# In-Sight® CIO-MICRO and CIO-MICRO-CC I/O Modules

## Installation Manual

**HVS** System

DISTRIBUTEUR CONSEIL DEPUIS 1985

AUTOMATION SOLUTION PROVIDER **ASP COGNEX**

**IN-SIGHT**
Vision Systems

| Declaration of Conformity | |
|---|---|
| **Manufacturer**: | Cognex Corporation<br>One Vision Drive<br>Natick, MA 01760 USA |
| Declares this CE-marked Machine Vision System Product | |
| **Product Type**: | In-Sight® CIO-MICRO I/O Module: TYPE 821-0016-1R<br>In-Sight® CIO-MICRO-CC I/O Module: TYPE 821-0017-1R |
| **Complies With**: | 2004/108/EC |
| **Compliance Standards:** | EN 55022:2006 Class A<br>EN 61000-6-2:2005 |
| **European Representative**: | COGNEX INTERNATIONAL<br>Immeuble "Le Patio"<br>104 Avenue Albert 1er<br>92563 Rueil Malmaison Cedex<br>France |
| Safety and Regulatory | |
| FCC | FCC Part 15, Class A<br>This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.<br><br>This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense. |
| NRTL | TUV SUD AM SCC/NRTL OSHA Scheme for UL/CAN 60950-1 |
| CB | TUV SUD AM, IEC/EN 60950-1 |
| RoHS | RoHS 6 Compliant |

| Note: | For the most up-to-date regulations and conformity information, please refer to the In-Sight online support site: http://cognexsensors.com/In-Sight |
|---|---|

Observe these precautions when installing the module to reduce the risk of injury or equipment damage:

- Power for the In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules is intended to be supplied by a listed power supply with a minimum output rated 24VDC and 750mA, a maximum short circuit current rating of less than 8A, a maximum power rating of less than 100VA, and marked Class 2 or Limited Power Source (LPS).
- Never connect the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module to a power source other than 24VDC and always use the 24VDC terminal block pins on the I/O module. Any other voltage creates a risk of fire or shock and can damage the module components.
- Do not install the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module in areas directly exposed to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity without a protective enclosure.
- Route all cables and wires away from high-voltage power sources to reduce the risk of damage or malfunction due to over-voltage, line noise, electrostatic discharge (ESD), power surges, or other irregularities in the power supply.
- The maximum torque that can be applied to the terminal block connectors is 0.0192 Nm (1.7 in-lb). Applying torque above this limit can damage the connectors.
- The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules do not contain user-serviceable parts. Do not make any electrical or mechanical modifications. Unauthorized modifications may violate your warranty.
- Changes or modifications not expressly approved by the party responsible for regulatory compliance could void the user's authority to operate the equipment.
- The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules are intended for indoor use only.
- The CIO-MICRO-CC I/O module must be grounded by attaching the module's ground terminal to a common ground.
- Both I/O modules support In-Sight 5600 series vision systems. When using an In-Sight 5600 series vision system, the vision system's Ethernet cable must be connected to the I/O module's PoE port and its I/O module cable must be connected to the I/O port.
- Access to the encoder inputs on the In-Sight 5604 (Line Scan) is not supported by these I/O modules.
- HS COMMON is not used for high-speed outputs with In-Sight 5600 series vision systems. The return must use –24VDC. See High-Speed Output To Strobe Controller (I/O Module Sinks Current) on page 46.
- Cable shielding can be degraded or cables can be damaged or wear out more quickly if a bend radius or service loop is tighter than 10X the cable diameter.
- Service loops should be included with RJ-45 connections.

# In-Sight CIO-MICRO and CIO-MICRO-CC I/O Module Overview

The In-Sight® CIO-MICRO and CIO-MICRO-CC I/O modules provide a convenient way to access the In-Sight Micro or 5600 series vision system's power, trigger, and high-speed output connections. These modules also extend the capabilities of the In-Sight Micro or 5600 series vision system by adding discrete inputs/outputs, and Ethernet access. The modules add hardware handshaking for serial communications for the supported In-SIght vision systems. The CIO-MICRO-CC I/O module also adds CC-Link networking capability.

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O module features include:

- Ethernet Port for PC or LAN
- Power over Ethernet (PoE) port for In-Sight Micro vision systems
- DIN rail mount
- 8 inputs and 8 outputs, optically isolated and over-voltage protected
- Support for sinking (NPN) and sourcing (PNP) devices
- RS-232 port
- Support for the supported In-Sight vision system's built-in high-speed outputs and trigger input
- LED status indicators for all discrete inputs/outputs
- Removable terminal blocks
- Support for CC-Link with status LEDs (CIO-MICRO-CC only)

Power and Ethernet connectivity are provided to the In-Sight Micro vision system by the In-Sight I/O modules using an M12/RJ-45 Ethernet cable, which is purchased separately. This cable and other available I/O cables are discussed in Cables on page 2.
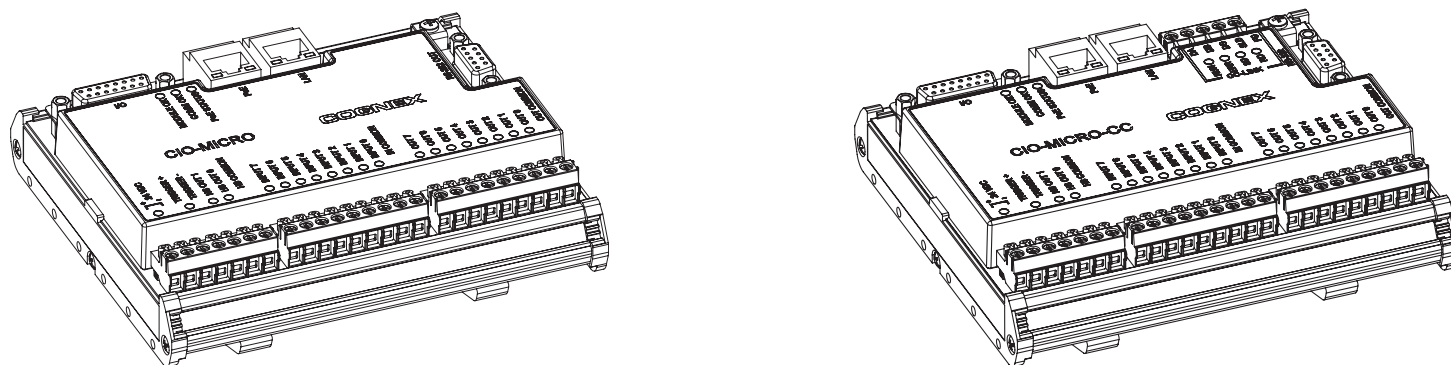


**Figure 1-1: In-Sight CIO-MICRO Module (P/N 821-0016-1R) and CIO-MICRO-CC (P/N 821-0017-1R)**

# Cables

## Ethernet Cable

The Ethernet cable, shown in Figure 1-2, connects the In-Sight I/O module's PoE (Power over Ethernet) port to an In-Sight Micro or 5600 series vision system, which provides ethernet connectivity. When this cable is connected to the In-Sight Micro vision system, the Micro vision system is also provided with power, which is not used with In-Sight 5600 series vision systems. The pin-outs are listed on page 28. This cable, purchased separately, is available in the lengths and styles listed in Table 1-1.

**Table 1-1: M12/RJ-45 Ethernet Cables**

| Length | Standard Part # | 45-Degree Key Right-Angle Part # | 135-Degree Key Right-Angle Part # |
|--------|-----------------|----------------------------------|-----------------------------------|
| 0.6 m  | CCB-84901-1001-00 | N/A | N/A |
| 2 m    | CCB-84901-1002-02 | CCB-84901-6005-02 | CCB-84901-7005-02 |
| 5 m    | CCB-84901-1003-05 | CCB-84901-6001-05 | CCB-84901-7001-05 |
| 10 m   | CCB-84901-1004-10 | CCB-84901-6002-10 | CCB-84901-7002-10 |
| 15 m   | CCB-84901-1005-15 | CCB-84901-6003-15 | CCB-84901-7003-15 |
| 30 m   | CCB-84901-1006-30 | CCB-84901-6004-30 | CCB-84901-7004-30 |



**M12 Connector**   **RJ-45 Connector**   **M12 Connector 135 Degree Key**   **M12 Connector 45 Degree Key**   **M12 Connector 135 Degree Key**
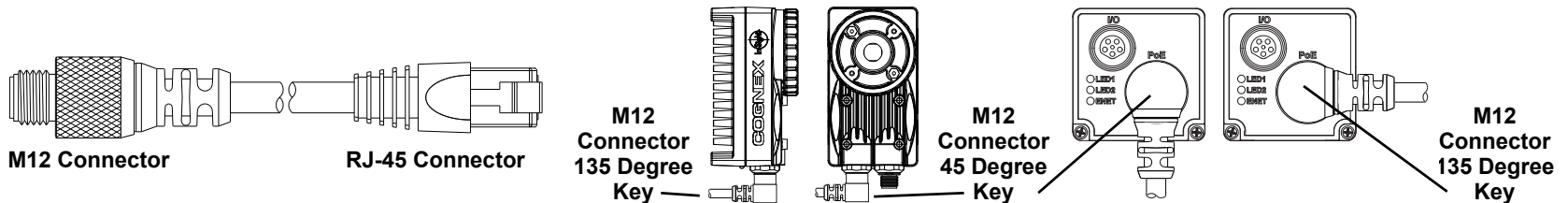
**Figure 1-2: Micro M12/RJ-45 Ethernet Cable**

**Caution:** The In-Sight CIO-MICRO and CIO-MICRO-CC I/O Module PoE ports provide power for In-Sight Micro vision systems and Ethernet connectivity for In-Sight Micro and 5600 series vision systems. Connecting any other devices to this port other than a 5600 series vision system could damage the In-Sight I/O module.

# In-Sight Micro Vision System I/O Module Cable

The I/O module cable for In-Sight Micro vision systems, shown in Figure 1-3, connects the In-Sight Micro vision system's trigger and high-speed signals to the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module using the module's I/O port. The In-Sight Micro vision system uses only the trigger signals, the high-speed outputs, and the HS COMMON signal. It does not use the power that is available from the In-Sight Micro's I/O connection. The pin-outs for the I/O port are listed on page 30. This cable, purchased separately, is available in the lengths listed in Table 1-2.

**Table 1-2: M8/DB15 I/O Cables**

| Length | Part # |
|--------|--------|
| 0.7 m | CCB-M8DSIO-00 |
| 2 m | CCB-M8DSIO-02 |
| 5 m | CCB-M8DSIO-05 |
| 10 m | CCB-M8DSIO-10 |
| 15 m | CCB-M8DSIO-15 |

**M8 Connector**

**DB15 Connector**
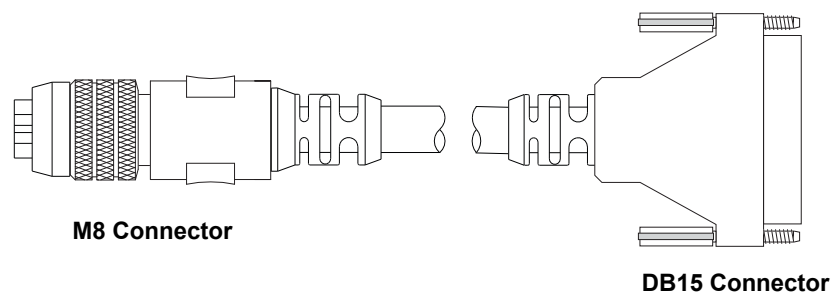
**Figure 1-3: I/O Module Cable**

**3**

# In-Sight 5600 Series Vision System I/O Module Cable

The I/O module cable for In-Sight series 5600 vision systems, shown in Figure 1-4, connects the In-Sight 5600 Series vision system's trigger, high-speed outputs, power, and ground signals to the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module using the module's I/O port. The pin-outs for the I/O port are listed on page 30. This cable, purchased separately, is available in the lengths listed in Table 1-3.

**Table 1-3: M12/DB15 I/O Module Cables**

| Length | Standard Part # | 45-Degree Key Right-Angle Part # | 135-Degree Key Right-Angle Part # |
|--------|-----------------|----------------------------------|-----------------------------------|
| 2 m | CCB-84901-0901-02 | CCB-84901-4001-02 | CCB-84901-5001-02 |
| 5 m | CCB-84901-0902-05 | CCB-84901-4002-05 | CCB-84901-5002-05 |
| 10 m | CCB-84901-0903-10 | CCB-84901-4003-10 | CCB-84901-5003-10 |
| 15 m | CCB-84901-0904-15 | CCB-84901-4004-15 | CCB-84901-5004-15 |



M12 Connector

DB15 Connector

M12 Connector 45 Degree Key

M12 Connector 135 Degree Key
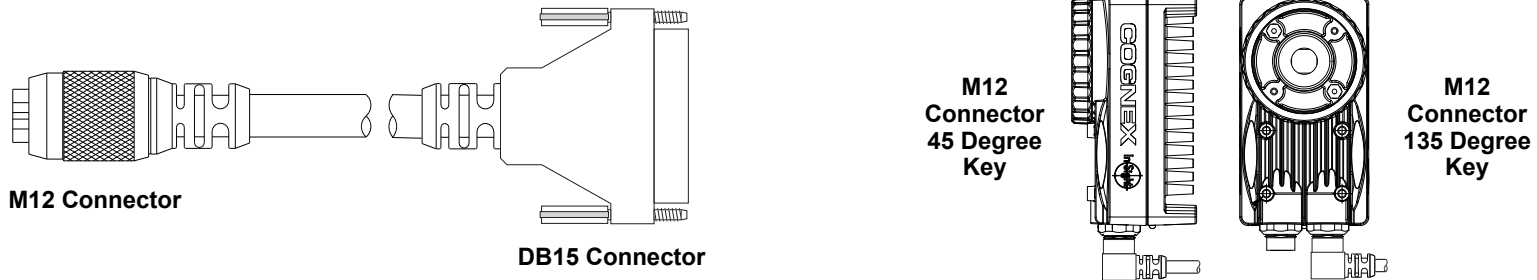
**Figure 1-4: I/O Module Cable**

# In-Sight Support

Several information resources are available to assist you in using the In-Sight CIO-MICRO or CIO-MICRO-CC I/O Module with the In-Sight Micro and 5600 series vision systems:

- *In-Sight*®*Explorer Help*, an online HTML Help file installed with the In-Sight Explorer software.
- In-Sight computer-based tutorials provided on CD-ROM with selected In-Sight starter accessories kits.
- *In-Sight Micro Series Vision System Installation Manual*, Cognex P/N 597-0109-XX (English, Chinese-simplified, German, Spanish-European, French, Japanese, Korean versions available.)
- *In-Sight 5000 Series Vision System Installation Manual*, Cognex P/N 597-0027-XX (English, Chinese-simplified, German, Spanish-European, French, Japanese, Korean versions available.)
- In-Sight online support: http://cognexsensors.com/In-Sight.

This section explains how to connect the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module using standard and optional components. For a complete list of options and accessories, contact your Cognex sales representative.

## Ports, Terminals, and Indicators

Figure 2-1 shows the CIO-MICRO-CC module's layout. Table 2-1 describes the ports, terminals, and indicators.
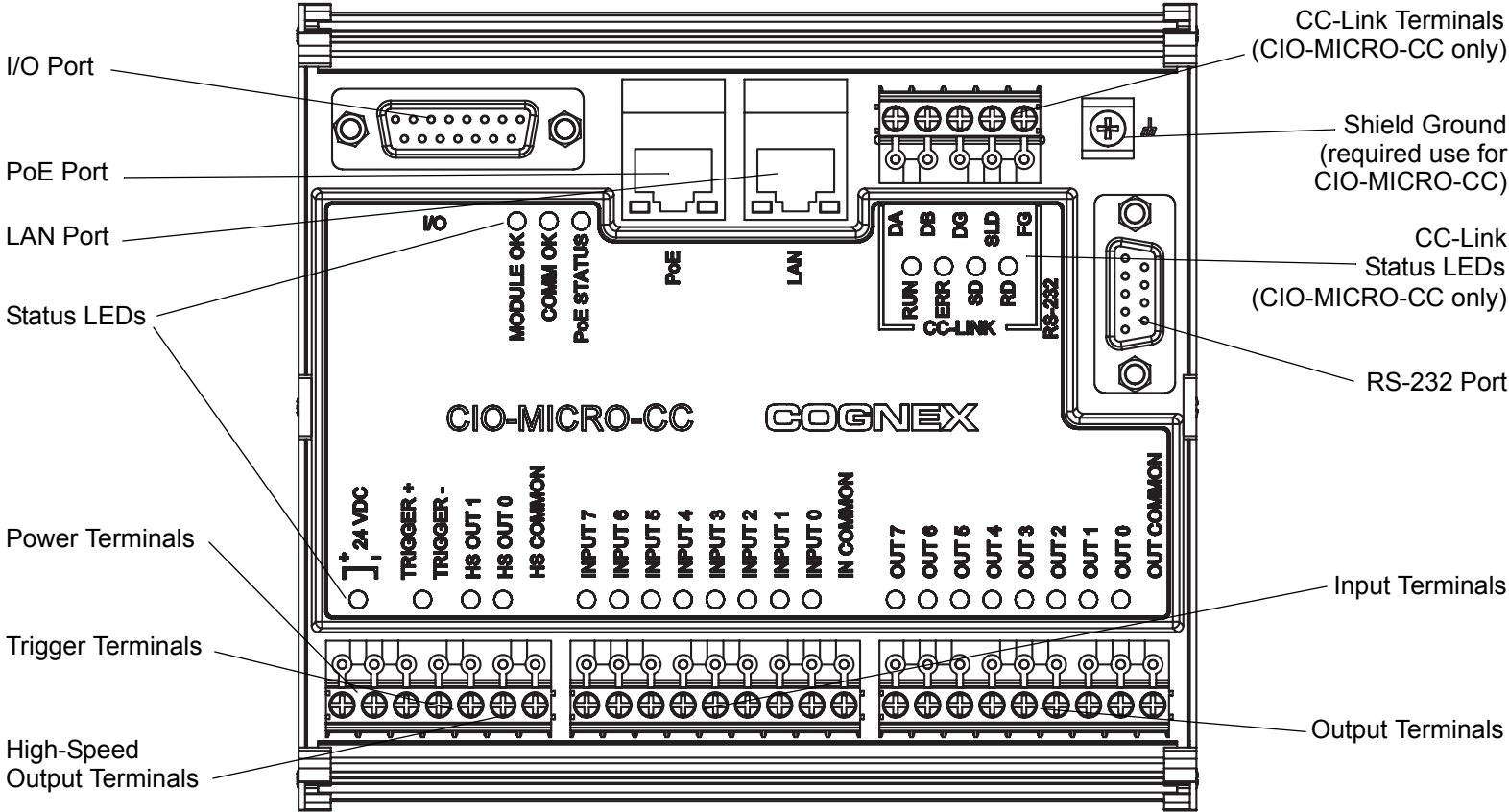


**Figure 2-1: In-Sight CIO-MICRO-CC I/O Module**

**Table 2-1: In-Sight CIO-MICRO and CIO-MICRO-CC I/O Module Ports, Terminals, and Indicators**

| Port/Indicator | Description |
|---|---|
| **COMM OK LED** | A green LED illuminates to indicate that the supported In-Sight vision system and I/O module are communicating properly. |
| **MODULE OK LED** | A green LED illuminates after the I/O module has powered on, has booted up, and is ready to communicate with the supported In-Sight vision system. |
| **I/O and Trigger Status LEDs** | Green LEDs that illuminate to indicate the an input/output signal has switched ON. |
| **High-Speed Output Status LEDs** | Green LEDs that illuminate to indicate the high-speed output signal on the attached In-Sight vision system has switched ON. The LED will illuminate even if the module's high-speed terminals are not connected to anything. The LEDs do not illuminate if the module is not connected to a supported In-Sight series vision system. |
| **CC-Link Status LEDs** | CIO-MICRO-CC only: Green and red LEDs that illuminate to indicate RUN, ERR, SD, and RD for a CC-Link operation status. |
| **I/O Port** | Connects the I/O module to a supported In-Sight vision system using an I/O module cable. Provides trigger and high-speed I/O signals to the supported In-Sight vision system. Also provides power to an In-Sight 5600 series vision system. |
| **RS-232 Port** | Connects the I/O module to an external serial device using an RS-232 DB9 serial cable. Provides RS-232 communications to the supported In-Sight vision system. |
| **PoE Port** | Connects the I/O module to a supported In-Sight vision system providing the vision system with Ethernet I/O. Also provides Power over Ethernet (PoE) to In-Sight Micro vision systems. |
| **LAN Port** | Connects the I/O module to an Ethernet network. |
| **Shield Ground Terminal** | Connects the I/O module to a common ground. Required use with CIO-MICRO-CC. |
| **Terminal Blocks** | Connects the I/O module to 24VDC power, trigger, external I/O, high-speed outputs, CC-Link (CIO-MICRO-CC only), and common connections. |

| | |
|---|---|
| **Note:** | The In-Sight CIO-MICRO and CIO-MICRO-CC I/O module high-speed outputs labeled HS OUT 0 and HS OUT 1 correspond to the In-Sight Micro or 5660 series vision system's built-in high-speed outputs. These signals are considered high-speed because they pass directly through the I/O module without processing, which provides minimal delay. |

# Connecting the I/O Module

To connect the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module to a Micro vision system:

1. Verify that your 24VDC power supplies are switched off.
2. Determine how devices will be connected to the I/O module's input and output ports and terminals and use a screw driver to loosen the appropriate screw terminals. Common wiring configurations are shown in Appendix A on page 35. Refer to Port and Terminal Block Specifications on page 27 for port and terminal block pin assignments.
3. Insert the +24VDC and negative ground (-24VDC) from the power supply into the 24VDC + and – terminal block positions, as shown in Figure 2-2. With the CIO-MICRO-CC, connect the Shield Ground to a common ground.



**Figure 2-2: Connecting Power and I/O Wires**

**Caution:** Never connect the In-Sight Micro I/O Module to a power source other than 24VDC. Any other voltage creates a risk of fire or shock and can damage the hardware. Do not connect the 24VDC power source to any terminals other than the 24VDC + – power connectors.

4. Tighten the screw terminals with the screwdriver to secure the wire leads in the terminal block; the maximum torque is 0.0192 Nm (1.7 in-lb).

5. Insert the the signal and common wire leads from remote I/O devices into the appropriate positions on the terminal block, as shown in Figure 2-2. With the CIO-MICRO-CC, connect the Shield Ground to a common ground.
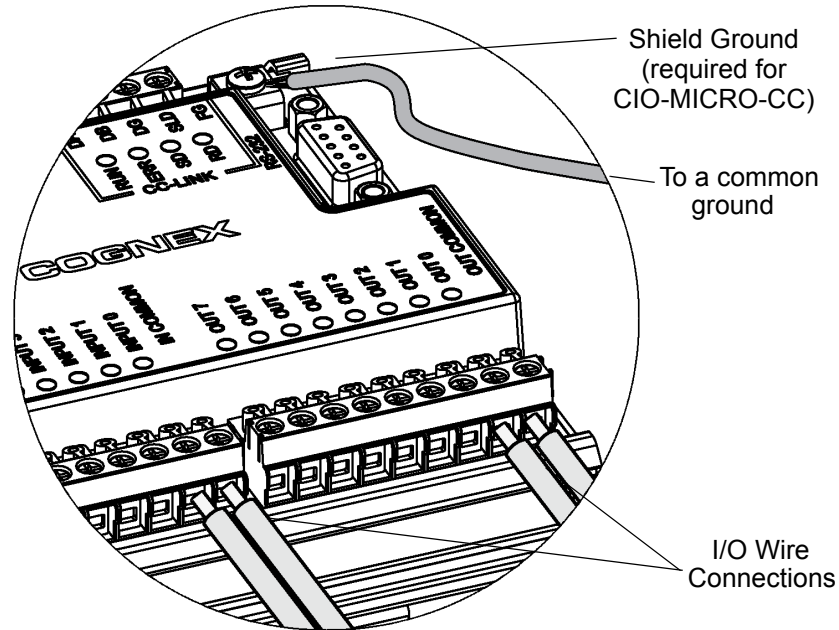


**Figure 2-3: Connecting Power and I/O Wires**
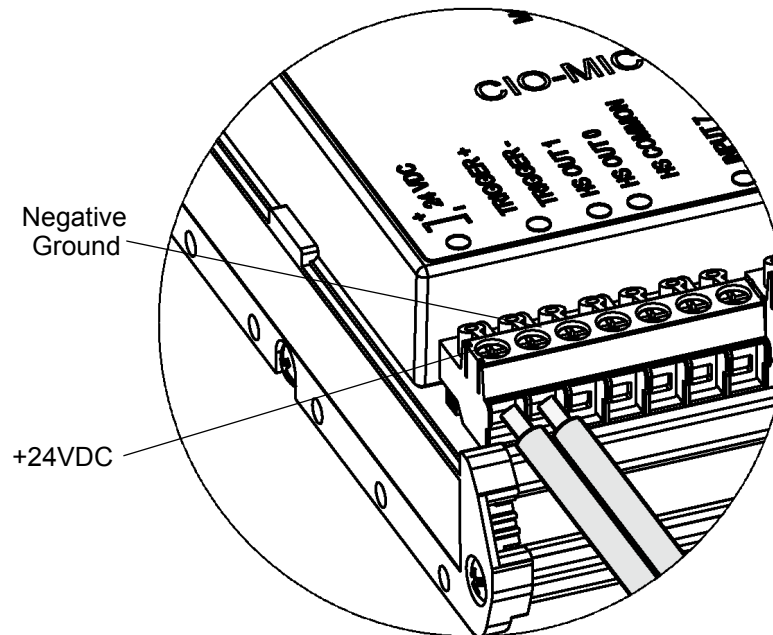
6. Tighten the screw terminals with the screwdriver to secure the wire leads in the terminal block; the maximum torque is 0.0192 Nm (1.7 in-lb).

7.    Connect the I/O module to an In-Sight vision system using one of the following procedures:

To connect the I/O module to an In-Sight Micro vision system:

a. Provide Ethernet and power to the Micro vision system by plugging the Ethernet cable's RJ-45 connector into the I/O module's PoE RJ-45 port, as shown in Figure 2-4, and connecting the Ethernet cable's keyed M12 connector into the In-Sight Micro vision system's PoE port, as shown in Figure 2-4.



**Figure 2-4: Connecting the Ehernet Cable to the I/O Module and Micro Vision System**

**Caution:**    The M12 connector is keyed and fits into the Micro vision system port in only one position. Forcing the connection can damage the connector or the vision system.

b.  If you want to use the In-Sight Micro vision system's high-speed outputs or trigger, plug the I/O module cable's DB15 connector into the I/O module's I/O port, as shown in Figure 2-5, and connect the I/O module cable's keyed M8 connector into the In-Sight Micro vision system's I/O port, as shown in Figure 2-5.



**Figure 2-5: Connecting the I/O Cable to the I/O Module**

**Caution:**    The M8 connector is keyed and fits into the Micro vision system port in only one position. Forcing the connection can damage the connector or the vision system.

To connect the I/O module to an In-Sight 5600 Series vision system:

a. Plug the Ethernet cable's RJ-45 connector into the I/O module's PoE RJ-45 port, as shown in Figure 2-4, and connect the Ethernet cable's keyed male M12 connector into the In-Sight 5600 series vision system's Ethernet port, as shown in Figure 2-4.

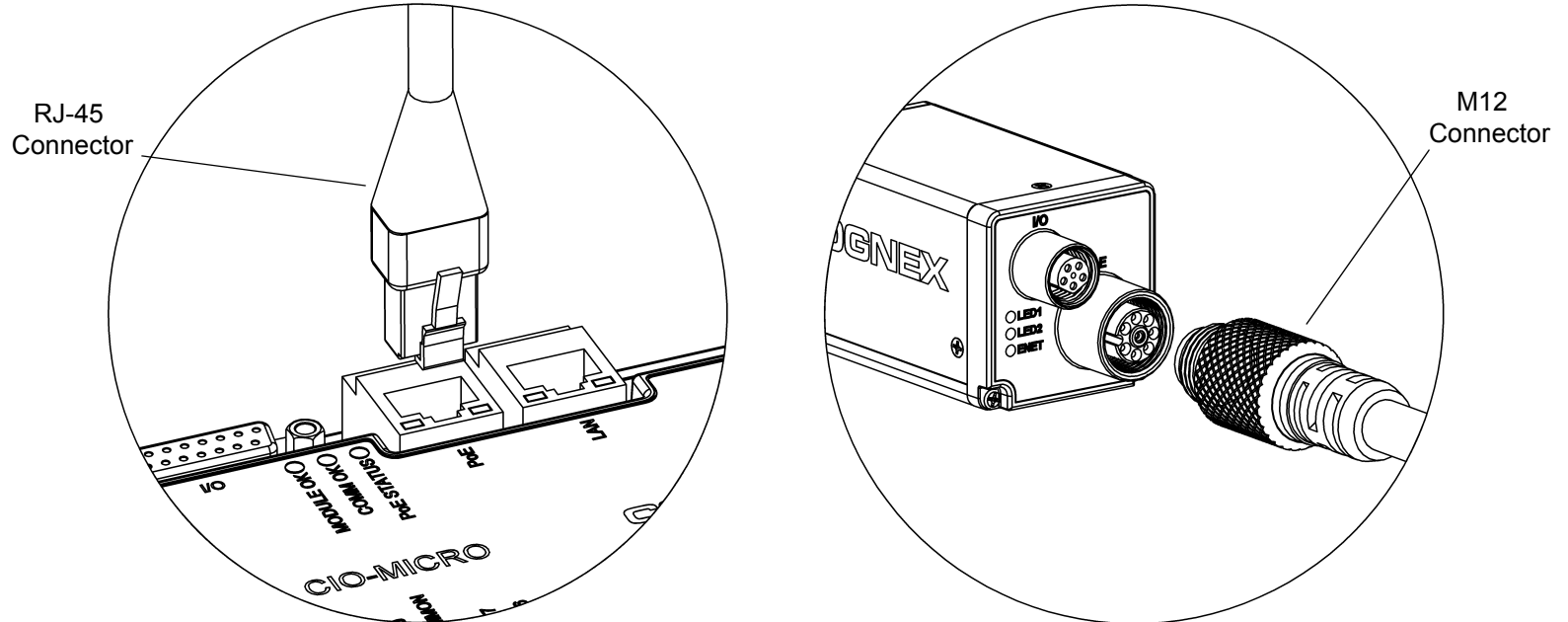RJ-45
Connector

M12 Male
Connector

**Figure 2-6: Connecting the Ehernet Cable to the I/O Module and 5600 Series Vision System**

**Caution:** The M12 connector is keyed and fits into the In-Sight 5600 series vision system port in only one position. Forcing the connection can damage the connector or the vision system.

b.  Plug the I/O module cable's DB15 connector into the I/O module's I/O port, as shown in Figure 2-5, and connect the I/O module cable's keyed female M12 connector into the In-Sight 5600 series vision system's 24VDC port, as shown in Figure 2-5.
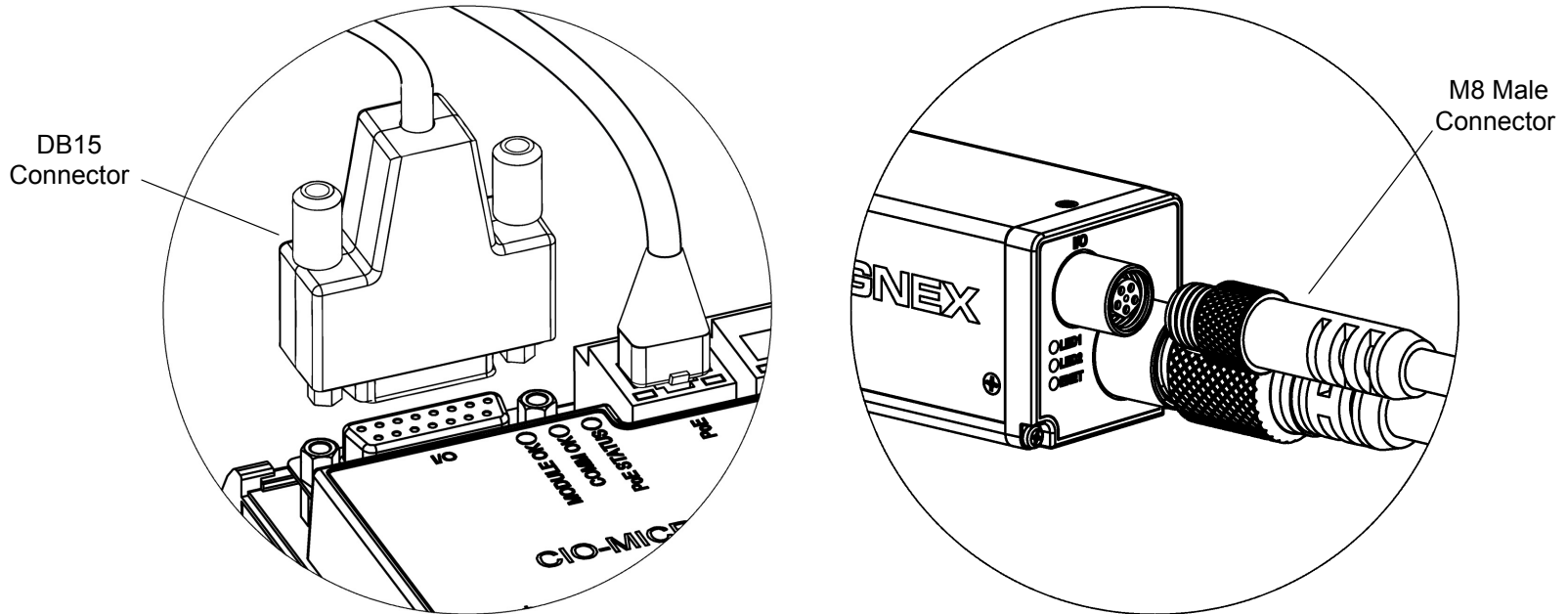


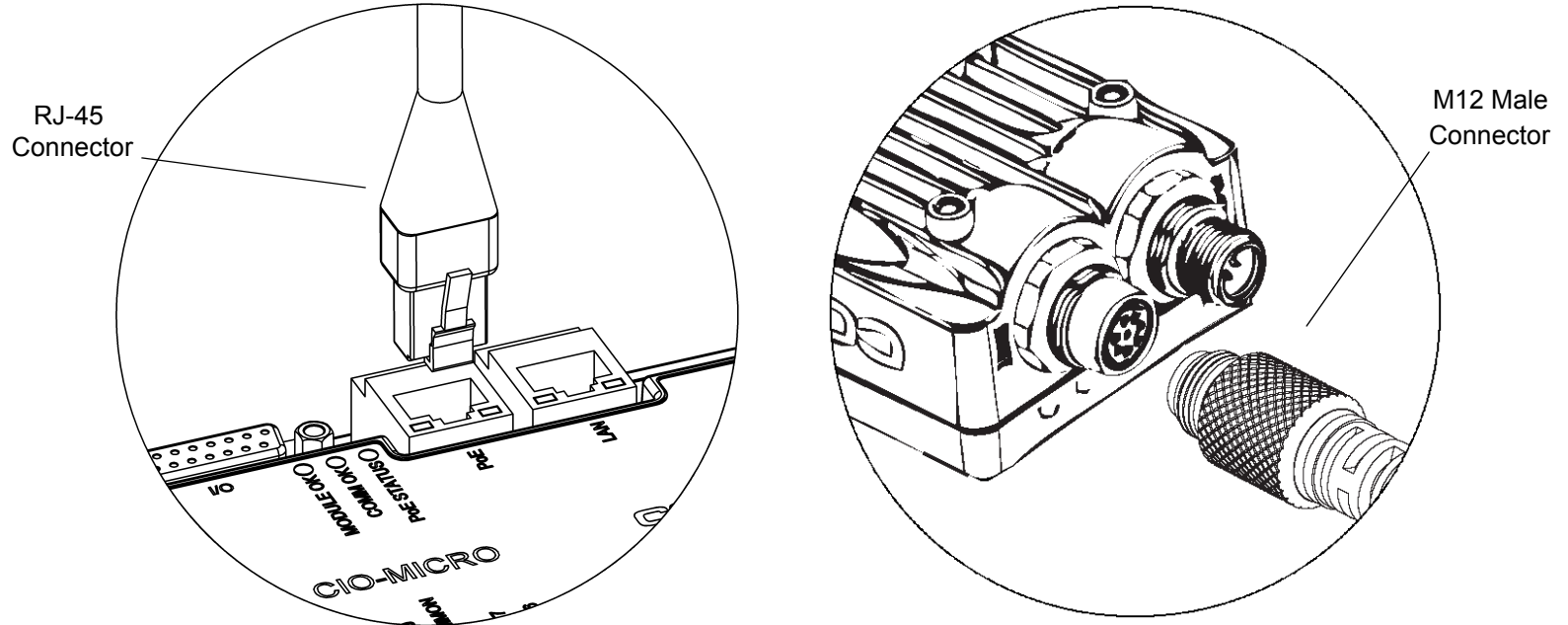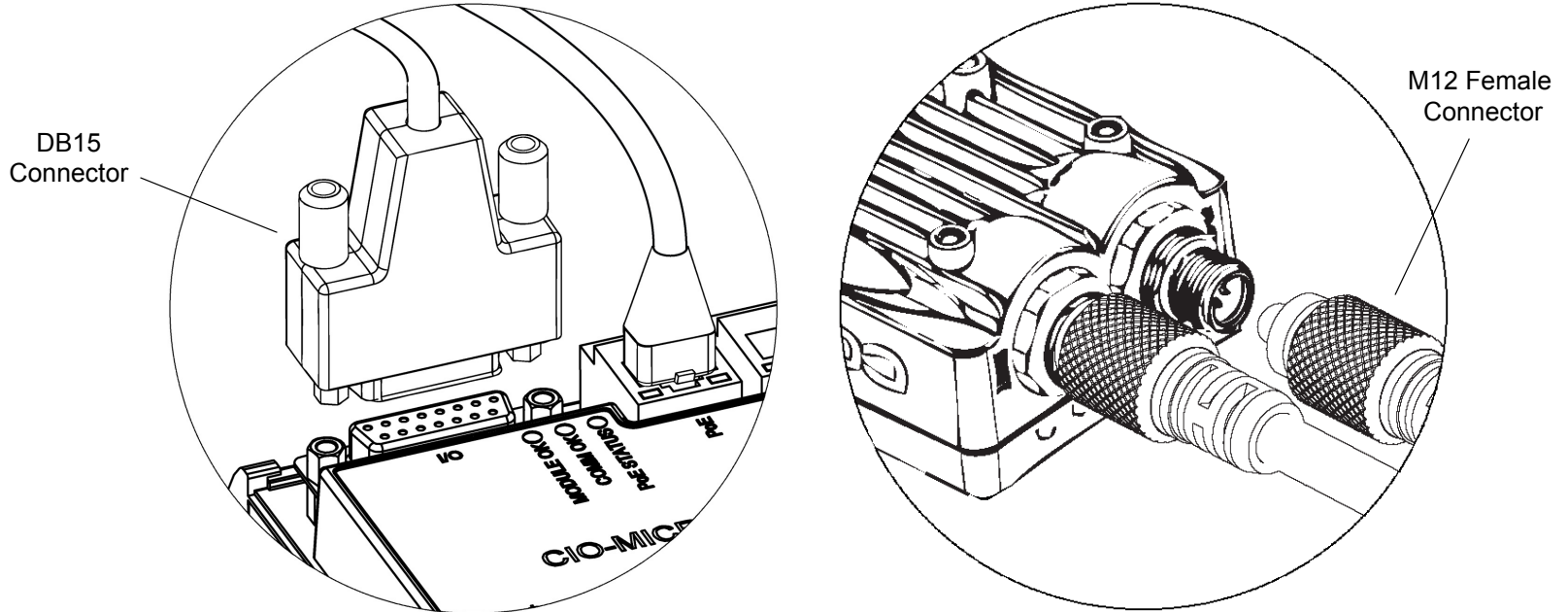**Figure 2-7: Connecting the I/O Cable to the I/O Module**

**Caution:**   The M12 connector is keyed and fits into the In-Sight 5600 series vision system port in only one position. Forcing the connection can damage the connector or the vision system.

8.  If you want to connect the In-Sight vision system to a serial device, plug the RS-232 serial cable (DB9 connector) into the I/O module's RS-232 port, as shown in Figure 2-8, and connect the other end of the cable to the serial device. Tighten the connector screws to secure it to the I/O module.
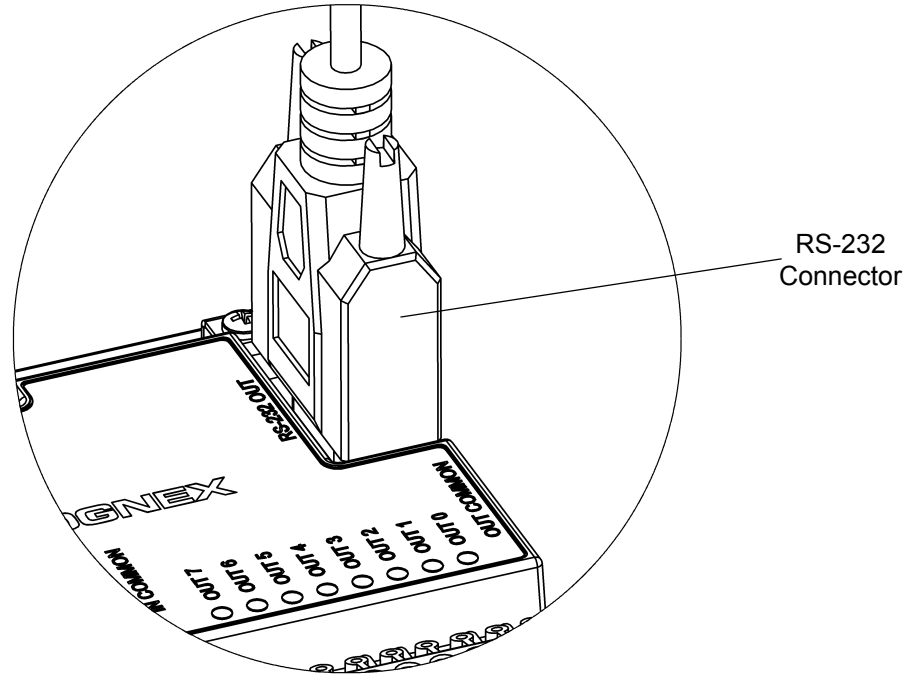


**Figure 2-8: Connecting the RS-232 Cable**

9. CIO-MICRO-CC only: If you want to connect the supported In-Sight vision system to a CC-Link device, connect one end of your CC-Link cables to the CIO-MICRO-CC CC-Link terminals as shown in Figure 2-9 and the other end of the cables to the other CC-Link devices. The CC-Link network is daisy-chained and may require a terminal resistor. Make certain that your connections are correct. For more information, see the *CC-Link Cable Wiring Manual* at http://www.cc-link.org/eng/t_html/index.html. An example of a CC-Link network is depicted on page 49.
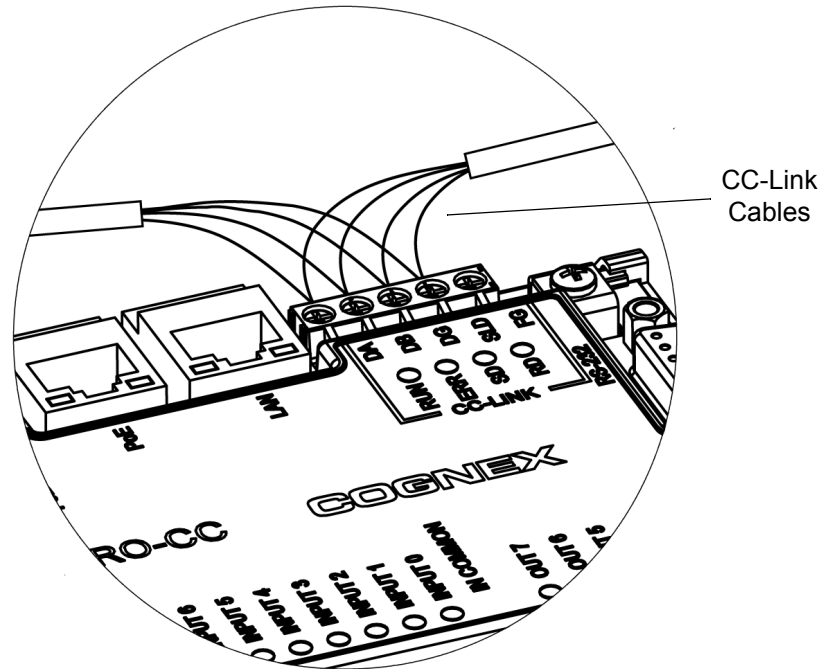


CC-Link Cables

**Figure 2-9: Connecting the CC-Link Cable**

10. Tighten the screw terminals with the screwdriver to secure the wire leads in the terminal block; the maximum torque is 0.0192 Nm (1.7 in-lb).

11. Connect the I/O module to an Ethernet network by plugging one end of an Ethernet cable to the I/O module's LAN RJ-45 port, as shown in Figure 2-9, and the other end to the network.



**Figure 2-10: Connecting the I/O Module to a Network**

12. Turn on the power supply.
13. Use In-Sight Explorer software running on a PC to connect to the In-Sight Micro or 5600 series vision system and configure the vision system and the I/O module. For more information, see the online help, which is available from the Help menu or by pressing the F1 key.

# Configuring and Operating the I/O Module

## In-Sight Vision System Connections

Note the following regarding connections to the In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules:

- By default, the In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules use DHCP to obtain an IP address and connect to a network. If no DHCP server is available, the module times out and binds to a link-local IP address. The module can also be configured with a static IP address.
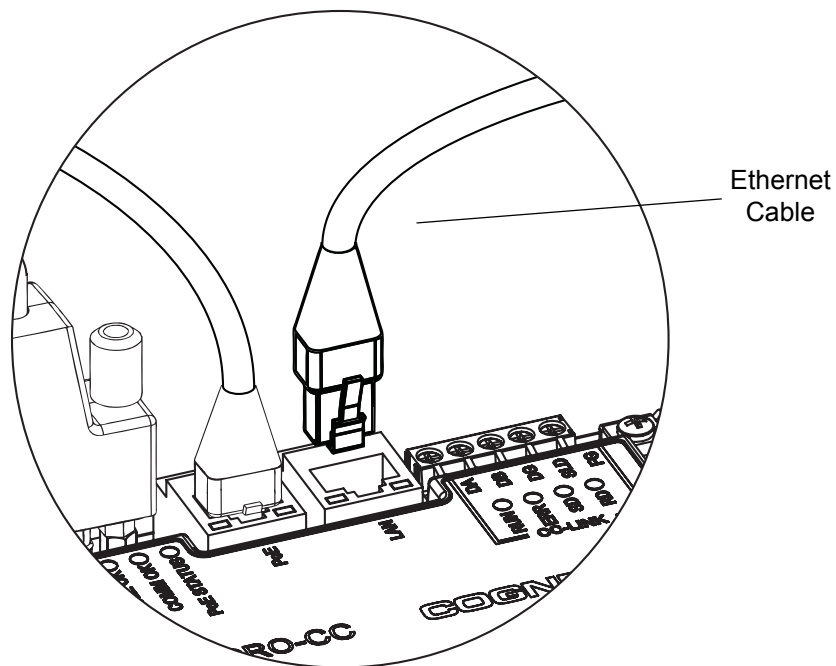- The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules connect to the first In-Sight Micro or 5600 series vision system that requests a connection.
- A connection to the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module can come from an In-Sight Micro or 5600 series vision system connected directly to the module using the PoE port or from the network to which the module is connected via the LAN port.
- The connection between the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module and an In-Sight Micro or 5600 series vision system is maintained when power is cycled.

## Firmware

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O module firmware can be upgraded using the Spreadsheet View or EasyBuilder View in In-Sight Explorer 4.2.0 or later for the CIO-MICRO and 4.3.0 or later for the CIO-MICRO-CC. Look for "firmware" in the In-Sight Explorer online help index, which is available from the Help menu or by pressing the F1 key.

## Configuring the I/O Module

The In-Sight CIO-MICRO I/O module can be configured from In-Sight Explorer 4.2.0 or later. The In-Sight CIO-MICRO-CC I/O module can be configured from In-Sight Explorer 4.3.0 or later. You can change the module's host name and configure the network settings using the Spreadsheet View or EasyBuilder View. Look for "discrete input settings" or "discrete output settings" in the In-Sight Explorer online help index, which is available from the Help menu or by pressing the F1 key.

## Configuring the In-Sight Vision System

Instructions for configuring an In-Sight Micro or 5600 series vision system to use an In-Sight CIO-MICRO and CIO-MICRO-CC I/O module are included in the I/O sections of the In-Sight Explorer online help, which is available from the Help menu or by pressing the F1 key.

## General Specifications

**Table 3-1: In-Sight CIO-MICRO and CIO-MICRO-CC General Specifications**

| Specification | | Description |
|---|---|---|
| Minimum Firmware Version | CIO-MICRO | In-Sight version 4.2.0 or later |
| | CIO-MICRO-CC | In-Sight verion 4.3.0 or later |
| Compatibility | | In-Sight Micro series and 5600 series vision systems |
| I/O | Trigger | Optically isolated trigger input;<br>ON: 20 to 28V (24V nominal), 2.2 to 3.3 mA<br>OFF: 0 to 3V (12V nominal threshold), <308µA; Resistance ~9,000 Ohms |
| | Inputs | 8 general purpose, optically isolated discrete (Maximum 30VDC, 100 mA) |
| | Outputs | 8 general purpose, optically isolated discrete (Maximum 30VDC, 100 mA) |
| | High-Speed Outputs | In-Sight Micro series vision systems: 2 optically isolated discrete (Maximum 28VDC, 100 mA)<br>In-Sight 5600 series vision systems: 2 discrete (Maxiumum 28VDC, 200 mA) |
| | CC-Link | CIO-MICRO-CC only. Standard CC-Link terminal connectors. See the CC-Link specifications for more information. |
| Ports | Ethernet (LAN) | RJ-45 10/100/1000 port (IEEE 802.3 Type 10Base-T; IEEE 802.3u Type 100Base-TX; IEEE 802.3ab 100Base-T Ethernet) |
| | PoE | RJ-45 10/100 port (IEEE 802.3 Type 10Base-T; IEEE 802.3u Type 100Base-TX; IEEE 802.3ab 100Base-T Ethernet) with PoE |
| | Serial (RS 232) | 1 RS-232C port (2400-115,200 baud), 8 data bits, 1 stop bit, RxD, TxD, and flow control (RTS/CTS & XON/XOFF) |
| | I/O | DB15 I/O providing Trigger, HS OUT 0, and HS OUT 1 signals to In-Sight Micro and 5600 series vision systems, and 24VDC and ground to In-Sight 5600 series vision systems. HS COMMON is used only with Micro vision systems. |
| Status LEDs | | MODULE OK, COMM OK, PoE STATUS, Trigger, and one for each input and output.<br>CIO-MICRO-CC only: CC-Link status LED for RUN, ERR, RD, and SD. |
| Mechanical | Housing | Black plastic |
| | Mounting | #3 DIN-rail (35 mm) |
| | Dimensions | Width: 139.5 mm (5.49 in), Depth: 125.4 mm (4.94 in), Height: 51.3 mm (2.02 in) |
| | Terminal Block | 16 AWG to 22 AWG<br>Torque 0.0192 Nm (1.7 in-lb.) |
| | Weight | 295 g (10.4 oz.) |

**Table 3-1: In-Sight CIO-MICRO and CIO-MICRO-CC General Specifications (Continued)**

| Specification | | Description |
|---|---|---|
| Electrical | Current | 600mA (maximum) |
| | Voltage | 24V +/- 10% |
| | Power Consumption | 14.4W (maximum) |
| Power Supply | | +24VDC +/- 10% |
| Environmental | Temperature | Operating: 0°C to 45°C (32°F to 113°F) Storage: –10°C to 65°C (14°F to 149°F) |
| | Humidity | Operating and Storage: 0 to 90%, non-condensing |
| | Altitude | 2000 m (6565 ft) |
| | Pollution Degree | 2 |
| | Shock | 30 G per IEC 68-2-27 |
| | Vibration | 2 G per IEC 68-2-6 |
| Regulatory Compliance | NRTL | TUV SUD AM SCC/NRTL OSHA Scheme for UL/CAN 60950-1 |
| | CB | TUV SUD AM, IEC/EN 60950-1 |

# Input and Output Specifications

## General Purpose Inputs

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules extend the capabilities of supported In-Sight vision systems by providing eight independent, general-purpose inputs (INPUT 0 - INPUT 7) that can be used to trigger vision system events. General purpose inputs are optically isolated and are typically connected (directly or indirectly) to a vision system (such as a limit, pressure, or temperature sensor).See Appendix A on page 35 for common wiring configurations.

**Note:** Since all general purpose inputs share a common ground (IN COMMON), all connected input devices must be either current sinking or current sourcing.

**Table 3-2: General Purpose Input Specifications**

| Specification | | Description |
| --- | --- | --- |
| Voltage | | 30V (24V nominal) |
| Current | | 100 mA (max), auto-reset fuse protection |
| Delay | Module | 150 µs (maximum delay due to the I/O module) |
| | Total | 1.25 ms (time between an input state change at the I/O module and completion of transmission to the supported In-Sight vision system, which is 2 ms maximum) |
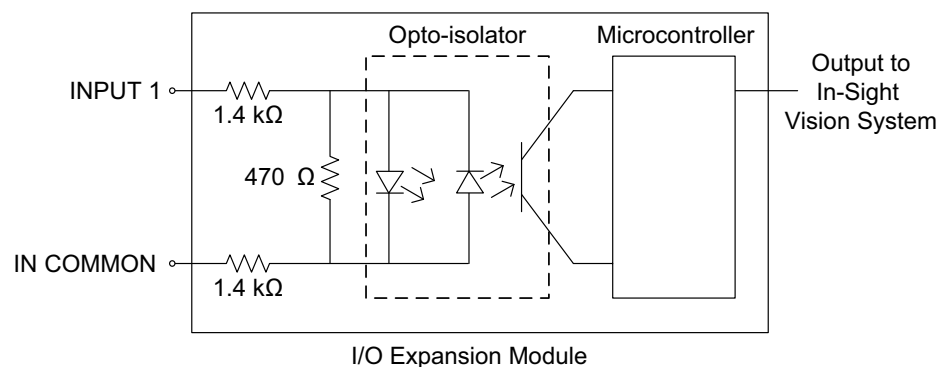


**Figure 3-1: General Purpose Input**

# General Purpose Outputs

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules extend the capabilities of supported In-Sight vision systems by providing eight independent, general-purpose outputs (OUT 0 - OUT 7) that can be used to trigger remote events. General purpose outputs are optically isolated and are typically connected (directly or indirectly) to a load (such as a relay, indicator light or motor). See Appendix A on page 35 for common wiring configurations.

| Note: | Since all general purpose outputs share a common ground (OUT COMMON), all connected output devices must be either current sinking or current sourcing. |
|---|---|

**Table 3-3: General Purpose Output Specifications**

| Specification | | Description |
|---|---|---|
| Voltage | | 30V (24V nominal) |
| Current | | 100 mA (max), auto-reset fuse protection |
| Delay | Module | 150 µs (maximum delay due to the I/O module) |
| | Typical | 2 ms (time between an input state change and completion of transmission to an In-Sight vision system) |
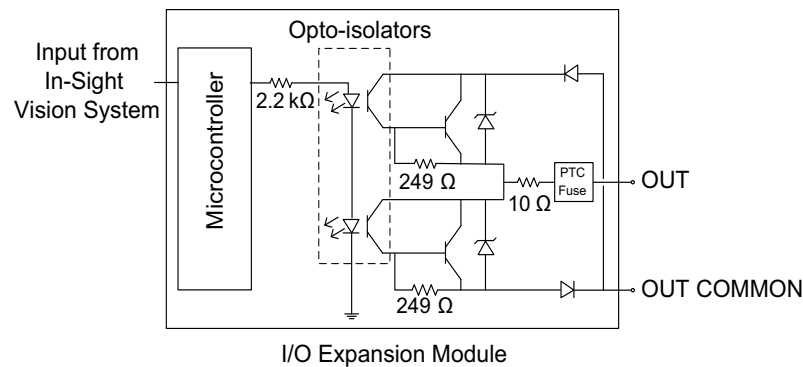


**Figure 3-2: General Purpose Output**

# Trigger Input

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules provide inputs for triggering a supported In-Sight vision system (TRIGGER +, TRIGGER-). When the I/O module is connected to a supported In-Sight vision system, trigger input signals travel directly through the I/O module and are optically isolated in the vision system. Trigger inputs are typically connected (directly or indirectly) to a sensor (such as a photo-detector). See Appendix A on page 35 for common wiring configurations.

**Table 3-4: Trigger Input Specifications**

| Specification | Description |
|---|---|
| Voltage | ON 20 - 28V (when connected to an In-Sight vision system) |
| | OFF 0 - 3V |
| Current | 3mA (when connected to an In-Sight vision system) |
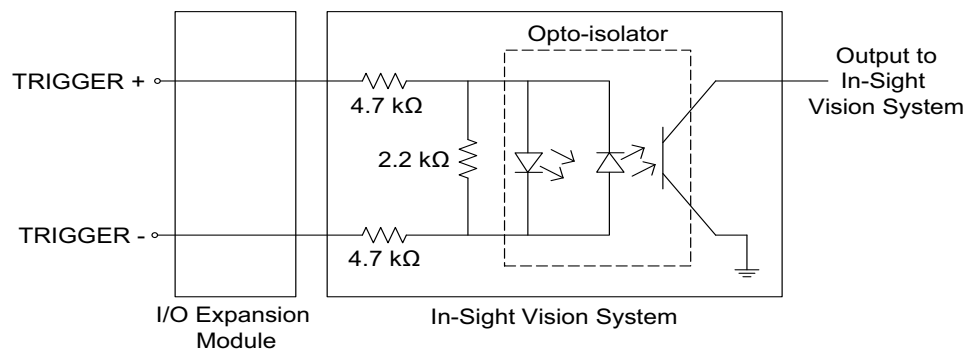


**Figure 3-3: Trigger Input**

# High-Speed Outputs

The In-Sight CIO-MICRO and CIO-MICRO-CC I/O modules provide two high-speed discrete outputs (HS OUT 0, HS OUT 1) that can be used to trigger remote events. High-speed output signals travel through the I/O module without processing. The outputs are typically connected (directly or indirectly) to a load (such as a relay, indicator light or a motor).

**Table 3-5: Output Specifications for In-Sight Micro Series Vision Systems**

| Specification | Description |
|---|---|
| Voltage | 28V max (24V nominal) |
| Current | 100 mA (max) |

**Table 3-6: Output Specifications for In-Sight 5600 Series Vision Systems**

| Specification | Description |
|---|---|
| Voltage | 28V max (24V nominal) |
| Current | 200 mA (max) |

## Using High-Speed Outputs With the In-Sight Micro Series Vision Systems

| Notes: | • Do not connect a high-speed output to OUT COMMON. High-speed outputs use HS COMMON as a return path. See Figure A-10. |
|---|---|
| | • Since both high-speed outputs share a common ground (HS COMMON), when both HS OUT 0 and HS OUT 1 are used, both must be current sinking or current sourcing. Do not mix current sinking and current sourcing on high-speed outputs. |

## Using High-Speed Outputs with the In-Sight 5600 Series Vision Systems

| Notes: | • Do not connect a high-speed output to HS COMMON or OUT COMMON. Use 24VDC – for the return. See Figure A-11 on page 46. |
|---|---|
| | • Since both high-speed outputs share a common ground (24V-), when both HS OUT 0 and HS OUT 1 are used, both must be current sinking or current sourcing. Do not mix current sinking and current sourcing on high-speed outputs. |
| | • Do not use the high-speed outputs if you need to isolate your connections. Use the general outputs, which are optically isolated. |

# Port and Terminal Block Specifications

The following sections provide specifications for the In-Sight CIO-MICRO and CIO-MICRO-CC I/O module ports and terminal block screw terminals.

## LAN Port

The LAN port is a standard Ethernet port that can be used to connect the In-Sight CIO-MICRO or CIO-MICRO-CC I/O Module to an Ethernet network. The pin assignments are listed in Table 3-7.

**Table 3-7: LAN Port Pin-Out**

| | | |
|---|---|---|
| LAN    1    8 | | |
| **Signal Name** | **Pin#** | **Wire Color** |
| Transmit + | 1 | White/Orange |
| Transmit – | 2 | Orange |
| Receive + | 3 | White/Green |
| N/A | 4 | Blue |
| N/A | 5 | White/Blue |
| Receive – | 6 | Green |
| N/A | 7 | White/Brown |
| N/A | 8 | Brown |

# PoE Port

The PoE port is an RJ-45 port that provides power and Ethernet connectivity to an In-Sight Micro vision system or Ethernet connectivity to an In-Sight 5600 series vision system. The pin-out is listed in Table 3-8.

**Caution:** Connecting any devices other than supported In-Sight Micro and 5600 series vision systems to this port could damage the In-Sight CIO-MICRO or CIO-MICRO-CC I/O module.
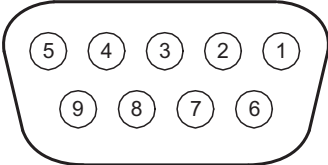
**Table 3-8: PoE Port Pin-Out**

| Signal Name | Pin# | Wire Color |
|---|---|---|
| TPO+/+48V (Mode A) | 1 | White/Orange |
| TPO–/+48V (Mode A) | 2 | Orange |
| TPI+/+48V RTN (Mode A) | 3 | White/Green |
| Spare A | 4 | Blue |
| Spare A | 5 | White/Blue |
| TPI–/+48V RTN (Mode A) | 6 | Green |
| Spare B | 7 | White/Brown |
| Spare B | 8 | Brown |

# RS-232 Port

The RS-232 port provides serial communication fuctionality to supported In-Sight vision systems. The RS-232 port pin assignments are listed in Table 3-9.
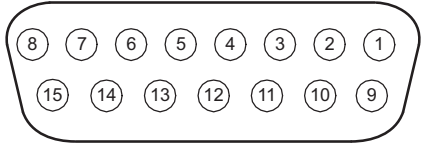
**Table 3-9: RS-232 Port Pin Assignments**



| Pin # | Assignment | Pin # | Assignment |
|-------|-----------|-------|-----------|
| 1 | No Connect | 6 | No Connect |
| 2 | TxD | 7 | CTS |
| 3 | RxD | 8 | RTS |
| 4 | No Connect | 9 | No Connect |
| 5 | GND | | |

# I/O Port

The module's I/O port allows the supported In-Sight vision system to handle triggers and high-speed outputs and provides power and ground to the In-Sight 5600 series vision systems. The I/O port pin assignments are listed in Table 3-10.

**Table 3-10: I/O Connector Pin Assignments**

| Pin # | Assignment | Pin # | Assignment |
|:---:|:---:|:---:|:---:|
| 1 | +24VDC [1] | 9 | Not Used |
| 2 | TRIGGER + | 10 | Not Used |
| 3 | TRIGGER – | 11 | Not Used |
| 4 | HS OUT 0 | 12 | Not Used |
| 5 | HS OUT 1 | 13 | Not Used |
| 6 | Not Used | 14 | Not Used |
| 7 | Not Used | 15 | HS COMMON[2] |
| 8 | –24VDC[1] | | |

1. These lines are used to power the In-Sight 5600 series vision systems, but are not used with In-Sight Micro vision systems.
2. HS COMMON is used only with In-Sight Micro vision systems. In-Sight 5600 series vision systems use –24VDC as the return for high-speed outputs.

# Terminal Block Assignments

Table 3-11 shows the signal assignments for each screw terminal on the I/O module's terminal blocks.

**Table 3-11: Terminal Block Pin Assignment**



| Pin # | Assignment | Pin # | Assignment |
|---|---|---|---|
| 1 | +24VDC | 14 | INPUT 1 |
| 2 | –24VDC | 15 | INPUT 0 |
| 3 | TRIGGER + | 16 | IN COMMON |
| 4 | TRIGGER – | 17 | OUT 7 |
| 5 | HS OUT 1 | 18 | OUT 6 |
| 6 | HS OUT 0 | 19 | OUT 5 |
| 7 | HS COMMON | 20 | OUT 4 |
| 8 | INPUT 7 | 21 | OUT 3 |
| 9 | INPUT 6 | 22 | OUT 2 |
| 10 | INPUT 5 | 23 | OUT 1 |
| 11 | INPUT 4 | 24 | OUT 0 |
| 12 | INPUT 3 | 25 | OUT COMMON |
| 13 | INPUT 2 | | |

# CC-Link Terminal Block Connectors (CIO-MICRO-CC-Link only)

The CC-Link terminal block connectors conform to the CC-Link specifications. See the CC-Link web site for more information and the specification details: http://www.cc-link.org/eng/t_html/index.html

Table 3-12 shows the connector and LED assignments for CIO-MICRO-CC I/O module CC-Link terminal blocks.

**Table 3-12: Terminal Block Pin Assignment**



| Pin Label | Assignment | LED | Indicates |
|-----------|------------|-----|-----------|
| DA | Communication Data | RUN | Normal |
| DB | Communication Data | ERR | Error |
| DG | Ground | SD | Send |
| SLD | Shield | RD | Receive |
| FG | Earth | | |
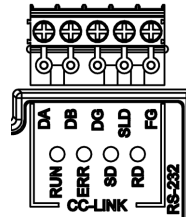
Figure 3-4 shows a typical wiring diagram for a CC-Link network.
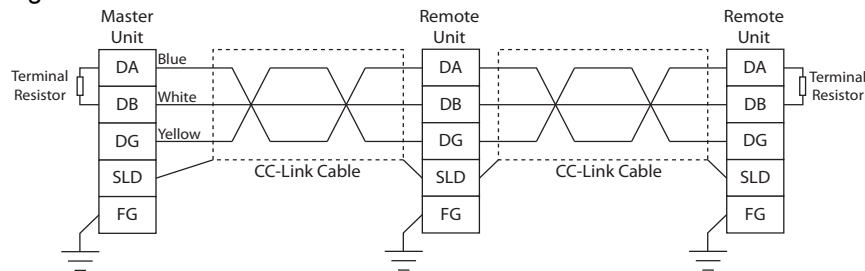


**Figure 3-4: CC-Link Network Wiring**

# Dimensions

Dimensions are in millimeters [inches], are for reference only, and may change without notice. These dimensions apply to the CIO-MICRO and the CIO-MICRO-CC.
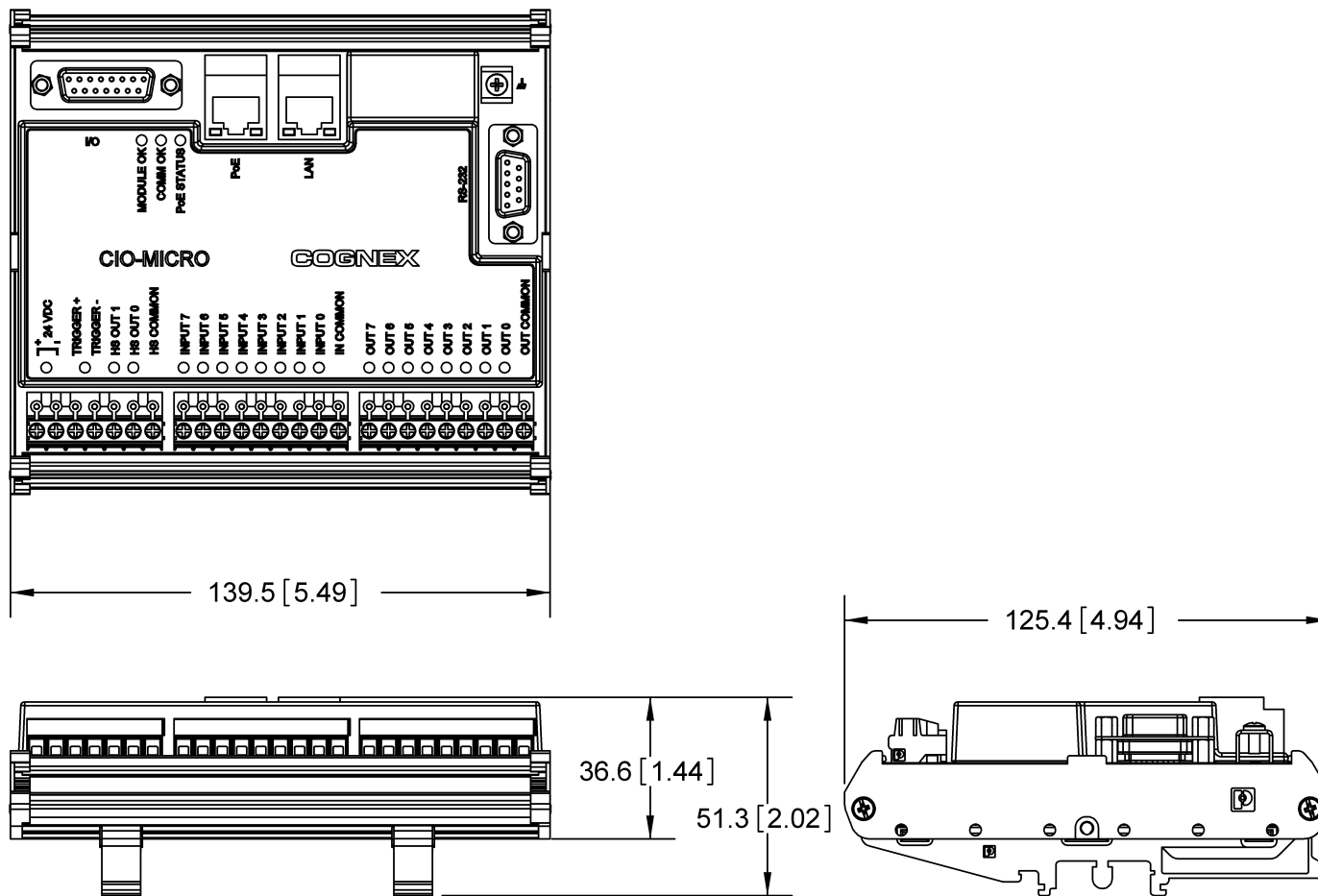


**Figure 3-5: In-Sight CIO-MICRO and CIO-MICRO-CC I/O Module Dimensions**

## Wiring Inputs and Outputs

The following figures show basic wiring for some of the more common In-Sight CIO-MICRO and CIO-MICRO-CC I/O Module configurations. The CIO-MICRO and CIO-MICRO-CC function the same in all examples, with the exception of the CC-Link example, which is limited to the CIO-MICRO-CC.

| Notes: | • Connections to both the –24VDC ground pin and the +24VDC power pin are required to supply the supported In-Sight vision systems with power. |
| --- | --- |
| | • OUT COMMON is only for general purpose outputs, not high-speed outputs. |
| | • In-Sight Micro series vision system high-speed outputs use HS COMMON for power with PNP or ground with NPN. |
| | • In-Sight 5600 series vision system high-speed outputs are NPN only and use –24VDC for the return. HS COMMON is not used. |
| | • Unless absolutely necessary, power to your device(s) should not be provided from the I/O module terminal block pin labeled +24V. If power is provided from the I/O module, general purpose inputs and outputs are no longer optically isolated. Use a separate power supply to ensure that inputs/outputs are optically isolated. |
| | • All general purpose inputs share a common connection (IN COMMON). Therefore, all input devices must be the same, either current sinking or current sourcing. Mixing inputs with sinking and sourcing could damage the I/O module or your devices. |
| | • All general purpose outputs share a common connection (OUT COMMON). Therefore, all output devices must be the same, either current sinking or current sourcing. Mixing outputs with sinking and sourcing could damage the I/O module or your devices. |
| | • Do not connect a relay to an input configured as a Job Load Switch. A signal from a relay fluctuates enough (from contact bounce) that multiple job loads are recognized. |
| | • Cable shielding can be degraded or cables can be damaged or wear out more quickly if a bend radius or service loop is tighter than 10X the cable diameter. |
| | • Service loops should be included with RJ-45 connections. |

# Trigger From Photo Eye or PLC (Photo Eye/PLC Sinks Current)

The supported In-Sight vision system trigger input is energized by a –24VDC Common signal from a photo eye or a PLC.
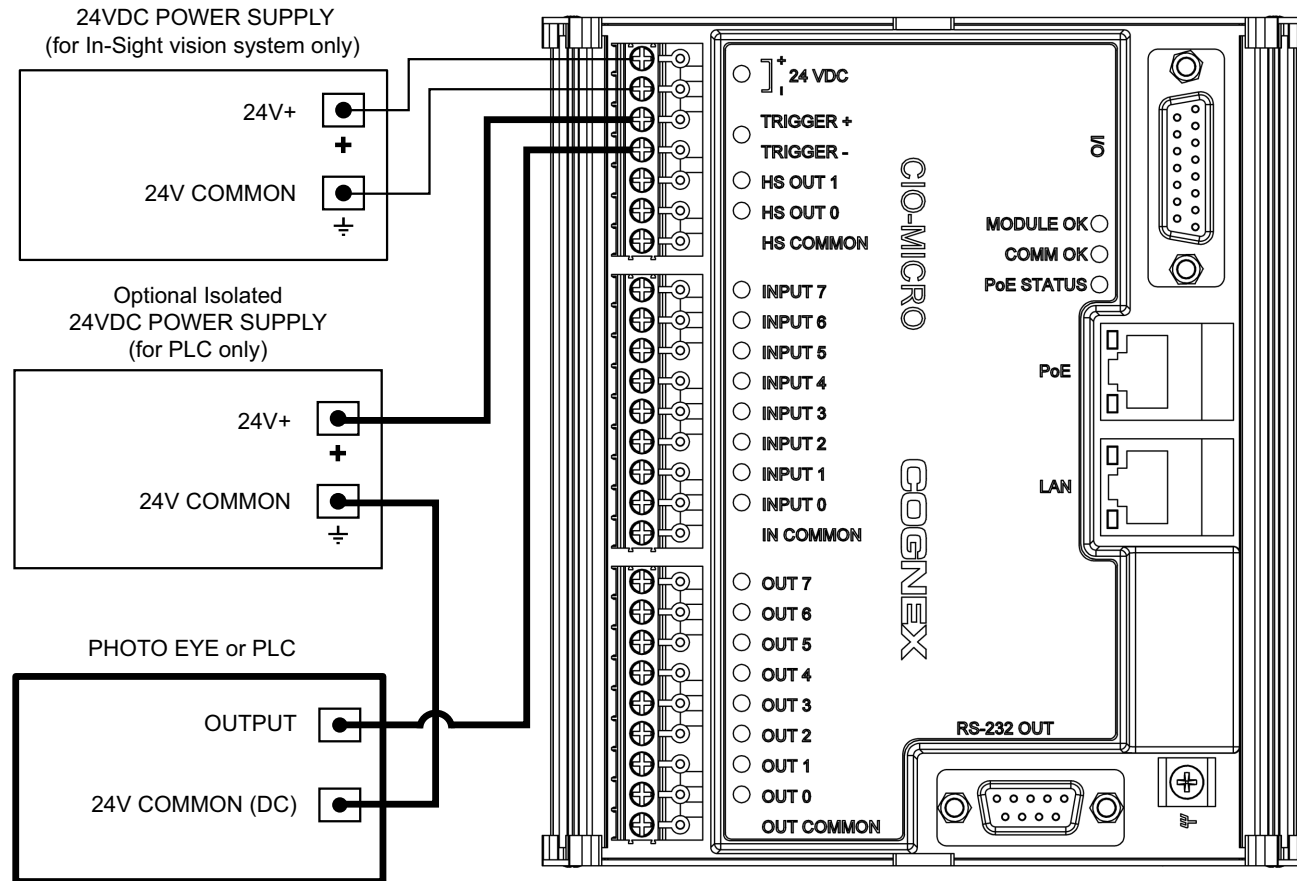


**Figure A-1: Trigger From Photo Eye or PLC (Photo Eye/PLC Sinks Current)**

# Trigger From Photo Eye or PLC(Photo Eye or PLC Sources Current)

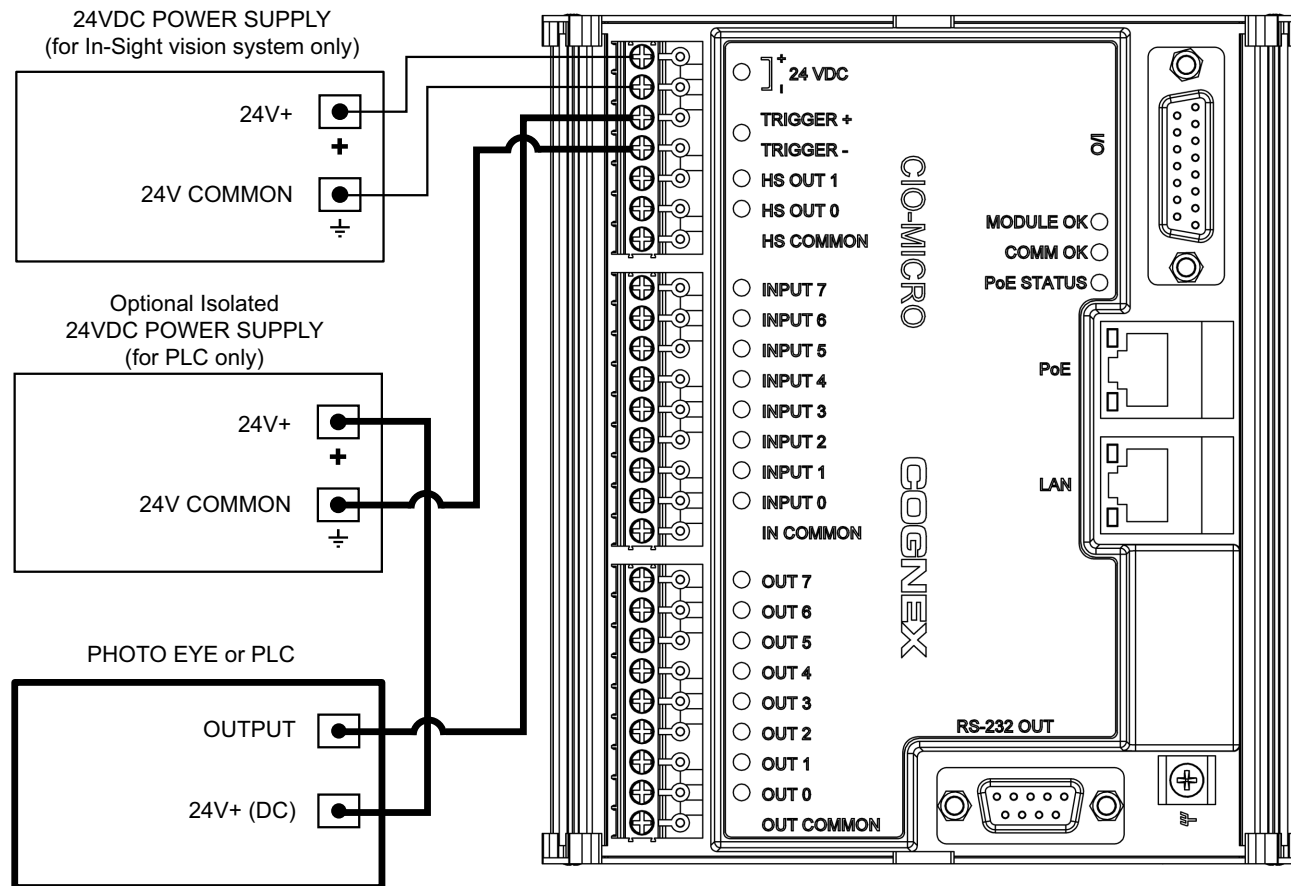The supported In-Sight vision system trigger input is energized by a +24VDC signal from a hoto eye or a PLC.



**Figure A-2: Trigger From Photo Eye or PLC (Photo Eye or PLC Sources Current)**

# Input From PLC (PLC Sinks Current)

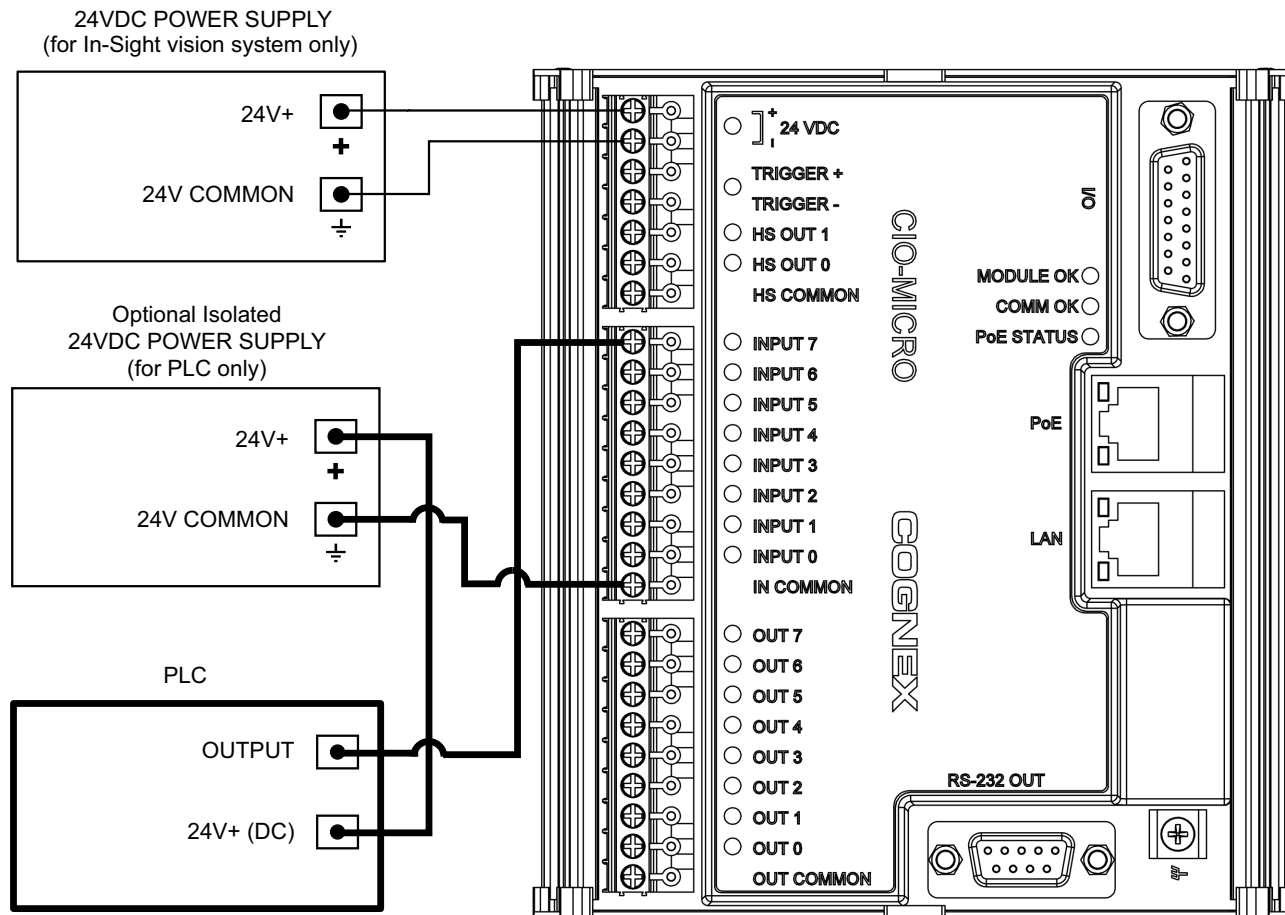The supported In-Sight vision system input is energized by a –24VDC common signal from a PLC.
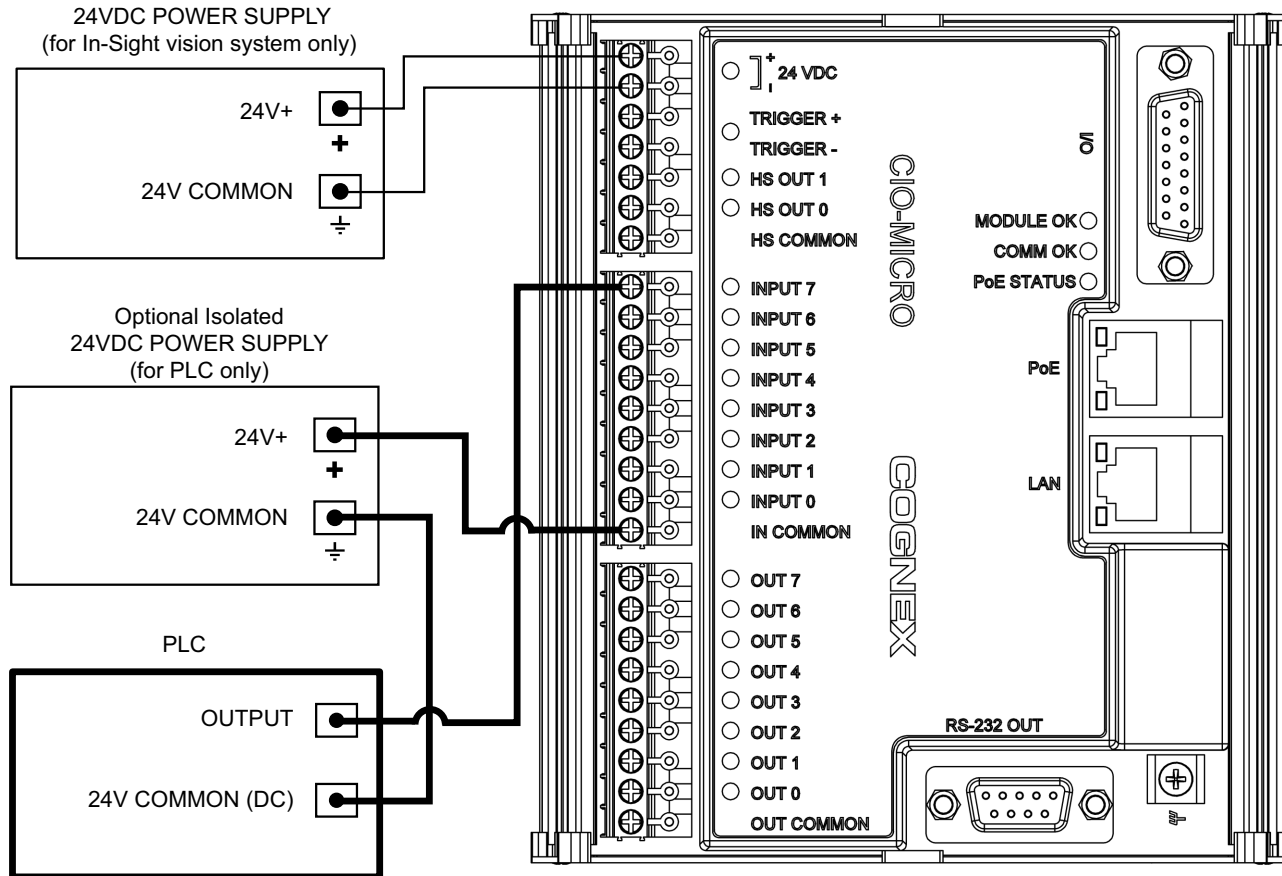


**Figure A-3: Input From PLC (PLC Sinks Current)**

# Input From PLC (PLC Sources Current)

The supported In-Sight vision system input is energized by a +24VDC signal from a PLC.

**Figure A-4: Input From PLC (PLC Sources Current)**

## Output to PLC (I/O Module Sources Current)

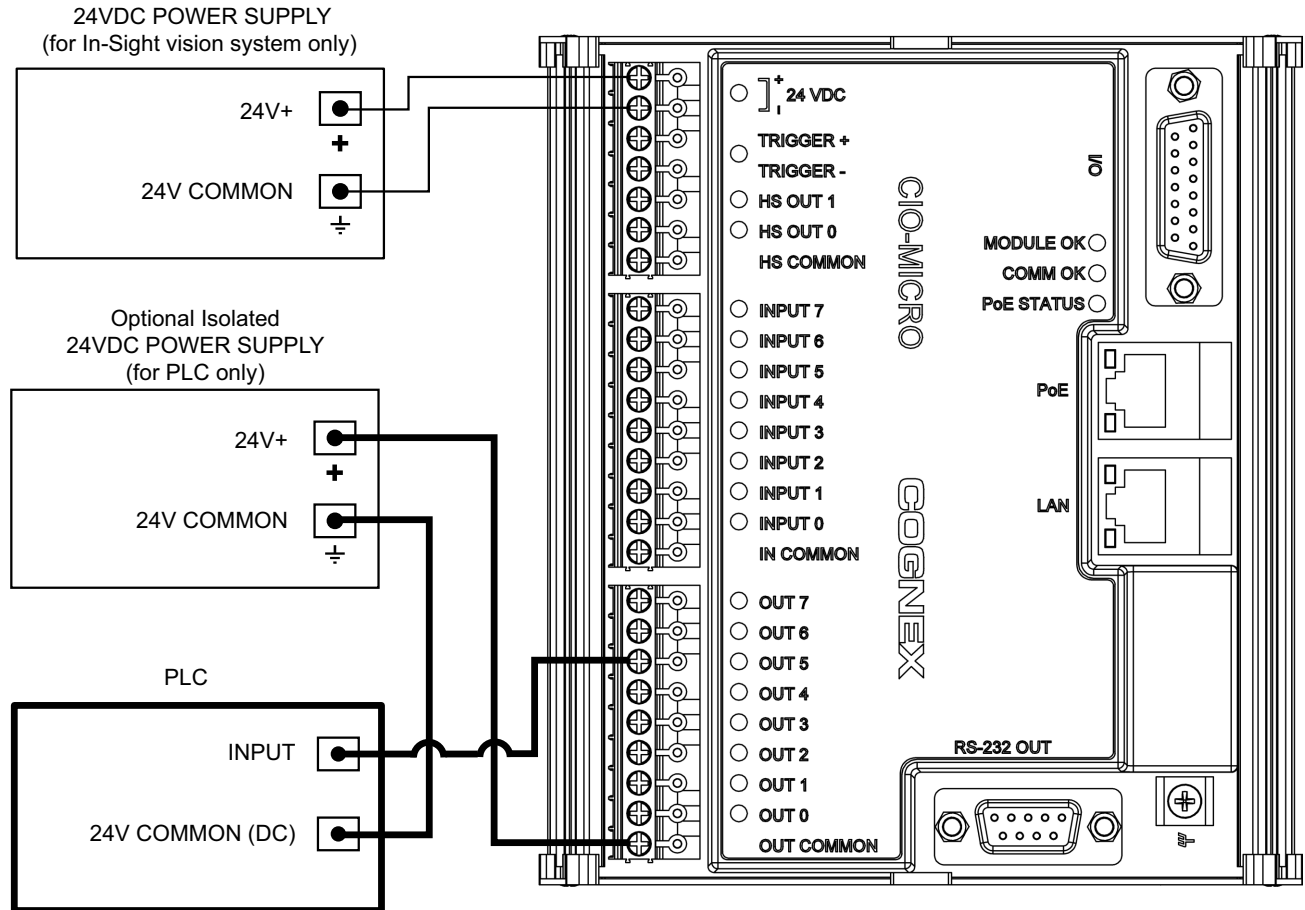The PLC input is energized by a +24VDC signal from a supported In-Sight vision system.



**Figure A-5: Output to PLC (I/O Module Sources Current)**

# Output To PLC (I/O Module Sinks Current)

The PLC input is energized by a 24VDC Common signal from a supported In-Sight vision system.
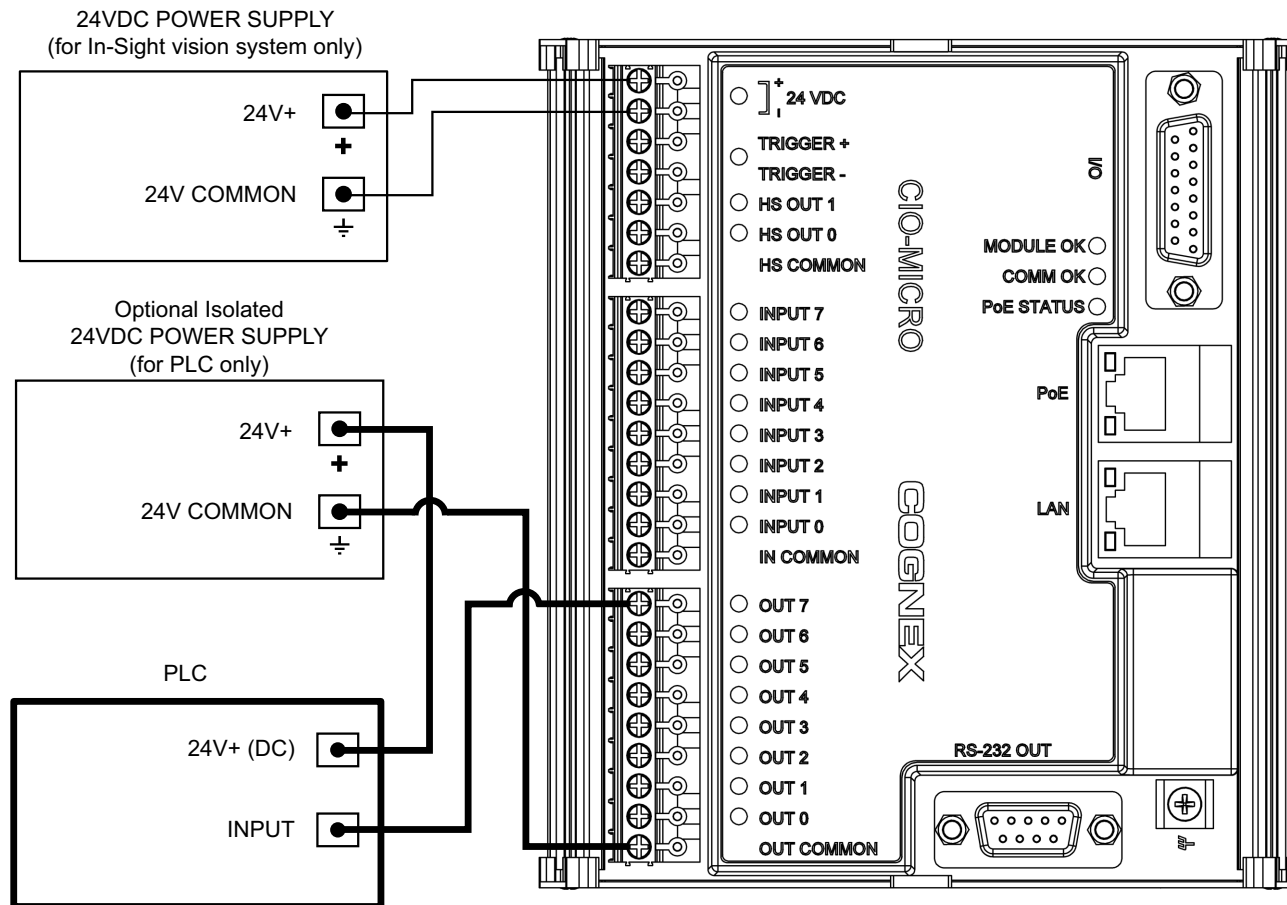


**Figure A-6: Output to PLC (I/O Module Sinks Current)**

# Output To Pilot Light or Relay (I/O Module Sources Current)

The pilot light or relay is energized by a + 24VDC signal from a supported In-Sight vision system.
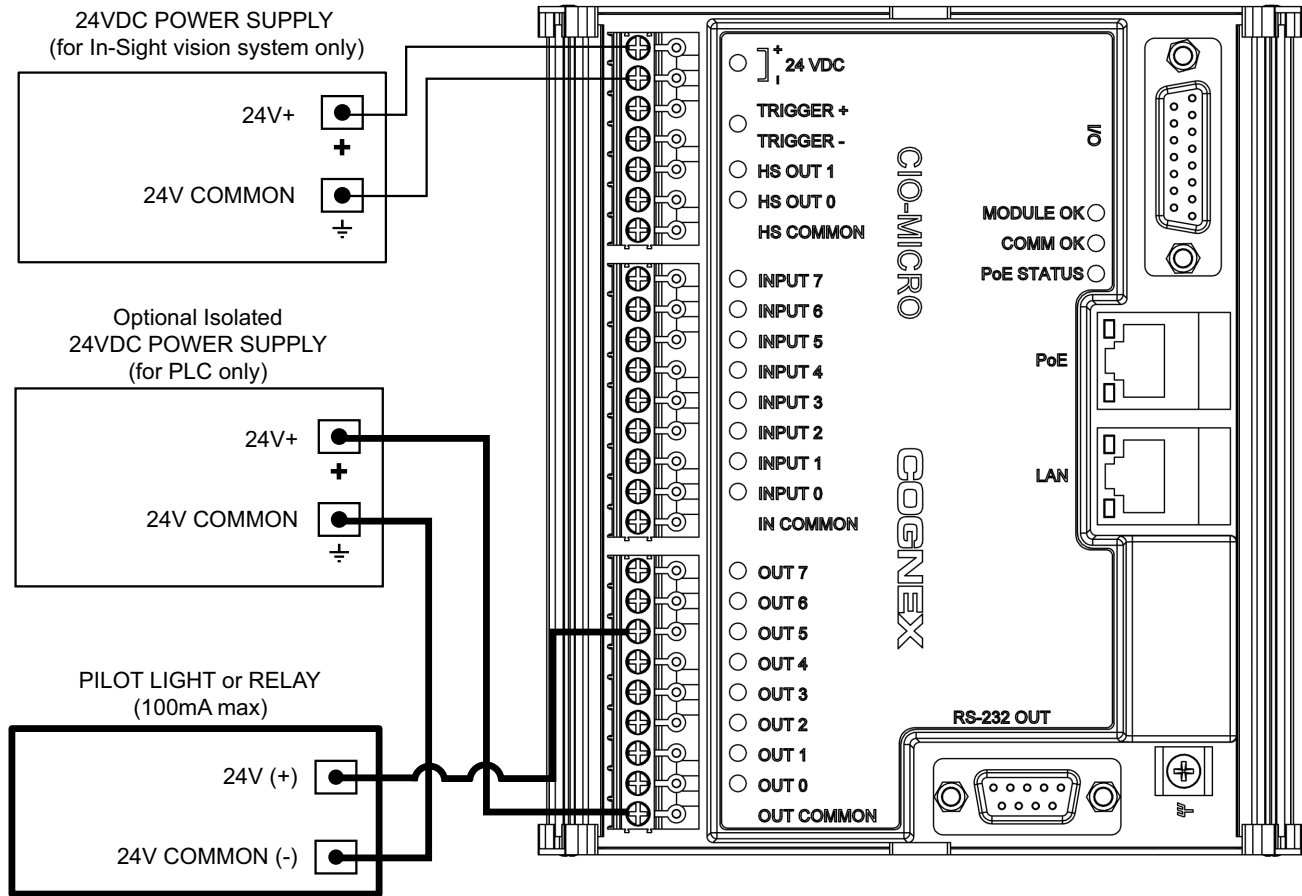


**Figure A-7: Output to Pilot Light or Relay (I/O Module Sources Current)**

# Output To Pilot Light or Relay (I/O Module Sinks Current)

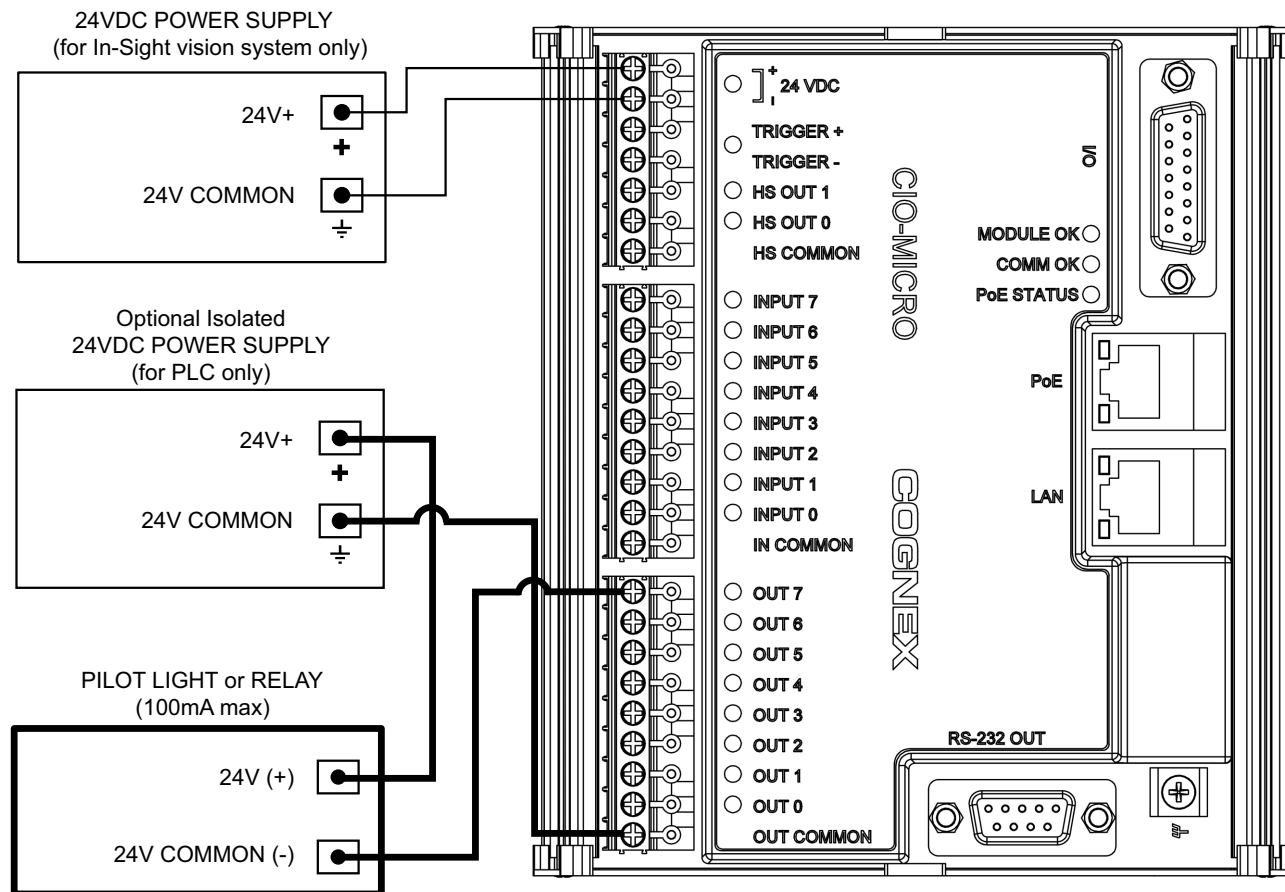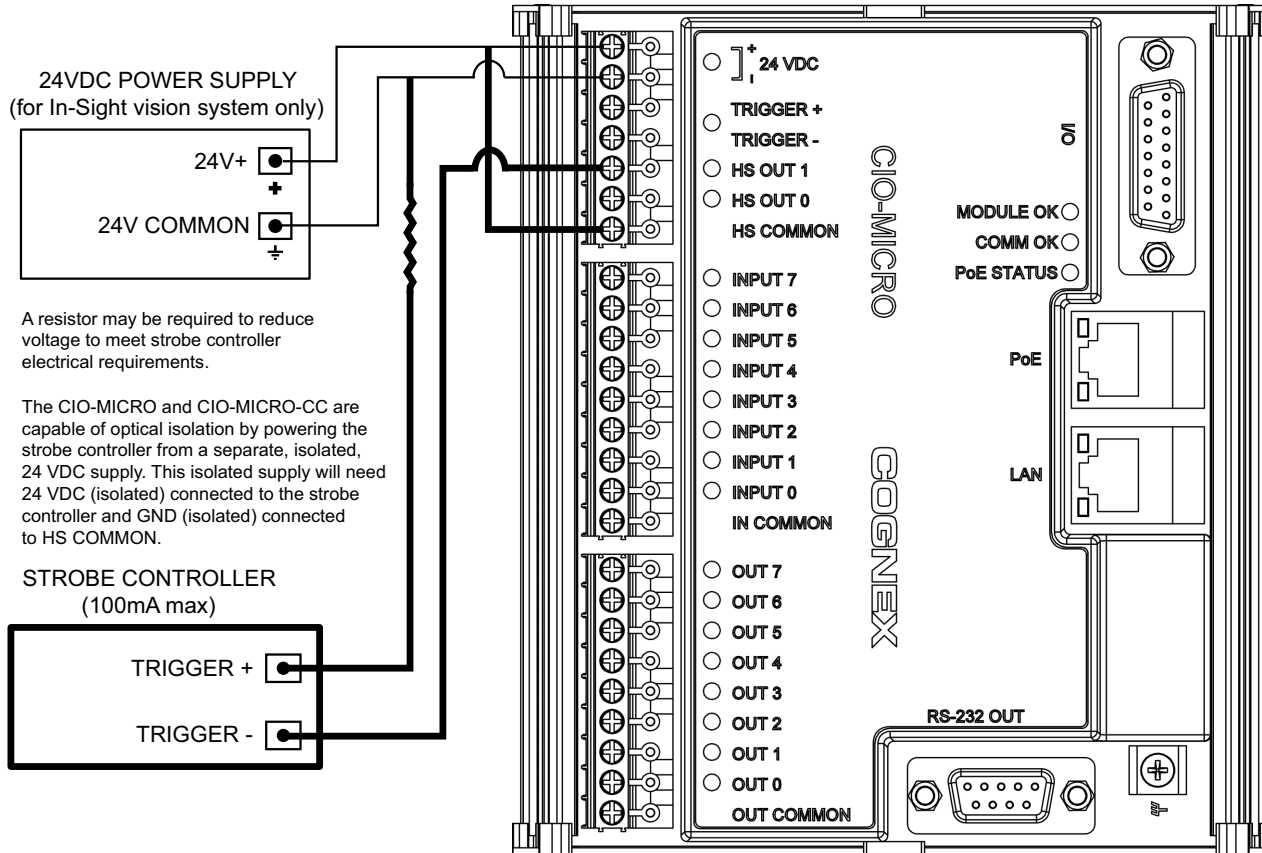The pilot light or relay is energized by a 24VDC Common signal from a supported In-Sight vision system.



**Figure A-8: Output to Pilot Light or Relay (I/O Module Sinks Current)**

# In-Sight Micro Vision System High-Speed Output To Strobe Controller (I/O Module Sources Current)



**Figure A-9: High-Speed Output To Strobe Controller (I/O Module Sources Current)**

**Note:** The In-Sight vision systems support high-speed strobe output only on HS OUT 1.

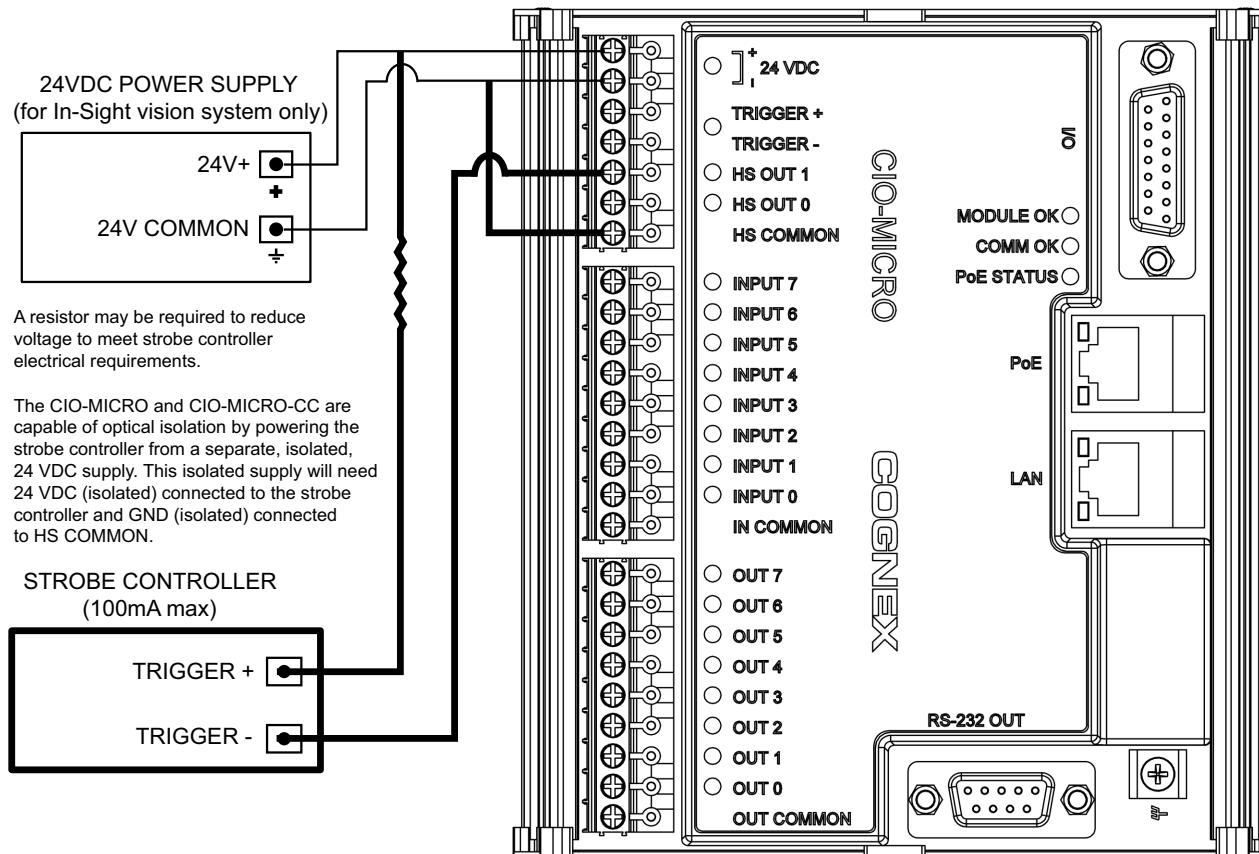# In-Sight Micro Vision System High-Speed Output To Strobe Controller (I/O Module Sinks Current)



24VDC POWER SUPPLY
(for In-Sight vision system only)

24V+

24V COMMON

A resistor may be required to reduce voltage to meet strobe controller electrical requirements.

The CIO-MICRO and CIO-MICRO-CC are capable of optical isolation by powering the strobe controller from a separate, isolated, 24 VDC supply. This isolated supply will need 24 VDC (isolated) connected to the strobe controller and GND (isolated) connected to HS COMMON.

STROBE CONTROLLER
(100mA max)

TRIGGER +

TRIGGER -

**Figure A-10: High-Speed Output To Strobe Controller (I/O Module Sinks Current)**

| Note: | The In-Sight vision systems support high-speed strobe output only on HS OUT 1. |
|---|---|

# In-Sight 5600 Vision System High-Speed Output To Strobe Controller (I/O Module Sinks Current)
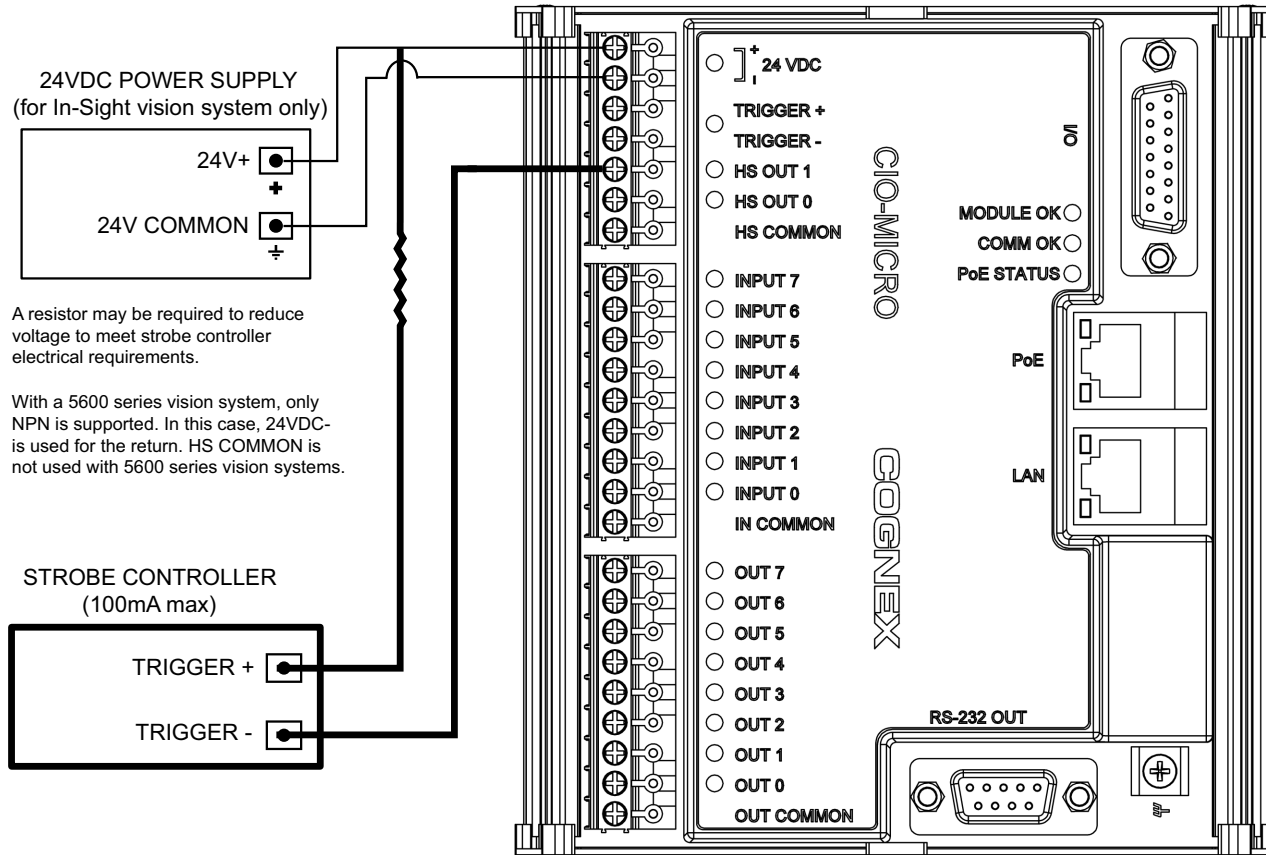


**Figure A-11: High-Speed Output To Strobe Controller (I/O Module Sinks Current)**

| Note: | The In-Sight vision systems support high-speed strobe output only on HS OUT 1. |
|---|---|

# Input From 3-Wire Photo Eye (PNP Current Sourcing)

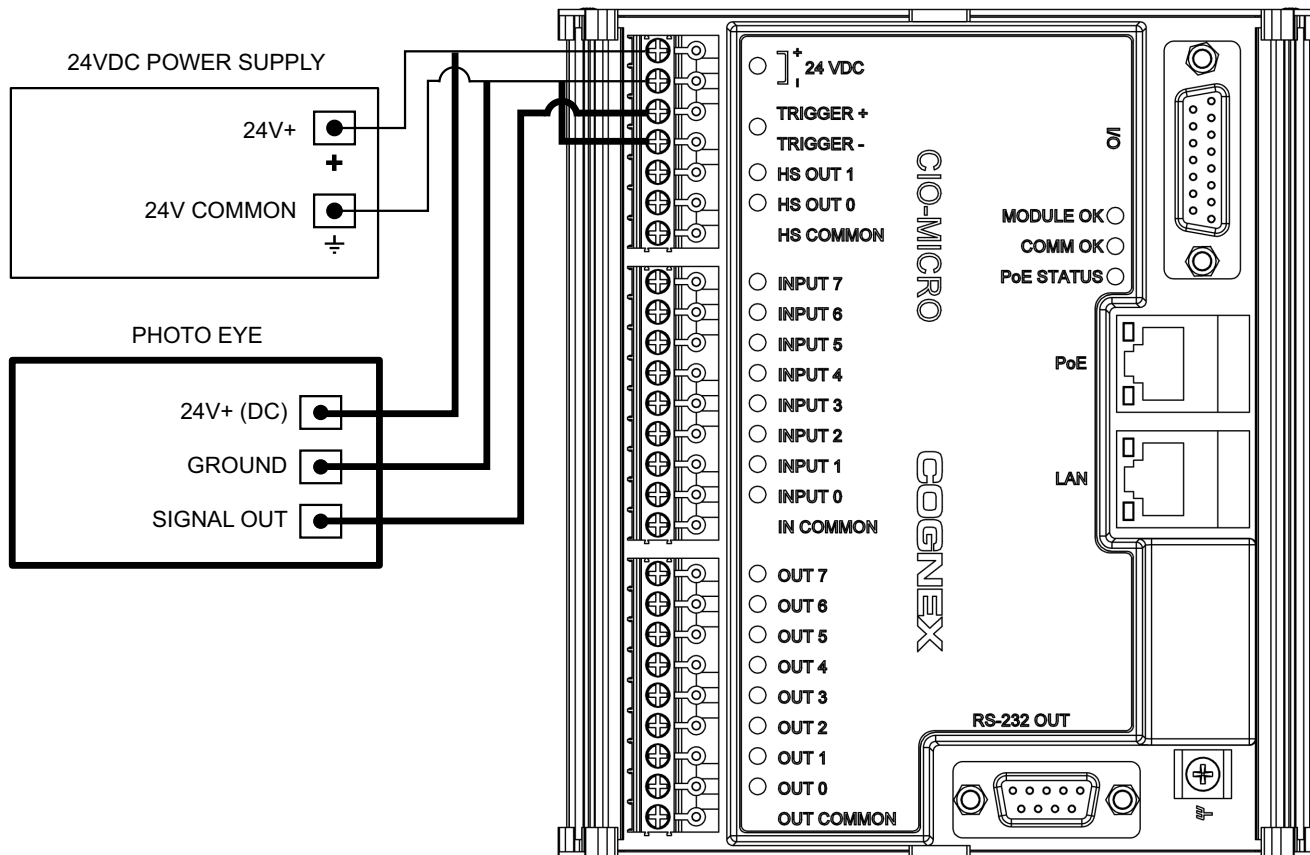The supported In-Sight vision system trigger input is energized by a +24VDC signal from a photo eye.



**Figure A-12: Trigger From Photo Eye (PNP Current Sourcing)**

# Input From 3-Wire Photo Eye (NPN Current Sinking)

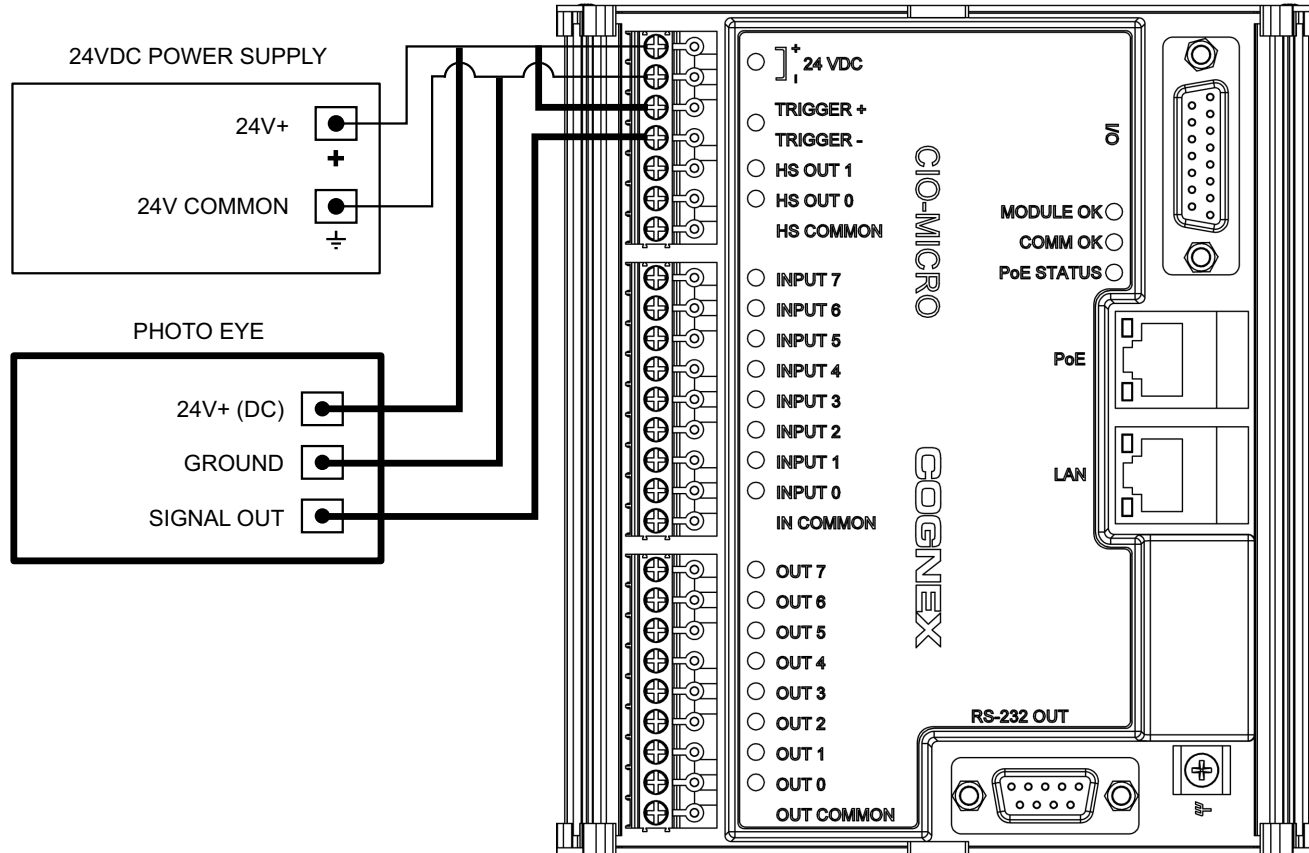The supported In-Sight vision system trigger input is energized by a +24VDC signal from a photo eye.



**Figure A-13: Trigger From Photo Eye (NPN Current Sinking)**

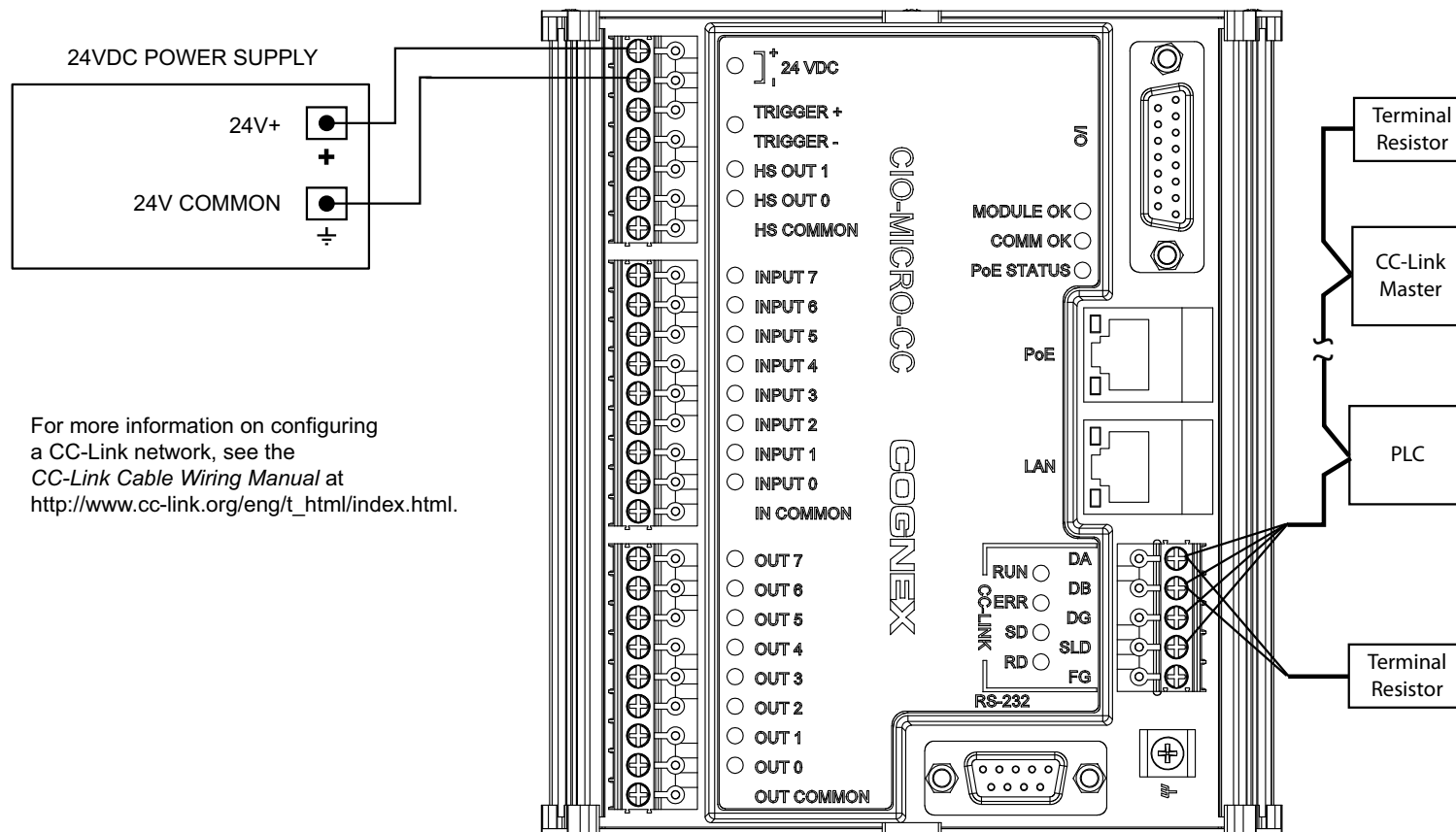# CIO-MICRO-CC CC-Link Connection

The In-Sight CIO-MICRO-CC is connected to a CC-Link network.



**Figure A-14: CIO-MICRO-CC CC-Link Connection**