

In-Sight 500 Vision System Reference Manual

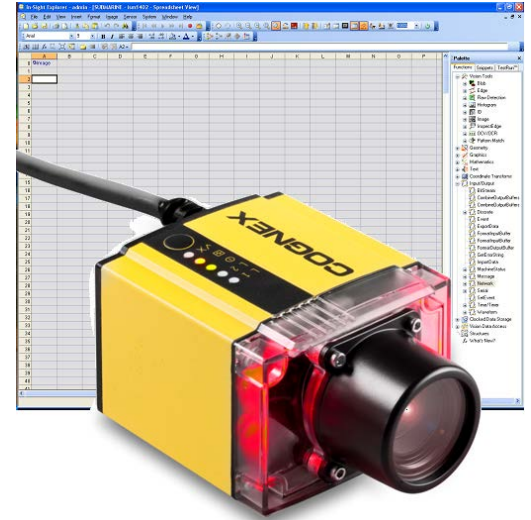
Introduction

This document describes the expected functionality of the In-Sight® 500 vision system and supported software: In-Sight Explorer 4.6.1 CR1.

The In-Sight 500 vision system is a high-performance, fixed-mount vision system, packaged in a rugged, IP65-rated housing. The In-Sight 500 vision system boosts an accelerated acquisition implementation which will enable the system to acquire partial images up to 500fps.

The model numbers for the In-Sight 500 vision system are:

- IS500-01 (without PatMax)
- IS500-11 (with PatMax)



Summary of Features

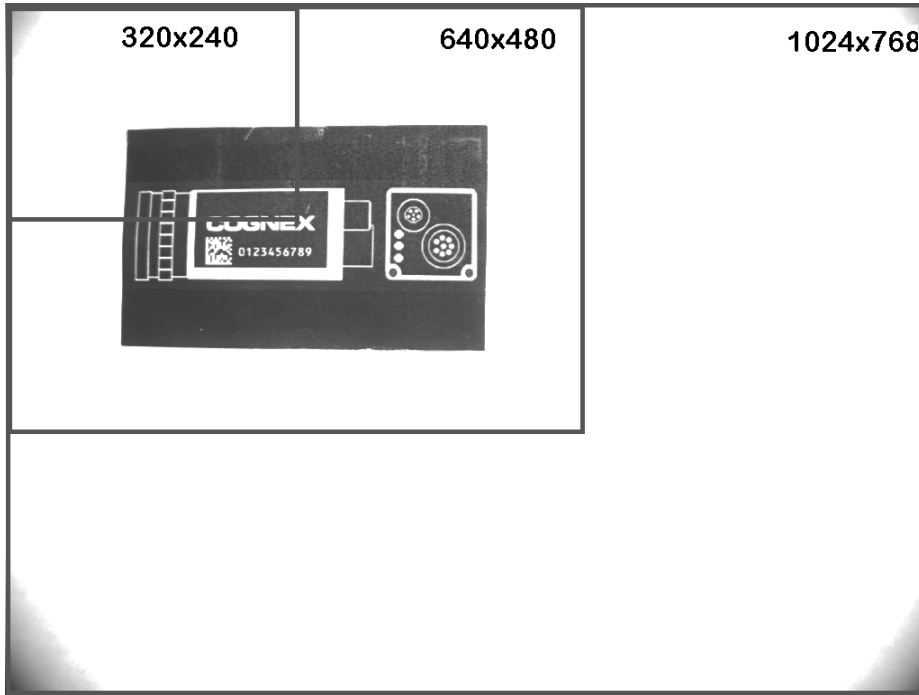
Software Features of the In-Sight 500 Vision System:

The In-Sight 500 vision system is a new addition to the In-Sight 5000 series and In-Sight Micro series vision systems. All In-Sight vision systems use In-Sight Explorer to program the vision system. Therefore, the same software functionality is expected on the In-Sight 500 vision system, unless noted specifically in this document.

Below is a summary of the software features:

- **Accelerated Image Acquisition:**
In addition to the standard In-Sight programming interface, expansive tool set, and communication methods, the In-Sight 500 vision system provides the ability to window the acquired image and provides accelerated acquisition. The partial image Row and Column size is set via the *Acquire Region* parameter in A0.
- The partial window is supported with origin at the 0,0 point.

- The following window sizes are supported and tested:
 - 1024x768 (full resolution)
 - 640x480
 - 320x240



- Example frame rates with supported acquire image sizes:

Image Size	Internal Light On (fps)	Internal Light Off (fps)
1024 x 768	98	98
640 x 480	222	222
320 x 240	292	430

These numbers assume an exposure of .171ms, external trigger, and connection to In-Sight Explorer GUI.

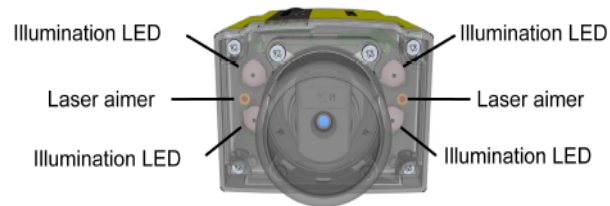
- The In-Sight 500 vision system is supported in Spreadsheet View only.
- All Industrial Ethernet Protocols are supported but testing has been limited to EIP communication.
- WritImageFTP is only supported in full resolution.
- In-Sight 500 vision system hardware specifies Gain using levels 0-9 (as opposed to 0-255 on the In-Sight 5000 series and Micro series vision systems).
- Cross-platform job loading is not supported. However, cutting and pasting cells between platforms is supported.

- Unsupported Acquisition features: Offset, Orientation, Auto Exposure, Trigger Debounce, and Camera Trigger (Camera Trigger does not exist on the In-Sight 500 platform, only External trigger is available for hardwired triggers).
- No In-Sight 500 vision system emulator is available (use the In-Sight 5401 emulator to get the same image resolution size: 1024x768).
- In-Sight Explorer 4.6.1 CR1 does not support firmware upgrade for other In-Sight models.
- Exposure is limited to 0.171ms when the internal (built-in) light is used.
- The In-Sight 500 vision system will not allow the following while online: ImportData, ExportData, Native Mode Job access commands: LF, TF, DF, TJ, DJ, TS, RF, WF, SJ, RJ, WJ, RS, WS (reference the *In-Sight® Explorer Help* file in In-Sight Explorer for command details), any FTP to the vision system, and Audit Message storage.
- The native mode command, LF, is not supported.
- It is not recommended to enable the internal light and use the external strobe signal for an external light together. The timing for the strobe signal is longer than the exposure when the internal light is enabled.
- Supported in VisionView v1.5
- 6 image buffers

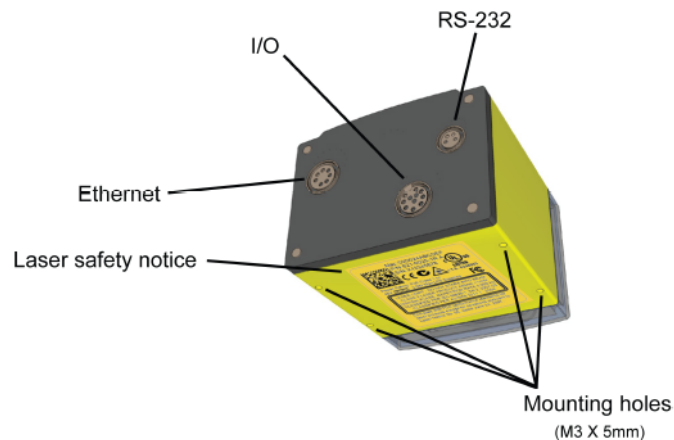
Hardware Features of the In-Sight 500 Vision System:

The In-Sight 500 vision system is shipped with a 5mm spacer (C-Mount adapter), front cover and lens cover. Installation of the lens, additional hardware specifications and dimensions can be found in the Specification Section of this document.

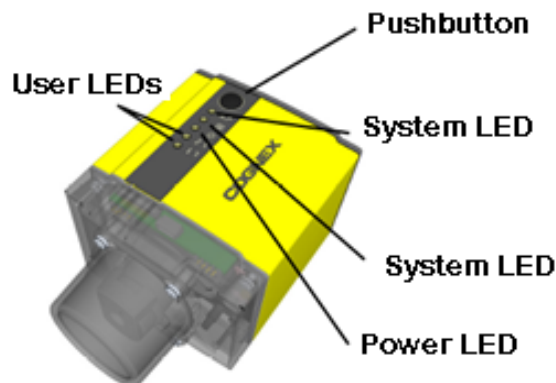
Below is a summary of the hardware feature set on the In-Sight 500 vision system:



- Imager
 - 1024x768 custom CMOS imager
- Aiming Laser
 - There are aiming lasers on the In-Sight 500 vision system, however, they are not enabled in this release.
- Lighting
 - Built-in lighting controlled directly by A0 property sheet in In-Sight Explorer.
 - No external power supply needed.
 - Red LED
- Lens
 - 2/3" CS-Mount or C-Mount lens
 - Use 5mm spacer (C-Mount adapter) included with In-Sight 500 vision system for C-Mount lenses.
 - The front cover can come off to accommodate larger diameter lenses (>28mm)
 - Cognex recommended lenses:
 - Tamron: 8mm, 12mm and 25mm



- I/O
 - 4 inputs and 4 outputs (optically isolated)
 - Standard In-Sight vision system I/O types are supported (for example: Strobe, Job Complete, etc. Reference *In-Sight® Explorer Help* for Discrete IO settings)
 - Output pulse width has been updated to 1ms (from 10ms)
 - No I/O modules are supported in this release
 - I/O is accessed via standard In-Sight methods in the Spreadsheet View
 - Serial is not supported in this release
 - Beep sound is not supported in this release
- Memory: 32MB flash, 256MB RAM
- Power/Ethernet:
 - PoE support
 - Requires PoE Class 3 injector
 - Available injectors from Cognex: CPS-24V-POE1, CPS-24V-POE4 and CPS-AC-POE1A-US
 - Cannot be powered by CIO-MICRO or VisionView
- Cabling:
 - Ethernet/Power: Standard In-Sight Ethernet Cable
 - I/O Cable: CCB-M12IO-S05 (straight) or CCB-M12IO-R05 (right-angle)
- Mounting information
 - Four M3x5mm mounting holes on the bottom of the vision system
 - Optional bracket: DM500-BRKT-000 – Pan and Tilt Mounting



- Status LEDs:
 - 1 Power Status LED
 - 2 LEDs for System Status – not used outside of boot-up sequence.
 - 2 User-configurable LEDs: Configurable in the Discrete Output Settings dialog as User LED 1 and User LED 2. Not supported.

Known Issues

Known Issue: In some cases one might see a 1 pixel single vertical line which might be 10 grayscale values brighter or darker from its adjacent pixels.

Workaround: If running an edge tool whose region of interest includes this vertical line, adjust the edge strength, edge width or light level of the image to remove the effect of the vertical line with edge inspections.

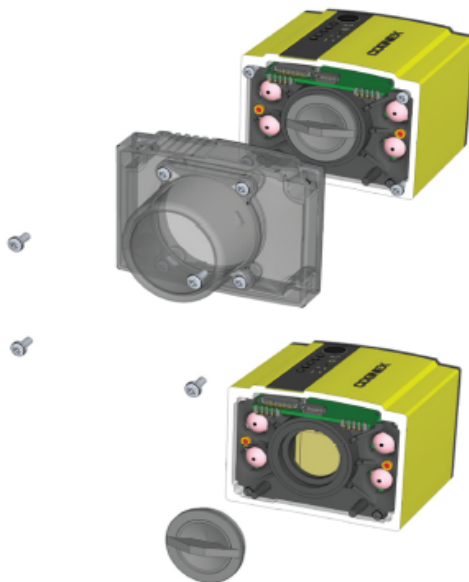
Setup Information

Installing the Lens:

CS-Mount and C-Mount lenses are supported. To use a C-Mount lens, use a 5mm spacer (C-Mount adapter). The Maximum size lens barrel that fits the lens cover is 30mm long (measured from lens mount base) and 28mm in diameter. You can remove the lens (and front) cover from the In-Sight 500 vision system to fit a larger lens, but the vision system will not maintain its IP rating.

Please note: Lenses are purchased separately

1. Remove the front cover, if attached, and lens cover.



Remove the four mounting screws from the corners of the front cover and remove the cover.

i Do not discard screws!

Unscrew the protective cover from the lens mount.

⚠ Do not leave the image sensor exposed to the environment!

2. Install lens.



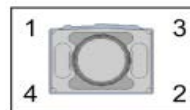
i Use C-mount adapter ring for C-mount lenses.



3. Re-attach front cover.

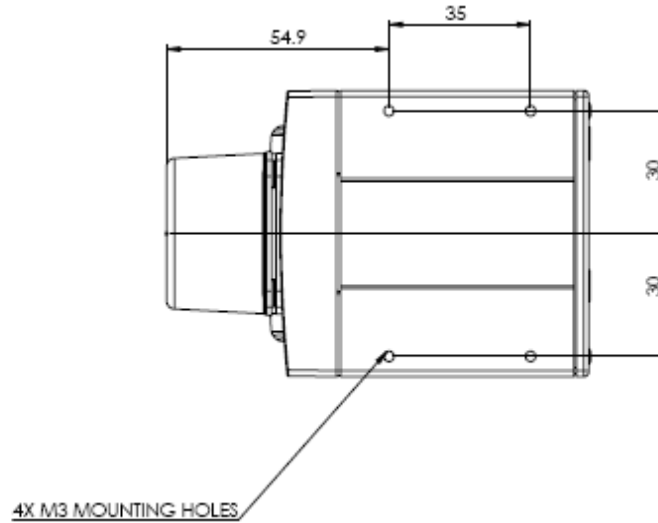


! Tighten in sequence.
Torque limit: 9 N-cm
(0.8 Lb-In).

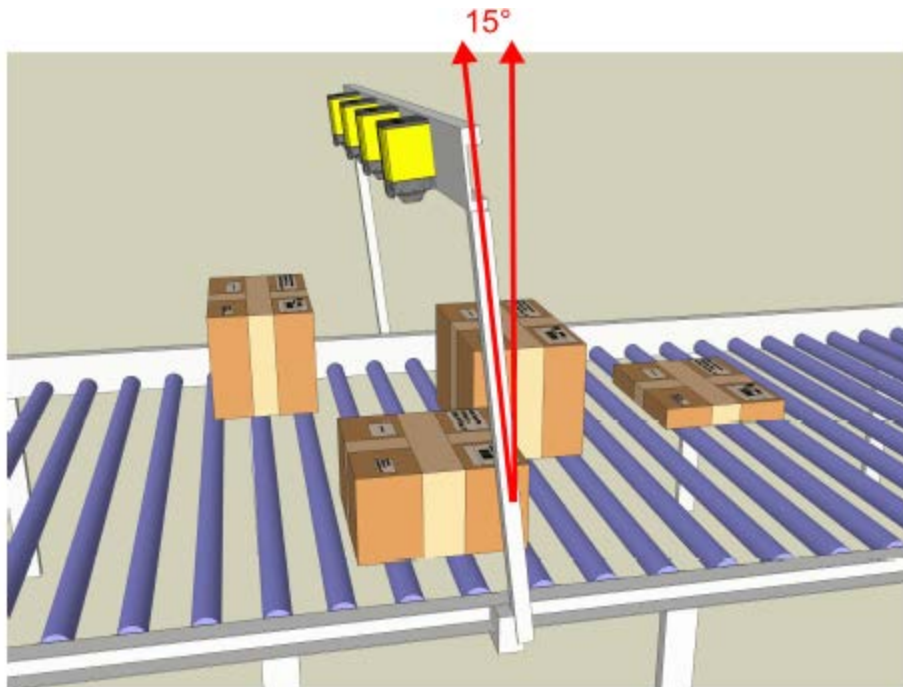


Mounting the Vision System:

The In-Sight 500 vision system provides four M3x5mm threaded attachment points. Use all of them when mounting your vision system. For technical drawings, reference the DataMan 500 3D Drawings available on the [DataMan Support page](#) on the Cognex website.



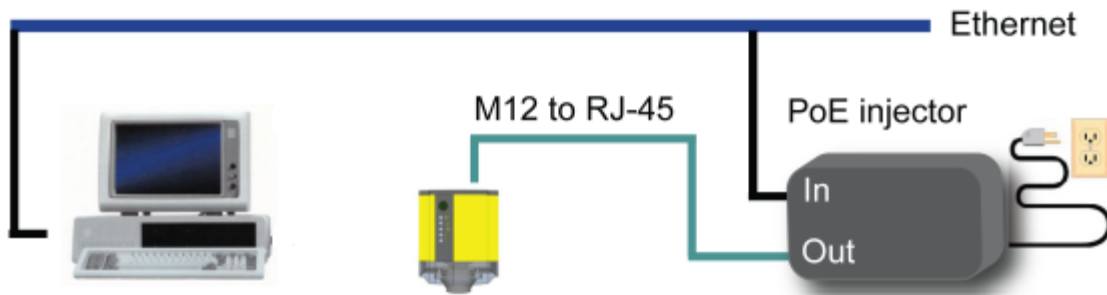
To avoid reflections and glare from part and label surfaces, mount the vision system at a 15 degree angle from vertical when using the internal light:



Connecting the Vision System:

Supply power to the vision system using a Power over Ethernet (PoE) injector. Cognex recommends the following connection sequence:

1. Connect the PoE injector with the Ethernet installation (both sides of the patch cable).
2. Connect the power cord (AC230V/110V) to the PoE injector.
3. Connect the vision system to the PoE injector.



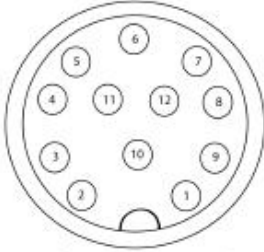
To disconnect the vision system:

1. Disconnect the vision system from the PoE injector.
2. Disconnect the power cord from the PoE injector.
3. Disconnect the PoE injector from the Ethernet installation.

Specifications

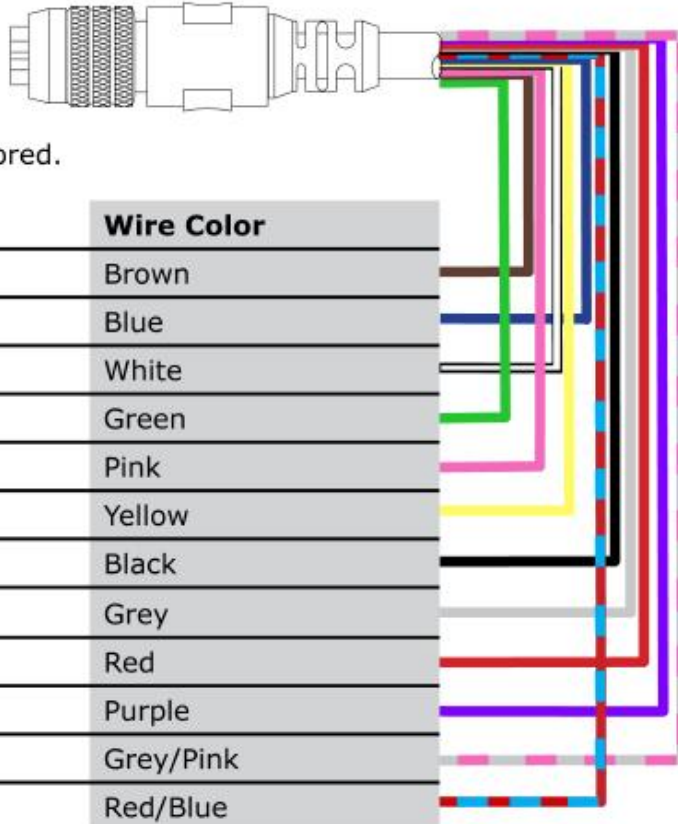
IO Cable Pin-out:

I/O Cable



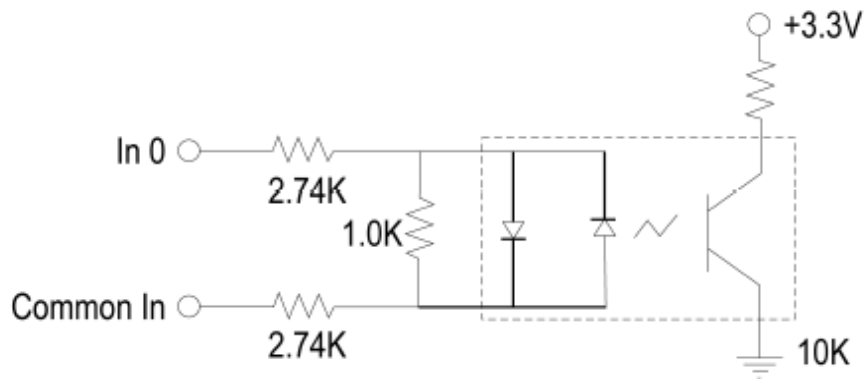
Device pin numbering.
Plug pin numbers are mirrored.

The I/O cable provides access to trigger and high-speed outputs. Unused wires can be clipped short or tied back using a tie made of non-conductive material.



Pin #	Signal Name	Wire Color
1	Out 0	Brown
2	N/C	Blue
3	Common In	White
4	In 2	Green
5	In 1	Pink
6	Common Out	Yellow
7	Out 2	Black
8	Out 3	Grey
9	Out 1	Red
10	N/C	Purple
11	In 3	Grey/Pink
12	In 0	Red/Blue

Input Circuit:



28V Max. Across input pins - Transition approx. 12V (Min).

Input Example: Acquisition Triggering: Set Trigger Parameter in A0 to External

The acquisition trigger input on the vision system is opto-isolated. To trigger from an NPN (pull-down) type photo-detector or PLC output, connect **In 0** to +24V and connect **Common In** to the output of the detector. When the output turns on, it pulls **Common In** down to 0V, turning the opto-coupler on.

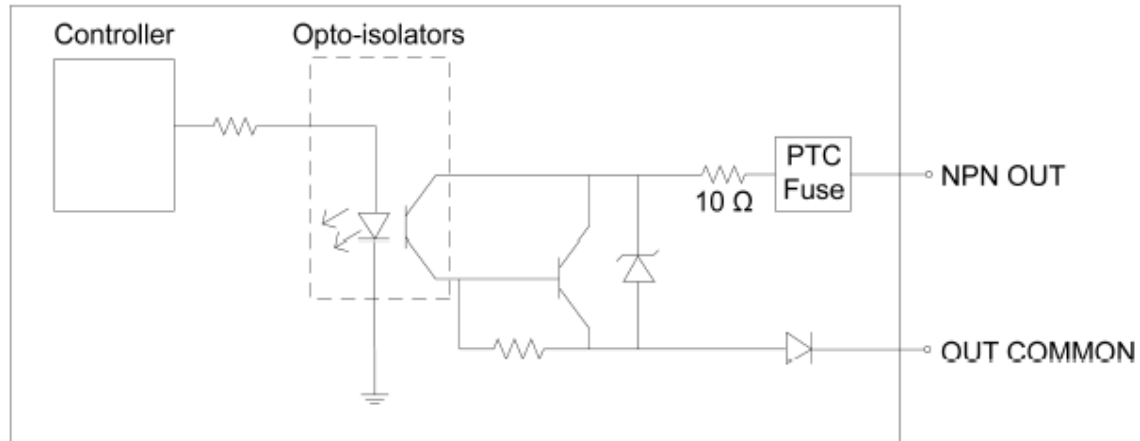
To trigger from an PNP (pull-up) photo-detector or PLC output, connect **In 0** to the output of the detector and connect **Common In** to 0V. When the output turns on, it pulls **In 0** up to 24V, turning the opto-coupler on.

Output Circuit:

The outputs can be used as either NPN (pull-down) or PNP (pull-up) lines.

Output Example: NPN

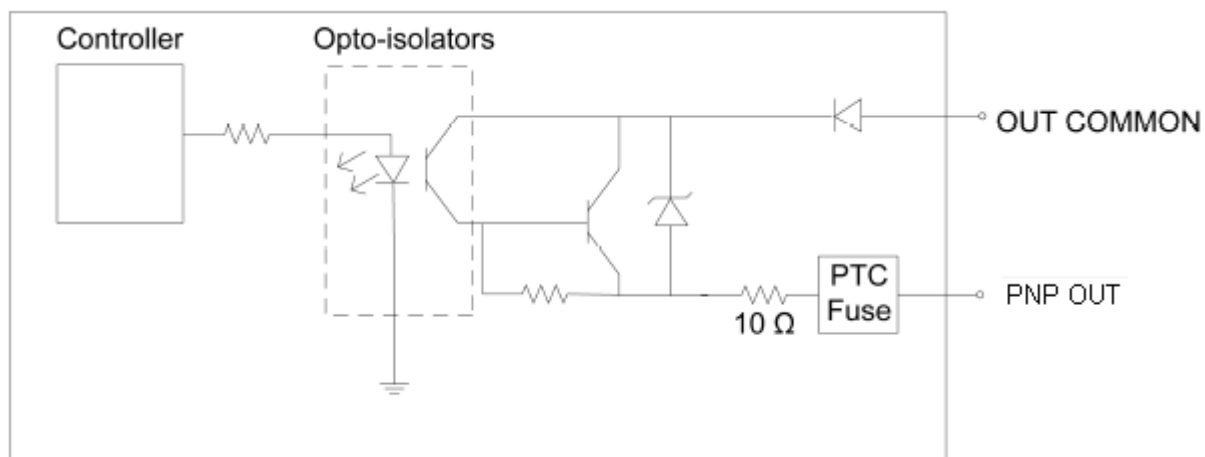
For NPN lines, the external load should be connected between the output and the positive supply voltage.



Specification	Description
Voltage	28V maximum through external load.
Current	50mA maximum sink current.
	OFF state leakage current 100μA maximum.
	External load resistance 240 Ohms to 10K Ohms.
	Each line rated at a maximum 50mA, protected against over-current, short circuit and transients from switching inductive loads. High current inductive loads require external protection diode.

Output Example: PNP

For PNP lines, the external load should be connected between the output and the negative supply voltage.

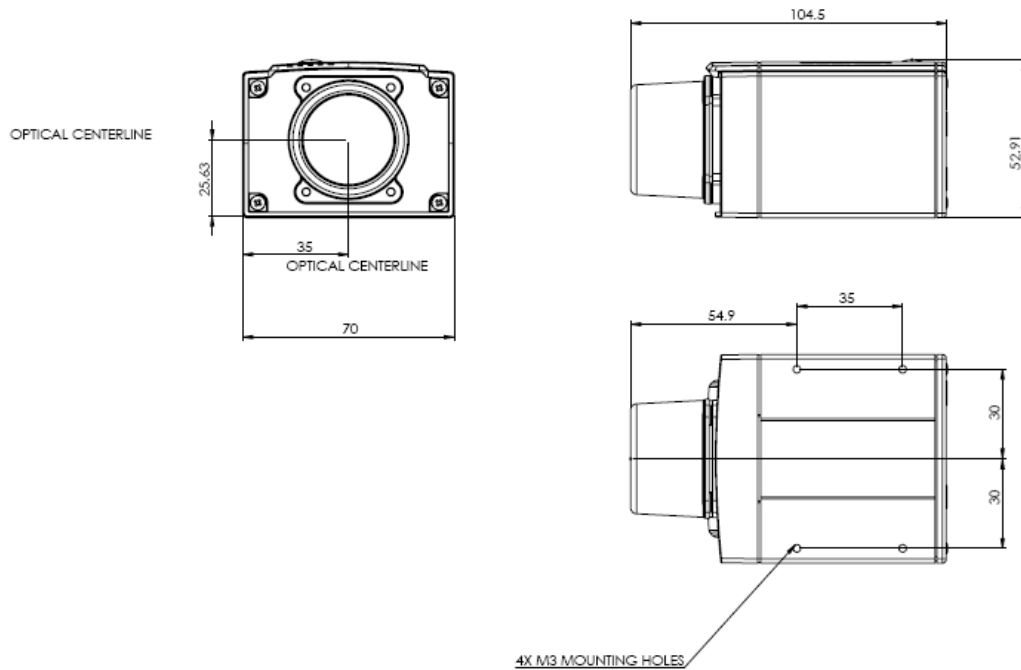


Vision System Specifications:

Weight	350g	
Operating Temperature	0°C to 40°C (32°F to 104°F)	
Storage Temperature	-10°C to 60°C (-14°F to 140°F)	
Maximum Humidity	95%, non-condensing (Operating and Storage)	
Environmental	IP65 (with cables or protection cap attached to all connectors, front cover properly installed).	
Vibration	EN61373 including IEC 60068-2-6, 60068-2-64 6.4, and 60068-2-27	
RS-232	RxD, TxD according to TIA/EIA-232-F	
Discrete I/O operating Limits	4 Inputs / 4 Outputs	Max output current: 50 mA @ 28 VDC Output load: 470 Ω @ 24 VDC; 150 Ω @ 12 VDC Input voltage limits: - 28 VDC — +28 VDC Input current: 4.2 mA @ 24 VDC; 2.0 mA @ 12 VDC
Power Supply Requirements	Class 3 PoE injector.	Maximum power: 5W (internal illumination)

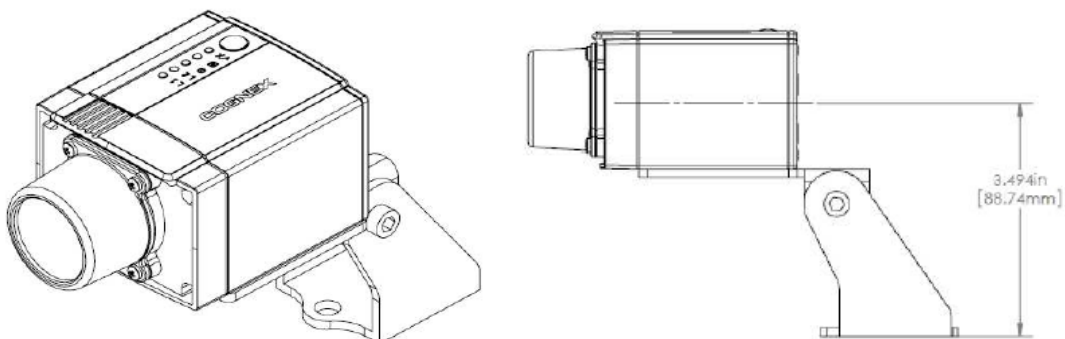
Vision System Dimensions:

For technical drawings, reference the DataMan 500 3D Drawings available on the [DataMan Support page](#) on the Cognex website.



Pan and Tilt Mounting Bracket Dimensions: DM500-BRKT-000

For technical drawings, reference the DataMan 500 Mounting Bracket Dimensional Drawing available on the [DataMan Support page](#) on the Cognex website.



Compliance Notice

The In-Sight 500 vision system meets or exceeds the requirements of all applicable standards organizations for safe operation. However, as with any electrical equipment, the best way to ensure safe operation is to operate them according to the agency guidelines that follow. Please read these guidelines carefully before using your device.

Regulator	Specification
USA	FCC Part 15, Class A FDA/CDRH Laser Notice No 50
Canada	ICES-003
European Community	EN55022:2006 +A1:2007, Class A EN55024:1998 +A1:2001 +A2:2003 EN60950 EN60825-1
Australia	C-TICK, AS/NZS CISPR 22 / EN 55022 for Class A Equipment
Japan	J55022, Class A

FCC Class A Compliance Statement



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 personal expense.

Canadian Compliance

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

C-Tick Statement



Conforms to AS/NZS CISPR 22/ EN 55022 for Class A Equipment.

European Compliance



The CE mark on the product indicates that the system has been tested to and conforms to the provisions noted within the 2004/108/EEC Electromagnetic Compatibility Directive and the 2006/95/EEC Low Voltage Directive. For further information please contact:

Cognex Corporation
One Vision Drive
Natick, MA 01760 USA

Cognex Corporation shall not be liable for use of our product with equipment (i.e., power supplies, personal computers, etc.) that is not CE marked and does not comply with the Low Voltage Directive.

Laser Safety Statement



Compliance with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. This device has been tested in accordance with IEC60825-1 2nd ed., and has been certified to be under the limits of a Class 2 Laser device. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



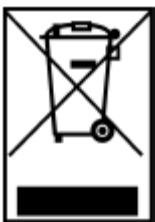
UL and cUL Statement



UL and cUL listed: UL60950-1 1st ed. and CSA C22.2 No.60950-1 1st ed.

For European Community Users

Cognex complies with Directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 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.

Warnings and Notices

CAUTION: This device requires the use of a PoE Class 3 or 48V DC LPS power supply.

Note: For product support, contact <http://support.cognex.com>

CAUTION: IP protection is ensured only when all connectors are attached to cables or shielded by a sealing cap.



LASER LIGHT, DO NOT STARE INTO BEAM: CLASS 2 LASER PRODUCT FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE SERIOUS INJURY

- **CAUTION** - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Do not attempt to service or repair this product -- return it to Cognex for service.
- Do not permit anyone other than Cognex Corporation to service, repair, or adjust this product.
- Do not attempt to open or modify this device except as described in this document.

- Do not direct or reflect laser light toward people or reflective objects.
- Do not operate this device if it is damaged or if the covers or seals are missing or damaged.

This Laser Product is designated as Class 2 during all procedures of operation.

Wavelength	650nm
Laser Power for classification	< 1 mW
Beam Diameter	< 3mm at aperture
Divergence	< 1.5 mrad

For assistance contact Cognex Corporation at <http://support.cognex.com>