

Conversion Guide

**Converting applications from In-Sight 7000
Gen1/51xx/54xx/Micro to In-Sight 7000 Gen2/8000**



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1 Overview

This conversion guide is specific to the next generation models: 7600/7800 series (7000 Gen2) and 8000 series. When upgrading to these models, some attributes are different between previous and next generations. This document reviews these differences and summarizes what considerations are needed when upgrading.

The In-Sight 7000 Gen2 Series is Cognex's newest family of industrial self-contained vision systems. The In-Sight 7000 Gen2 Series offers the following advantages:

- High speed acquisition, improved performance over the previous generation models and up to 15 GB of memory all in a self-contained industrial IP67 package.
- Enhanced flexibility with field interchangeable lenses and lighting. The Gen2 can go from C-Mount to Autofocus to slim S-Mount(M12) lens in the field. No need to return to buy a different piece of hardware.
- Platform for all new vision tools and enhancements such as PatMax RedLine, Color PatMax RedLine, BeadInspect, and Web HMI.
- Updated onboard user display with allows direct triggering via a button and highly visible, wraparound pass/fail indicator ring.

The In-Sight 8000 series is the next generation In-Sight Micro vision system. Like the Micro, the 8000 is the size of a standard image only GigE camera. The In-Sight 8000 offers the following advantages:

- High speed acquisition and improved performance over the previous generation
- Platform for all new vision tools and enhancements such as PatMax RedLine, Color PatMax RedLine, BeadInspect, and Web HMI.
- Power over Ethernet (PoE) reduces the cable connections to the camera
- Resolution range of VGA models up to 5MP while still maintaining the small installation footprint.

The next generation models use the same In-Sight Explorer interface as the previous generation, which has the point and click simplicity of EasyBuilder with the flexibility of the spreadsheet for additional control and customization. The In-Sight Explorer software version has been updated to version 5.x however it supports all currently active In-Sight models. Additional versioning details are below:

- In-Sight Explorer 5.x supports all In-Sight models running 4.x and 5.x firmware.
- All next generation models, including the 7000 Gen2, run firmware 5.x
- In-Sight Explorer contains firmware for 4.x models and 5.x models.
 - Updated firmware for 4.x will remain with the 4-leading version number.
 - Updated firmware for next generation models will have the 5-leading version number.
- Any enhancements to In-Sight Explorer will be available to all In-Sight models supported, however features specific to the next generation will only be selectable/available to the next generation models. Such as:
 - Web HMI support
 - New Integrated Light GUI with live adjustments of the light in live mode

For more information on the new products, features and changes described in this guide, refer to the resources, copied to your PC as part of the In-Sight Explorer 5.x software installation:

- *In-Sight 7000 Gen2 Series Vision System Reference Guide*
- *In-Sight 8000 Series Vision System Reference Guide*
- *In-Sight Explorer 5.x help*
 - *Help contains all release notes from release 5.1 to current*
- *In-Sight Explorer 5.x Release Notes*

Please note the following references used in this document:

- The 5000 series references refer to the In-Sight 51xx or 54xx models **only**.
- The 7000 Gen1 references refer to the 70xx, 72xx, and 74xx models.
- The Micro references refer to the ISM1xxx models.
- Gen1 references refer to the 7000 Gen1, 5000 series, and Micro series collectively.
- The next generation 7000/5000 series is referred to as: 7000 Gen2.
- 7000 Gen2 references refer to the 75xx, 76xx, and 78xx models
- The next generation Micro series is referred to as the 8000 or IS8000.
- Gen2 references refer to both the 7000 Gen2 and the 8000.

2 Comparison Charts

This section provides an overview of hardware changes when migrating from a 4.x firmware model to a 5.x firmware model. The table below outlines the migration path from like models between generations.

Industrial Models (IP67 rating)

Gen1 (4.x firmware)	Gen2 (5.x firmware)	Resolution	Relative Performance
7050	7500	SVGA	¼ speed of Base
7200	7600	SVGA	Base
7400	7800	SVGA	High performance
5100	7600	VGA	Base
5400	7800	VGA	High performance
7402	7801	1.3MP	High performance
5403	7802	2MP	High performance

Transitioning from the 7010/7020 platform to next generation In-Sight products will have to be assessed for individual applications. The recommended next generation model is the In-Sight 2000-230. Please contact your local Cognex Sensor Sales representative when transitioning a customer from this series to a next generation model.

Compact Models (Micro size)

Gen1 (4.x firmware)	Gen2 (5.x firmware)	Resolution	Relative Performance
1050	8200	VGA	Base
1100	8200	VGA	Base
1400	8400	VGA	High performance
1500	8401	1.3MP	High performance
1402	8401	1.3MP	High performance
1403	8402	2MP	High performance

Transitioning from the 1020 platform to next generation In-Sight products will have to be assessed for individual applications. The recommended next generation model is the In-Sight 2000-230. Please contact your local Cognex Sensor Sales representative when transitioning a customer from this series to a next generation model.

2.1 Specification Comparison: 5000 VGA vs. 7000 Gen2 VGA

In-Sight 51x0/54x0 vs. 7600/7800

		5100	5400	7600	7800
					
Firmware		4.x versions		5.4 and later versions	
Imager Type		1/3-inch CCD (7.4 μm² pixels)		1/1.8-inch CMOS (4.5 μm² pixels)	
Image Resolution		VGA (640x 480)		VGA (640 x 480) / SVGA (800 x 600) ¹	
Acquisition Speed (Max) ²		58 fps		135 fps (VGA)	
Memory	File Storage	128MB flash(jobs)		7.2GB flash (jobs), 8GB Micro SD (jobs, images)	
	Processing	256MB SDRAM		512MB SDRAM	
Options	Lenses	C-Mount		C-Mount, S-Mount (M12), Autofocus	
	Lighting	Integrated (limited)		Integrated and external	
	Vision Tools	PatMax®		PatMax®, PatMax RedLine™	
I/O	Network	Ethernet		Gigabit Ethernet	
	Built-in	(1) Trigger, (2) GP OUT		(1) Trigger, (1) GP IN, (2) GP OUT, (2) Bi-Directional	
	Expansion ^{3,4}	CIO-MICRO, CIO-1400			
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232			
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP, IEEE 1588 (CIP Sync)			
Mechanical	Dimensions	43.5mm x 124.2mm x 61.4mm		35.7mm x 60.5mm x 90.1mm	
	Weight	300g (no accessories attached)		240 g (no accessories attached)	
	Protection	IP67 (with lens cover)		IP67 (with integrated light or lens cover)	

¹ Resolution selectable in software.

² Maximum frame rate with smallest exposure and no vision tools.

³ CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

⁴ CIO-1400 provides (7) GP IN, (8) GP OUT.

2.2 Specification Comparison: 5000 2MP vs 7000 Gen2 2MP

In-Sight 54x3 vs. 7802

	5403	7802
		
Firmware	4.x versions versions	5.5 and later versions
Imager Type	1/1.8-inch CCD (4.4 μm^2 pixels)	1/1.8-inch CMOS (4.5 μm^2 pixels)
Image Resolution	2MP (1600 x 1200)	2MP (1600 x 1200)
Acquisition Speed (Max)¹	14 fps	53 fps
Memory	File Storage	128MB flash(jobs)
	Processing	256MB SDRAM
Options	Lenses	C-Mount
	Lighting	Integrated (limited)
	Vision Tools	PatMax [®]
I/O	Network	(1) Ethernet
	Built-in	(1) Trigger, (2) GP OUT
	Expansion^{2,3}	CIO-MICRO, CIO-1400
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP, IEEE 1588 (CIP Sync)
Mechanical	Dimensions	43.5mm x 124.2mm x 61.4mm (83.4mm x 124.2mm x 61.4 mm with 50mm lens cover)
	Weight	300 g (no accessories attached)
	Protection	IP67 (with lens cover)

¹ Maximum frame rate with smallest exposure and no vision tools.

³ CIO-1400 provides (7) GP IN, (8) GP OUT.

² CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

2.3 Specification Comparison: 7000 Gen1 SVGA vs. 7000 Gen2 SVGA

In-Sight 72x0/74x0 vs. 7600/7800

		7200	7400	7600	7800
					
Firmware		4.x versions versions		5.4 and later versions	
Imager Type		1/1.8-inch CMOS (5.3 μm² pixels)		1/1.8-inch CMOS (4.5 μm² pixels)	
Image Resolution		SVGA (800 x 600)		VGA (640 x 480) / SVGA (800 x 600) ¹	
Acquisition Speed (Max) ²		102 fps		217 fps (VGA) / 165 fps (SVGA)	
Memory	File Storage	512MB flash (jobs)		7.2GB flash (jobs), 8GB Micro SD (jobs, images)	
	Processing	256MB SDRAM		512MB SDRAM	
Options	Lenses	C-Mount, Autofocus		C-Mount, S-Mount (M12), Autofocus	
	Lighting	Integrated and external lights via light control connector			
	Vision Tools	PatMax®		PatMax®, PatMax RedLine™	
I/O	Network	(1) Ethernet		(1) Gigabit Ethernet	
	Built-in	(1) Trigger, (3) GP IN, (4) GP OUT		(1) Trigger, (1) GP IN, (2) GP OUT, (2) Bi-Directional	
	Expansion	CIO-MICRO		CIO-MICRO ³ , CIO-1400 ⁴	
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232			
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP, PowerLink		EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP, IEEE 1588 (CIP Sync)	
Mechanical	Dimensions	42.7mm x 84.8mm x 55mm (55mm x 84.8mm x 55mm with integrated light)		35.7mm x 60.5mm x 90.1mm (77.4mm x 88.9mm x 97.2mm with integrated light)	
	Weight	180 g (no accessories attached)		240 g (no accessories attached)	
	Protection	IP67 (with lens cover)		IP67 (with integrated light or lens cover)	

¹ Resolution selectable in software.

² Maximum frame rate with smallest exposure and no vision tools.

³ CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

⁴ CIO-1400 provides (7) GP IN, (8) GP OUT.

2.4 Specification Comparison: 7000 Gen1 1.3MP vs. 7000 Gen2 1.3MP and 2MP

In-Sight 74x2 vs. 7801/7802

		7402	7801	7802
				
Firmware		4.x versions versions	5.5 and later versions	
Imager Type		1/1.8-inch CMOS (5.3 μm² pixels)	1/1.8-inch CMOS (4.5 μm² pixels)	
Image Resolution		1.3MP (1280 x 1024)	1.3 MP (1280 x 1024)	2MP (1600 x 1200)
Acquisition Speed (Max) ¹		60 fps	76 fps	53 fps
Memory	File Storage	512MB flash(jobs)	7.2GB flash (jobs), 8GB Micro SD (jobs, images)	
	Processing	256MB SDRAM	512MB SDRAM	
Options	Lenses	C-Mount, Autofocus	C-Mount, S-Mount (M12), Autofocus	
	Lighting	Integrated and external lights via light control connector		
	Vision Tools	PatMax®	PatMax®, PatMax RedLine™	
I/O	Network	(1) Ethernet	(1) Gigabit Ethernet	
	Built-in	(1) Trigger, (3) GP IN, (4) GP OUT	(1) Trigger, (1) GP IN, (2) GP OUT, (2) Bi-Directional	
	Expansion ^{2 3}	CIO-MICRO	CIO-MICRO, CIO-1400	
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232		
	Industrial	Ethernet/IP with AOP, PROFINET, Modbus TCP, SLMP, POWERLINK	Ethernet/IP with AOP, PROFINET, Modbus TCP, SLMP, IEEE 1588 (CIP Sync)	
Mechanical	Dimensions	42.7mm x 84.8mm x 55mm (55mm x 84.8mm x 55mm with integrated light)	35.7mm x 60.5mm x 90.1mm (77.4mm x 88.9mm x 97.2mm with integrated light)	
	Weight	180 g (no accessories attached)	240 g (no accessories attached)	
	Protection	IP67 (with lens cover)	IP67 (with integrated light or lens cover)	

¹ Maximum frame rate with smallest exposure and no vision tools.

³ CIO-1400 provides (7) GP IN, (8) GP OUT.

² CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

2.5 Specification Comparison: Micro VGA vs. 8000 VGA

In-Sight 11x0/14x0 vs. 8200/8400

	1100	1400	8200	8400
				
Firmware	4.x versions		5.2 and later versions	
Imager Type	1/3-inch CCD (7.4 μm^2 pixels)		1/1.8-inch CMOS (4.5 μm^2 pixels)	
Image Resolution	VGA (640 x 480)	VGA (640 x 480)	VGA (640 x 480)	VGA (640 x 480)
Acquisition Speed (Max)¹	60 fps	60 fps	217 fps	217 fps
Memory	File Storage	128MB flash (jobs)	512MB/128MB flash (jobs)	
	Processing	256MB SDRAM	512MB SDRAM	
Options	Lenses	CS-Mount, requires 5mm spacer for C-Mount		C-Mount
	Vision Tools	PatMax®		PatMax®, PatMax RedLine™
I/O	Network	(1) PoE Ethernet		(1) PoE Gigabit Ethernet
	Built-in	(1) Trigger, (2) GP OUT		
	Expansion	CIO-MICRO ²		
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232(with CIO-MICRO)		
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP		
Mechanical	Dimensions³	30mm x 30mm x 70.5mm (75.1mm including 5mm spacer)		31mm x 31.2mm x 75.1mm
	Weight	121g		132g
	Protection	IP51		IP40

¹ Maximum frame rate with smallest exposure and no vision tools.

³ Dimension includes connectors.

² CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

2.6 Specification Comparison: Micro SVGA and 1.3MP vs. 8000 1.3MP

In-Sight 15x0/14x2 vs. 8401

	1500	1402	8401
			
Firmware	4.x versions		5.2 and later
Imager Type	1/1.8-inch CMOS (5.3 μm^2 pixels)		1/1.8-inch CMOS (4.5 μm^2 pixels)
Image Resolution	VGA (640 x 480) / SVGA (800 x 600) ¹	1.3MP (1280 x 1024)	1.3MP (1280 x 1024)
Acquisition Speed (Max)²	213 fps (VGA) / 157 fps (SVGA)	60 fps	76 fps
Memory	File Storage	128MB flash (jobs)	512MB flash (jobs)
	Processing	256MB SDRAM	512MB SDRAM
Options	Lenses	CS-Mount, requires 5mm spacer for C-Mount	
	Vision Tools	PatMax®	
I/O	Network	PoE Ethernet	
	Built-in	(1) Trigger, (2) GP OUT	
	Expansion	CIO-MICRO ³	
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232(with CIO-MICRO)	
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP	
Mechanical	Dimensions⁴	30mm x 30mm x 70.5mm (75.1mm including 5mm spacer)	
	Weight	121g	
	Protection	IP51	

¹ Resolution selectable in software.

² Maximum frame rate with smallest exposure and no vision tools.

³ CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

⁴ Dimensions include connectors.

2.7 Specification Comparison: Micro 2MP vs. 8000 2MP

In-Sight 14x3 vs. 8402

		1403	8402
			
Firmware		4.X versions	5.X versions
Imager Type		1/1.8" CCD (4.4 μm^2 pixels)	1/1.8" CMOS (4.5 μm^2 pixels)
Image Resolution		2MP (1600 x 1200)	2 MP (1600 x 1200)
Acquisition Speed (Max)¹		14 fps	53 fps
Memory	File Storage	128MB flash (jobs)	512MB flash (jobs)
	Processing	256MB SDRAM	256MB SDRAM
Options	Lenses	CS-Mount, requires 5mm spacer for C-Mount	C-Mount
	Tools	PatMax®	PatMax®, PatMax RedLine™
I/O	Network	(1) PoE Ethernet	(1) PoE Gigabit Ethernet
	Built-in	(1) Trigger, (2) GP OUT	(1) Trigger, (2) GP OUT
	Expansion	CIO-MICRO ²	
Protocols	General	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP, RS-232(with CIO-MICRO)	
	Industrial	EtherNet/IP with AOP, PROFINET, CC-Link IE Field Basic, SLMP/SLMP Scanner, Modbus TCP	
Mechanical	Dimensions³	30mm x 30mm x 70.5mm (75.1mm including 5mm spacer)	31mm x 31.2mm x 75.1mm
	Weight	121 g	132 g
	Protection	IP51	IP40

¹ Maximum frame rate with smallest exposure and no vision tools.

² CIO-MICRO provides (8) GP IN, (8) GP OUT and RS-232C.

³ Dimension includes connectors.

3 Hardware Updates

This section summarizes the differences between 7000 Gen1 and 7000 Gen2 hardware and its accessories. Understanding the changes in physical dimensions of the camera, mounting options, optical distance differences and field of view (FOV) changes are critical for obtaining accurate images from your new system. Likewise, it is imperative to know the I/O differences in-order to avoid connection errors as well as what accessories can be reused between the models.

3.1 Size differences

3.1.1 7000 Gen1 and 5000

The 7000 Gen2 is dimensionally different from 7000 Gen1 and 5000 with slight variances in length, width and depth. The 7000 Gen2 is as wide as the 5000 models, and 5mm wider than the 7000 Gen1 models. The 7000 Gen2 is the same length as the 7000 Gen1 models.



Dimensional differences

	Length(mm)	Width(mm)	Depth(mm)
7000 Gen2	77.5	60.5	35.7
7000 Gen1	75.0	55.0	42.7
51XX/54XX	109.1	61.4	43.5

The 7000 Gen2, when mounted with the autofocus and integrated light accessory, is much larger than the 7000 Gen1. Details on the integrated light is in the Accessories topic of this section.

7000 Gen2 and 7000 Gen1 dimension with autofocus and integrated light



Dimensional differences with integrated light installed

	Length (mm)	Widest width of integrated system (mm)	Depth (mm)
7000 Gen2	77.5	88.9	77.4
7000 Gen1	75.0	55.0	75.0

3.1.2 Micro

The 8000 camera is slightly larger than that of the Micro. This is because the 8000 camera has a 5mm spacer built-in making it a C-Mount. The Micro requires a 5mm spacer to be a C-Mount. (It is a CS mount by default.) The over-all dimensional differences between 8000 and Micro are depicted in table below:

Dimensional differences between In-Sight Micro and In-Sight 8000

	Length (mm)*	Width (mm)	Depth (mm)
In-Sight 8000	75.1	31.2	31.2
In-Sight Micro	70.1	30.0	30.0

*The length of the camera includes the connector length

Note that the design and location of the connectors are different on the 8000 series as compared to Micros.



In-Sight Micro



In-Sight 8000

3.2 Mounting and brackets

The 7000 Gen2 and the 8000 Series both require new mounting brackets. Details below:

3.2.1 7000 Gen1 and 5000

Between the 7000's – the mounting holes are in the same location. However – the 7000 Gen1 mounting bracket will not fit the 7000 Gen2 due to the design. Therefore, a new mounting bracket has been added for the 7000 Gen2: ISB-7000-7K. Additionally, 7000 Gen2 has 2 front mounting holes, like that of the 5000 series.

Between 7000 Gen2 and 5000 models, the rear mounting holes are different while the front holes are identical. The 7000 Gen2 has only 2 front mounting holes while the 5000 has 4. A new bracket has been created to allow the 7000 Gen2 to be mounted using the same mounting holes as the 5000: ISB-7000-5K. This bracket has mounting hole placement that matches the 7000 Gen2 on one side and mounting hole placement that matches the 5000 on the other. Technical drawings of the mounting holes are available on the support site and in the reference manual.

3.2.2 Micro

The Micro and 8000 only have mounting holes on the bottom of the camera body. These do differ from each other therefore a new bracket is needed for the 8000 series. BKT-IS8K-01. Additional details on mounting brackets can be found in the accessories section.

3.3 Optical difference

Optical differences between the models could lead to adjustments in working distances if the depth of focus for your lens is too small to compensate for this change.

3.3.1 7000 G1 and 5000

The distance from back of the unit to image is different for 7000 Gen2 as compared to 7000 Gen1 and 5000 models. As noted in the chart below, this distance is less for the 7000 Gen2 as compared to the other two systems, which implies that when you transition to a 7000 Gen2, your working distance may need to be increased.

Optical distance differences between 7000 Gen2 and 7000 Gen1/5000

	7000 Gen1	7000 Gen2	5000
Back of unit to imager (optical plane)	18.1 mm	17.98 mm	20.4 mm
7000 conversion bracket to imager (ISB-7000-7K)	N/A	27.3 mm	N/A
5000 conversion bracket to imager (ISB-7000-5K)	N/A	24.4mm	N/A

3.3.2 Micro

The distance from the optical plane to the back of the unit decreases for 8000 series as compared to the Micro as well. As mentioned above this implies an increase in the working distance.

Optical distance differences between In-Sight 8000 and Micro

	In-Sight 8000	In-Sight Micro
Back of unit to imager (optical plane)	44.3 mm	47.4 mm

3.4 Field of View (FOV)

Since the G2 cameras have different pixel size as compared to G1, you will encounter changes in the FOV when you transition to the new model even though you use the same lens and keep the same working distance as before. Also note that with the pixel size differences – the amount of light collected per pixel will change as well. If the pixels are smaller, less light is absorbed, and the image appears darker when compared to G1. If the pixels are larger, more light is absorbed, and the image appears brighter when compared to G1.

3.4.1 7000 Gen1 and 5000

The table below summarizes the FOV changes that will be seen when transitioning from a 7000 Gen1 or 5000 system to 7000 Gen2.

FOV changes between 7000 Gen2 and 7000 Gen1/5000 systems

Model	#Pixels Horizontal	#Pixels Vertical	Pixel Size	Lens	Gen2 option	Gen2 pixel size	FOV changes with Gen2
5100/5400	640	480	7.40	16mm	7600(VGA)	4.50	43% decrease
5401	1024	768	4.65	16mm	7600(SVGA)	4.50	22% decrease
5403	1600	1200	4.40	16mm	7802(1600)	4.50	3% increase
7xx0	800	600	5.3	16mm	7600(SVGA)	4.50	14% decrease
74x2	1280	1024	5.3	16mm	7801(1280)	4.50	15% decrease

3.4.2 Micro

The table below summarizes the FOV changes that will be seen when transitioning from a Micro to the 8000.

FOV changes between In-Sight 8000 and Micro

Model	#Pixels Horizontal	#Pixels Vertical	Pixel Size (um)	Gen2 option	Gen2 pixel size (um)	FOV changes with Gen2
10xx/1100/1400/1500	640	480	7.40	8200/8400(VGA)	4.50	39% decrease
1402	1280	1024	5.3	8401 (1.3MP)	4.50	15% decrease
1403	1600	1200	4.40	8402 (2MP)	4.50	2.25% increase
1403	1600	1200	4.40	8405 (5MP)	2.2	50% decrease

3.5 Inputs / Outputs

The built-in discrete inputs and outputs (I/O) are also different between models. Whether going from a 5000 to a 7200, or a 7402 to a 7802 – the number of points and connection type (npn, pnp, optically isolated) are different.

3.5.1 7000 Gen1 and 5000

Below is a summary of discrete I/O for each model. For additional information on how to connect to the I/O, please refer to the specific In-Sight model reference manual installed with In-Sight Explorer Software (Documentation folder)

Discrete I/O differences between 7000 Gen2 and 7000 Gen1

	7000 Gen2	7000 Gen1	51XX/54XX
Built-in Inputs	1 camera trigger(opto) 1 input, 2 Bi-Directional* (NPN or PNP)	1 camera trigger(opto), 3 inputs** (NPN or PNP)	1 camera trigger(opto)
Built-in Outputs	2 outputs, 2 Bi-Directional* (NPN or PNP)	4 outputs** (NPN or PNP)	2outputs (NPN only)
External I/O supported	CIO-Micro, CIO-1400	CIO-Micro, CIO-1400, CIO-Micro-CC	CIO-Micro, CIO-1400, CIO-Micro-CC

* Bi-Directional can be configured as inputs or outputs.

** One input and one output are used to support serial communication

3.5.2 Micro

The discrete inputs and outputs for Micro models and the 8000 models are identical. The old and new models contain 1 trigger input, 2 outputs and external I/O in the form of CIO-MICRO.

3.6 Accessories

New accessories are added to support the newer models. However, some of the accessories can be used across like models. Below is a summary of accessories new and old between models.

3.6.1 Integrated Accessories

NEW Autofocus:

The autofocus module (ISAF-7000-8mm) for the 7000 Gen2 is designed to be modular. Meaning, it can be installed in the field on supported 7000 Gen2 hardware. The 7000 Gen2 autofocus module has been redesigned to be more robust in industrial environments which would include vibrations (tested from 2G – 10G's while installed and focus position held). The ISLM-7000-8mm comes preinstalled with an 8mm lens. This change be swapped out for another M12 lens with the aid of the autofocus tool: ISAF-7000-TOOL.

The 7000 Gen1 autofocus was limited in installation meaning the autofocus could be removed from the system, but it could **not be reinstalled**, therefore a system with preinstalled autofocus hardware needed to be purchased if this feature was desired.

Both autofocus systems are designed for job change over focus adjustment (while offline). Online autofocus is not supported by either module. Both autofocus systems support the same range of M12 lenses: 6,8,12,16, and 25. For field of view and working distance charts, please refer to the Reference Manuals installed with In-Sight Explorer software (Documentation folder).

Integrated lighting

The 7000 Gen2 supports a new integrated light (ISLM-7000-WHI) which is designed to provide diffuse illumination across the field of view. The light is a ring light; however, the diameter of the light has been increased (making it more rectangular) past the body size of the 7000 to provide a broader light area. The light is effective up to working distances of 600mm. Closer working distances of 100mm or less results in a low angle effect due to the diffuse properties of the diffuse cover (installed by default with the light module). The integrated light module supports directional light control over each light bank and is available in White(default), Red, Blue and IR. In addition to the integrated light with the white LED preinstalled, it is also available with no LED board installed (Part number: ISLM-7000-00).

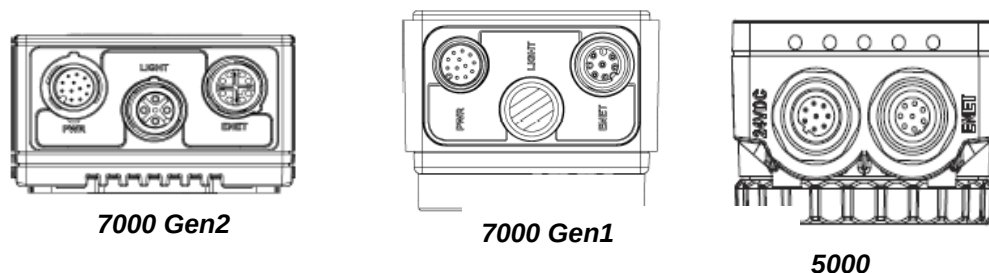
Along with the integrated light, the 7000 Gen2 also supports a range of DataMan lights such as the HPIL and HPIA series. All integrated lights and lighting accessories, along with the wavelength of each light color are contained in the In-Sight 7000 Gen1I reference manual installed with In-Sight Explorer software.

The 7000 Gen1 integrated light is a standard ring light which supported all colors as the 7000 Gen2 integrated light however, it also supported a green light.

All In-Sight integrated lights provide IP67 protection. The DataMan lights provide IP65 protection.

3.6.2 Connectors/Cables

Below is an image of the connector panels for each of the 7000 Gen1 / 5000



Ethernet Cable

The ethernet connector on the 7000 Gen2 and 8000 systems are different from that on 7000 Gen1 and Micro systems. The new connector is an X-coded M12 connector, while the 7000 Gen1/Micro ethernet connectors were designed with a D-sub connector. This means — all 7000 Gen2/8000 systems need a new Ethernet cable. However, an adapter is available that connects between the D-sub style connector of the 7000 Gen1/Micro and the X-coded connector of the 7000 Gen2/8000. The adapter part number is: CCB-M12X8MS-XCAC.

Right angled X coded ethernet cables in varying lengths (from 2M TO 30M) are also available with the x-coded connector: CCB-84901-2002-XX. For the 7000 Gen2 – the right-angle exit is towards the back of the model (identical to the right-angle cables for the power and light cable). The right-angle cable will exit out the right side of the 8000 models.



7000 Gen2 and 8000 with Right Angle X-Coded Cable

Power cable

You can reuse your power cable if you are transitioning from a 7000 Gen1 model to a 7000 Gen2. However, if transitioning from a 5000 model, you will need to change your power cable to the 7000 Gen2 power cable: CCB-PWRIO-xx. The 5000 cable only has 8 wires, however the 7000 Gen2 has 12 which allows for more IO built into the camera. Right angle versions of this cable are also available: CCB-PWRIO-XXR.

Light Cable

The light connector is available on both the 7000 Gen1 and the 7000 Gen2. This light connector provides power and a strobe signal output to an attached light. However, the light connector on the 7000 Gen2 also supports intensity control of the light as well. Light cable part numbers are described below but can also be found in the Reference Manual installed with In-Sight Explorer.

External lights can be connected to 7000 Gen2's light connector using the external light cable CCB-M12LTF-xx. This cable provides power and strobe only.

The yellow Smart Vision Light (SVL) cable, IVSL-5PM12-Jxxx, can be used for the yellow SVL lights with part number: IVSL-YLWxxxx or IVSL-ODDM-x. The black SVL light cable, IVSL-M12-

NSB-300, is used with general SVL lights (blue housing) and SVL lights that have the part number: IVSL-YL300-xx. These light cables and lights support intensity control.

The CCS light adapter cables, IC00-ADAP and IC00-ADAP-02, are used to connect CCS lights however the cable and CCS lights do not support intensity control.

Light connector circuitry

Light Connector Circuitry Comparison

Signal	7000 Gen1	7000 Gen2
Power/Ground	Current load when light is continuously on: 750 mA maximum Current load when strobed: up to 1amp Max at 50% duty cycle (max on time of 100ms). Only the +24VDC pin is capable of sourcing current.	
Strobe	Active low 0VDC and active high +24VDC Polarity configured in the Light Settings dialog within In-Sight Explorer Control signal only and may not to be used for power.	Active low 0VDC and active high +12VDC Polarity configured in the Light Settings dialog within In-Sight Explorer. Control signal only and may not to be used for power.
Intensity*	N/A	Analog signal that ranges from 0 to +10VDC Configurable through In-Sight Explorer. Control signal only and must not be used to power an external device.

*To use the intensity signal – the light connected must also be setup to use the intensity signal.

Micro I/O Cable

The I/O cable for the Micro series can be reused for the 8000 series cameras.

I/O Module Cable

The 7000 Gen2 supports a direct connection to the CIO-1400 or the CIO-MICRO. To directly connect, a new cable is required: CCB-PWRIO-MOD-xx. This cable provides access to all the I/O on the CIO-1400 along with supplying power to the system. This cable provides power and access to 2 high speed outputs and trigger input only when connected to the CIO-MICRO. The remaining 8 in/8 out points on the CIO-MICRO are accessed via connecting to the module over Ethernet. Refer to the In-sight Explorer help for details.

3.6.3 Brackets

7000 Gen2

The Pan and Tilt bracket (BKT-7k-03) is compatible with both 7000 Gen1 and 7000 Gen2 systems. If you use any other bracket with your existing systems, we recommend using ISB-7000-5K or ISB-7000-7K that can be used to mount 7000 Gen2 to existing 5000 or 7000 Gen1 mount respectively.

8000

The pan and tilt bracket BKT-7PT, IC00-BK-SQR56-ISM, and the mounting block shipped with the Micro **cannot** be used with the 8000 series. Instead, please use the new pan and tilt bracket: BK-PTU-BQ, IC00-BK-SQR56-IS8 (same CCS lights used), and the new mounting block, BKT-IS8K-01, for the 8000-series mounting.

3.6.4 Enclosure differences

7000 Gen2

The C-Mount configuration enclosure, ENC-L7-01, is compatible with both 7000 Gen1 and 7000 Gen2 systems. However, the shorter depth enclosure: ENC-LD-01 leaves only 20mm of space for the lens therefore use a small M12 lens with the C-Mount to S-Mount converter on the 7000 Gen2 if this enclosure is needed.

None of the enclosures that are used with 5000 can be used with 7000 Gen2.

A new enclosure has been added to support the 7000 Gen2 with the integrated light installed. This enclosure part number is: ENC-LD-DN.

8000

The enclosures for Micro, ISM-ENCL-C and ISM-ENCL-G, can be reused with the In-Sight 8000 series. Additionally, Cognex offers more enclosure choices for the 8000 series cameras: ENC-24C-CK, ENC-24C-CL, ENC-30D-EM, ENC-30D-EN, ENC-30S-ED, ENC-30S-EE, and ENC-EH-AC.

3.6.5 Lens mount types

Lens Mount Comparison

	Imager Size	Lens Mount type	Supports M12(S-Mount)
7000 Gen2	1/1.8"	C-Mount	Yes, with ISLN-7000-SMNT adapter, and any S-Mount lens
7000 Gen1	1/1.8"	C-Mount	Requires third party adapter.
Micro	1/3"	CS-Mount. Requires 5mm spacer shipped with system to support C-	Requires third party adapter and 5mm spacer.

		Mount.	
8000	1/1.8" 1/2.5" (for IS8405)	C-Mount	Requires third party adapter

3.6.6 C-Mount Cover:

IP67 C-Mount covers are available for the 7000 Gen1, 5000 series and the 7000 Gen2 series. When transitioning, be sure to verify the lens used will fit under the 7000 Gen2 C-mount cover options if IP67 is needed. Optionally – smaller c-mount lenses can be used with the 7000 Gen2 integrated light assuming they are smaller than noted below:

Maximum lens dimensions for C-Mount covers

	Max diameter	Max length
COV-7000-CMNT	36.5mm	41mm
COV-7000-CMNT-EX	36.5mm	62mm
ISLM-7000-WHI or ISLM-7000-00	29.5mm	38.5mm

4 Industrial Protocols

This section highlights the Industrial protocol differences between the In-Sight models running 4.x firmware and the In-Sight models running 5.x firmware.

4.1 Overview of supported Industrial Protocols

The below table provides an overview of supported Industrial Protocols supported by the currently active In-Sight product line. Additional details are provided for each protocol in this section. Industrial protocols not listed can be assumed to be identical in setup. For example: ProfiBus is setup via a gateway in both 4.x and 5.x models.

Table 21: Comparison of Supported Protocols

Ethernet	4.x	5.x
Modbus TCP	✓	✓ Updated
EtherNet/IP	✓	✓ Updated
MC Protocols	✓	✓ Updated
ProfiNet	✓	✓ Updated
Powerlink	✓ 7000 Gen1 only	✓ Requires Gateway
IEEE 1588 (CIP-Sync)	✓ 5000 only	✓ 7000 Gen2
EtherCAT	✓ Requires gateway	✓ Requires gateway
Serial (built in functions)	4.x	5.x
DeviceNet	✓ Requires gateway	✓ Requires gateway
CC-Link	✓ Requires CIO-MICRO-CC	✓ Requires gateway

NOTE: Serial communication is supported on all systems. For the In-Sight 8000 Series and In-Sight Micro Series, the CIO-MICRO is required for serial communication

4.2 Modbus TCP

Modbus TCP functionality is divided into two sections: Modbus Client functionality and Modbus Server functionality. The Modbus Client functionality has not changed between firmware versions. However, the Modbus server has been updated to use data blocks like E/IP and is now supported in EasyBuilder.

4.2.1 Summary of updates for In-Sight models 5.x:

Modbus Client

- Uses same TCPDevice and QueryDevice as 4.x
- Spreadsheet only like 4.x
- Anybus gateway snippets for Modbus TCP to serial protocol (DeviceNet, ProfiBus) work the same as in 4.x

Modbus Server

- Supported in EasyBuilder (4.x is not)
- Uses ReadUserDataBuffer and WriteResultsBuffer functions (same as E/IP, ProfiNet, and SLMP)
- Adds new control and functionality by using Modbus TCP Data blocks
 - Trigger In-Sight
 - Set events on In-Sight
 - Load jobs
 - And more...
- No direct cell access

4.2.2 Modbus TCP Data Blocks

The defined data blocks allow control over where the vision system reads and writes data to and from the PLC. Additionally, further control over the vision system is allowed using the Vision Control Block. For additional setup information, please refer to the In-Sight Explorer Help topic: *Modbus TCP Factory Interface (5.3.0 or later)*

Modbus Vision Control Block

Block	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Vision Control	0	Set Offline	Reserved		Execute Command	Inspection Results Ack	Buffer Results Enable	Trigger	Trigger Enable
	1	Reserved							
	2	Reserved				Clear Exposure Complete	Clear Error	Initiate String Command	Set User Data
	3	Soft Event 7	Soft Event 6	Soft Event 5	Soft Event 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0
Vision Status	0	Online	Offline Reason			Missed Acq	Reserved	Trigger Ack	Trigger Ready
	1	Error	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy
	2	Reserved			Job Pass	Exposure Complete	String Command Error	String Command Ack	Set User Data Ack
	3	Soft Event Ack 7	Soft Event Ack 6	Soft Event Ack 5	Soft Event Ack 4	Soft Event Ack 3	Soft Event Ack 2	Soft Event Ack 1	Soft Event Ack 0

Modbus TCP Data Blocks

Block	Word	
Input	0	Command
	1 - 2000	User Data
Output	0	Current Job ID
	1	Error Code
	2	Acquisition ID
	3	Inspection ID
	4	Inspection Result Code
	5 - 2004	Inspection Results
String Command	0	String Command Length
	1 - 960	String Command
String Command Result	0	Result Code
	1	String Command Result Length
	2 - 961	String Command Result

4.3 EtherNet/IP

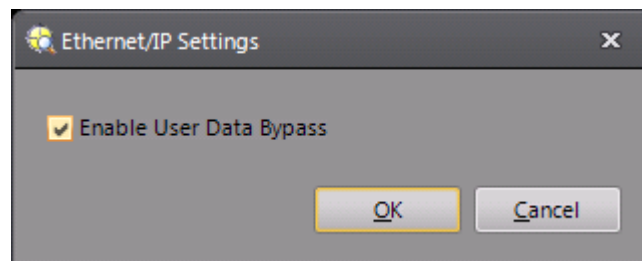
New functionality has been added to enhance the control and communication between In-Sight and PLC's that support EtherNet/IP. The corresponding assembly IO blocks have been updated which causes shifting of bytes within the assembly. This occurs between firmware releases such as 4.9 to 4.10; and 4.10 to 5.x firmware versions. For this document, only the changes from latest 4.10 assembly IO and 5.x assembly IO as compared. For additional information on these changes,

please refer to the In-Sight Explorer Help topic: *EtherNet/IP Object Model and Input/Output Assembly Objects*

NOTE: All 4.x and 5.x firmware models are supported with the latest AOP version 1.28.

4.3.1 Summary of updates for In-Sight models 5.x:

- Requires AOP version 1.28
- Uses ReadUserDataBuffer and WriteResultsBuffer functions
- Assembly Input version update to instance 13
- Assembly Output version update instance 22
- Assembly I/O updates resulted in shifting of bytes/bits to support the added functionality. New functionality includes:
 - SoftEvent acknowledge
 - Load Job by name
 - TestRun added in firmware version 5.6
 - Error code feedback bits
 - Clear Error code bits
 - Clear Exposure Complete
 - Data Attribute changed from ForceOnline to SetOnline
 - SetUserData bit: This has been added for handshaking between PLC and In-Sight. This command is used by the PLC to indicate to the In-Sight vision system that it should transfer the UserData field into a holding buffer for consumption by the vision system.
 - Option to disable SetUserData behavior and revert to 4.x behavior. This feature can be disabled from the In-Sight Explorer Sensor menu by selecting Network Settings, then in the Industrial Ethernet Protocols section, select Settings for Ethernet/IP. Check the box for Enable User Data Bypass:



- IEEE 1588 (used for CIP-Sync) is supported on the 7000 Gen2 (and 5705 models).
- New Trigger at time X queue feature with CIP-Sync. In-Sight is capable of being triggered via a timestamp using an EtherNet/IP implicit connection. As new trigger times are determined, they can be queued up for future trigger times. In-Sight supports time stamping down to 8 nanosecond accuracies.
 - For firmware 5.x, bytes 0-7 represent the offset and then the timestamps follow.
 - In 4.x, 8 bytes for the single timestamp followed by 8 bytes for the offset.
- PCCC not supported
 - New sample code created to show how to send native mode commands using CIP generic message types.

4.3.2 Assembly I/O block updates

The defined data blocks allow control over where the vision system reads and writes data to and from the PLC. For additional setup information, please refer to the In-Sight Explorer Help topic: *EtherNet/IP Object Model and Input/Output Assembly Objects – In-Sight 5.x.x Firmware*. Changes to the Assembly I/O for In-Sight 5.x from In-Sight 4.10.x are highlighted below.

Input Assembly Instance 13: Items highlighted in green are changes from 4.10.x

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
13	0	Online	Offline Reason			Missed Acq	Reserved	Trigger Ack	Trigger Ready
	1	Error	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy
	2	Reserved	Reserved	Reserved	Job Pass	Exposure Complete	Reserved	Reserved	Set User Data Ack
	3	Soft Event Ack 7	Soft Event Ack 6	Soft Event Ack 5	Soft Event Ack 4	Soft Event Ack 3	Soft Event Ack 2	Soft Event Ack 1	Soft Event Ack 0
	4	Error Code (16-bit integer)							
	5								
	6	Reserved (16-bit integer)							
	7								
	8	Current Job ID (16-bit integer)							
	9								
	10	Acquisition ID (16-bit integer)							
	11								
	12	Inspection ID (16-bit integer)							
	13								
	14	Inspection Result Code (16-bit integer)							
	15								
	16	Inspection Results 0							
	...								
	499	Inspection Results 483							

Output Assembly 22: Items highlighted in green are changes from 4.10.x

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
22	0	Set Offline	Reserved		Execute Command	Inspection Results Ack	Buffer Results Enable	Trigger	Trigger Enable
	1	Reserved							
	2	Reserved				Clear Exposure Complete	Clear Error	Reserved	Set User Data
	3	Soft Event 7	Soft Event 6	Soft Event 5	Soft Event 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0
	4	Command							
	5								
	6 .. 7	Reserved							
	8	User Data 0							
	...								
	495	User Data 487							

4.4 ProfiNet

New functionality has been added to ProfiNet communication. As a result, the IO Module reference table and signals contained in the table have been updated which caused some shifting of ID within the table. For this document, only the changes from latest 4.10.x I/O Module table and 5.5 I/O Module table are compared. For additional information on these changes, please refer to the In-Sight Explorer Help topic: *ProfiNet IO Module Reference Table – In-Sight 5.x.x Firmware*.

NOTE: In-Sight 5.x and later firmware requires GSD version 2.3 file. This is included with the In-Sight Explorer software installation under Factory Protocol Files from the start menu.

4.4.1 Summary of updates for In-Sight models 5.x:

- Uses ReadUserDataBuffer and WriteResultsBuffer functions
- Acquisition Control Module added Clear Exposure Complete bit
- Acquisition Status Module added Exposure Complete bit
- Inspection Control Module added a Clear Error and Execute Command bit
- Inspection Status Module was moved to ID 0x203
 - “Job Load” was changed to “Command”
 - “Inspecting” was changed to “System Busy”
 - Error and Test Run bits were added. (TestRun added in 5.6)
 - Error Code status added
- Command Control Input, ID 0x107 replaced Job Control Input, ID 0x103
 - Command is now 16-bit
- Command Control Output, ID 0x107 replaced Job Control Output, ID 0x103
 - Current Job ID is now 16-bit
- Soft Event Control Input ID changed to 0x106
- Soft Event Control Output, ID 0x106 added
 - Includes all Soft Event Ack

4.4.2 Module I/O reference block updates

Changes to the Module I/O reference blocks for In-Sight 5.x, from In-Sight 4.10.x are highlighted in green below:

Module	ID	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Acquisition Control	0x101	0	Set Offline	Reserved				Clear Exposure Complete	Trigger	Trigger Enable
Acquisition Status	0x201	0	Online	Offline Reason			Missed Acq	Exposure Complete	Trigger Ack	Trigger Ready
		1..2	Acquisition ID							
Inspection Control	0x102	0	Clear Error	Reserved			Execute Command	Set User Data	Inspection Results Ack	Buffer Results Enable
Inspection Status	0x203	0	Set User Data Ack	Command Failed	Command Completed	Command Executing	Results Valid	Results Buffer Overrun	Inspection Completed	System Busy
		1	Error	Reserved				Reserved	Reserved (5.1.0 - 5.5.x) TestRun Ready (5.6.0 and later)	Job Pass
		2..3	Error Code							
Command Control Input	0x107	0..1	Command (16-bit)							
Command Control Output	0x107	0..1	Current Job ID (16-bit)							
Soft Event Control Input	0x106	0	Soft Event 7	Soft Event 6	Soft Event 5	Soft Event 4	Soft Event 3	Soft Event 2	Soft Event 1	Soft Event 0
Soft Event Control Output	0x106	0	Soft Event Ack 7	Soft Event Ack 6	Soft Event Ack 5	Soft Event Ack 4	Soft Event Ack 3	Soft Event Ack 2	Soft Event Ack 1	Soft Event Ack 0
User Data	0x301(16) 0x302(32) 0x303(64) 0x304(128) 0x305(254)	0..	User Data							
Inspection Results	0x401(16) 0x402(32) 0x403(64) 0x404(128) 0x405(250)	0..1	Inspection ID							
		2..3	Inspection Results Code							
		4..	Inspection Results							

4.5 MC Protocol

In-Sight vision systems support three methods for communicating with Mitsubishi MELSEC Automation Controllers: CC-Link, CC-Link IE Field Basic, SLMP, and SLMP Scanner. Below is a summary of updates involving these methods using systems with firmware 5.x.

4.5.1 Summary of updates for In-Sight models 5.x

- Direct serial CC-Link is not supported (CIO-MICRO-CC is not a supported I/O Module)
 - Use Anybus gateway to bridge communication from supported protocols like Modbus TCP, EIP or ProfiNet to serial CC-Link. There are examples in the In-Sight Explorer

help.

- Use CC-Link IE Field
- SLMP Scanner protocol does not support the iQ Sensor Solution on 5.x.
 - Potentially planned for upcoming release. Please reach out to a Cognex Sales Engineer for an update.

4.6 POWERLINK

In-Sight 5.x does not support POWERLINK. To communicate over POWERLINK with these models, a gateway module is needed. Modules from gateway manufacturer: KUNBUS, have been used to bridge the communication from supported industrial protocols to POWERLINK.

4.7 EtherCAT

In-Sight does not support EtherCAT directly. To communicate over EtherCAT with these models, a gateway module is needed. Please reference the [*HMS ANYBUS GATEWAY ETHERNET/IP TO ETHERCAT*](#) document on the Cognex support site for details on the setup.

5 Converting to In-Sight Explorer 5.x

The next generation uses the same In-Sight Explorer interface as the previous generation, which has the point and click simplicity of EasyBuilder with the flexibility of the spreadsheet for additional control and customization. The current In-Sight Explorer software has a version that starts with “5”. However, In-Sight Explorer 5.x supports all In-Sight models running 4.x and 5.x firmware. Additional highlights include:

- All next generation models (G2), including the IS5705, run firmware 5.x
- In-Sight Explorer contains firmware for 4.x models **and** 5.x models.
 - Updated firmware for 4.x will remain with the “4” version number.
 - Updated firmware for next generation models will have the “5” version number.
- Any enhancements to In-Sight Explorer will be available to all In-Sight models supported, however features specific to the next generation will only be selectable/available to the next generation models. Such as:
 - Web HMI support
 - New Integrated Light GUI with adjustments of the light in live mode

5.1 Vision Tool Updates

Some functions have been updated in 5.x and could result in job incompatibility. Job incompatibility means that when loading a job created in 4.x, into a system that supports 5.x firmware, some functions will not be able to be loaded and will be replaced with a #ERR. The job will load – however these #ERR will need to be updated to the current functions.

5.1.1 Function changes (same name, new parameters)

The following function has different parameters in version 5.x when compared to version 4.x:

ImageMath:

The ImageMath function has been updated to use a new algorithm. Due to this change, the Display Row and Display Column parameters have been added to this function. The Result Alignment parameter, Advance Options parameters and the AND, OR and XOR options (operation parameter) have been removed. This function will need to be recreated after loading into a 5.x system (or emulator of a 5.x system).

5.1.2 Function replacements (old functions removed, replaced with new)

There are new 5.x functions available that have the same functionality as those in 4.x. Below is a table of these old functions and potential replacements:

Feature	Function in 4.x firmware	Function in 5.x firmware
Filter tool	PointFilter*, NeighborFilter*	Filter (combined two functions)
Read ID	ReadIDMax or ReadIDCode*	ReadIDMax
OCR/OCV	OCRMax or ReadText*, VerifyText*	OCRMax
Blob	ExtractBlobs	DetectBlobs or ExtractBlobs
Bead	N/A – Used InspectEdge functions	BeadFind/BeadInspect
SceneCorrection	SceneCorrection	Filter tool, with the filter selection: Local Median Normalization. The Kernel size is increased to 100x100 in 5.7 firmware.

*These functions will be brought into firmware 5.7 and will be hidden (not documented as supported in 5.x). This will enable jobs that used these in 4.x, to load without #ERR in 5.7 firmware and beyond. The customer can choose to use the new tools for new jobs or continue to use the older hidden tools.

5.1.3 Functions removed

Auto exposure is not supported in the Acquireimage cell for any G2 model.

5.1.4 New functions

Below is a snapshot of new tool functions added by 5.6. New tools and functions will continue to be added to 5.x with each new release. New functionality cannot be added to any In-Sight models running 4.x firmware.

- DetectBlobs – Optimized to run on larger input regions (over SVGA size)
- SurfaceFX – New filter tool highlighting surface topography of an object
- BeadFind/BeadInspect – Intuitive and graphics-based Bead tool setup
- PatMaxRedLine – Blazing fast PatMax
- PatMaxRedLineColor – Pattern match with edges and color (available in 5.6)
- Scripting – Write your own java scripts to handle parsing of data sets.

5.1.5 Gain/Offset

Since the new models use a different imager – the gain and offset values are not consistent between the G1 and the G2. When the 4.x job is loaded, it will contain gain and offset values that may not be valid for the newer model. These imager parameters will need to be adjusted to achieve the same brightness of the image on the new system imager.

6 Frequently Asked Questions

6.1 Configuration questions

6.1.1 Am I limited on the c-mount lenses I can use?

NO – any C-Mount can be used. Any restrictions come into play when using the integrated light or the C mount covers. Lens size constraints for are listed in the Reference Manual when using the C-Mount lens covers or the In-Sight Integrated Light (ISLM-7000-WHI or ISLM-7000-00). The Reference Manual is installed by default with ISE and is found here:



Manuals

C:\Program Files (x86)\Cognex\In-Sight\In-Sight Explorer 5.4.0\Documentation\Manuals\

Or on the support site here:

<https://support.cognex.com/en/downloads/in-sight/documentation>

6.1.2 I thought the little circuit board will limit the c mounts I can use?



The little circuit board is ONLY used with the integrated light. When using the integrated light, this is a list of supported C mount lenses supported due to size constraints. If you are not using the integrated light – then this circuit board is not used and should NOT be installed.

6.1.3 Do I need the PCB (little circuit board) if I am not using the Integrated light?

No, the PCB is used to bring power to the light and autofocus module. It is NOT needed and SHOULD NOT be installed when the system is not setup with the integrated light.

6.1.4 Do I need the little circuit board for the DataMan lights?

No, the pcb (little circuit board) is shipped with the In-Sight Integrated light module (ISLM-7000-xxx). This is a component of the In-Sight light only.

6.1.5 What is the ISLN-7000-SMNT?

This is the S mount adapter kit. You would use this to use any manual s mount. This is NOT needed for autofocus. It contains the S mount adapter, an install tool and a rubber cone to hold the s mount in place. The rubber cone is meant to hold the S-Mount in place.



ISLN-7000-SMNT contents

6.1.6 What parts do I need for the different lenses?

- The camera comes C-mount ready. Purchase the C mount cover for IP67.
- If you want an S lens only, you will need the ISLN-7000-SMNT. Purchase the DM300-CLCOV for IP65 cover if needed.
- If you want to autofocus, you need the ISAF-7000-8mm and the ISLM-7000-xxx
- The Integrated light is required if you need autofocus.
- Autofocus comes with an 8mm lens. If you want other sizes- it supports 6,12,16 and 25mm S mount lenses. Use the ISAF-7000-TOOL to help with swapping the lenses. Part numbers for the lenses are listed in the Reference Manual.

6.1.7 How is the 7000 Gen2 shipped?

The system is shipped c-mount ready – like the In-Sight 5000's. You can choose to add covers, lights, lens type and autofocus as accessories purchased separately.



6.1.8 What accessories can I reuse from the 7K and 5K?

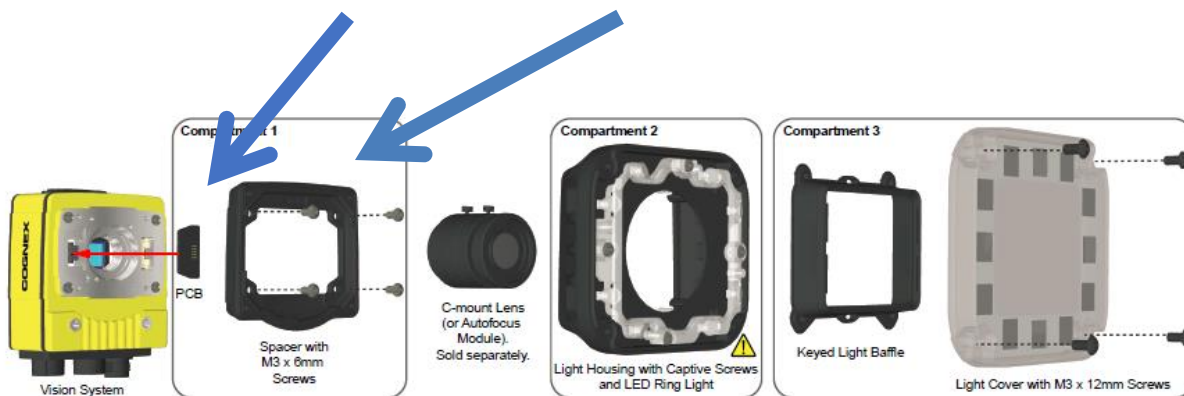
The same Power/IO cable is used as the 7000 Gen1. The 7000 Gen1 light cable can be reused as well but this cable does not have intensity control capability. Lenses are shared among all our vision systems. But all other accessories are new to the 7000 Gen2.

Since the next generation models require X-coded connectors on the Ethernet cable, new Ethernet cables will need to be purchased. There is an adapter cable for the older Ethernet connector (D-sub) to the X-coded Ethernet as well: CCB-M12X8MS-XCAC. This adapter will fit on the 5000 Ethernet cable and allow it to be used on the next generation systems which have the X-coded Ethernet connector.

6.1.9 Can I go from a c mount to an autofocus system in the field?

Absolutely – the system is shipped as a C-Mount. You can purchase the autofocus module and install in the field. You can uninstall the autofocus module and change to S mount or C mount – all in the field. No need to send the camera to headquarters or buy an autofocus only system.

NOTE: When not using the autofocus/integrated light – remove all autofocus and integrated light parts! This includes the little circuit board and the spacer. There are not needed for C-Mount/S-Mount configurations.



6.1.10 Why can't I use the 6mm Fujinon lens with the integrated light?

I understand there are size constraints for the C-Mount lenses used with the Integrated Light (ISLM-7000-WHI). I see we support the family of Fujinon lenses because they have a smaller diameter. But why can't I use the Fujinon 6mm lens in that family?

The Fujinon 6mm is long and will hit the glass filter on the light when focused at <110mm position.

6.1.11 What are the dimension limitations for each of the IP67 covers?

- For the COV-7000-CMNT cover, the lens size constraints are:
41mm lens length max and 36.5 max body diameter (body only, there is plenty of additional room for set Screws).
- For the COV-7000-CMNT-EX, the lens constraints are:
 - 62mm lens length max
 - 36.5 max body diameter (body only, there is plenty of additional room for set screws)

6.1.12 Are the DataMan lights IP67 as well?

No, the DataMan light options/covers are IP65.

6.1.13 Can I change the configurations while powered on?

No – please power off the system when swapping out different configurations. Unlike the original 7000, the light boards have more intelligence to them. In-Sight knows if there is an integrated light connected and it also knows the color of the light (this is not displayed in the GUI yet). Therefore, to not damage to the system – please pull power before replacing light board colors, installing the integrated light (DataMan or In-Sight lights) or the autofocus.

6.1.14 I have a customer who wants the Autofocus module only. What covers can they use?

The Autofocus module must be used with the Integrated light module (ISLM-7000-WHI) or the Integrated light module cover (ISLM-7000-00). The ISLM-7000-00 contains the cover and circuit board, but not LED lighting. This can be used with the autofocus system. If you decide you want to use the light – you can purchase the LED light board only and add this to the ISLM-7000-00.

6.1.15 I am having problems removing the black autofocus lens nut

(step 9 from the Replace the M12 Autofocus Lens topic in the reference manual). Can I get more of these?

The new toolkit for the autofocus module contains extra black lens nuts, blue ring and a tool to hold the lens in place while removing. It is highly recommended to purchase this tool: ISAF-7000-TOOL. This tool is referenced in the manual as well. The black lens nut is snug and since it is thin, any force applied to it, when trying to unscrew it, creates a brake on the surface which makes it tougher to remove! What I found to work well is that I hold the lens and gently unscrew the black lens nut. If I try to apply force, the lens nut will not come loose.

It is far easier to use the extra black lens nuts included with the tool.

6.2 Autofocus

6.2.1 How different is this from the 7000 Gen1 autofocus?

This is a new autofocus module designed from the ground up. Before we designed it, we had a review of the challenges met from the 7000 Gen1 autofocus and designed these challenges out of the next version. We have done industrial testing; this includes vibration testing with the autofocus module outside of standard shipping vibration specification when the system is not powered on. And motor longevity. We did not do industrial testing with 7000 Gen1 autofocus system.

6.2.2 I have a customer who wants the 16mm autofocus and the new integrated light. What do I order?

You would need to order the autofocus module: ISAF-7000-8mm; the autofocus lens installation tool ISAF-7000-TOOL; the integrated light module: ISLM-7000-Whi and the 16mm S mount lens: LFC-16F1.

6.2.3 What is the vibration specification?

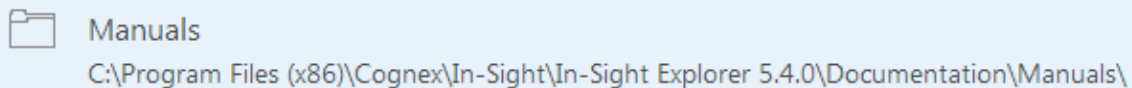
We spec the system at 2G's however we have tested up to 10G. 2G surpasses what the assembly line would see and what a normal robot could inflict on something mounted on it.

6.2.4 Can I use this in robotic applications?

Absolutely! This has been tested to handle vibration and hold its focus.

6.2.5 What are the working distances for the supported Autofocus lenses?

The working distances for each lens and each resolution can be found in the reference manual.



6.2.6 How many cycles is the Autofocus rated to?

The Autofocus module is rated to 20,000 cycles. (However, we have successfully tested this to 100K).

6.2.7 Can I use this autofocus to focus while running online?

No – this is a “Set it and Forget it” autofocus. Which means this is set while the system is offline. This is used for job change overs and not on the fly adjustments like the liquid lens.

6.3 Integrated Light

6.3.1 Why is the intensity limited to 50%?

Intensity is limited to 50% due to the banks. When intensity is decreased below 50%, the intensity is not eventually distributed along the banks. To avoid this unwanted effect – we have limited the intensity to 50%.

6.3.2 Can I set different intensity levels per bank?

No, all banks will have the same intensity.

6.3.3 Can I adjust the light settings remotely? (PLC, SDK)

Yes – you can add the integrated light function to the spreadsheet and adjust the function from the spreadsheet.

6.3.4 Can I adjust the light settings in EasyBuilder?

Yes – using the light settings dialog in the image setup step.

6.3.5 Can I use the External light connector AND the Integrated Light at the same time?

No – you can only use one or the other.

6.3.6 Can I switch between the external light connector and the integrated light while online?

Yes, you can, but in spreadsheet only. Since the Light Control dialog box is only enabled while offline, you can use the HIDDEN function called: SelectLightControl(). This function requires you to pass it either a 0 or a 1 which will enable either the external light or the integrated light. Please contact Samantha Frost if you are considering using this in an application.

6.4 Part Number questions

6.4.1 Are there right-angle cable options?

Yes, the power can be reused from the previous generation 7000 (7400 for example). There is a new right-angle x-coded ethernet cable available as well: CCB-84901-2002-XX. All options exit out the back of the system like the previous generation 7000.

6.4.2 How does this attach to the CIO-1400?

There is a new cable that is needed for the IS7000 Gen2 connection to the CIO-1400: I/O Module cable M12-12 to DB15 (CCB-PWRIO-MOD-xx).

6.4.3 What about the original 7000 light cables for CCS lights? Can we use these?

Yes, the two adapter cables for the light connector on the 7000 to the CCS can still be used:

- IC00-ADAP – constant on
- IC00-ADAP-02 – strobe, on/off

Note: These do not support intensity control.

6.5 Technical Details

6.5.1 What is the spectral response?

The spectral response is like the 7000 Gen1 where the peak sensitivity is in the red wavelengths. Unlike the 5000 series where the peak wavelengths are in the green wavelengths.

6.5.2 How does the physical size compare to the original 7000 and 5000 models?

The 7000 Gen2 is as wide as the IS5000 models, and 5mm wider than the original IS7000 models. The 7000 Gen2 is as long as the original 7000 models.

6.5.3 What is the mounting?

The 7000 Gen2 has the same front mounting holes as the IS5000. Except there are only 2 front mounting holes as opposed to 4 with the IS5000. The rear mounting holes are the same as the 7000 Gen1 series. Even though they are the same as the 7000 Gen1, we had to make a new bracket because the old bracket “hugged” the system and this feature did not fit with the new 7000 Gen2.

We do have brackets that have the 5000 mounting holes on one side and the 7000 Gen2 mounting holes on the other. And we have a new IS7000 Gen2 bracket, which will fit the 7000 Gen1 as well since the mounting holes are the same.

Technical drawings are available on the support site and in the reference manual.

6.6 Software/Tool

6.6.1 Can I load a 5K job on this? What will happen?

Yes, you can however since the imagers are different, you will need to adjust some of the A0 parameters (gain, offset). Also, some tools are different as well. The filter tools changed between 4.x and 5.x, so these will need to be recreated.

6.6.2 Can I load a 7K job on this? What will happen?

Yes, you can however since the imagers are different – you will need to adjust some of the A0 parameters (gain, offset). Also, some tools are different as well. The filter tools changed between 4.x and 5.x, so these will need to be recreated. The autofocus metrics are different between the systems as well so if you had autofocus metrics in the 7000 Gen1, this will need to be updated with the new 7000 Gen2 for the new autofocus module.

6.6.3 What does the TUNE button do?

The Tune button, for now, is treated like an event button. In the Event function, there is a new list item named Tune Button. You can reference this Event in other tools etc.

6.6.4 How do I control the status ring light?

The wrap around status ring light is linked to the Pass/Fail status LED. This is output line 4. You can set this by using the WriteDiscrete function for Discrete Output line 4.

6.6.5 Can I use SurfaceFX with this new light?

Yes, you can but keep in mind the field of view is smaller (3-5 inches, 76mm-127mm,) but it is a compact, all in one solution for SurfaceFX! No additional controller or IO needed.

6.6.6 Will the Gen2 be able to do a full backup and restore to the SD card?

Yes, it does. You need firmware version 5.5 and beyond to get this functionality.

6.7 Miscellaneous

6.7.1 How much memory does the camera have? What can I do with this?

The 7000 Gen2 has a total of 15.2GB of memory. This can be used for job storage, image storage (on the SD card only), tool storage (cxd) and pattern data storage.

6.7.2 Does this have an AOP?

Yes, it does! The new AOP version 1.28 supports all In-Sight models running 4.x and 5.x firmware.

6.7.3 Vision View support?

Yes – version 1.6.8

6.7.4 Will this know if I plug in a light on the light connector on the bottom?

No, just like the IS7000, it is up to the user to select the external light settings.

6.7.5 The 7000 Gen1 cable does not work with intensity on the light connector. Is there another cable that will?

External lights can be connected to 7000 Gen2's light connector using the external light cable CCB-M12LTF-xx. This cable provides power and strobe only.

The yellow Smart Vision Light (SVL) cable, IVSL-5PM12-Jxxx, can be used for the yellow SVL lights with part number: IVSL-YLWxxxx or IVSL-ODDM-x. The black SVL light cable, IVSL-M12-NSB-300, is used with general SVL lights (blue housing) and SVL lights that have the part number: IVSL-YL300-xx. These light cables and lights support intensity control.

The CCS light adapter cables, IC00-ADAP and IC00-ADAP-02, are used to connect CCS lights however the cable and CCS lights do not support intensity control.

6.7.6 Is there a cover for the connectors on the face of the 7800 (the flexible optics connector and the connector shown below) if my customer does not use any of the

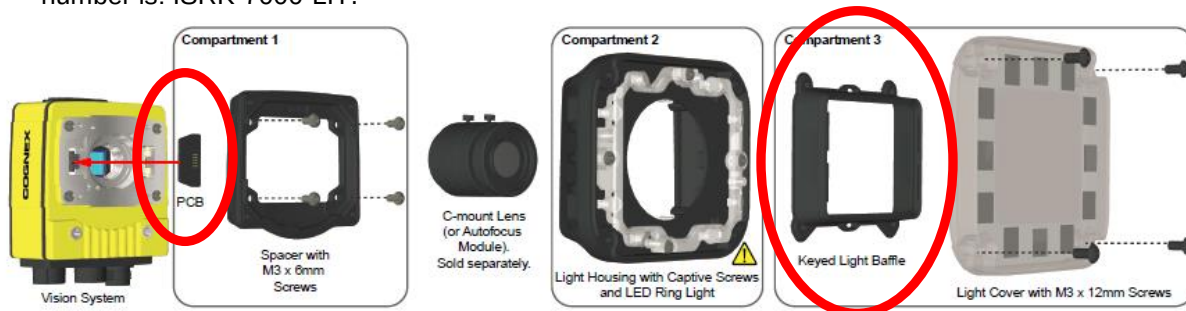
covers?

Yes, we have a new part number: IS7000-CON-PLG. These two covers are installed over the Connector and Flexible Optics Interface on the faceplate of the system. Keep in mind – the imager itself is isolated from the rest of the system internally – therefore the only way dust will get on the imager is from the C-Mount opening.



6.7.7 I lost the little light board used with the integrated light. Can I get a new one?

Yes, there is a small repair kit which contains this little pcb as well as the light baffle for the light. This part number is: ISRK-7000-LIT.



6.7.8 Does a Gen1 existing job work on a Gen2 Vision System, with no changes (or limitations)?

There are a few changes to note:

- Different Imager**
 If there is a different imager the gain setting may need to be adjusted.
 If imager is faster and more sensitive, the exposure may need to be adjusted. Recommendation: Save an image on the original Gen1 camera. Pick a region and compare the intensity between the old and new image.
- Image Filters**
 There are new functions for the image filter tools. However, the older filters, Neighbor and Point are available in the 5.x systems. You can choose to migrate to the new Filter tool or continue to use the filter tools from 4.x. Jobs containing the older filter tools (in 4.x) will load without error in 5.x.
- Lens/Working Distance/Field of View Adjustment**
 Verify the working distance and field of view stays the same as it may change slightly with the new imager's location and size. If upgrading to UC lenses (recommended), verify that the working distance and field of view does not change. When making these changes the region of interest may need to be adjusted.