

Electrostatic Damage

Electrostatic discharge can damage semiconductor devices inside this module if you touch backplane connector pins. Guard against electrostatic damage by observing the following precautions.

ATTENTION



Electrostatic discharge can degrade performance or cause permanent damage. Handle the module as stated below.

- Wear an approved wrist strap grounding device when handling the module.
- Touch a grounded object to rid yourself of electrostatic charge before handling the module.
- Handle the module from the front, away from the backplane connector. Do not touch backplane connector pins.
- Keep the module in its static-shield bag when not in use, or during shipment.

1746-NI8 Power Requirements

The 1746-NI8 module receives its power through the SLC 500™ chassis backplane from the fixed or modular +5V dc/+24V dc chassis power supply. The +5V dc backplane supply powers the SLC circuitry and the +24V dc backplane supply powers the module analog circuitry. The maximum current drawn by the module is shown in the table below.

5V dc Amps	24V dc Amps
200 mA	100 mA

When you are using a *modular system* configuration, add the values shown in the table above to the requirements of all other modules in the SLC chassis to prevent overloading the chassis power supply.

Module Location in Chassis

Modular Chassis Considerations

Place your 1746-NI8 module in any slot of an SLC 500 modular, or modular expansion chassis, except for the extreme left slot (slot 0) in the first chassis. This slot is reserved for the processor or adapter modules.

IMPORTANT	For applications using the upper limit of the operating temperature range, the 1746-NI8 module (or multiple modules) should be placed in the right-most slot(s) of the chassis.
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Operating Temperature Range	
Temperature	Chassis Location
+0°C to +55°C (+32°F to +131°F)	Any slot except slot 0.
0°C to +60°C (32°F to 140°F)	In right most slot of chassis

Fixed Expansion Chassis Considerations

IMPORTANT	The 2-slot, SLC 500 fixed I/O expansion chassis (1746-A2) supports only specific combinations of modules. If you are using the 1746-NI8 module in a 2-slot expansion chassis with another SLC I/O or communication module, refer to the 1746-NI8 user manual to determine whether the combination can be supported.
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Terminal Wiring

The 1746-NI8 module contains an 18-position, removable terminal block. The terminal pin-out is shown below.

ATTENTION

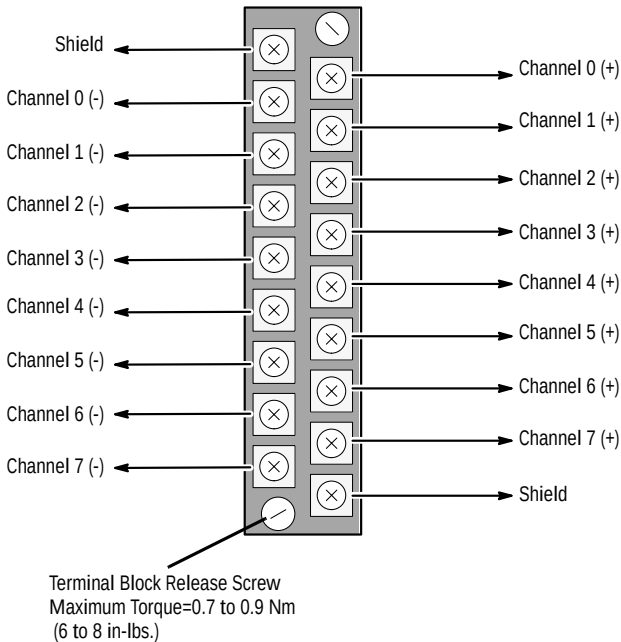


Disconnect power to the SLC before attempting to install, remove, or wire the removable terminal wiring block.

To avoid cracking the removable terminal block, alternate the removal of the slotted terminal block release screws.

Terminal Block

(Terminal Block Spare Part Catalog Number 1746-RT25G)



Wiring Single-Ended Inputs

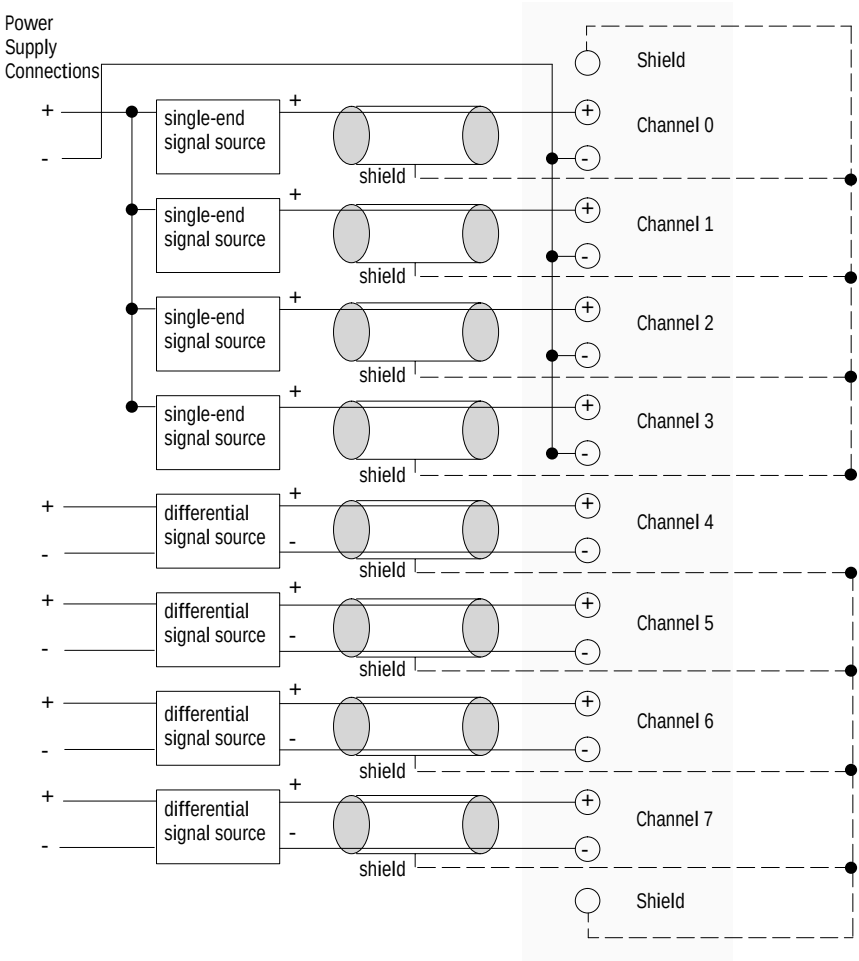
The following diagram shows typical wiring for the 1746-NI8 module.

IMPORTANT

Follow these guidelines when wiring the module.

- Use shielded communication cable (Belden™ 8761) and keep length as short as possible.
- Connect only one end of the cable shield to earth ground.
- Connect the shield drain wires for channels 0 to 3 to the top shield terminal.
- Shield terminals are internally connected to chassis ground which is connected to earth ground via the SLC backplane.
- Single-ended source commons may be jumpered together at the terminal block.
- Channels are not isolated from each other.
- If a different signal source has an analog common, it cannot and must not be connected to the module.
- Common mode voltage range is ± 10.5 volts. The voltage between any two terminals must be less than 15 volts.
- The module does not provide power for the analog inputs.
- Use a power supply that matches the transmitter (sensor) specifications.

Typical 1746-NI8 Wiring

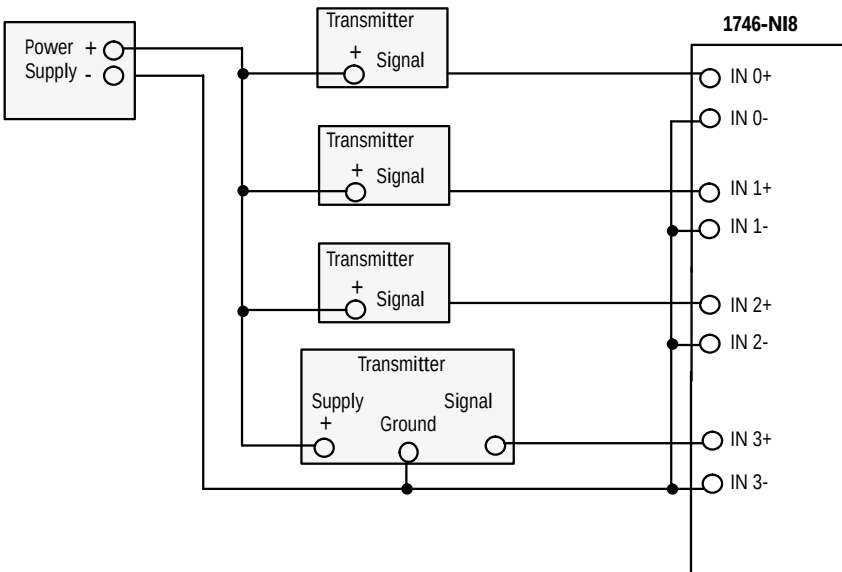


When wiring single-ended analog input devices to the analog input module, the number of total wires necessary can be limited by jumpering all “IN” terminals together. Note that differential inputs are more immune to noise than single-ended inputs.

IMPORTANT

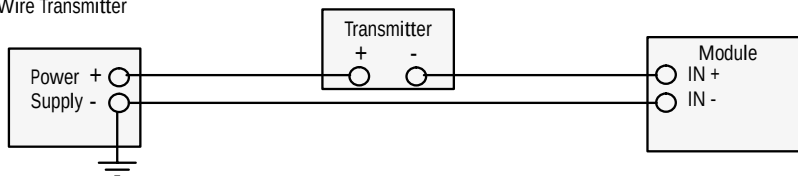
The module does not provide loop power for analog inputs. Use a power supply that matches the transmitter specifications.

Wiring Schematic for Single-Ended Analog Input Connections

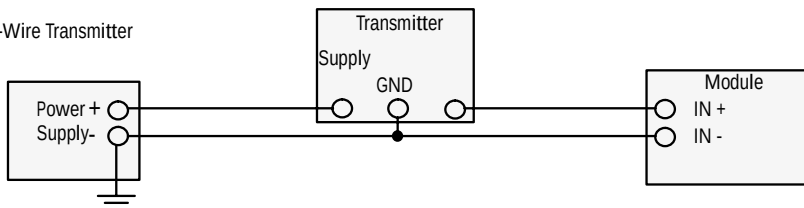


Wiring Schematics for 2, 3, and 4-Wire Analog Input Devices

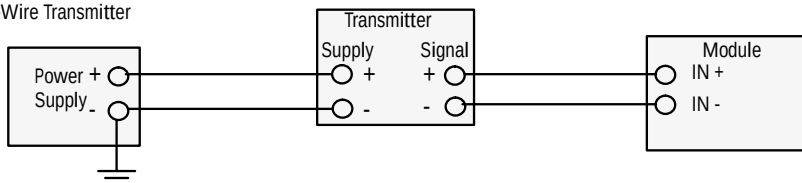
2-Wire Transmitter



3-Wire Transmitter



4-Wire Transmitter

**IMPORTANT**

The module does not provide loop power for analog inputs. Use a power supply that matches the transmitter specifications.

Wiring Guidelines

ATTENTION



To prevent shock hazard, care should be taken when wiring the module to analog signal sources. Before wiring any analog module, disconnect power from the SLC 500 system and from any other source to the analog module.

Follow the guidelines below when planning your system wiring.

- To limit noise, keep signal wires as far away as possible from power and load lines.
- To ensure proper operation and high immunity to electrical noise, always use Belden™ 8761 (shielded, twisted-pair) or equivalent wire.
- Connect the shield drain wire to the shield terminal on the 1746-NI8 module. Up to four shield wires may be connected to each shield screw terminal that provides a connection to chassis ground.
- Tighten terminal screws using a screwdriver. Each screw should be turned tight enough to immobilize the wire's end. Excessive tightening can strip the terminal screw. The torque applied to each screw should not exceed 0.9 Nm (8 in-lb) for each terminal.
- Follow system grounding and wiring guidelines found in your *SLC 500 Modular Hardware Style Installation and Operation Manual*, publication 1747-6.2.

Input Devices

Transducer Source Impedance

If the source impedance of the input device and associated cabling is too high, it affects the accuracy of the channel data word. Source impedance of 500 ohms produces up to 0.05% of module error over and above the specified accuracy of the module.

You can compensate for device impedance error by implementing the following equation in your ladder program:

$$V_S = V_{measured} \times \frac{(R_s + R_{in})}{R_{in}}$$

where:

- V_s = input device voltage
- R_s = input device impedance
- R_{in} = 1746-NI8 input impedance (See Specifications on page 17.)

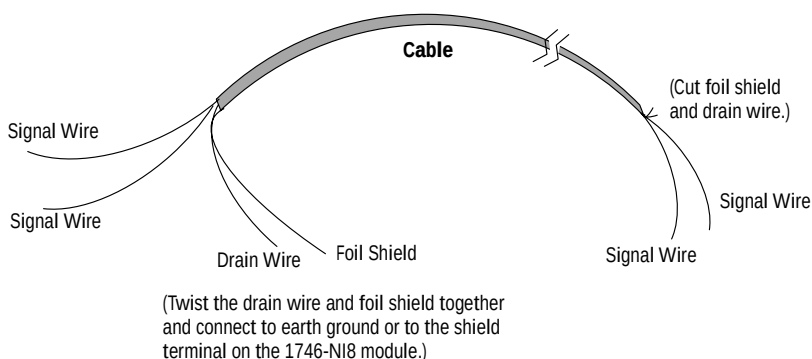
Wiring Input Devices to the 1746-NI8

After the analog input module is properly installed in the chassis, follow the wiring procedure below using Belden 8761 cable.

ATTENTION



Care should be taken to avoid connecting a voltage source to a current input module. Improper module operation or damage to the voltage source can occur.



To wire your 1746-NI8 module follow these steps.

1. At each end of the cable, strip some casing to expose the individual wires.
2. Trim the signal wires to 50 mm (2 inch) lengths. Strip about 5 mm (3/16 inch) of insulation away to expose the end of the wire.
3. At one end of the cable, twist the drain wire and foil shield together. This end of the cable is connected to one of the shield terminals on the 1746-NI8 module. Connect shields for channels 0 through 3 to the upper shield terminal and shields for channels 4 through 7 to the lower shield terminal.
4. At the other end of the cable, cut the drain wire and foil shield back to the cable.
5. Connect the signal wires and shield drain wire to the 1746-NI8 terminal block or interposing terminal block.
6. Connect the other end of the cable to the voltage or current transmitter terminals.
7. Repeat steps 1 through 6 for each channel on the module.

Specifications

Electrical Specifications

Description	Specification
Backplane Current Consumption	200 mA at 5V dc 100 mA at 24V dc
Backplane Power Consumption	3.4W maximum (1.0W at 5V dc, 2.4W at 24V dc)
Number of Channels	8 (backplane isolated)
I/O Chassis Location	Any I/O module slot except slot 0
A/D Conversion Method	Successive approximation, switched capacitor
Input Filtering	Low-pass digital filter with programmable filter frequencies
Normal Mode Rejection (between [+] input and Analog Com)	Provided by low-pass filter
Common Mode Rejection (between inputs and chassis ground)	Greater than or equal to 75 dB at DC Greater than or equal to 100 dB at 50/60 Hz
Input Filter Frequencies	1 Hz 2 Hz 5 Hz 10 Hz 20 Hz 50 Hz 75 Hz
Calibration	The module performs continuous autocalibration
Isolation	500V dc continuous between the analog inputs and the backplane 530V ac and 750V dc pulse withstand for one second
Common-Mode Voltage Range	±10.5V (15V maximum between any two terminals)

Physical Specifications

Description	Specification
LED Indicators	9 green status indicators one for each of 8 channels and one for module status
Module ID Code	Class 1 Interface: 3526 Class 3 Interface: 12726
Recommended Cable	Belden #8761 or equivalent
Maximum Wire Size	Two 14 AWG wires per terminal
Maximum Cable Impedance	Voltage Source (with less than 10 Ω impedance): 40 Ω maximum loop impedance, for <1LSB error Current Source (transmitter properly wired to its power supply): 250 Ω maximum loop impedance, to meet common-mode voltage requirements
Terminal Block	Removable, Allen-Bradley spare part Catalog Number 1746-RT25G

Environmental Specifications

Description	Specification
Operating Temperature	0°C to +55°C (32°F to 133°F) in any slot except 0 0°C to 60°C (32°F to 140°F) in right most slot of chassis
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Relative Humidity	5% to 95% (without condensation)
Agency Certification	UL listed CSA approved CE compliant for all applicable directives
Hazardous Environment Classification	Class 1 Division 2 Hazardous Environment

Input Specifications

Description	Specification
Type of Input (Selectable)	±10V dc 1 to 5V dc 0 to 5V dc 0 to 10V dc 0 to 20 mA 4 to 20 mA ±20 mA 0 to 1 mA
Type of Data (Selectable)	Engineering Units Scaled-for-PID Proportional Counts (-32,768 to +32,767 range) Proportional Counts (User Defined Range, Class 3 only) 1746-NI4 Data Format
Input Impedance	1 MΩ
Voltage Input (maximum)	±30V between any two signal terminals
Current Input (maximum)	30 mA
Time to Detect Open Circuit	1 module scan
Input Step Response	(1)
Input Resolution	1 mV or 1 μA
Display Resolution	1 mV or 1 μA
Overall Module Accuracy (0°C to +60°C, +32°F to +140°F)	Voltage input types (±10V dc, 1 to 5V dc, 0 to 5V dc, 0 to 10V dc): ±0.1% Current Input Types (0 to 20 mA, 4 to 20 mA, ±20 mA): ±0.05% Current Input Type (0 to 1 mA): ±0.5%
Overall Module Drift	Voltage input type: ±6 ppm/°C Current Input Type: ±12 ppm/°C

(1 Depends on filter selected. Refer to the *1746-NI8 User Manual*, publication 1746-6.8.