



COGNEX
Vision for Industry®

Installing the In-Sight® 4000 Series Vision Sensors



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Regulations/Compliance

Declaration of Conformity

Manufacturer	Cognex Corporation One Vision Drive Natick, MA 01760 USA
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Declares this -marked product:

Product Number	In-Sight 4000, 4001, 4100
Complies With	73/23/EEC Low Voltage Directive 89/336/EEC Electromagnetic Compatibility Directive
Compliance Standards	EN 60950:1992 Electrical Safety A1:1993, A2:1993, A3:1995 EN 55022 RF Emissions Information Technology EN 50082-1 EMC Immunity Standard

European Representative:	Cognex France Immeuble le Patio 104 avenue Albert 1er 92563 Rueil Malmaison France
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Safety

	LISTED (UL 1950) 51KJ	CUL Certification marks are present on products
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Precautions

Observe these precautions when installing the In-Sight 4000 to reduce the risk of injury or equipment damage:

- Never connect the In-Sight 4000 to a power source other than 24VDC. Any other voltage creates a risk of fire or shock and can damage the In-Sight hardware.
- Do not install the In-Sight 4000 in locations that directly expose it to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity.
- 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, route all cables and wires away from high-voltage power sources.
- Do not open the In-Sight 4000. This device does not contain user-serviceable parts. Do not make electrical or mechanical modifications to the In-Sight hardware. Unauthorized modifications violate your warranty.

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1.1 In-Sight 4000 Series Overview

The In-Sight[®] 4000 series is a family of compact, high performance, networked machine vision sensors for high-speed automated inspection, measurement, identification, alignment, and robot guidance applications on the factory floor.

In-Sight 4000 sensors are configured remotely using an intuitive spreadsheet interface running on a networked In-Sight 3000 or a PC running *In-Sight PC Host*, or *In-Sight Explorer*. This spreadsheet also allows remote monitoring of sensor operation during runtime. In-Sight 4000 sensors may also be controlled remotely from users' custom application programs using In-Sight Native Mode commands to change settings and retrieve inspection results.

The In-Sight 4000 series include the following models:

- In-Sight 4000 integrated processor/camera (640 x 480 image resolution)
- In-Sight 4001 integrated processor/camera (1024 x 768 image resolution)
- In-Sight 4100 processor with remote head camera (640 x 480 image)

The In-Sight 4100 remote head camera is available in standard anodized aluminum. Optionally, a stainless steel version is available for applications where required (e.g. food services). The remote head enclosure is also available in stainless steel with a polycarbonate window.

Unless otherwise specified, references to the In-Sight 4000 in this document also apply to the In-Sight 4001 and 4100 models.

1.2 In-Sight Support

Many information resources are available to assist you in using the In-Sight 4000 sensor and its spreadsheet interface:

- *Getting Started with In-Sight*, Cognex P/N 590-6368 (English), 590-6368F (French), 590-6368G (German), or 590-6368J (Japanese).
- *In-Sight[®] Guide & Reference*, an on-line HTML Help file provided on the In-Sight CD-ROM.
- *In-Sight[®] Explorer Help*, an HTML Help file provided on the In-Sight CD-ROM.
- In-Sight computer-based tutorials provided on CD-ROM with In-Sight starter accessories kits.
- The In-Sight Online Support and Learning Center at www.cognex.com/support/In-Sight.asp.

NOTE: Only registered In-Sight users have access to the In-Sight Online Support and Learning Center website.

1.3 Networking an In-Sight 4000 Sensor

An In-Sight 4000 sensor is designed to operate as a host system on an Ethernet TCP/IP network. For the purposes of the instructions in this manual, an In-Sight network exists wherever any In-Sight sensor is connected by Ethernet to at least one other In-Sight sensor or personal computer running In-Sight PC Host or In-Sight Explorer software.

In-Sight 4000 sensors may be used in several possible network configurations. For each configuration, the In-Sight 4000 is configured from the user interface of another In-Sight system, which also provides the remote display for the In-Sight 4000.

1.3.1 Standalone In-Sight Network Configurations

The simplest In-Sight 4000 networks are shown in Figure 1-1 and Figure 1-2. In these basic configurations, a CAT5 cable with crossover coupler (P/N 185-0080) directly connects a single In-Sight 4000 to a standalone PC equipped with a network card running In-Sight PC Host or In-Sight Explorer, or to an In-Sight 3000 processor. Neither the PC nor the In-Sight 3000 is connected to the larger, factory-floor network.

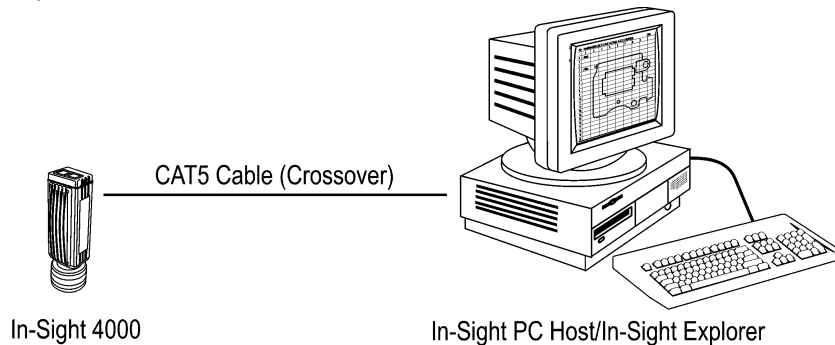


Figure 1-1: In-Sight 4000 - In-Sight PC Host/In-Sight Explorer

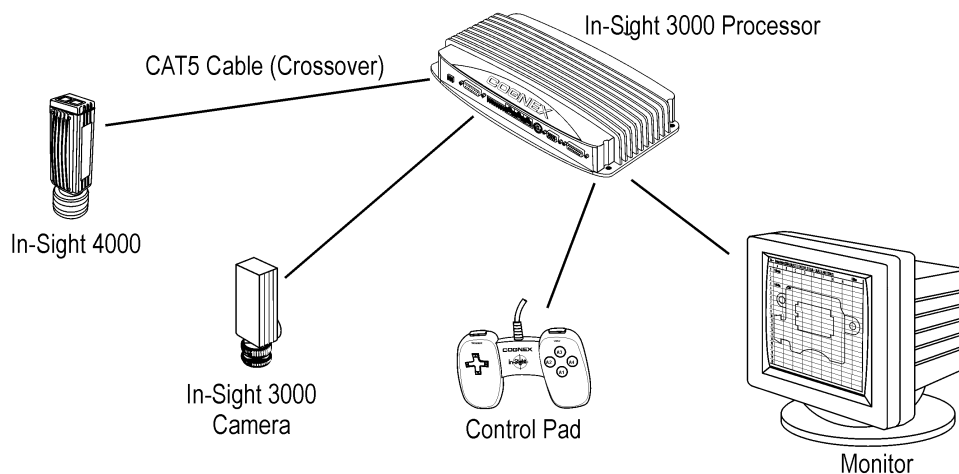


Figure 1-2: In-Sight 4000 – In-Sight 3000 Network

Installing the In-Sight® 4000 Series Vision Sensors

To install multiple In-Sight 4000 sensors onto a standalone In-Sight network, use an Ethernet switch between the In-Sight 4000 sensors and an In-Sight 3000 processor or PC running the In-Sight PC Host or In-Sight Explorer software. Make all connections via standard, straight-pinned CAT5 cable (Figure 1-3 and Figure 1-4).

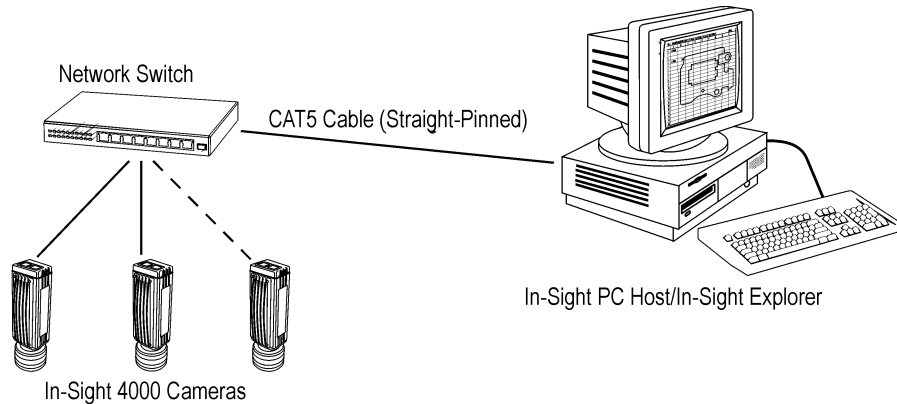


Figure 1-3: Multiple In-Sight 4000 Sensors – In-Sight Network

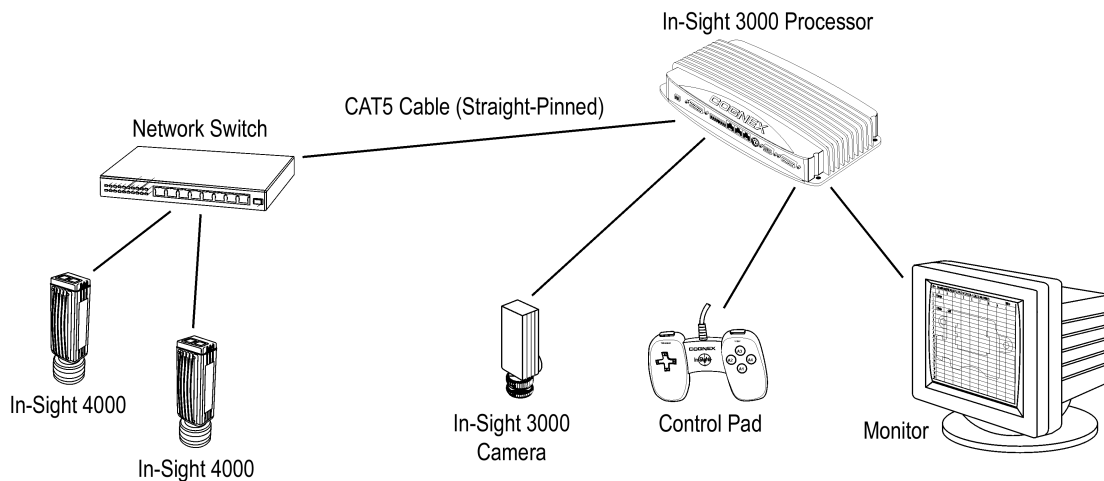


Figure 1-4: Multiple In-Sight 4000 Sensors – In-Sight 3000 Network

The number of In-Sight sensors that may be installed on a standalone In-Sight network are limited only by the number of ports available on the Ethernet switch. To expand the standalone In-Sight network, add Ethernet switches as needed to increase the number of available network ports.

1.3.2 Factory-Floor In-Sight Network Configurations

To take full advantage of their data sharing and remote monitoring capabilities, In-Sight sensors should be connected to the larger, factory-floor network. The only physical difference

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between factory-networked In-Sight sensors and a standalone In-Sight network is that the Ethernet switch is itself connected to the factory-floor network.

Groups of In-Sight systems connected to the factory-floor network through a common Ethernet switch are referred to as a local network, or subnet. Figure 1-5 shows a subnet that includes two In-Sight 4000 sensors, an In-Sight 3000, and an In-Sight PC Host or In-Sight Explorer.

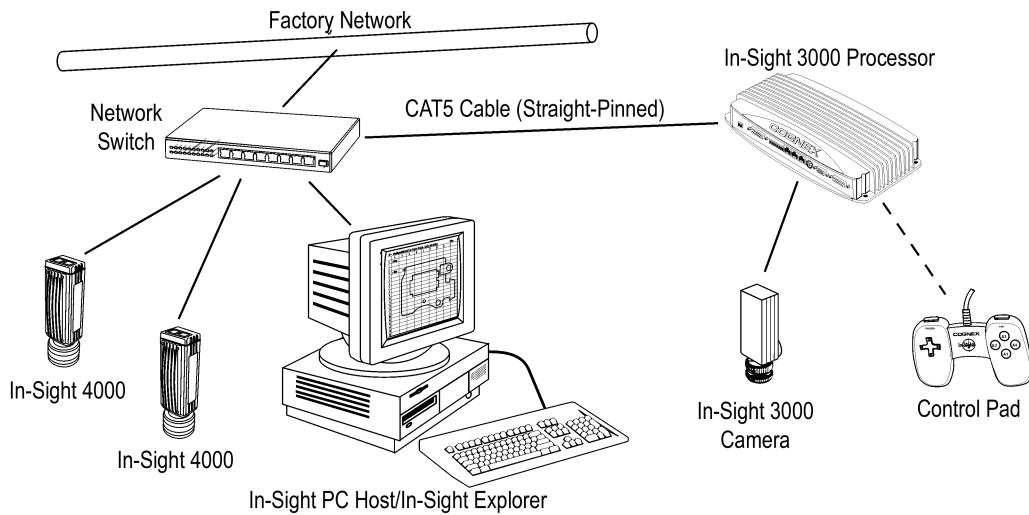


Figure 1-5: Multiple In-Sight 4000 Sensors on a Local Network

NOTE: In-Sight 4000 sensors can be connected to the factory network even if there is no In-Sight PC Host/In-Sight Explorer or In-Sight 3000 processor on the same subnet. In this configuration, any In-Sight 3000 processor or PC Host/In-Sight Explorer on any other subnet on the network can provide remote configuration and display service to the In-Sight 4000 sensors on a different subnet.

2 Installing the In-Sight 4000



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2.1 Connecting the In-Sight 4000

The In-Sight 4000 has two RJ-45 connector ports opposite the lens mount on a 4000/4001 or the remote head connector on the 4100 processor, as shown in Figure 2-1 the network port (left, labeled **ENET**) and the breakout port (right, labeled **24VDC**). The network port provides the Ethernet connection for network communications. The breakout port supplies connections for power, I/O, and serial communications.

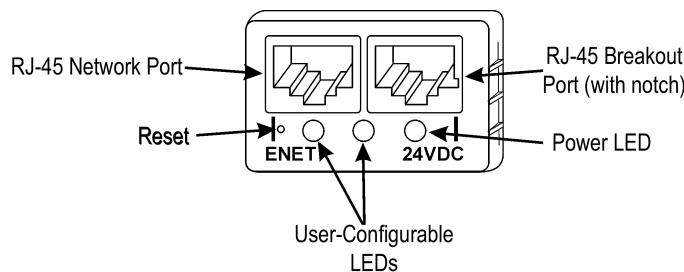


Figure 2-1: In-Sight 4000 Network and Breakout Ports

2.1.1 Connecting the Network Cable

If you are connecting to an Ethernet switch:

1. Plug one of the RJ-45 connectors on a CAT5 straight-pinned cable into the ENET port.
2. Plug the other end of the CAT5 straight-pinned cable into an available port on the switch.

If you are connecting directly to an In-Sight sensor or In-Sight PC Host:

1. Plug one of the RJ-45 connectors on a CAT5 cable into the ENET port on the In-Sight 4000.
2. Plug the other end of the CAT5 cable into the crossover coupler (P/N 185-0080).
3. Connect the crossover coupler into the other system's Ethernet port.

2.1.2 Connecting the Breakout Cable

The In-Sight Breakout Cable (P/N 300-0340-15/30) included with every In-Sight sensor provides access to the In-Sight 4000 sensor's power, serial communications, and I/O lines. The RJ-45 connector on this cable is "keyed" to the notch in the breakout port, and cannot be inadvertently plugged in to the network port.

See Section 3.2.1 on page 14 for the Breakout Cable's wiring details.

To connect the Breakout Cable to the In-Sight 4000:

1. Verify the 24VDC power supply being used is switched off.
2. Attach the Breakout Cable's power (white-green wire) and ground (brown wire) to the corresponding terminals on the power supply.
3. Connect the wires for the acquisition trigger, discrete outputs, and serial communications to their corresponding terminals on remote devices.
4. Plug the RJ-45 connector into the In-Sight 4000 sensor's breakout port (labeled 24VDC).
5. Restore power to the 24V supply. The green power LED will indicate that the 4000 is receiving power.

2.1.3 Connecting the Breakout Module

The optional In-Sight Breakout Module (P/N 800-5743) is more convenient than using the standard Breakout Cable to connect the In-Sight 4000 sensor's power, serial communications, and I/O lines.

For additional information on connecting a Breakout module, see Section 3.2.1 on page 14 or the *Breakout Module Installation and Reference* manual (P/N 597-0008-xx).

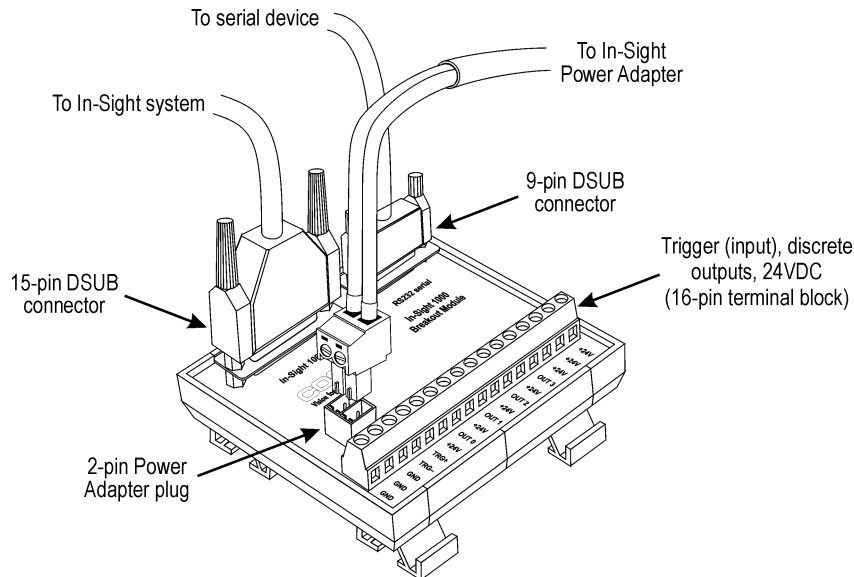


Figure 2-2: Breakout Module Connections

To connect the Breakout Module to the In-Sight 4000:

1. Verify the 24VDC power supply being used is switched off.
2. Optionally, connect the power and ground wires for the acquisition trigger input and the discrete outputs into their corresponding terminals on the Breakout Module.
3. Optionally, connect the 9-pin male D-sub connector of an RS232 serial cable into the corresponding 9-pin female connector on the Breakout Module.
4. Plug the Breakout Module Cable's 15-pin male D-sub connector into the corresponding female connector on the Breakout Module.
5. Plug the RJ-45 connector of the Breakout Module Cable (P/N 300-0341-15) into the In-Sight 4000 sensor's breakout port. The cable's connectors are "keyed" to the notch in the Breakout port.

6. Plug the wire leads from a 24VDC supply for the +24V power and ground into the 2-pin terminal plug on the Breakout Module. Alternatively, remove the terminal plug and insert the 2-pin terminal plug attached to the In-Sight power adapter into the keyed power adapter port on the Breakout Module (Breakout Module Connections).
7. Restore power to the 24V supply. The red power LED on the In-Sight 4000 and the orange +24V LED on the Breakout Module will indicate that the In-Sight 4000 and Breakout Module are receiving power.

2.1.4 Connecting the I/O Expansion Module

Like the Breakout Module, the optional I/O Expansion Module provides convenient access to the In-Sight 4000 sensor's power, serial communications, and discrete I/O lines. In addition to the two discrete outputs, acquisition trigger, and serial transmit/receive that are standard on the 4000, the I/O Expansion module provides the following:

- 8 discrete outputs
- 8 discrete inputs
- RS232 hardware handshaking

For additional information on connecting an In-Sight I/O Expansion module, see section 3.2.1 on page 14 or the *In-Sight Expansion Module Installation and Reference* manual (P/N 597-0013-xx).

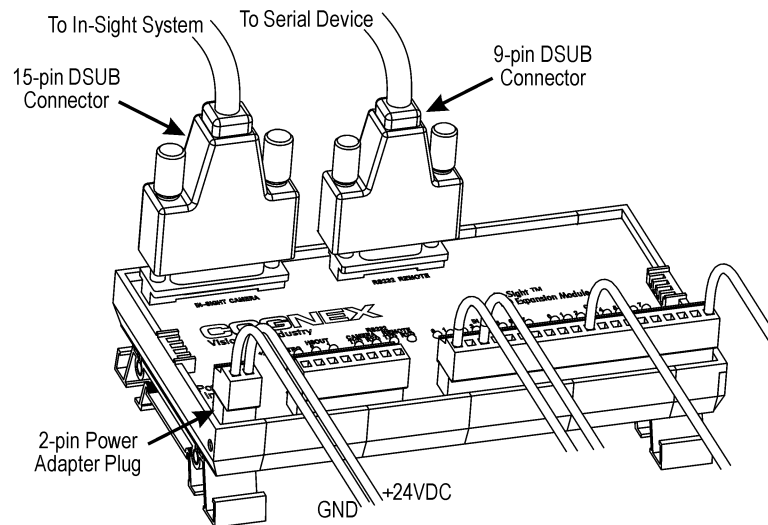


Figure 2-3: I/O Expansion Module Connections

To connect an I/O Expansion Module to the In-Sight 4000:

1. Verify the 24VDC power supply being used is switched off.
2. Optionally, connect the power and ground wires for the acquisition trigger input, discrete outputs, and discrete inputs into their corresponding terminals on the Expansion Module.
3. The outputs labeled HSOUT0 and HSOUT1 are high-speed outputs direct from the In-Sight 4000 and pass through the Expansion Module. The outputs labeled OUT0 through OUT7 are lower speed because their signals are processed by the Expansion Module processor before being sent to remote devices.

Installing the In-Sight 4000

4. Optionally, connect the 9-pin male D-sub connector of an RS232 serial cable into the corresponding 9-pin female connector on the Expansion Module.
5. Plug the Expansion Module Cable's 15-pin male D-sub connector into the corresponding female connector on the Expansion Module.
6. Plug the RJ-45 connector of the Expansion Module Cable (P/N 300-0341-15) into the In-Sight 4000 sensor's breakout port. The cable's connectors are "keyed" to the notch in the Breakout port.
7. Plug wire leads from a 24VDC supply for the +24V power and ground into the 2-pin terminal plug labeled "Power Input" on the Expansion Module. Alternatively, remove the terminal plug and insert the 2-pin terminal plug attached to the In-Sight power adapter into the keyed power adapter port on the Expansion Module (Figure2-3).
8. Restore power to the 24V supply. The green power LED on the 4000 and the +24V LED on the Expansion Module will indicate that the 4000 is receiving power.

2.2 Installing In-Sight PC Host Software

The In-Sight 4000 is configured, and its operation monitored, over an Ethernet network from an In-Sight 3000 or from a PC. An In-Sight 4000 accessed from a networked In-Sight 3000 is configured using a control pad.

An In-Sight 4000 accessed from a networked PC is configured using mouse and keyboard input. The following must be installed on the PC:

- A Microsoft® Windows™ XP, 2000, NT 4.0 (with Service Pack 4 or later), Me, or 98SE operating system.
- A network card that supports 10/100 Base-T Ethernet TCP/IP communications.
- In-Sight PC Host or In-Sight Explorer software (included on the CD-ROM shipped with your system).
- Internet Explorer 4.0 or higher to display the *In-Sight Guide & Reference*.

NOTE: In-Sight PC Host or In-Sight Explorer software can be used only on a local subnet that includes a networked In-Sight sensor.

To install the In-Sight PC Host or In-Sight Explorer software on a Windows PC:

1. Shut down any applications running on your PC.
2. Insert the In-Sight installation CD-ROM into your PC's CD-ROM drive. If the install program starts automatically, follow the setup dialogs as they appear on screen. If the install program does not start automatically:
3. Click the Start menu, click Run, and then click Browse.
4. In the browse window, select the PC's CD-ROM drive, and then select the **SETUP.EXE** file.
5. Click **Open**, and then click **OK** to begin the installation. The default installation directory is C:\INSIGHT2.
6. When the installation program is complete, remove the CD from the CD-ROM drive.
7. Verify the In-Sight PC Host software installation by opening the Start menu, opening the Programs menu, opening the In-Sight2 program group, and selecting In-Sight PC Host or In-Sight Explorer. The applicable window will appear, displaying the In-Sight spreadsheet.
8. Verify the *In-Sight Help* and *In-Sight Explorer Help* installation by opening the Start menu, opening the Programs menu, opening the In-Sight2 program group, and selecting the applicable Help file. If you are running Windows NT 4.0 and the Help file does not open, verify you

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are using Internet Explorer version 4.0 or higher. If not, use Service Pack 4 to update your browser.

NOTE: Open the *In-Sight Release Notes* file for current information about In-Sight software, including new features, fixes, and known issues. Registered In-Sight users can download updated versions of In-Sight documentation at www.cognex.com/insight/support/support.asp.

2.3 Adding the In-Sight 4000 to a Network

The In-Sight 4000 is ready to be installed as a network host once it has power and is physically connected to the network.

As previously described, there are many possible In-Sight network configurations. The specific procedure for adding an In-Sight 4000 to a network depends on whether or not a **Dynamic Host Configuration Protocol** (DHCP) server is available. The DHCP server automatically assigns the In-Sight 4000 sensor a network IP address and Subnet Mask.

NOTE: When installing the In-Sight 4000 to an existing network, consult your network administrator to determine whether a DHCP server is available.

2.3.1 Installing to a DHCP Network

The In-Sight 4000 is factory-configured for installation on an existing network with a DHCP server. To add an In-Sight 4000 to a network using a DHCP server requires only connecting the sensor to the network and supplying power; no manual configuration of the network settings is required.

NOTE: After adding an In-Sight 4000 to a network with a DHCP server, disabling DHCP on the sensor and assigning it a static IP Address is strongly recommended. For more information on disabling DHCP and assigning a static IP address, refer to the "Network Dialog" topic in the In-Sight Guide & Reference HTML Help file.

The Host Name is the only configurable network setting when using DHCP. This Host Name is an "alias" for the In-Sight 4000 sensor's IP Address, and appears in any list of host names in the In-Sight interface. If you do not assign a new Host Name, the In-Sight 4000 will appear on the network with the default Host Name.

After adding the In-Sight 4000 to the network using DHCP, proceed to section 2.4 (page 10).

2.3.2 Installing to a Non-DHCP Network

To install an In-Sight 4000 sensor on a network that does not use a DHCP server, use an In-Sight 3000, In-Sight PC Host or In-Sight Explorer to manually configure the 4000 sensor's network settings. This installation may also require changes to network settings in Microsoft Windows (see Appendix A, page 23).

Refer to the In-Sight Help or In-Sight Explorer Help file included on the installation CD and in the In-Sight 2 Program Group when installing to a non-DHCP network.

2.4 Logging On to the In-Sight 4000

After the In-Sight 4000 has been added to the network, log on to the sensor to verify the installation and to configure additional network settings.

1. Attach a lens to the In-Sight 4000 you installed to verify the acquisition of live video images. The exact focal length needed depends on the working distance and the field of view required in your machine vision application. For now, any compatible lens may be used.

NOTE: The In-Sight 4000 and 4001 sensors use C-Mount lenses. The In-Sight 4100 remote head camera uses CS-Mount lenses or C-Mount lenses (with 5mm extension).

2. Cycle power on the In-Sight 4000.
3. Logon to the installed In-Sight 4000 in accordance with the applicable interface documentation (In-Sight 3000 Installation Manual, In-Sight PC Host Help File or In-Sight Explorer Help File).

2.5 Changing In-Sight 4000 Network Settings

You may need to change the In-Sight 4000 sensor's Network settings when installing it to a non-DHCP network where a Default Gateway, DNS Server, and Domain name are used, or when moving the In-Sight 4000 from one network to another.

If the Network settings need to be changed, refer to the applicable interface documentation (In-Sight 3000 Installation Manual, In-Sight PC Host Help File or In-Sight Explorer Help File).

3 Specifications



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Specifications

3.1 General Specifications

Table 3-1: In-Sight 4000/4001 General Specifications

SPECIFICATION		4000	4001
Firmware		In-Sight version 2.30 and later.	
Memory	Job/Program	8MB non-volatile flash memory; Unlimited storage via remote network device.	
	Image/Processing	16MB SDRAM	
Image	Sensor	1/3-inch CCD (5.84 x 4.94 mm , 6 mm diagonal)	1/3-inch CCD (5.80 x 4.92 mm, 6 mm diagonal)
		640 x 480 pixel display (307,200 sq. pixels, 7.4 x 7.4 μm	1024 x 768 pixel display (786,432 sq. pixels, 4.65 x 4.65 μm)
		Electronic shutter speed: .025ms to 1000ms	Electronic shutter speed: .04ms to 1000ms
	Acquisition	Rapid reset, progressive scan (supports partial scan), full-frame integration.	
		256 gray levels (8 bits/sec)	
		Gain controlled by software.	
		Up to 38 frames per second	Up to 18 frames per second
	Lens Type	C-mount	
I/O ^a	Trigger	1 opto-isolated, acquisition trigger input.	
		Remote software commands via Ethernet and RS232.	
	Discrete Inputs	None built-in.	
		8 inputs available using optional I/O Expansion Module (P/N 800-5758-1). Unlimited inputs using optional Ethernet I/O Module (P/N CIO-ENET-IN4).	
	Discrete Outputs	2 built-in, high-speed outputs	
		8 additional outputs available using optional I/O Expansion Module (P/N 800-5758-1). Unlimited outputs using optional Ethernet I/O Module (P/N CIO-ENET-OUT4).	
Status LEDs	2 configurable (1 green, 1 red)		
Communications	Network	1 Ethernet port, 10/100 BaseT, TCP/IP protocol. Supports DHCP (factory default) or static IP address. Manual reset switch disable DHCP and forces factory-assigned, static IP address.	
	Serial	1 RS-232C port (1200 to 115,200 baud rates)	
Power		24 ± 10% VDC, 200mA, 4.8W supply	
Mechanical	Material	Painted aluminum housing	
	Mounting	One ¼-20 and two M6 threaded holes	
	Dimensions	118.60 mm (4.66 in) x 43.18 mm (1.70 in) x 46.7 mm (1.84 in)	
	Weight	275.0 g (9.7 oz)	
Environmental	Temperature	10 to 45°C (Operating), -10 to 65°C (Storage)	
	Humidity	10 to 90%, non-condensing (Operating and Storage)	
Certifications		CE, CUL	

a. See Detailed I/O Specifications for more information.

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Table 3-2: In-Sight 4100 General Specification

SPECIFICATION		4100	
Firmware		In-Sight version 2.30 and later	
Memory	Job/Program	8MB non-volatile flash memory; Unlimited storage via remote network device	
	Image/Processing	16MB SDRAM	
Image	Sensor	1/3-inch CCD (5.84 x 4.94 mm, 6 mm diagonal)	
		640 x 480 pixel display (307,200 sq. pixels, 7.4 x 7.4 µm)	
		Electronic shutter speed: .025ms to 1000 ms	
	Acquisition	Rapid reset, progressive scan (supports partial scan), full-frame integration	
		256 gray levels (8 bits/sec)	
		Gain controlled by software	
		Up to 38 frames per second	
	Lens Type	CS-mount and C-mount (with 5mm extension, included)	
I/O^a	Trigger	1 opto-isolated, acquisition trigger input.	
		Remote software commands via Ethernet and RS232.	
	Discrete Inputs	None built-in.	
		8 inputs available using optional I/O Expansion Module (P/N800-5758-1). Unlimited inputs using optional Ethernet I/O Module (P/N CIO-ENET-IN4).	
	Discrete Outputs	2 built-in, high-speed outputs	
		8 additional outputs available using optional I/O Expansion Module (P/N 800-5758-1). Unlimited outputs using optional Ethernet I/O Module (P/N CIO-ENET-OUT4).	
	Status LEDs	2 configurable (1 green, 1 red)	
Communications	Network	1 Ethernet port, 10/100 BaseT, TCP/IP protocol. Supports DHCP (factory default) or static IP address. Manual reset switch disables DHCP and forces factory-assigned, static IP address.	
	Serial	1 RS-232C port (1200 to 115,200 baud rates)	
Power		24 ± 10% VDC, 250mA, 6W supply	
Mechanical		Processor	Remote Head
	Housing	Painted aluminum	Black anodized aluminum or Stainless steel (optional)
	Mounting	One ¼-20 & two M6 threaded holes	Two M4 threaded holes
	Dimensions	118.60 mm (4.66 in) x 43.18 mm (1.70 in) x 46.7 mm (1.84 in)	39.1 mm (1.54 in) x 30.00 mm (1.18 in) dia.
			5 m (16.4 ft) cable, attached
	Weight	266.0 g (9.4 oz)	45.4 g (1.6 oz) without lens or cable
Environmental	Temperature (Operating)	10 to 45°C	10 to 50°C
	Temperature (Storage)	-10 to 65°C	
	Humidity	10 to 90%, non-condensing (Operating and Storage)	
Certifications		CE, CUL	

Specifications

- a. See Detailed I/O Specifications for more information.

Table 3-3: In-Sight 4100 Remote Head Enclosure Specifications

SPECIFICATION	DESCRIPTION
Material	Black anodized aluminum housing with glass window.
	Stainless steel housing with polycarbonate window (optional)
Dimensions	Without camera: 65.2 mm (2.57 in) high x 46.0 mm (1.81) diameter
	Nominal height with camera: 76.8 mm (3.03 in) to 93.0 mm (3.66 in)
Weight	136.1 g (4.8 oz), without camera
Protection	Sealed against dust and liquids to IP67 rating (NEMA 6 equivalent).

3.2 Detailed I/O Specifications

The In-Sight 4000 features one built-in acquisition trigger input and two configurable discrete outputs for general-purpose use.

The number of I/O lines may be increased using the optional I/O Expansion Module, which provides 8 additional discrete inputs and outputs.

3.2.1 Breakout Port Pin Assignments

Table 3-4 lists the pin assignment for each of the 8 signal lines of the In-Sight 4000 Breakout Port (labeled “24VDC”) according to each method of access.

Table 3-4: Breakout Port Pin Assignment

PIN No.	SIGNAL	WIRE COLOR	BREAKOUT MODULE ^a TERMINAL No.	EXPANSION MODULE ^a TERMINAL No.
1	+24 VDC	White-Green	6, 8, 10, 12, 14, 15, 16 (+24V)	+24V
2	Trigger +	Green	5 (TRG+)	TRG+
3	Trigger –	White-Orange	4 (TRG-)	TRG-
4	Output 0	Blue	7 (OUT0)	HSOUT0
5	Output 1	White-Blue	9 (OUT1)	HSOUT1
6	Serial Receive	Orange	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
7	Serial Transmit	White-Brown	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
8	Ground	Brown	1, 2, 3 (GND)	GND

- a. Refer to the *In-Sight Breakout Module Installation and Reference* (P/N 597-0008-xx) and the *In-Sight I/O Expansion Module Installation and Reference* (P/N 597-0013-xx) for more detailed information.

3.2.2 Acquisition Trigger Input

Table 3-5: Acquisition Trigger Input Specifications

SPECIFICATION	DESCRIPTION
Voltage	ON 20 to 28V (24V nominal)
	OFF 0 to 3V (12V nominal threshold)
Current	ON 0.9 to 1.3mA
	OFF <150 μ A
	Resistance ~22,000 Ohms
	For higher current add external resistor (for example, 2.2k Ω , 0.5W for 12mA) across inputs.
Delay	250 μ Sec latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1 ms wide.

The acquisition trigger input on the 4000 is opto-isolated. To trigger from an NPN (pull-down) type photo-detector or PLC output, connect pin 2 (TRG+) to +24V and connect pin 3 (TRG-) to the output of the detector. When the output turns ON, it pulls TRG- down to 0V, turning the opto-coupler ON.

To trigger from a PNP (pull-up) photo-detector or PLC output, connect pin 2 (TRG+) to the output of the detector and connect pin 3 (TRG-) to 0V. When the output turns ON, it pulls TRG+ up to 24V, turning the opto-coupler ON.

NOTE: When using the In-Sight 4000 with the Breakout Cable, the polarity of the input trigger (pins 2 and 3) is not critical. However, when using the optional Breakout or I/O Expansion Modules, the polarity of the TRG+ and TRG- terminals should be observed.

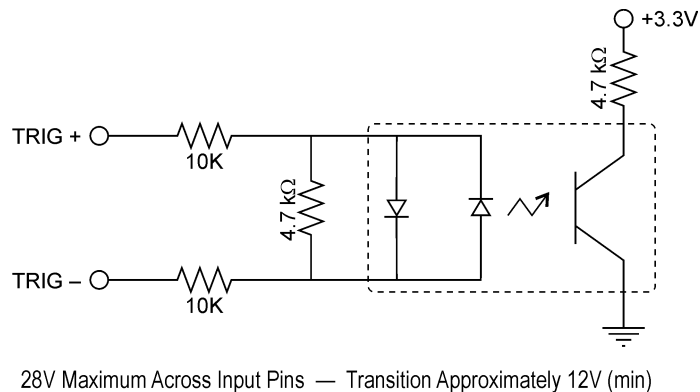


Figure 3-1: Acquisition Trigger Input Schematic

Specifications

3.2.3 Discrete Outputs

Table 3-6: Discrete Output Specifications

SPECIFICATION	DESCRIPTION
Voltage	28V maximum through external load.
Current	200mA maximum sink current.
	OFF state leakage current 200 μ A maximum
	External load resistance 120 to 10K Ohms
	Each line rated at a maximum 200mA, protected against over-current, short circuit, and transients from switching inductive loads. High current inductive loads require external protection diode.

Both of the built-in discrete outputs (pins 4 and 5) on the In-Sight 4000 are NPN (pull-down) lines. The external load should be connected between the output and the positive supply voltage (<28V). The outputs pull down to 0V when ON, which causes current to flow through the load. When the outputs are OFF, no current flows through the load.

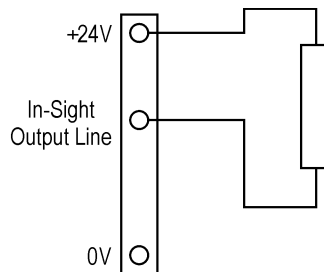


Figure 3-2: Discrete Output Connection Example 1

To connect to an NPN-compatible PLC input, connect Output 0 or Output 1 directly to the PLC input. When enabled, the output pulls down the PLC input to 0V.

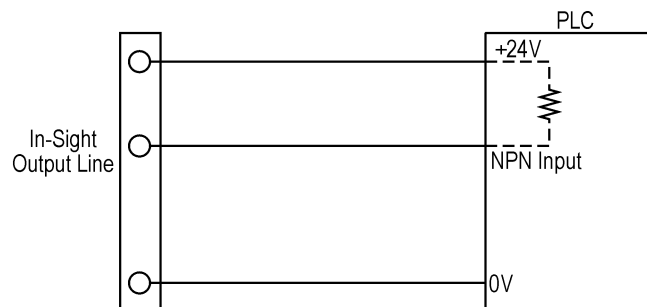


Figure 3-3: Discrete Output Connection Example 2

To connect Output 0 or Output 1 to a relay, LED, or similar load, connect the negative side of the load to the output and the positive side to +24V. When the output switches on, the negative side of the load is pulled down to 0V, and 24V appears across the load. Use a protection diode for a large inductive load, with the anode connected to the output and the cathode connected to +24V.

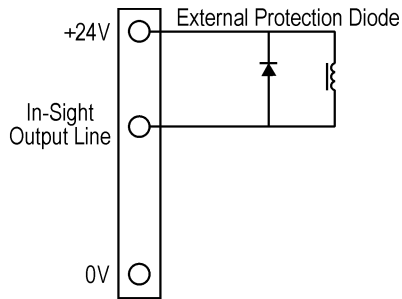


Figure 3-4: Discrete Output Connection Example 3

In-Sight 4000 outputs can also be used with PNP-compatible PLC input if a pull-up resistor (for example, 2.2kΩ 0.5W) is connected from the output to +24V. In this case, the resistor supplies 24V to the PLC input. The output will pull the voltage down to 0V, turning off the PLC input. This creates an inversion, with the PLC input ON when the In-Sight output is OFF, and vice-versa. Use an external NPN to PNP converter when this inversion is not desired.

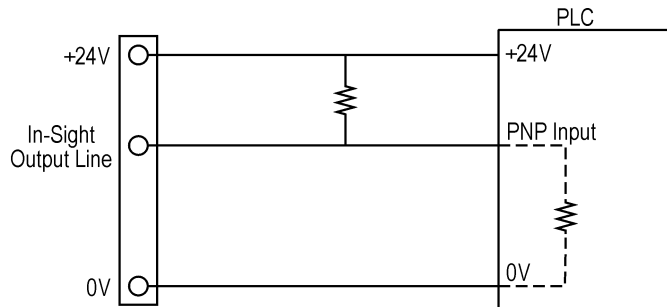


Figure 3-5: Discrete Output Connection Example 4

3.3 CAT5 Network Cable Specifications

Cognex-supplied network patch cables meet CAT5/CAT5e specifications using 568-B standard wire pairing.

Table 3-7: Cat5/CAT5e Network Cable Wiring

STRAIGHT-PINNED		CROSSOVER	
RJ-45 Connector (A)	RJ-45 Connector (B)	Connector (A)	Connector (B)
1	1	1	3
2	2	2	6
3	3	3	1
4	4	4	5
5	5	5	4
6	6	6	2
7	7	7	8
8	8	8	7

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Table 3-8: CAT5/CAT5e Network Cable 568-B Wire Pairs

PAIR #	WIRE PAIRS
1	4 — 5
2	1 — 2
3	3 — 6
4	7 — 8

3.4 Mechanical Specifications

The following sections present dimensional drawings for the In-Sight 4000 series vision sensors.

NOTE: All dimensions are shown in millimeters (inches).

3.4.1 In-Sight 4000/4001 Dimensions

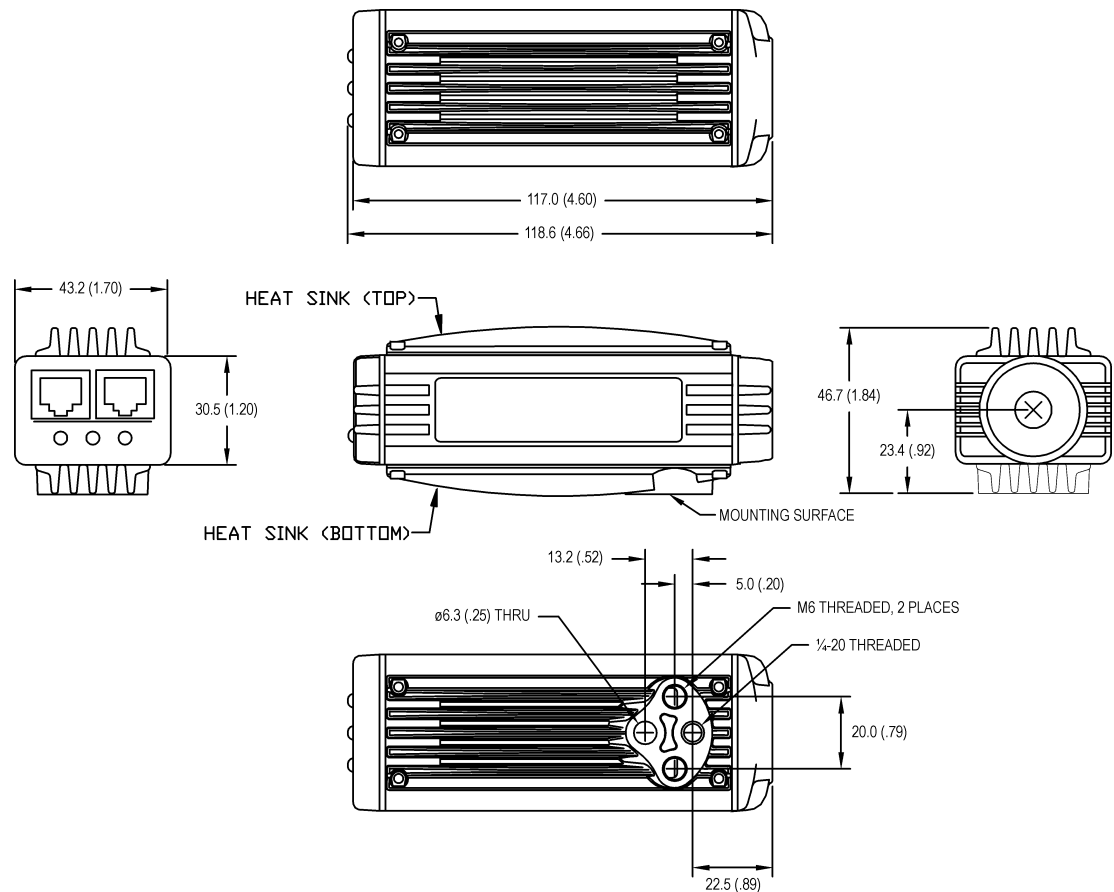


Figure 3-6: Dimensions, In-Sight 4000/4001

3.4.2 In-Sight 4100 Dimensions

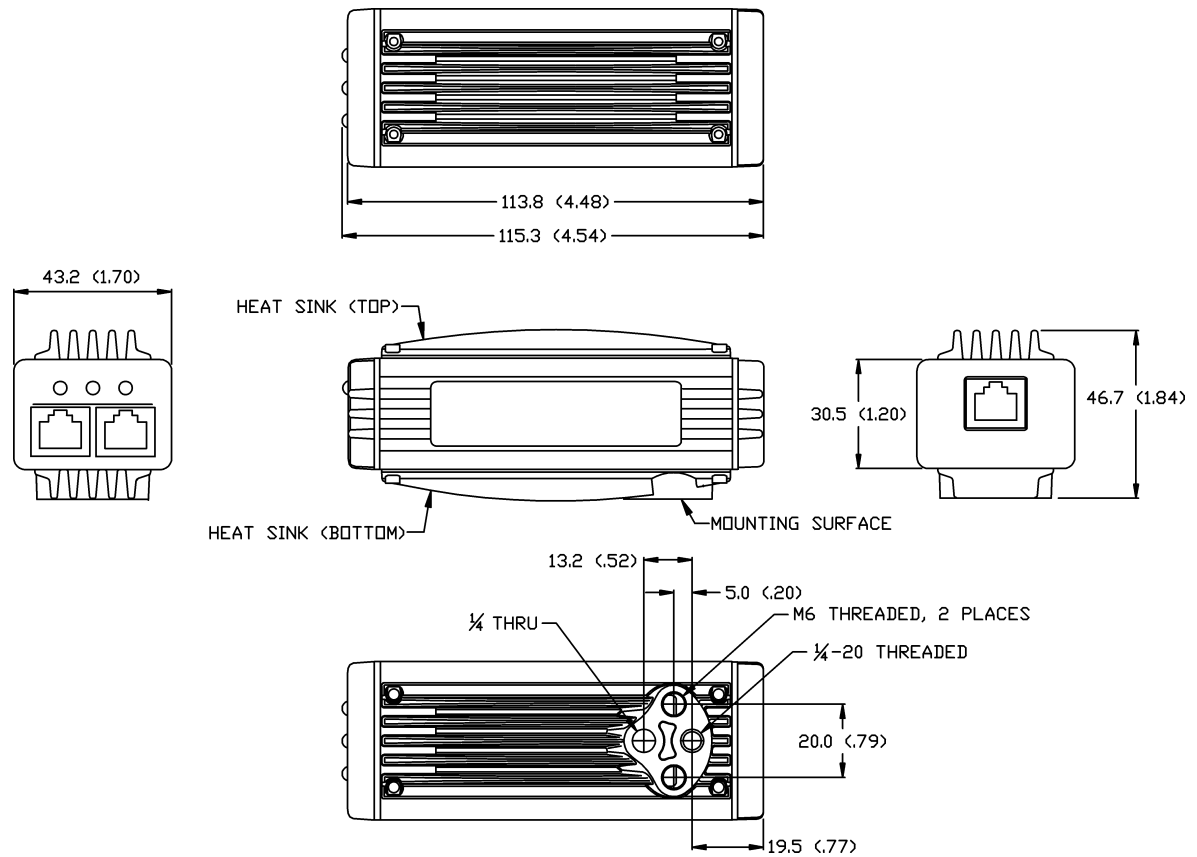


Figure 3-7: Dimensions, In-Sight 4100 Processor

Specifications

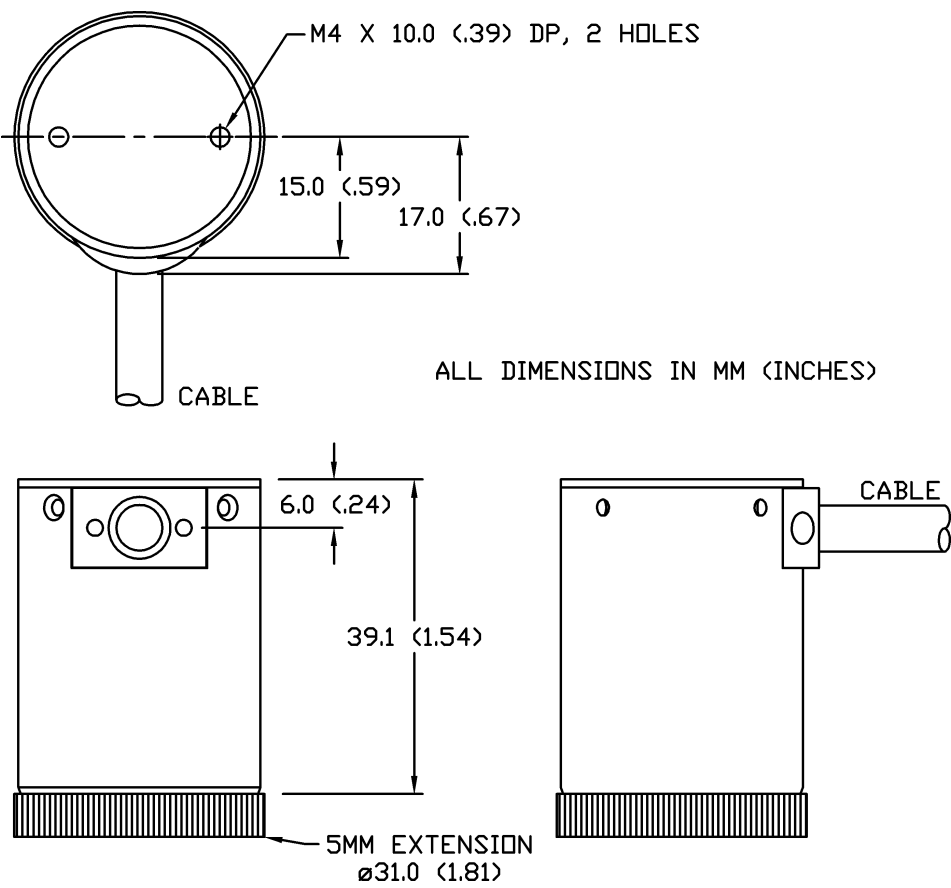


Figure 3-8: Dimensions, In-Sight 4100 Remote Head Camera

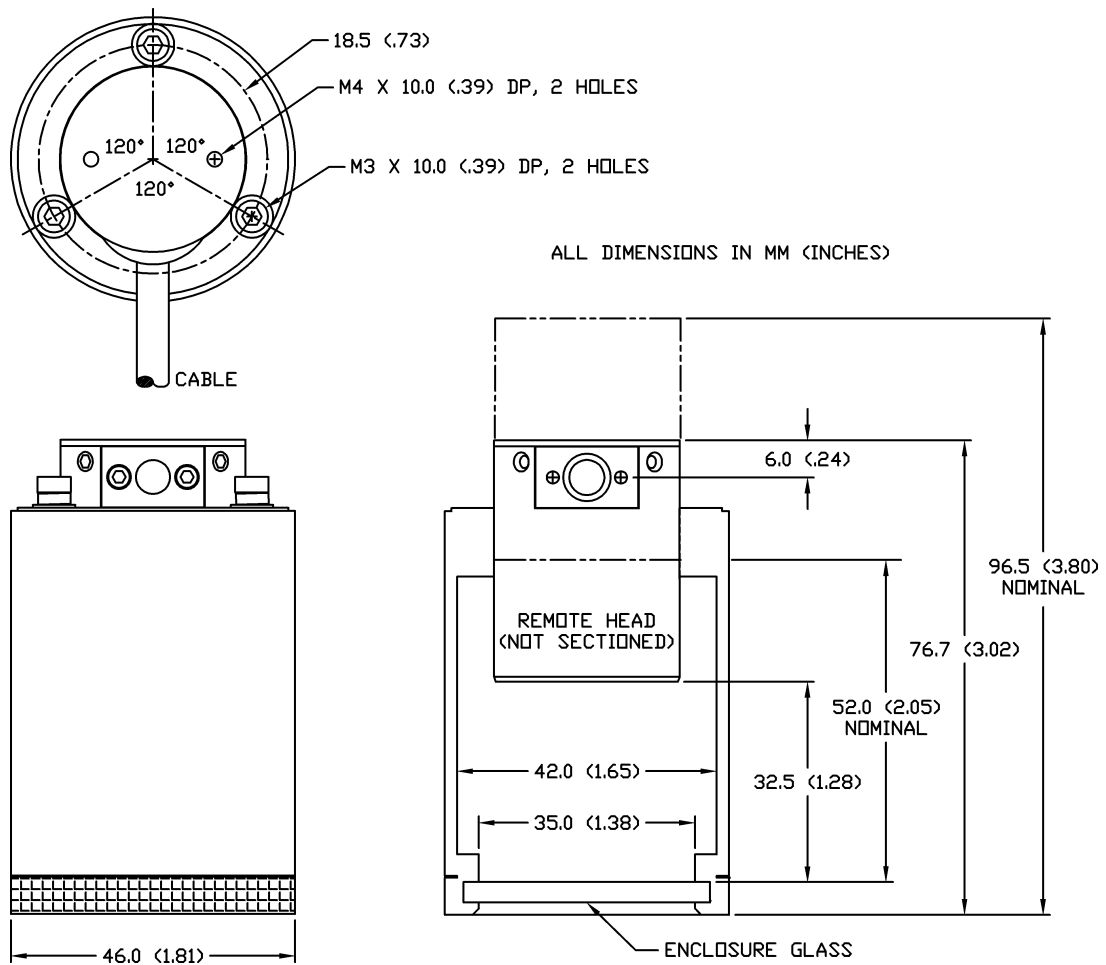


Figure 3-9: Dimensions, In-Sight 4100 Remote Head Camera with Enclosure

Specifications

Configuring Microsoft Windows Network Settings

This section provides information on how to configure Microsoft Windows network settings in order to connect to an In-Sight 4000 using the In-Sight PC Host program. The steps listed below and the example dialogs are specific to Windows NT 4.0. The exact steps required may vary slightly in Windows XP, 2000, Me, and 98SE.

To configure Windows network settings:

1. Verify the PC has a TCP/IP protocol installed.
2. Close all programs on the PC except Windows NT.
3. Click **Start**, click **Settings**, and then click on the **Control Panel** shortcut to open the Control Panel icon group.
4. Click the **Network** icon to open the Network dialog.
5. Select the **Protocols** tab (FigureA-1). If TCP/IP Protocol appears in this list, skip steps 6 and 7.
6. If TCP/IP is not on the list of installed protocols, click **Add** to open the Select Network Protocol dialog (FigureA-1).
7. Select TCP/IP and click **OK**. Windows NT will install the protocol and return to the Network dialog.

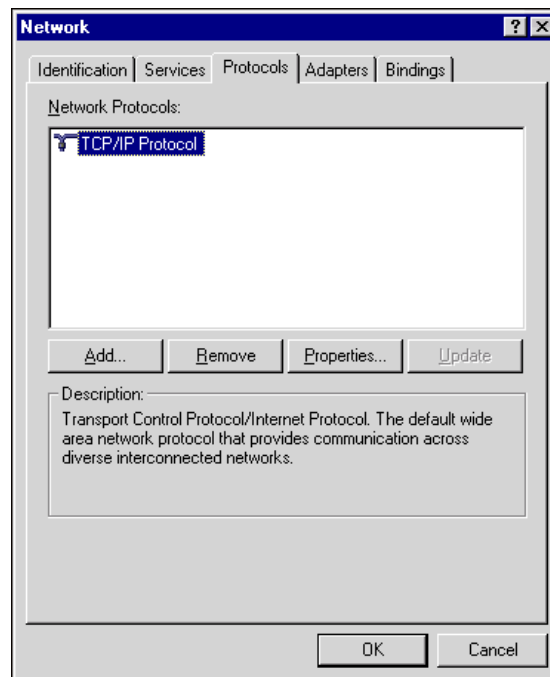


Figure A-1: Windows Network dialog, Protocols tab

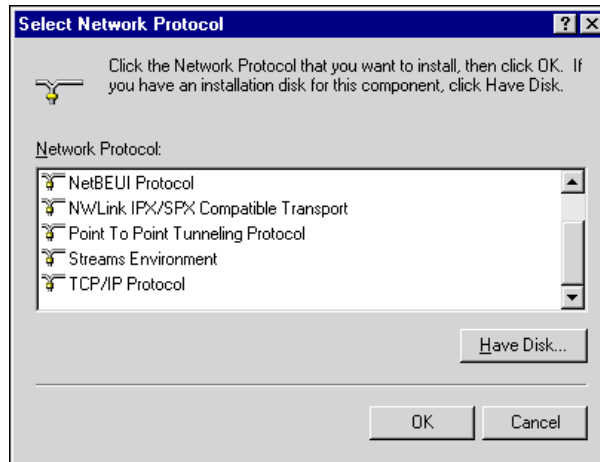


Figure A-2: Select Network Protocol dialog

Configure the IP Address and Subnet Mask.

1. Highlight **TCP/IP Protocol** in the Protocols tab and click **Properties** to open the Microsoft TCP/IP Properties dialog (FigureA-3):

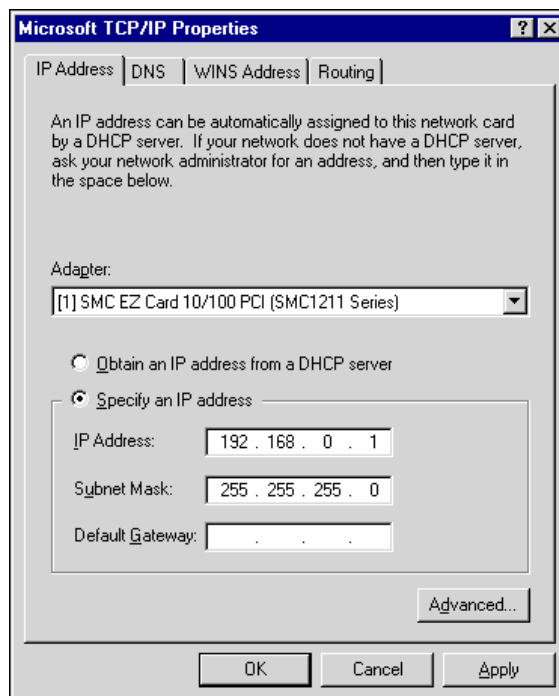


Figure A-3: Microsoft TCP/IP Properties Dialog

2. Click the **Specify an IP address** radio button. The IP Address and Subnet Mask fields, which are grayed-out when DHCP is enabled, become active.

Installing the In-Sight® 4000 Series Vision Sensors

3. Enter an appropriate Subnet Mask. The Subnet Mask defines which part of the In-Sight 4000's IP Address refers to the network and which part refers to the host. The network part of the IP address is the same for all hosts on the same subnet, and the remainder is unique to each host. The default Subnet Mask setting of 255.255.255.0 is usually appropriate.
4. Click **OK** twice, then restart Windows if prompted to do so.



Using the IP Address Switch

All In-Sight 4000 series sensors feature a manual switch that can be used to change IP address settings to a known state when performing one of the following actions:

- Using Native Mode commands to change network settings on a non-DHCP network (or serial port) when In-Sight PC Host or In-Sight Explorer is unavailable;
- Troubleshooting network connection problems.

The IP Address switch has two modes of operation:

Force DHCP

Force DHCP mode enables the default DHCP server mode, overriding the sensor's current Static IP address and allowing a DHCP server to automatically assign the In-Sight sensor a network IP address and Subnet Mask. If the sensor is already set to DHCP server mode, no changes to the IP address will occur. The sensor's Serial Port 1 **Mode** setting is also changed to 'Native' to allow Network settings to be configured from a remote RS232 device.

To force DHCP mode, insert the end of a paper clip into the sensor's IP Address switch. Depress the switch once and remove the paper clip. When all three LEDs have stopped blinking, the sensor has been restarted. These settings will remain in effect even after the sensor is powered down.

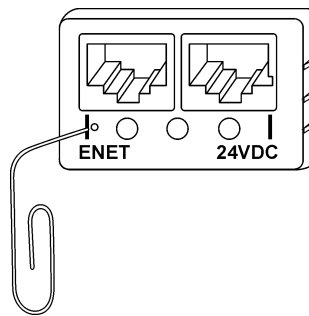


Figure B-1: IP Address Switch Operation

Force Static IP

Force Static IP mode disables the DHCP server mode. If a static IP address and Subnet Mask were previously assigned to the In-Sight system, those settings will be used, otherwise, the factory default static IP Address (192.168.0.1) and Subnet Mask (255.255.255.0) will be used. If the sensor is already configured to use a static IP, no changes to the IP address will occur. Like force DHCP mode, force static IP mode changes the sensor's Serial Port 1 **Mode** setting to 'Native' to allow Network settings to be configured from an RS232 device.

To Force Static IP mode, insert the end of a paper clip into the sensor's reset switch. Depress the switch for at least five seconds, then remove the paper clip. When all three LEDs have

Appendix B

stopped blinking, the sensor has been restarted. These settings will remain in effect even after the sensor is powered down.



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