

- Where enhanced performance is NOT required: replace IDNet isolators with direct replacements (legacy isolators, NOT Isolator2 isolators).
- Where enhanced performance is required:

  - Update IDNet2 firmware and system software to the latest revision.
  - Replace all IDNet devices that are not compatible with Isolator2.
  - Replace all IDNet Isolators with Isolator2 isolators.

If legacy Isolators and Isolator2 isolators are mixed on an IDNet2 channel, although the isolation performance will remain at least equivalent to the legacy Isolator performance, the automatic ground fault search will be degraded and will not recognize Isolator2 isolators. When there is a mix of legacy Isolators and Isolator2 isolators on an IDNet2 channel, automatic ground fault search will only report the address of the closest legacy Isolator that is connected before the Isolator2 isolator with a ground fault; it will never report the address of an Isolator2 isolator. In order to identify the location of a ground fault down to the closest Isolator2 isolator, ground fault search would need to be performed manually on each isolator on the channel. For this reason, it is not recommended to mix legacy Isolators and Isolator2 isolators on an IDNet2 loop or channel.