

# In-Sight<sup>®</sup> 9902L Vision System Reference Guide



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# Regulations and Conformity

**Note:** For the most up-to-date CE declaration and regulatory conformity information, please refer to the Cognex online support site: <http://www.cognex.com/Support>.

Safety and Regulatory	
Manufacturer	Cognex Corporation One Vision Drive Natick, MA 01760 USA
	Regulatory Model 1AA9
FCC	FCC Part 15, Class A 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. 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.
KCC 	Regulatory Model 1AA9: R-REM-CGX-1AA9
NRTL	TÜV SÜD AM SCC/NRTL OSHA Scheme for UL/CAN 61010-1.
CB	TÜV SÜD AM, IEC/EN 61010-1. CB report available upon request.
EU RoHS	Compliant to the latest applicable Directive.

## China RoHS



Part Name 部件名称	Hazardous Substances 有害物质					
	Lead (Pb) 铅	Mercury (Hg) 汞	Cadmium (Cd) 镉	Hexavalent Chromium (Cr (VI)) 六价铬	Polybrominated biphenyls (PBB) 多溴联苯	Polybrominated diphenyl ethers (PBDE) 多溴二苯醚
Regulatory Model 1AA9	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.  
这个标签是根据SJ/T 11364 的规定准备的。

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB / T26572 - 2011.  
表示本部件所有均质材料中含有的有害物质低于GB / T26572 - 2011 的限量要求。

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB / T26572 - 2011.  
表示用于本部件的至少一种均质材料中所含的危害物质超过GB / T26572 - 2011 的限制要求。

## For European Community Users

Cognex complies with Directive 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE).

This product has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment, if not properly disposed.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems for product disposal. Those systems will reuse or recycle most of the materials of the product you are disposing in a sound way.



The crossed out wheeled bin symbol informs you that the product should not be disposed of along with municipal waste and invites you to use the appropriate separate take-back systems for product disposal.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You may also contact your supplier for more information on the environmental performance of this product.

# Precautions

To reduce the risk of injury or equipment damage when you install the Cognex product, observe the following precautions:

- The vision system requires a UL or NRTL listed power supply with a 24VDC output and meets the following rating requirements:
  - At least 2A continuous current.
  - A maximum short circuit current of less than 8A.
  - A maximum power of less than 100VA and marked as a Limited Power Source (LPS) or National Electrical Code (NEC) Class 2.

Any other voltage creates a risk of fire or shock and can damage the components. Applicable national and local wiring standards and rules must be followed.

- 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 current wiring or high-voltage power sources.
- Do not install Cognex products where they are directly exposed to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity.
- Do not expose the image sensor to laser light; image sensors can be damaged by direct, or reflected, laser light. If your application requires the use of laser light that may strike the image sensor, a lens filter at the corresponding laser's wavelength is recommended. Contact your local integrator or application engineer for suggestions.
- Changes or modifications not expressly approved by the party responsible for regulatory compliance could void the user's authority to operate the equipment.
- Service loops should be included with all cable connections.
- Cable shielding can be degraded or cables can be damaged or wear out more quickly if a service loop or bend radius is tighter than 10X the cable diameter. The bend radius must begin at least six inches from the connector.
- The LIGHT connector is not supported.
- This device is certified for office use only and if used at home, there can be frequency interference problems.
- This device should be used in accordance with the instructions in this manual.
- All specifications are for reference purpose only and may be changed without notice.


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# Symbols


The following symbols indicate safety precautions and supplemental information.

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 **WARNING:** This symbol indicates the presence of a hazard that could result in death, serious personal injury or electrical shock.


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 **CAUTION:** This symbol indicates the presence of a hazard that could result in property damage.


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 **Note:** Notes provide supplemental information about a subject.

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 **Tip:** Tips provide helpful suggestions and shortcuts that may not otherwise be apparent.

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# Introduction

The In-Sight<sup>®</sup> vision system is a compact, network-ready, stand-alone machine vision system used for automated inspection, measurement, identification and robot guidance applications on the factory floor. All models can be easily configured remotely over a network using an intuitive user interface.

## Support

Many information resources are available to assist you in using the vision system:

- The *In-Sight<sup>®</sup> Explorer Help* and *EasyBuilder Help* files, provided with In-Sight Explorer software.
- On-demand training: <http://www.cognex.com/on-demand-training.aspx>.
- The In-Sight online support site: <http://www.cognex.com/Support/InSight>.

## Standard Components

**Note:**



- Cables are sold separately.
- If any of the standard components appear to be missing or damaged, immediately contact your Cognex Authorized Service Provider (ASP) or Cognex Technical Support.



Component	Description
Vision System	Provides image acquisition, vision processing, job storage, Ethernet connectivity and discrete I/O. The vision system has an 8GB SD card pre-installed.

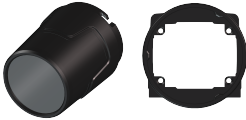

## Accessories

The following components can be purchased separately. For a complete list of options and accessories, contact your local Cognex sales representative.



### C-Mount Covers

**Note:**

- A C-Mount lens has the following restrictions:
  - Maximum thread length is 5.25mm.
  - The C-Mount lens threads and body cannot protrude more than 6.5mm in length into the vision system when screwed in, unless the diameter of the back lens is smaller than 19.25mm. If the C-Mount lens threads and body protrude more than 6.5mm, you can add a spacer between the lens and vision system. However, the spacer decreases the working distance.
- Refer to [C-Mount Lens Clearance Dimensions on page 29](#) for more information.

<p>Large C-Mount cover and adapter (COV-7000-CMNT-LG).</p> <p><b>Note:</b> If using the COV-7000-CMNT-LG cover, the maximum lens length is 77mm with a bandpass filter, the maximum lens body diameter is 55mm and the maximum diameter including locking screws is 55mm.</p>	
<p>C-Mount cover extender (COV-7000-CMNT-LGX).</p>	

### Cables

<p>Breakout cable, M12-12 to Flying Lead (CCB-PWRIO- xx) (straight, xx specifies length: 5m, 10m, 15m)</p>	
<p>Breakout cable, M12-12 to Flying Lead (CCB-PWRIO-xxR) (right-angled, xx specifies length: 5m, 10m, 15m)</p>	
<p>Ethernet X-coded M12-8 to RJ-45 cable (CCB-84901-2001-xx) (straight, xx specifies length: 2m, 5m, 10m, 15m, 30m)</p>	
<p>Ethernet X-coded M12-8 to RJ-45 cable (CCB-84901-2002) (right-angled, xx specifies length: 2m, 5m, 10m)</p>	

## Connectors and Indicators





Connector	Function
PWR Connector	Connects the Breakout cable, which provides connections to an external power supply, the acquisition trigger input, encoder inputs, general-purpose input, high-speed outputs and RS-232 serial communications. For more information, refer to <a href="#">Breakout Cable on page 25</a> .
LIGHT Connector	Not supported.
ENET Connector	Connects the Ethernet cable, which provides 10/100/1000 Ethernet connectivity. For more information, refer to <a href="#">Ethernet Cable on page 24</a> .



Indicator	Function
	Focus Metric LEDs Indicates the image focus score (0 - 10) while in Live Video Mode within In-Sight Explorer.
	TRIG Button Manually triggers an image acquisition when the vision system is either: <ul style="list-style-type: none"> <li>• Online within In-Sight Explorer and the acquisition Trigger parameter is set to Manual.</li> <li>• Offline within In-Sight Explorer.</li> </ul>
	Power LED The green LED illuminates to indicate that the vision system is powered on.
	SD Card Status LED <ul style="list-style-type: none"> <li>• Off: The SD card is not inserted.</li> <li>• Green: The SD card is present, and it is safe to remove the SD card after removing power from the vision system.</li> <li>• Yellow: The SD card is present, but it is not safe to remove it.</li> </ul>
	Pass/Fail LED and Indicator Ring Green or red when active. User configurable.
	Network LED The yellow LED flashes to indicate network activity.



Indicator		Function
	Error LED	Red when active. User configurable.
	TUNE Button	Used as an Event Trigger within In-Sight Explorer to force a cell containing an Event structure to run when the TUNE button is pressed.

# Installation

This section describes the connection of the vision system to its standard components and accessories. For a complete list of options and accessories, contact your Cognex sales representative.

**Note:** Cables are sold separately.

**CAUTION:** All cable connectors are “keyed” to fit the connectors on the vision system; do not force the connections or damage may occur.

## Install the C-Mount Lens and Cover (COV-7000-CMNT-LG)

Complete the following steps to install a C-Mount lens and cover to the vision system. The C-Mount cover (COV-7000-CMNT-LG) is an optional accessory and required for IP67 protection.

**Note:**

- A C-Mount lens has the following restrictions:
  - Maximum thread length is 5.25mm.
  - The C-Mount lens threads and body cannot protrude more than 6.5mm in length into the vision system when screwed in, unless the diameter of the back lens is smaller than 19.25mm. If the C-Mount lens threads and body protrude more than 6.5mm, you can add a spacer between the lens and vision system. However, the spacer decreases the working distance.
- If using the COV-7000-CMNT-LG cover, the maximum lens length is 77mm with a bandpass filter, the maximum lens body diameter is 55mm and the maximum diameter including locking screws is 55mm.

1. Remove the rubber faceplate covering the image sensor window, if present.
2. Remove the protective film covering the threaded lens opening, if present.
3. Place the adapter on the faceplate of the vision system. Insert the four adapter screws and tighten; the maximum torque is 0.90 Nm (8 in-lb).
4. Thread the lens into the vision system.
5. (Optional) For longer lenses, the C-Mount cover extender accessory (COV-7000-CMNT-LGX) can be used to add 30mm in length to the C-Mount cover. If using the cover extender, attach it to the vision system and rotate the cover extender clockwise approximately thirteen degrees to lock it.
6. Attach the cover to the vision system. Rotate the cover clockwise approximately thirteen degrees to lock it.



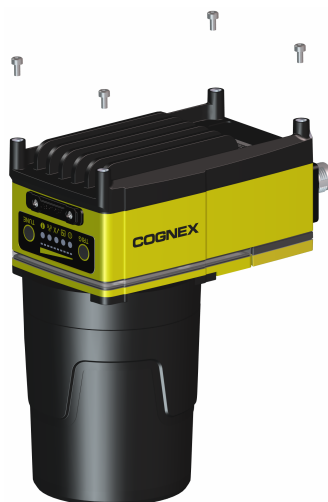
## Mount the Vision System

The vision system provides mounting holes for attachment to a mounting surface.

**CAUTION:** The vision system should be grounded, either by mounting the vision system to a fixture that is electrically grounded or by attaching a wire from the vision system's mounting fixture to frame ground or Earth ground. If a ground wire is used, it should be attached to one of the four mounting points on the back plate of the vision system and not to the mounting points on the front of the vision system.

1. Align the holes on the mounting surface with the mounting holes on the vision system.
2. Insert the M4 screws into the mounting holes and tighten using a 2.5mm hex wrench; the maximum torque is 0.90 Nm (8 in-lb).

**Note:** The maximum insertion depth of the M4 screws should be 6mm in the rear housing and 3.75mm in the front housing, plus the thickness of the mounting material used.



## Connect the Ethernet Cable

**CAUTION:** The Ethernet cable shield must be grounded at the far end. Whatever this cable is plugged into (typically a switch or router) should have a grounded Ethernet connector. A digital voltmeter should be used to validate the grounding. If the far end device is not grounded, a ground wire should be added in compliance with local electrical codes.

1. Connect the Ethernet cable's M12 connector to the vision system's ENET connector.
2. Connect the Ethernet cable's RJ-45 connector to a switch/router or PC, as applicable.



## Connect the Breakout Cable

**⚠ CAUTION:** To reduce emissions, connect the far end of the Breakout cable shield to frame ground.

**Note:**

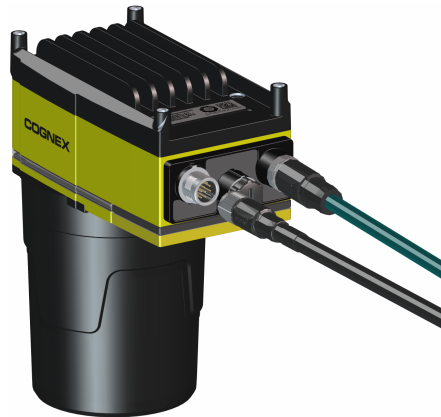


- Perform wiring or adjustments to I/O devices when the vision system is not receiving power.
- Exposed wires can be cut short or wire ends trimmed, and the wires tied back using a tie made of non-conductive material. Keep all bare wires separated from the +24VDC wire.

1. Verify that the 24VDC power supply being used is unplugged and not receiving power.
2. Optionally, connect the I/O wires to an appropriate device (for example, a PLC, encoder or serial device). For more information, refer to [Breakout Cable on page 25](#).
3. Attach the Breakout cable's +24VDC (Red wire) and GND (Black wire) to the corresponding terminals on the power supply.

**⚠ CAUTION:** Never connect voltages other than 24VDC. Always observe the polarity shown.

4. Connect the Breakout cable's M12 connector to the vision system's PWR connector.



5. Restore power to the 24VDC power supply and turn it on if necessary.

## Replace the SD Card (Optional)

The vision system is equipped with a Micro SD card slot and an 8GB SD card is pre-installed for saving job and image files. Complete the following steps to replace the pre-installed SD card.

**Note:** The vision system supports SD cards formatted with a FAT32 file system.

**CAUTION:**

- Hot-plugging the SD card is not supported and may damage the SD card and/or lead to unexpected behavior.
- !**
- IP67 protection requires that all cables are properly attached (or the provided connector plug installed), the IP67-rated lens cover is properly installed, and the Micro SD card cover is fastened in place.
  - Observe ESD precautions when installing or removing an SD card or other accessories.

1. Remove power from the vision system.
2. Unscrew the screws in the Micro SD card cover and open the card slot.
3. Remove the existing SD card from the Micro SD card slot.
4. Insert the new SD card into the Micro SD card slot, ensuring the card is properly oriented.
5. Replace the SD card cover, reinsert the screws and torque screws to 0.18 Nm (25 in-oz).



6. Restore power to the vision system.

# Specifications

The following sections list general specifications for the vision system.

## Vision System Specifications

Specifications	9902L
Minimum Firmware Requirement	In-Sight version 5.6.1
Job/Program Memory	7.2GB non-volatile flash memory; unlimited storage via remote network device.
Image Processing Memory	512MB SDRAM
SD Card Slot	1 Micro SD card slot with an 8GB SD card pre-installed for saving job and image files. The vision system supports SD cards formatted with a FAT32 file system.
Sensor Type	1-inch CMOS, line sensor
Sensor Properties	7 $\mu$ m x 7 $\mu$ m active area, 7 $\mu$ m x 7 $\mu$ m sq. pixels
Maximum Resolution (pixels) <sup>1</sup>	2048 x 1; 2048 x 16384 (up to 16384 lines for a full resolution image). 1K Resolution (Low Light Mode): 1024 x 1; 1024 x 16384 (up to 16384 lines for a full resolution image).
Acquisition	Line Scan integration.
Bit Depth	256 grey levels (8 bits/pixel)
Lines Per Second (LPS)	66K LPS
Lens Type	C-Mount
Trigger	1 opto-isolated, acquisition trigger input. Remote software commands via Ethernet.
Discrete Inputs	1 general-purpose input when connected to the Breakout cable.
Discrete Outputs	2 high-speed outputs when connected to the Breakout cable.
Encoder Inputs	2 built-in, encoder inputs for use with a 24VDC signal.
Status LEDs	SD Card Status, Pass/Fail LED and Indicator Ring, Network LED and Error LED.
Network Communication	1 Ethernet port, 10/100/1000 BaseT with auto MDIX. IEEE 802.3 TCP/IP Protocol. Supports DHCP, static and link-local IP address configuration.
1588 Support	Timestamp Resolution: 8ns Synchronization Accuracy Through Transparent Clock: 5 $\mu$ s
Serial Communication	RS-232C when connected to the Breakout cable.
Power Consumption	24VDC $\pm$ 10%, 1.5A maximum
Material	Die-cast and extruded aluminum housing.
Finish	Painted.
Mounting	Four M4 threaded mounting holes on front and back of the vision system.

<sup>1</sup> The default resolution is 2048 x 4096. The width and maximum image height can be adjusted in the Line Scan Settings dialog within In-Sight Explorer. If the 1K Resolution (Low Light Mode) checkbox is selected, the width is decreased to 1024, providing increased light sensitivity. Within the AcquireImage function, the Number of Lines parameter value can range from 1 to the Max Image Height.

Specifications	9902L
Dimensions	<ul style="list-style-type: none"> <li>• 53.4mm (2.10in) x 60.5mm (2.38in) x 121.0mm (4.77in)</li> <li>• 135.7 (5.34in) x 68.0mm (2.68in) x 121.0mm (4.77in) with C-Mount cover accessory (COV-7000-CMNT-LG).</li> <li>• 165.7 (6.52in) x 68.0mm (2.68in) x 121.0mm (4.77in) with C-Mount cover accessory (COV-7000-CMNT-LG) and C-Mount cover extender accessory (COV-7000-CMNT-LGX).</li> </ul>
Weight	<ul style="list-style-type: none"> <li>• Vision System with no accessories attached: 400 g (14.1 oz.)</li> <li>• C-Mount cover accessory (COV-7000-CMNT-LG): 75.9 g (2.68 oz.)</li> <li>• C-Mount cover extender accessory (COV-7000-CMNT-LGX): 25.0 g (0.88 oz.)</li> </ul>
Case Temperature <sup>1</sup>	0°C to 50°C (32°F to 122°F).
Storage Temperature	-20°C to 80°C (-4°F to 176°F)
Humidity	< 80% non-condensing
Protection	IP67 with all cables properly attached (or the provided connector plug installed), the IP67-rated cover properly installed and the Micro SD card cover fastened in place.
Shock (Shipping and Storage)	IEC 60068-2-27: 18 shocks (3 shocks in each polarity in each (X, Y, Z) axis) 80 Gs (800m/s <sup>2</sup> at 11ms, half-sinusoidal) with cables or cable plugs and a 150 gram or lighter lens attached.
Vibration (Shipping and Storage) <sup>2</sup>	IEC 60068-2-6: vibration test in each of the three main axis for 2 hours @ 10 Gs (10 to 500 Hz at 100m/s <sup>2</sup> / 15mm) with cables or cable plugs and a 150 gram or lighter lens attached.
Regulations/Conformity	CE, FCC, KCC, TÜV SÜD NRTL, EU RoHS, China RoHS

<sup>1</sup> To verify case temperature, use the EV GetSystemConfig("Internal.Temperature") Extended Native Mode command. When issued, it returns the vision system internal temperature in degrees Celsius, which is approximately 3 to 5 degrees above the vision system case temperature. For more information, see the *In-Sight® Explorer Help* file. A thermal scanner can also be used to determine the vision system case temperature. Additional cooling measures are required if the case temperature cannot be kept below 50°C. Examples of such measures include: extra heat sinking and/or air movement.

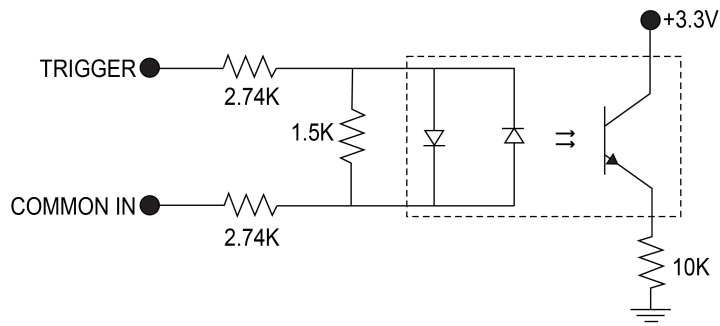
<sup>2</sup> Before you ship this product or any machinery that contains it, remove lenses that weigh more than 150 grams.

## Acquisition Trigger Input

The vision system features one acquisition trigger input, which is optically isolated. The acquisition trigger input can be configured to trigger from either an NPN (current sinking) or PNP (current sourcing) device.

Specification	Description
Voltage	ON: 15 to 28V DC (24VDC nominal) OFF: 0 to 5VDC (11.5VDC nominal threshold)
Current (Typical)	ON: 2.6mA to 4.9mA from 15 to 28V input OFF: < 830µA for < 5VDC input Resistance: ~6 Kohms
Delay	1 line + 5µs is the maximum latency between the leading edge of the trigger and the start of acquisition. The line period varies depending on acquisition settings. Input pulse should be a minimum of 1ms wide.

- To trigger from an NPN type photoelectric sensor or PLC output, connect COMMON IN to +24VDC and connect TRIGGER to the output of the photoelectric sensor. When the output turns ON, it pulls TRIGGER down to 0VDC, turning the opto-coupler ON. For more information, refer to [Breakout Cable on page 25](#).
- To trigger from a PNP photoelectric sensor or PLC output, connect TRIGGER to the output of the photoelectric sensor and connect COMMON IN to 0VDC. When the output turns ON, it pulls TRIGGER up to +24VDC, turning the opto-coupler ON. For more information, refer to [Breakout Cable on page 25](#).

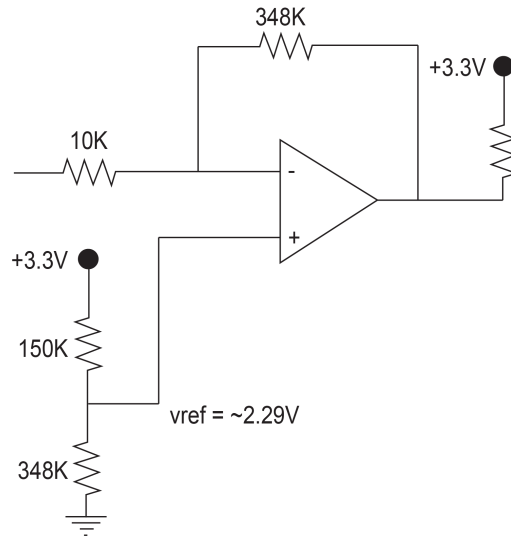


26.4V Max. across input pins - Transition approximately 12V (Min.)

## Encoder Inputs

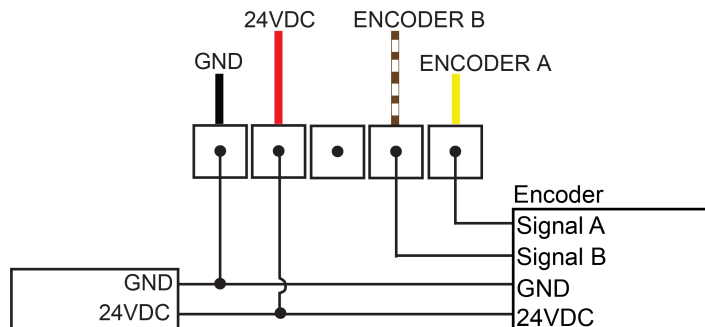
The Breakout cable can be used for communication between the vision system and a single or quadrature encoder.

Specification	Description
Voltage	ON: 5 to 24VDC OFF: <2VDC
Current	ON: <1000 $\mu$ A OFF: 0 $\mu$ A Resistance: ~350 kOhms
Maximum Encoder Frequency	96KHz (assuming a 50/50 duty cycle)



## Encoder Input Wiring

For single encoders, the ENCODER A pin must be used. For quadrature encoders, the ENCODER A or ENCODER B pin can be used. For more information, refer to [Breakout Cable on page 25](#).

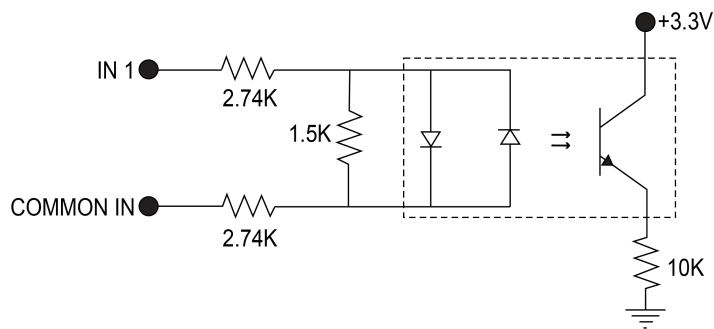


## General-Purpose Input

The vision system features one built-in general-purpose input, which is optically isolated. The input can be configured as either NPN (current sinking) or PNP (current sourcing) lines.

Specification	Description
Voltage	ON: 15 to 28V DC (24VDC nominal) OFF: 0 to 5VDC (11.5VDC nominal threshold)
Current (Typical)	ON: 2.6mA to 4.9mA from 15 to 28V input OFF: < 830µA for < 5VDC input Resistance: ~6 Kohms
Delay	1.11ms maximum latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1ms wide.

- For NPN lines, connect COMMON IN to +24VDC and connect IN 1 to the output of the photoelectric sensor or PLC. When the output turns ON, it pulls IN 1 down to 0VDC, turning the opto-coupler ON.
- For PNP lines, connect IN 1 to the output of the detector and connect COMMON IN to 0VDC. When the output turns ON, it pulls IN 1 up to +24VDC, turning the opto-coupler ON.



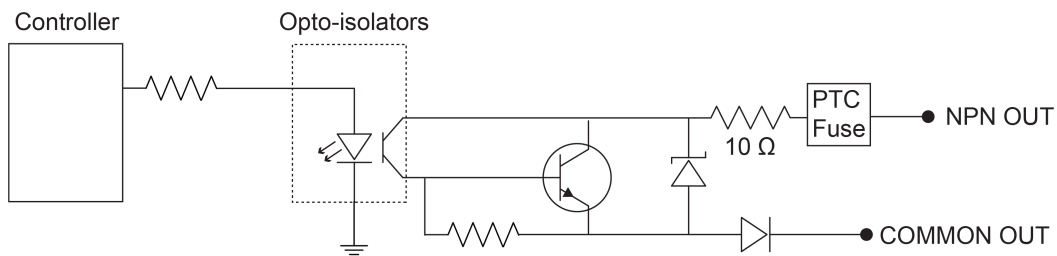
26.4V Max. across input pins - Transition approximately 12V (Min.)

## High-Speed Outputs

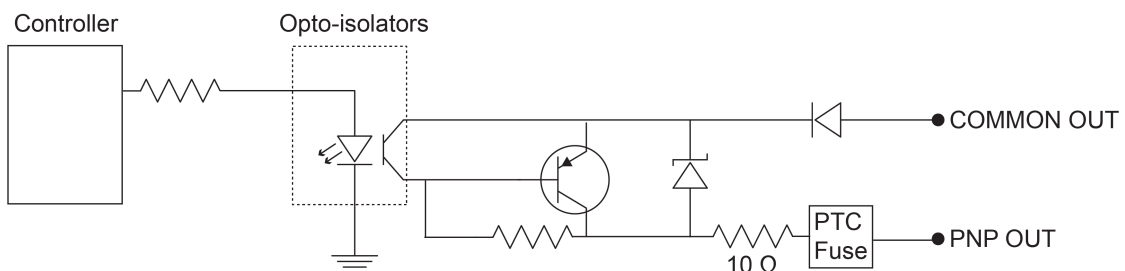
The vision system features two built-in, high-speed outputs, which are optically isolated. The high-speed outputs can be used as either NPN (current sinking) or PNP (current sourcing) lines.

Specification	Description
Voltage	26.4VDC maximum through external load
Current	50mA maximum sink or source current
	OFF state leakage current 100 $\mu$ A
	External load resistance 470 Ohms to 10K Ohms
	Each line rated at a maximum 50mA, protected against over-current, short circuits and transients from switching inductive loads. High current inductive loads require an external protection diode.
Delay <sup>1</sup>	25 $\mu$ s (maximum due to opto-isolators turning ON).

For NPN lines, the external load should be connected between the output and the positive supply voltage (<26.4VDC). The output pulls down to less than 3VDC when ON, which causes current to flow through the load. When the output is OFF, no current flows through the load.



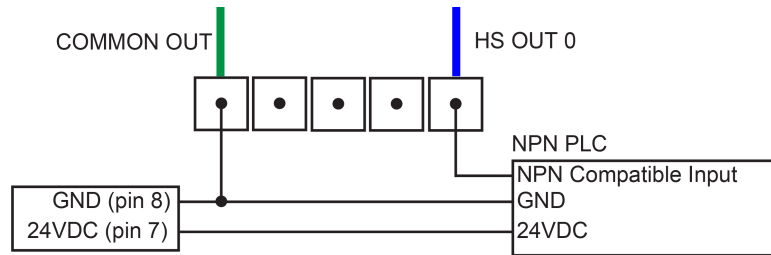
For PNP lines, the external load should be connected between the output and the negative supply voltage (0VDC). When connected to a 24VDC power supply, the output pulls up greater than 21VDC when ON, and current flows through the load. When the output is OFF, no current flows through the load.



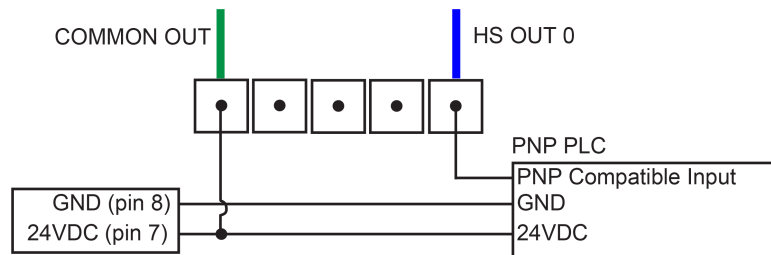
<sup>1</sup> Delay when opto-isolators turn OFF depends on the load to which the output is connected. With a 470 Ohm load, the maximum delay will be 200 $\mu$ s.

## High-Speed Output Wiring

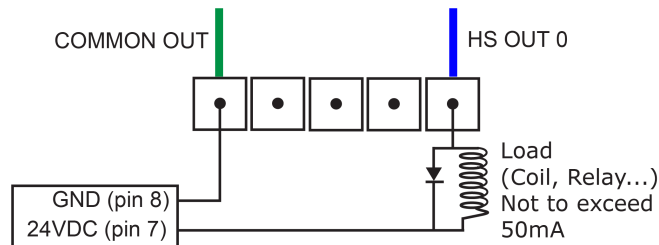
To connect to an NPN-compatible PLC input, connect one of the vision system's high-speed outputs directly to the PLC input. When enabled, the output pulls the PLC input down to less than 3VDC.



To connect to a PNP-compatible PLC input, connect one of the vision system's high-speed outputs directly to the PLC input. When enabled, the output pulls the PLC input up to greater than 21VDC.

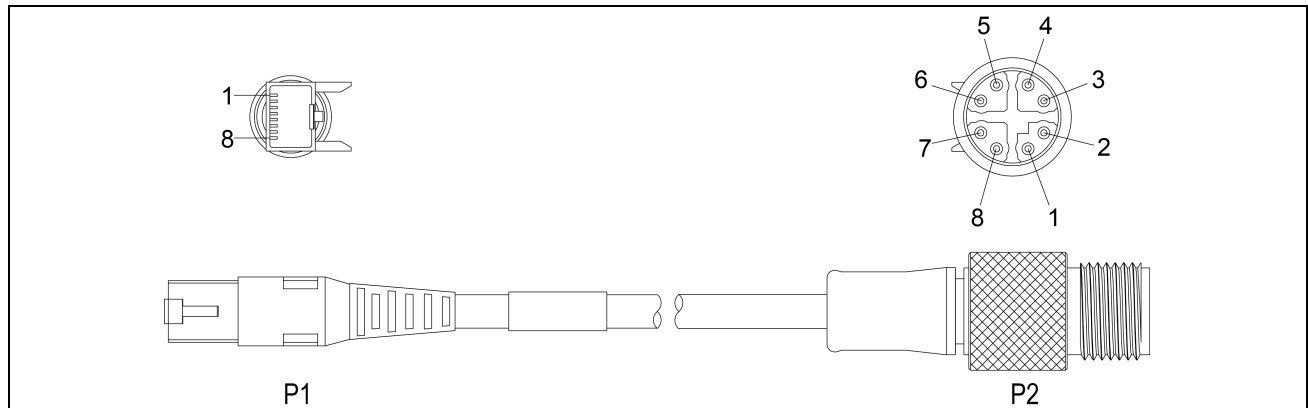


To connect the high-speed outputs to a relay, LED or similar load, connect the negative side of the load to the output and the positive side to +24VDC. When the output switches on, the negative side of the load is pulled down to less than 3VDC, and 24VDC appears across the load. Use a protection diode for a large inductive load, with the anode connected to the output and the cathode connected to +24VDC.



## Ethernet Cable

The Ethernet cable provides Ethernet connectivity to the vision system.



P1 Pin Number	Wire Color	Signal Name	P2 Pin Number
1	White/Orange	TxRx A +	1
2	Orange	TxRx A -	2
3	White/Green	TxRx B +	3
4	Blue	TxRx C +	8
5	White/Blue	TxRx C -	7
6	Green	TxRx B -	4
7	White/Brown	TxRx D +	5
8	Brown	TxRx D -	6

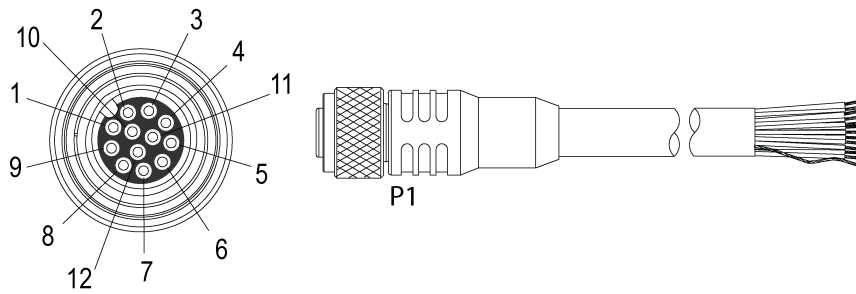
**CAUTION:** The Ethernet cable shield must be grounded at the far end. Whatever this cable is plugged into (typically a switch or router) should have a grounded Ethernet connector. A digital voltmeter should be used to validate the grounding. If the far end device is not grounded, a ground wire should be added in compliance with local electrical codes.

**Note:**



- Cables are sold separately.
- The wiring for this cable follows standard industrial Ethernet M12 specifications. This differs from the 568B standard.

## Breakout Cable



Pin#	Signal Name	Wire Color
1	ENCODER A INPUT	Yellow
2	RS-232 TRANSMIT	White/Yellow
3	RS-232 RECEIVE	Brown
4	ENCODER B INPUT	White/Brown
5	IN 1	Violet
6	COMMON IN	White/Violet
7	+24VDC	Red
8	GND	Black
9	COMMON OUT	Green
10	TRIGGER	Orange
11	HS OUT 0	Blue
12	HS OUT 1	Grey

**Note:**

- Cables are sold separately.



- Exposed wires can be cut short or wire ends trimmed, and the wires tied back using a tie made of non-conductive material. Keep all bare wires separated from the +24VDC wire.
- Perform wiring or adjustments to I/O devices when the vision system is not receiving power.

# Dimensions

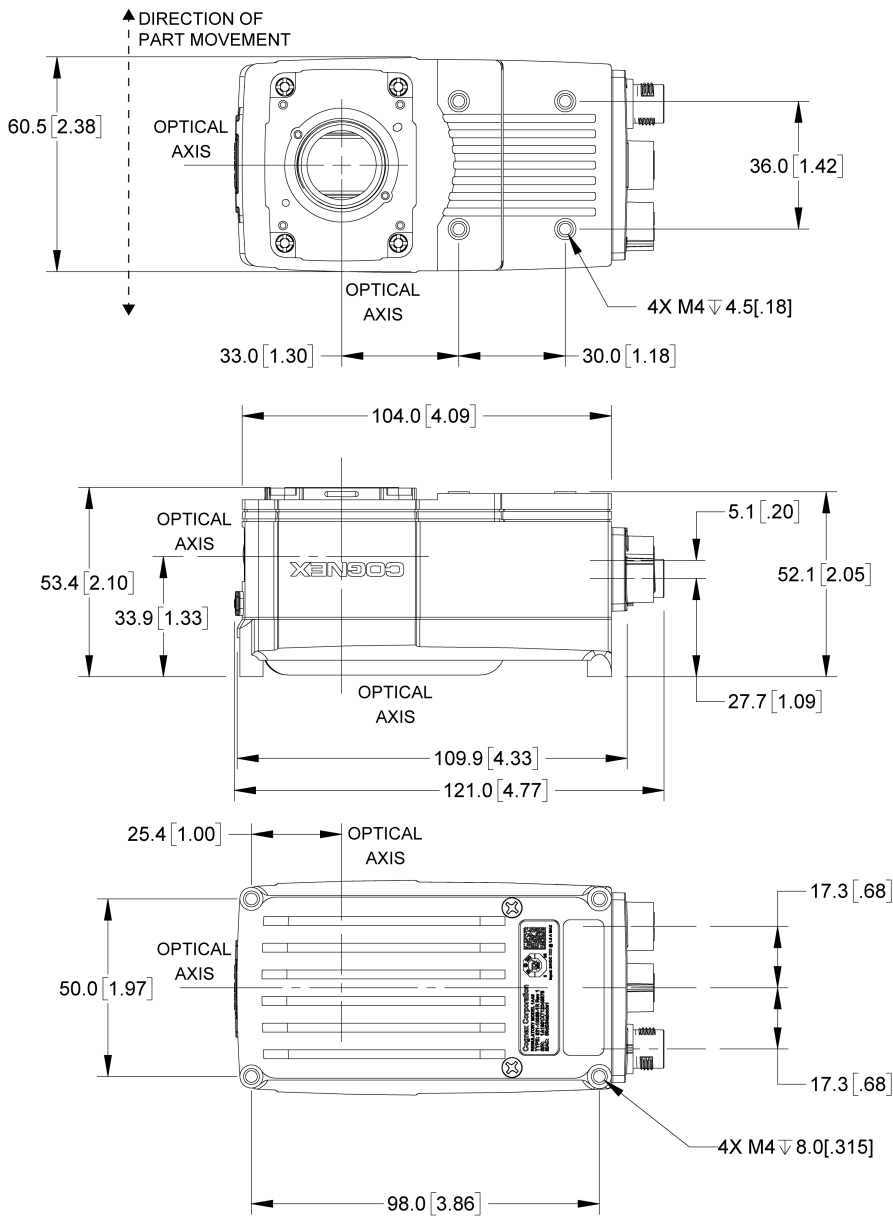
The following sections list dimensions of the vision system and optional accessories.

## Vision System Dimensions

**Note:**



- All dimensions are in millimeters [inches] and are for reference purposes only.
- All specifications are for reference purpose only and may be changed without notice.

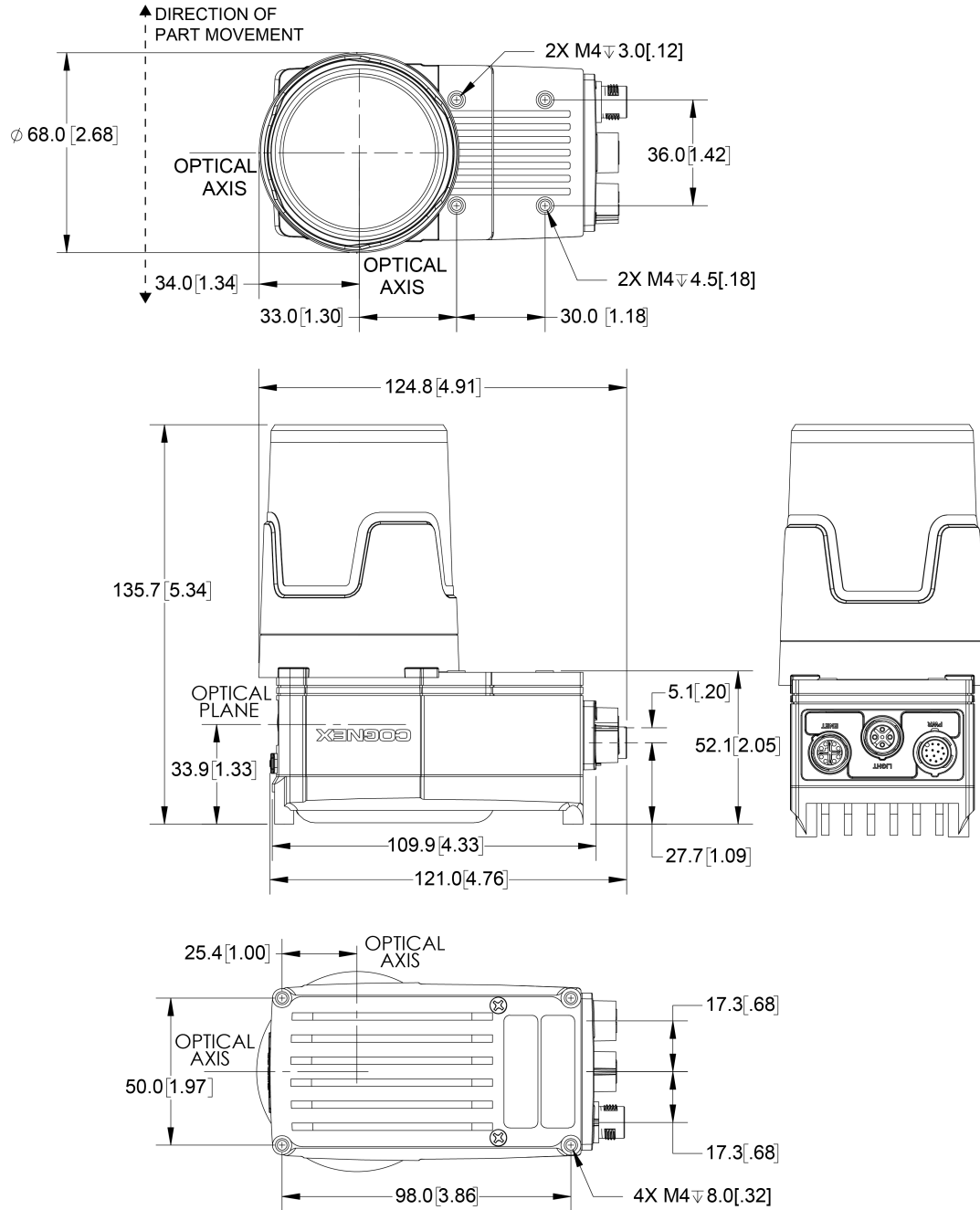


## Vision System with Cover (COV-7000-CMNT-LG)

**Note:**



- All dimensions are in millimeters [inches] and are for reference purposes only.
- All specifications are for reference purpose only and may be changed without notice.

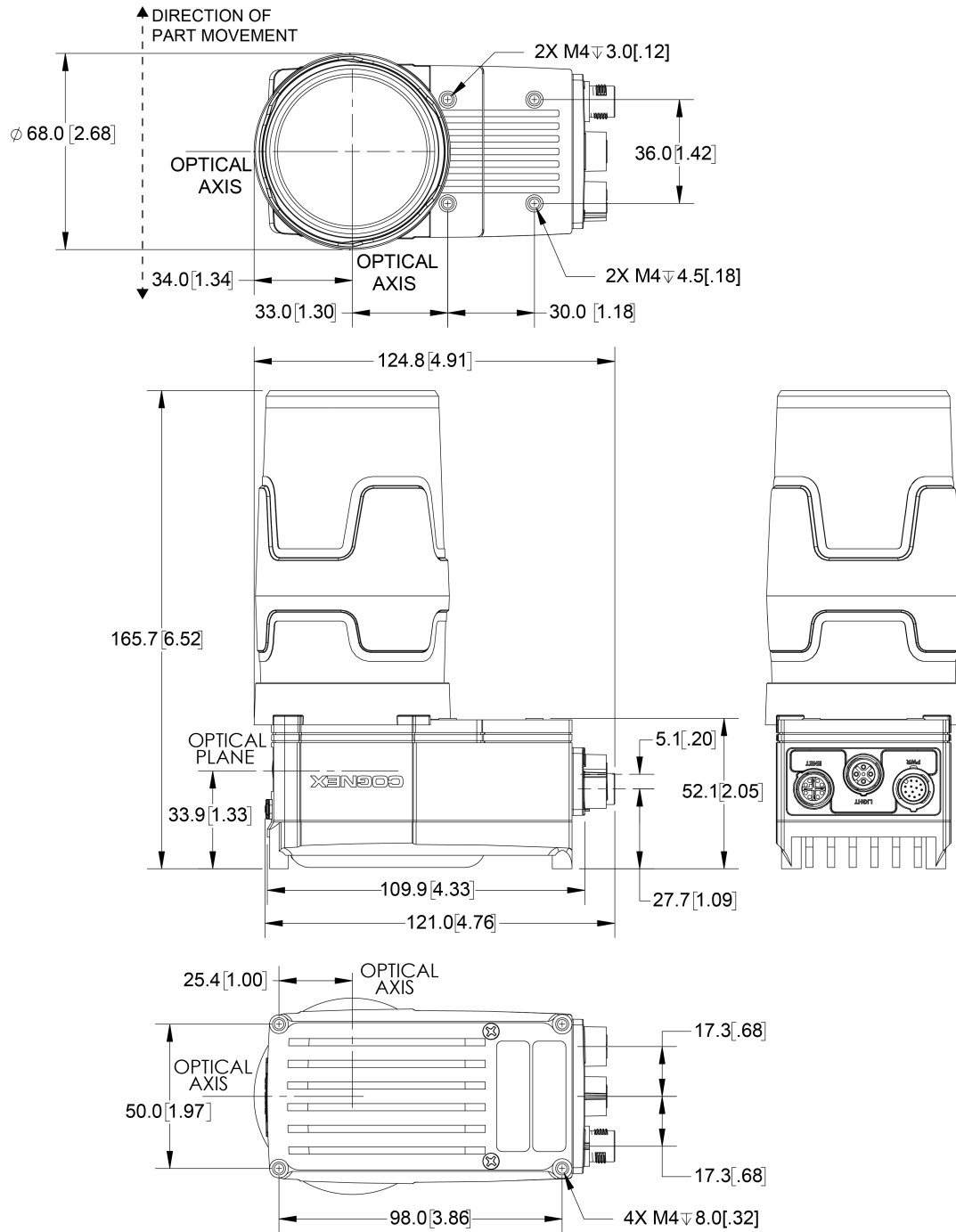


## Vision System with Cover (COV-7000-CMNT-LG) and Extender (COV-7000-CMNT-LGX)

**Note:**



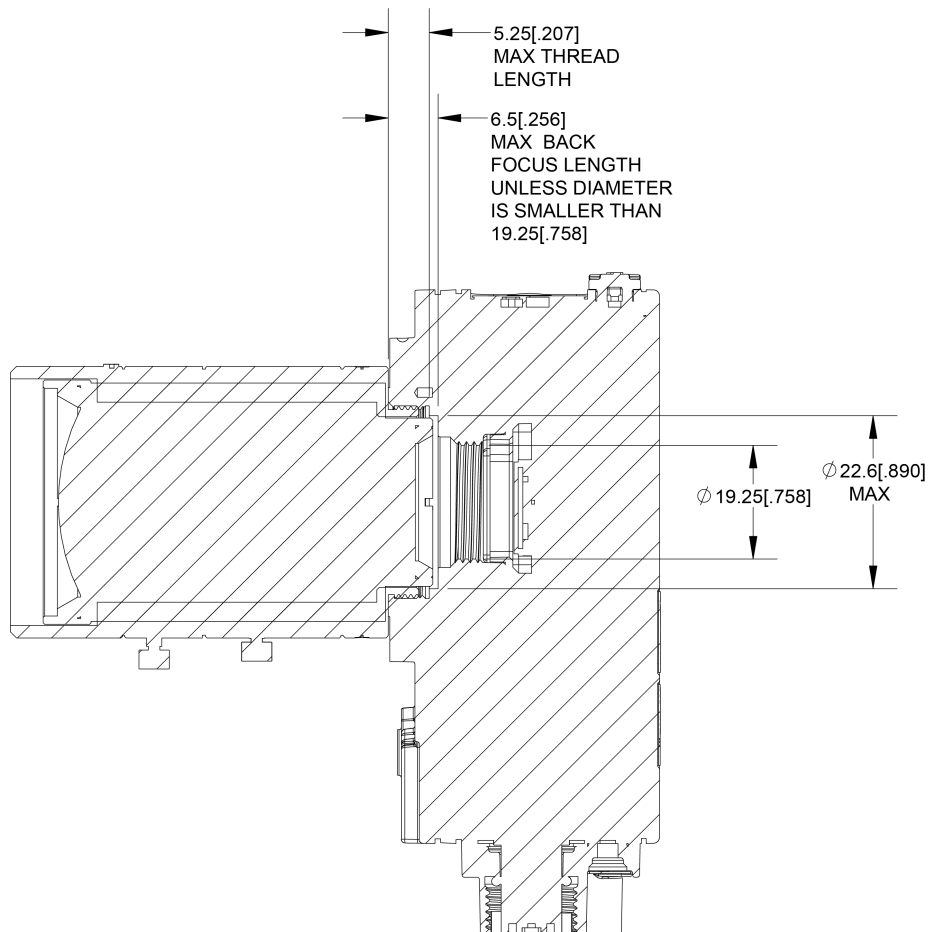
- All dimensions are in millimeters [inches] and are for reference purposes only.
- All specifications are for reference purpose only and may be changed without notice.



## C-Mount Lens Clearance Dimensions

**Note:**

- A C-Mount lens has the following restrictions:
  - Maximum thread length is 5.25mm.
  - The C-Mount lens threads and body cannot protrude more than 6.5mm in length into the vision system when screwed in, unless the diameter of the back lens is smaller than 19.25mm. If the C-Mount lens threads and body protrude more than 6.5mm, you can add a spacer between the lens and vision system. However, the spacer decreases the working distance.
- All dimensions are in millimeters [inches] and are for reference purposes only.
- All specifications are for reference purpose only and may be changed without notice.




# Cleaning and Maintenance

## Clean the Housing

To clean the outside of the vision system housing, use a small amount of mild detergent cleaner or isopropyl alcohol on a cleaning cloth. Do not pour the cleaner directly onto the vision system housing.

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 **CAUTION:** Do not attempt to clean any In-Sight product with harsh or corrosive solvents, including lye, methyl ethyl ketone (MEK) or gasoline.

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## Clean the Image Sensor Window

To remove dust from the outside of the image sensor window, use a pressurized air duster. The air must be free of oil, moisture or other contaminants that could remain on the glass and possibly degrade the image. Do not touch the glass window. If oil/smudges still remain, clean the window with a cotton bud using alcohol (ethyl, methyl or isopropyl). Do not pour the alcohol directly on the window.

## Clean the Cover

To remove dust from the lens cover, use a pressurized air duster. The air must be free of oil, moisture or other contaminants that could remain on the lens cover. To clean the plastic window of the lens cover, use a small amount of isopropyl alcohol on a cleaning cloth. Do not scratch the plastic window. Do not pour the alcohol directly on the plastic window.

