

**LN Series Input/Output (I/O) Extension Modules and LN
Communicating Sensors Subnetwork for
LN-VAVCF-12 and LN-PRGxxx-12**
Application Note

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LN-IOE400-0, LN-IOE410-0, LN-IOE420-0, LN-VAVCF-12, LN-PRGxxx-12

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LN Series Input/Output (I/O) Extension Modules and LN Communicating Sensors Subnetwork for LN-VAVCF-12 and LN-PRGxxx-12

Application Note

Document Introduction

This document describes the subnetwork for the LN Series Input/Output Extension Modules and LN Series Communicating Sensors. The LN-VAVCF0-12 and LN-PRGxxx-12 Series Controllers are equipped with an RJ-45 subnetwork port to quickly connect with subnetwork devices such as the LN Communicating Sensors using a Cat 5e cable (standard patch Ethernet cable). In addition, the LN-PRG6x0-12 Series controllers can also link to the LN-IOE-4x0 I/O Extension Modules through the subnetwork. The subnetwork for the LN-IOE-4x0 I/O Extension Modules uses a standard screw-type terminal block connector and twisted pair shielded cable.

This document does not describe how to set up a LONWORKS® network. For information on setting up your LONWORKS® network, refer to the *LONWORKS® LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*.

Related Documentation

Table 1: Related Documentation

For Information On	See Document	LIT Number
Setting Up a LONWORKS Network	<i>LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin</i>	LIT-12011253
Setting Up a Subnetwork with LN Series Input/Output Extension Modules Subnetwork for LN-PRG6x0-2	<i>LN Series Input/Output (I/O) Extension Modules Subnetwork for LN-PRG6x0-2 Application Note</i>	LIT-12011706
Installing LN Free Programmable PRG 600 Series Controllers	<i>LN Free Programmable PRG 600 Series Controllers Installation Instructions</i>	LIT-12011691
Installing LN Series Input/Output (I/O) Extension Modules	<i>LN Series Input/Output (I/O) Extension Modules Installation Instructions</i>	LIT-12011693
LN Free Programmable PRG 600 Series Controllers and LN I/O Extension Modules Features and Benefits	<i>LN Free Programmable PRG 600 and LN Input/Output Extension Modules Product Bulletin</i>	LIT-12011656
LN Series Communicating Sensors Features and Benefits	<i>LN Series Communicating Sensors Product Bulletin</i>	LIT-12011779

Subnetwork Bus Total Length

The total maximum length of all subnetwork buses, including both the length of the LN Series I/O Extension Modules subnetwork bus and the LN Series Communicating Sensors subnetwork bus is 300 m (1,000 ft). The maximum length of the LN Series I/O Extension Modules subnetwork bus is 300 m (1,000 ft) (Figure 1). The maximum length of the LN Series Communicating Sensors subnetwork bus is 200 m (650 ft) (Figure 2).

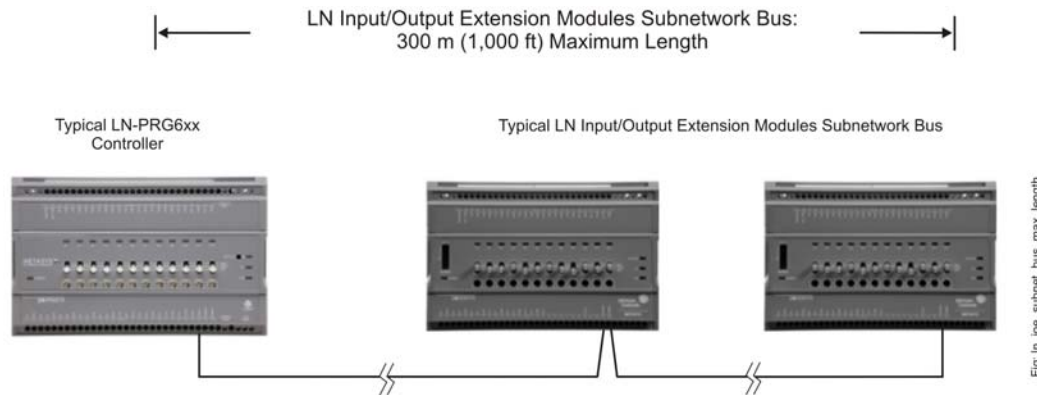


Figure 1: Maximum Length of the LN I/O Extension Modules Subnetwork Bus

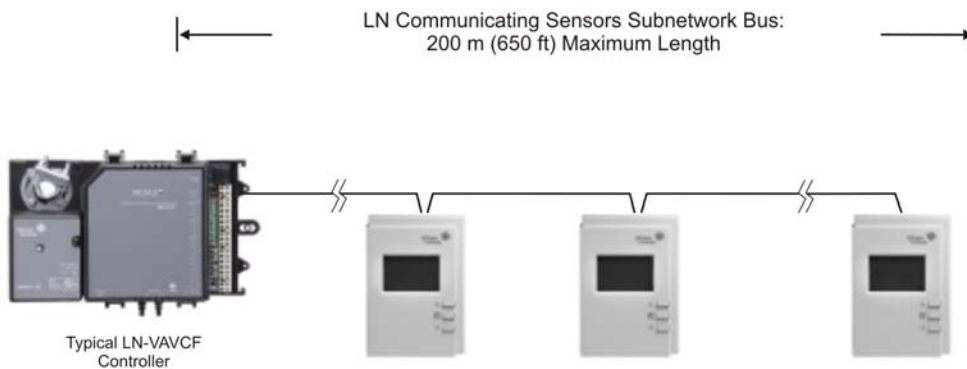


Figure 2: Maximum Length of the LN Communicating Sensors Subnetwork Bus with an LN-VAVCF-12 Controller

Since the total maximum length of all subnetwork buses cannot exceed 300 m (1,000 ft), the length of one subnetwork bus affects the length of other subnetwork buses. Figure 3 shows that if the LN Series Communicating Sensors subnetwork is 150 m (500 ft), then the LN Series I/O Extension Modules subnetwork length can only be a maximum of 150 m (500 ft).

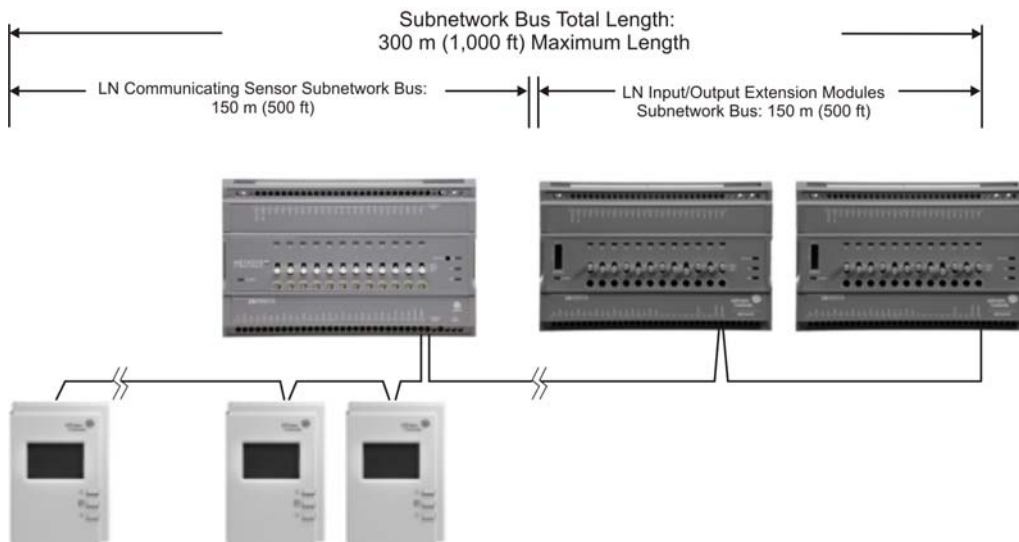


Figure 3: Example of Distribution and Total Maximum Length of Subnetwork Bus Length

Subnetwork

Figure 4 shows the LN Series Input/Output Extension modules on the subnetwork with the proper End-of-Line (EOL) terminations.

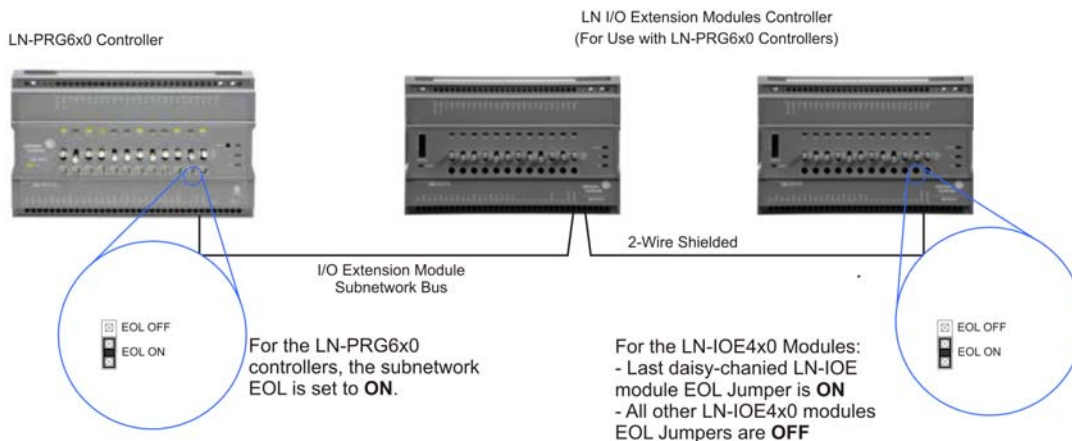


Figure 4: EOL Terminations Settings on Subnetwork

Note: In Figure 4, the EOL jumpers are located on the inside of the controller and modules.

When LN-IOE4x0 modules are installed with an LN-PRG6x0 controller and with LN Communicating Sensors, only the EOL terminations of the last LN-IOE4x0 and the last LN Communicating Sensor are set to ON. All other LN-IOE4x0 modules and LN Communicating Sensors must have their EOL terminations set to OFF (Figure 5).

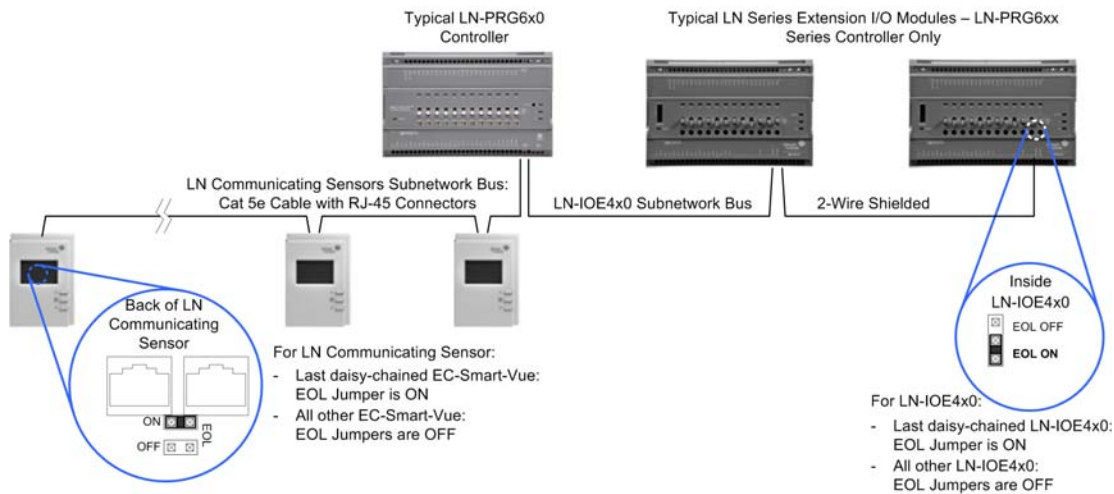


Figure 5: Setting the EOL Terminations on the LN-IOE4x0 Subnetwork Bus When the LN Communicating Sensors Are Used

Topology and EOL Terminations

Set the EOL terminations on the LN Free Programmable PRG 600 Series Controller and the last LN I/O Extension Module to ON. All other extension modules must have their EOL termination set to OFF (Figure 4).

Connecting to the LONWORKS Network Through an LN Communicating Sensor

The subnetwork bus extends the LONWORKS network to the LN Communicating Sensors to provide convenient network access for maintenance and troubleshooting purposes (Figure 6).

This section explains how to enable the LONWORKS network with the LN Communicating Sensors. A LONWORKS network has a limited number of enabled controllers.

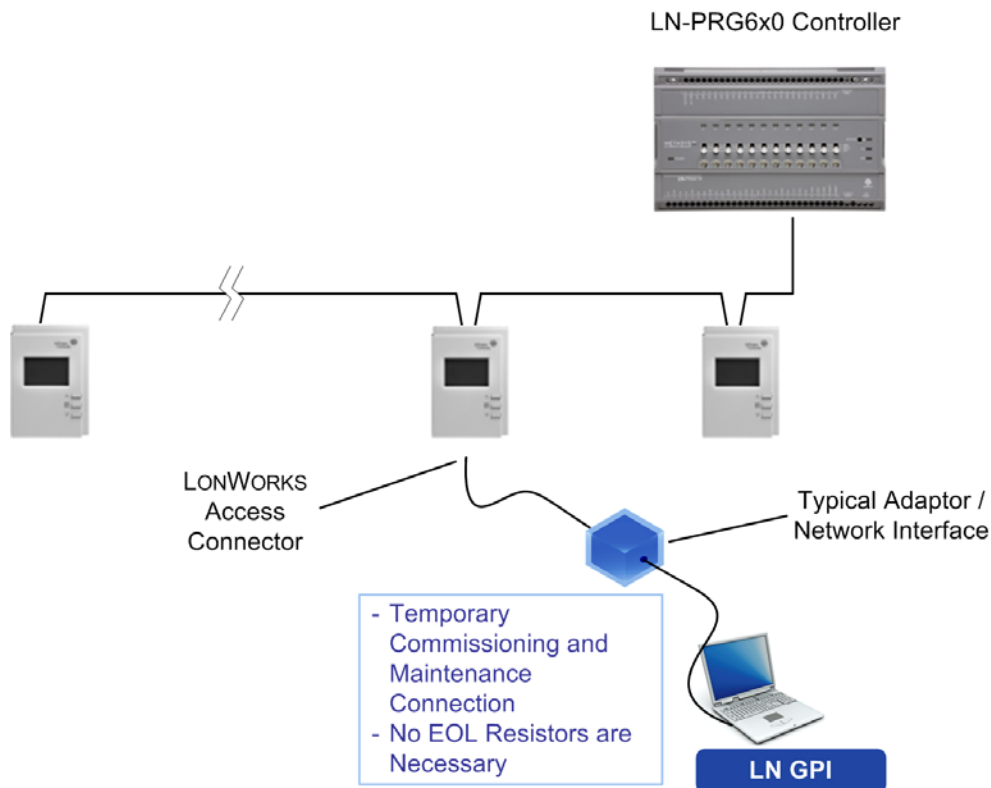


Figure 6: LN Communicating Sensors Subnetwork with LONWORKS Network

To provide LONWORKS network access, jumpers on both the controller and the LN Communicating Sensor must be enabled.

All LONWORKS controllers have **Net to Subnet Port Settings** jumpers, which (when enabled) connect the LONWORKS network to the LN Communicating Sensor.

Note: Only a limited number of controllers on the LONWORKS network segment should have their **Net to Subnet Port Settings** jumpers enabled. Enabling too many LN Communicating Sensors with network access may cause communication issues.

Figure 7 shows a typical LONWORKS network bus topology with only a few controllers enabled for network access at the LN Communicating Sensor.

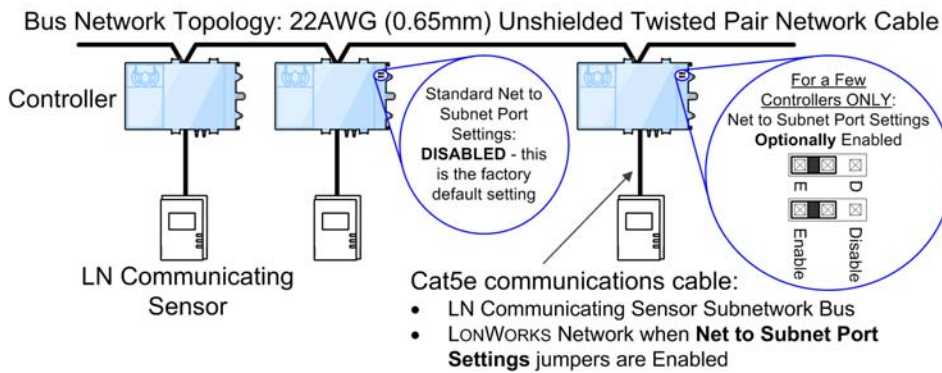


Figure 7: LONWORKS Network Bus Topology

For maximum cable lengths and cable specifications for LONWORKS network bus topology, see Table 2.

The length of the LN Communicating Sensor subnetwork bus must also comply with the restrictions shown in Figure 1 and Figure 2.

Enabling the Net to Subnet Port Settings Jumper

To connect the main LONWORKS network to the LN Communicating Sensor subnetwork Cat5e cable, set the two **Net to Subnet Port Settings** jumpers inside the LN-PRG6x0 controller to **Enable** (Figure 8). The factory default for the **Net to Subnet Port Settings** jumpers is set to Disable.

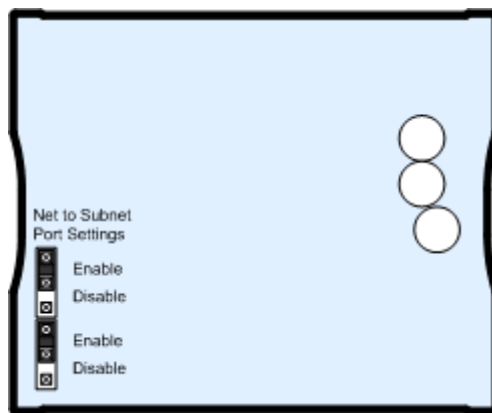


Figure 8: Jumpers Set to Enabled on the LN-PRG6x0 Controller

To connect the main LONWORKS network to the LN Communicating Sensor subnetwork Cat5e cable, set the two **Net to Subnet Port Settings** jumpers inside the LN-VAVCF-12 controller to **Enable** (Figure 9). The factory default for the **Net to Subnet Port Settings** jumpers is set to Disable.

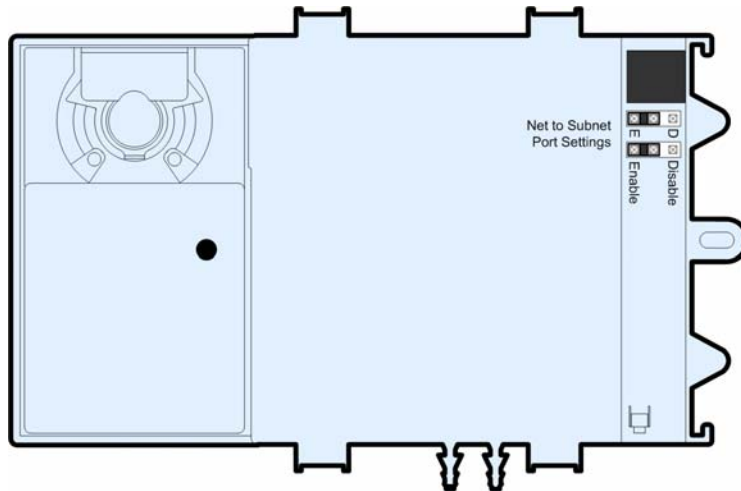


Figure 9: Jumpers Set to Enabled on the LN-VAVCF-12 Controller

Configuring the LN Communicating Sensor

On each LN Communicating Sensor, ensure that the BAC/LON jumper is set to the **LON** position (Figure 10). Use this setting for all LN Communicating Sensors, in case you wish to enable the network in the future.

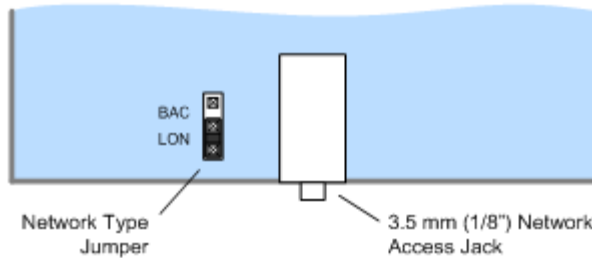


Figure 10: LN Communicating Sensor BAC/LON Jumper Set to LON

Connecting to the LON USB Interface

To temporarily access the LONWORKS network for commissioning and maintenance purposes, connect a LON USB Network Interface to the stereo audio plug located on the lower edge of the LN Communicating Sensor. You can then wire a standard 3.5 mm (1/8 in.) three-conductor (stereo jack) or two-conductor (mono jack) as shown in Figure 11.

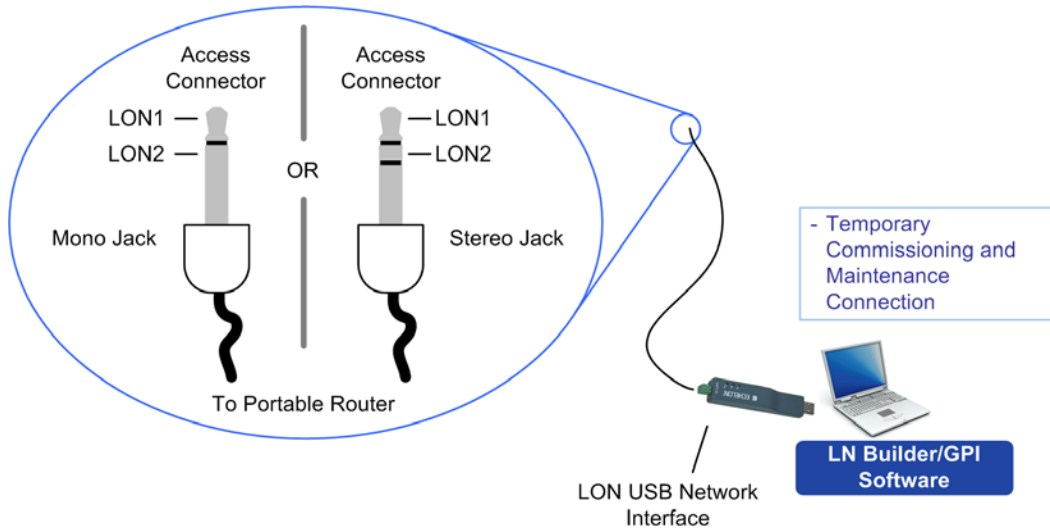


Figure 11: Connecting to LONWORKS Network via Stereo Jack on LN Communicating Sensor

Subnetwork Length

The total maximum length of the subnetwork is 300 meters (1,000 feet). The polarity of the LN Series I/O Extension Modules must be configured as shown in Figure 12. All terminals identified as SUBNET+ must be connected to the same conductor. Similarly, all terminals identified as SUBNET- must be connected to the same conductor.

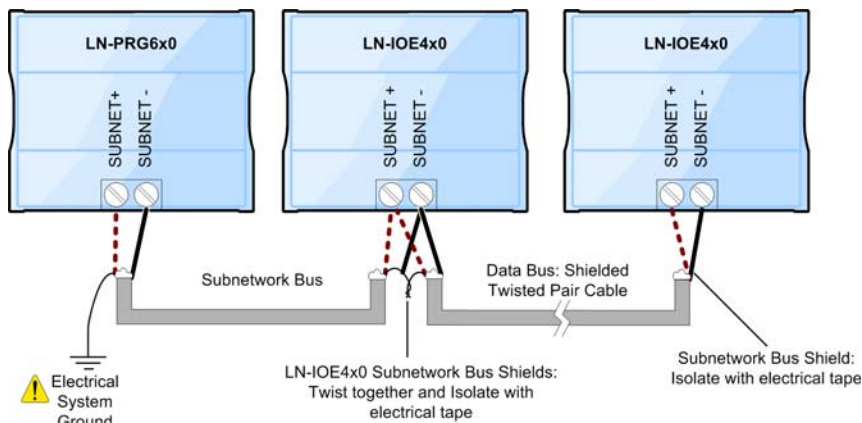


Figure 12: LN Free Programmable PRG 600 Series Controllers Subnetwork Shielding

Use properly grounded, shielded cable for the best protection against interference on the LN Series I/O Extension Module subnetwork. Use the daisy-chain configuration with the cable shield twisted together and isolated with electrical tape at each extension module.

When you use an LN Free Programmable PRG 600 Series Controller, connect the shielding of the extension modules on the subnetwork to the electrical system ground at one point only (Figure 12).

Physical Specifications and Cable Requirements

Use cables composed of stranded conductors, instead of solid conductors, for the best breakage resistance during pulling operations. Table 2 describes the physical specifications and cable requirements for an LN Series I/O Extension Module subnetwork.

Table 2: Physical Specifications and Cable Requirements

Specification	Description
Maximum Number of LN Series I/O Extension Modules	2 LN Series I/O Extension Modules
Media	Shielded, Twisted Pair
Characteristic Impedance	100–130 ohm
Distributed Capacitance	Less than 100 pF per meter (30 pF per foot)
Maximum Length of the LN Series I/O Extension Modules Subnetwork	300 meters (1,000 ft) Maximum
Polarity	Polarity Sensitive
Multi-Drop	Daisy-chain (No Routers)
End-of-Line (EOL) Terminations	Built-in and set (enabled) on the last extension module only.
Shield Grounding	See Figure 12.

Addressing

Each LN Series I/O Extension Module on the subnetwork must have a unique address. The current valid addresses are 1 or 2. Figure 13 shows an example of how to set a DIP switch. Table 3 shows the DIP switch settings.



Figure 13: DIP Switch Set to 2

Table 3: DIP Switch Settings

Switch Position			Value
1	2	3	
OFF	OFF	OFF	Invalid
ON	OFF	OFF	1
OFF	ON	OFF	2
ON	ON	OFF	Invalid
OFF	OFF	ON	Invalid
ON	OFF	ON	Invalid
OFF	ON	ON	Invalid
ON	ON	ON	Invalid



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