

ifm Vision Assistant Overview



The ifm Vision Assistant software is a free and highly versatile configuration tool that will help you get the most from your ifm vision system.

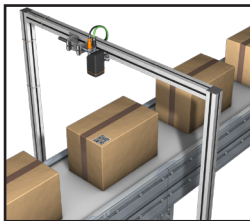
ifm Wizards simplify set-up

About 90% of applications that can be addressed with an ifm camera can be set up using the built-in wizards. These wizards walk the user through the necessary settings.

This step-by-step approach will minimize the learning curve for someone who is just getting into the vision world. For example, the wizard utilizes the system's autofocus capabilities to help determine exposure settings which optimize contrast.

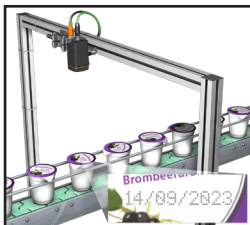
For more advanced users, ifm's Vision Assistant software also has an advanced user-defined mode designed to allow seasoned vision experts to get the very most from these systems.

O2I Wizards



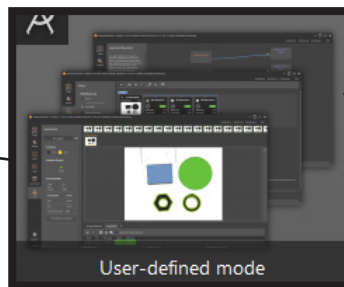
Logistics sorting

Single- or multi-code setup (can also provide barcode quality metrics)



Date code verification

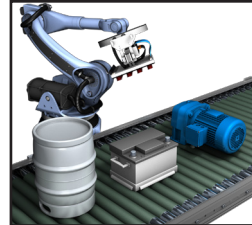
Using built-in OCR (Object Character Recognition)



User-defined mode

Allows advanced users to develop custom rule-based applications

O3D Wizards



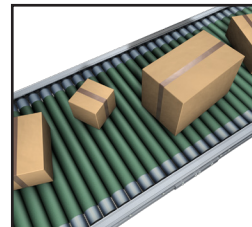
Robot pick and place

Detection of parts returns robotic coordinates



Is the carton or case complete?

Color is irrelevant



Dimensioning

Logistics – for sorting based on size



Level of solid products

Can determine percentage filled overall instead of just a single point

O2D Wizards



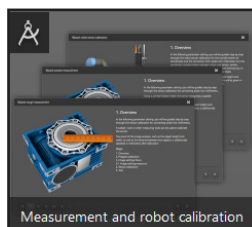
Detection of parts

Searches for a specific shape to see if the shape is in the image

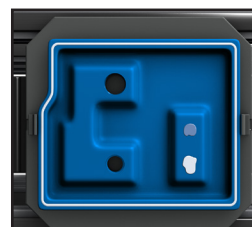


Presence of threads

Searches the image to see if a BLOB is present



Rough or precise measuring



Object width/quality

By analyzing a BLOB

ifm Vision Assistant Overview



Added control

The software also controls things like focus, exposure time, gain, control of internal and external lighting and other settings.

For example, ifm's O2D and O2I cameras have four built-in lights (two polarized and two non-polarized), and with the O2D RGBW cameras you can test red, green, blue, white and even polarized lighting strategies to find the best fit for your application.

As seen by human eyes under white light

Objects may appear differently depending on the color of the light with which they're illuminated.

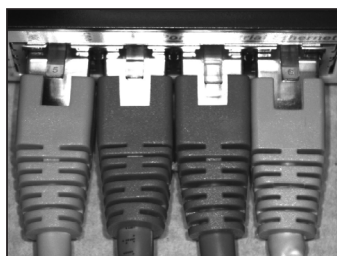
For example, here's how a set of differently colored plugs appears to human eyes when illuminated by white light.



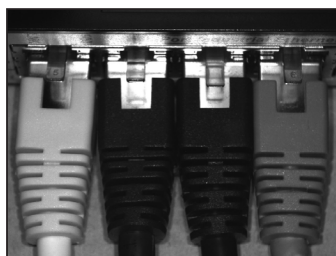
As seen by ifm Vision Assistant under white, red, green or blue light

The ifm Vision Assistant allows objects to be illuminated by white light as well as by monochromatic light. The choice of light color may aid in visualization of various elements of the object in question (for instance, a barcode printed on colored packaging).

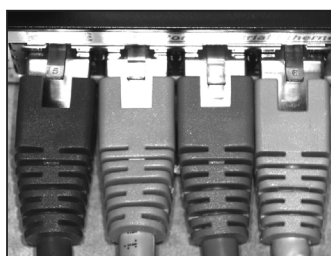
By way of illustration, here is how the same objects shown above might appear to the ifm Vision Assistant when illuminated under white, red, green or blue light. Note how the relative contrast between colors changes with different types of illumination.



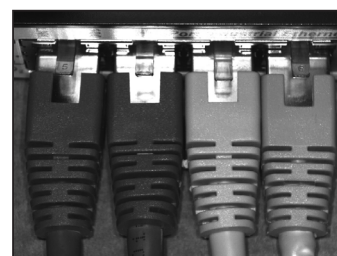
White light



Red light



Green light



Blue light

Simulation features

Additionally, Vision Assistant offers a simulator feature. To access the simulator, first open the software. Once on the home screen "Ctrl+M" will open the "manual connection" dialog box, where the user can select the type of device to test (for example "O2I5XX SimuLater"). This mode allows the user to explore the functions and tools that the software has to offer.

Please note that the simulator does not have the ability to upload an example image and build the rules from that image.

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Machine Mount 1D/2D Barcode Scanner

**O2I500**

The ifm efector machine mount 1D/2D barcode scanner provides simple, capable, and reliable image-based barcode reading. The O2I barcode reader is fully self-contained, including the imager, evaluation unit, illumination, and outputs. The evaluation algorithm provides 4x higher resolution for reliable reading results, 10x faster evaluation for high-speed applications, and 10x faster setup to optimize production availability.

Features

- Convenient autofocus
- Alignment laser
- Four built-in lights (two non-polarized and two polarized)
- Two configurable outputs
- Onboard logic engine
- IP65
- Local device backup and cloning
- Optical Character Recognition (OCR)
- IO-Link (available on O2I4xx models) simplifies integration into complex systems

Applications

- Barcode presence
- Barcode placement
- Barcode quality
- Identification and verification of text (via OCR)

ifm efector Machine Mount 1D/2D Barcode Scanner Selection Guide

Part Number	Price	Scanner Capability	Lens Type	Light Emission	Port Protocols	Lens Material	Drawing
O2I500	\$1,436.00	1D and 2D	Standard	Visible red	TCP/IP and EtherNet/IP	Gorilla Glass	PDF
O2I501	\$1,436.00			Infrared			PDF
O2I502	\$1,436.00		Wide angle	Visible red			PDF
O2I503	\$1,436.00			Infrared			PDF
O2I400	\$991.00		Standard	RGBW (red/green/blue/white)	TCP/IP and IO-Link		PDF
O2I420	\$991.00			Infrared			PDF
O2I402	\$991.00		Wide angle	RGBW (red/green/blue/white)			PDF
O2I422	\$991.00			Infrared			PDF

One-Button Teach Configuration

Simple applications for the O2I can be programmed by the single touch button located on the back of the O2I device.

Trigger and network settings are configured via a data matrix code generated by a smartphone app (iOS and Android).



Android QR Code

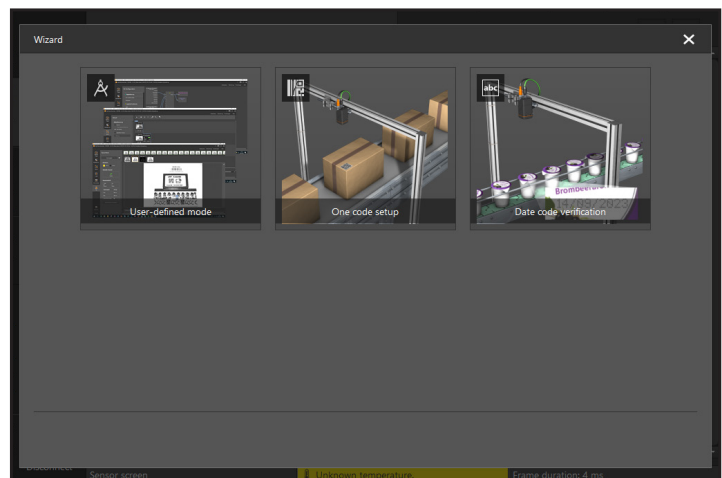


iOS QR Code

**O2I500 rear view showing touch button and LEDs.**

Full-Featured Vision Assistant Configuration

ifm's free Vision Assistant configuration software has easy-to-use wizards to read a single code or to do date code verification via Optical Character Recognition (OCR). The software also allows the user to define the parameters for each specific application. The camera also has built-in logic to simplify the integration of the camera into the system.



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Machine Mount 1D/2D Barcode Scanner



ifm efector Machine Mount 1D/2D Barcode Scanners Technical Specifications

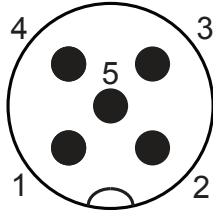
Product Characteristics					
Image Resolution	(pixels)	1280 x 960			
Maximum Reading Rate	(Hz)	40			
Electrical Data					
Operating Voltage	(VDC)	18–30			
Current Consumption	(mA)	<400 @ 24 VDC			
Reverse Polarity Protection		Yes			
Wavelength	(nm)	Models Q2I500 and Q2I502 : Red (617) Models Q2I501 , Q2I503 , Q2I420 , Q2I422 : Infrared (850) Models Q2I400 , Q2I402 : Red (625), green (525), blue (453), visible white			
Image Sensor		CMOS image sensor (black/white)			
Inputs					
Trigger		All models: External 24V PNP/NPN, Continuous Models Q2I4xx : IO-Link Models Q2I5xx : TCP/IP, EtherNet/IP			
Outputs					
Number of Digital Outputs		2 (configurable)			
Output Function		24V PNP/NPN			
Maximum Current Load Per Output		100 mA			
Monitoring Range					
Field of View	(mm [in])	For standard lens (Q2I500 , Q2I501 , Q2I400 , Q2I420)		For wide-angle lens (Q2I502 , Q2I503 , Q2I402 , Q2I422)	
		Operating distance:	Field of view:	Operating distance:	Field of view:
		85 [3.35]	28 x 21 [1.10 x 0.83]	35 [1.38]	25 x 19 [0.98 x 0.75]
		300 [11.81]	92 x 69 [3.62 x 2.72]	300 [11.81]	184 x 138 [7.24 x 5.43]
		500 [19.69]	152 x 114 [5.98 x 4.49]	500 [19.69]	304 x 228 [11.97 x 8.98]
		1000 [39.37]	302 x 227 [11.89 x 8.94]	1000 [39.37]	604 x 453 [23.78 x 17.83]
Operating Distance	(mm [in])	>85 [3.35]		>35 [1.38]	
Autofocus Type		Mechanical autofocus			
Readable Codes		1D and 2D – See product manuals for supported code types			
Maximum Inclination to Image Plane		45°			
Ethernet Interface					
Transmission Standard		10Base-T; 100Base-TX			
Transmission Rate		10 Mbps; 100 Mbps			
Protocol		TCP/IP; EtherNet/IP			
Factory Settings		IP address: 192.168.0.69 Subnet mask: 255.255.255.0 (Class C) Gateway IP address: 192.168.0.201			
IO-Link Interface					
Transmission Type		COM3 (230.4 kBaud)			
IO-Link Revision		1.1			
Required Master Port Type		A			
Minimum Process Cycle Time		4.2 ms			
Operating Conditions					
Ambient Temperature		-10 to +50 °C [+14 to +122 °F]			
Storage Temperature		-40 to +70 °C [-40 to +158 °F]			
IP Rating		IP65			
Tests/Approvals					
Notes on Laser Protection		Caution: Laser light, laser class: 1			
Mechanical Data					
Weight	(g [lb])	601 [1.32]			
Material		Housing: Diecast zinc powder coated; Front lens: Gorilla Glass; LED window: PC; Pushbuttons: POM			

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Machine Mount 1D/2D Barcode Scanner

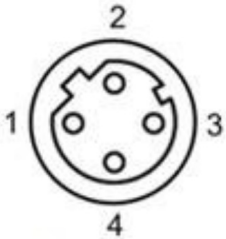


Electrical Connections – Supply



M12 5-Pin Male Connector	
1	+24 VDC
2	Trigger input+
3	0 V-
4	Switching output 1 (configurable) IO-Link (on certain models)
5	Switching output 2 (configurable) Trigger output with external illumination

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data -
4	RxD-, receive data -

Accessories

O2I Accessories Selection Guide			
Part Number	Price	Description	Drawing
<u>E21302</u>	\$105.00	Protective lens cover for O2xxx products	<u>PDF</u>
<u>E2D500</u>	\$41.50	Right-angle bracket for 12mm rod	<u>PDF</u>

**[E2D500](#)****[E21302](#)****[E21112](#)**

316L Stainless Steel Rod Selection Guide				
Part Number	Price	Diameter (mm [in])	Length (mm [in])	Drawing
<u>E21112</u>	\$18.00	12 [0.5]	200 [7.9]	<u>PDF</u>
<u>E21113</u>	\$20.50	12 [0.5]	300 [11.8]	<u>PDF</u>

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Machine Vision 2D Camera

**O2D500**

The ifm efector 2D machine vision sensor provides simple, capable and reliable image-based detection. Whether contour detection or BLOB analysis, the O2D family of vision sensors excels at solving most error-proofing and inspection applications throughout the manufacturing plant for a fraction of the cost of other vision systems and sensors.

Features

- Convenient autofocus
- Four built-in lights (two non-polarized and two polarized)
- Up to five configurable outputs
- Onboard logic engine
- IP65
- Anchor tracking
- Multi-image analysis at various exposure rates
- Contour and BLOB detection
- Imager resolution: 1.2 MP
- IO-Link (available on O2Uxxx models) simplifies integration into complex systems

Applications

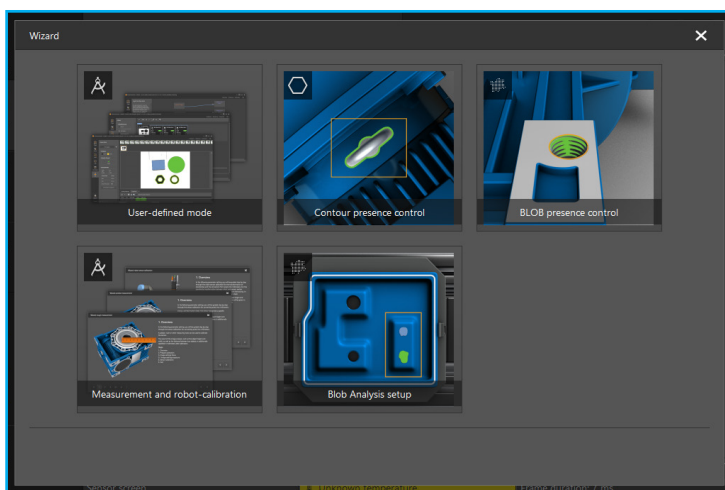
- Metal injection molding quality
- Bottle filling operation quality
- Packaging box quality
- Filter quality
- Tapped hole detection

ifm efector Machine Vision 2D Camera Selection Guide

Part Number	Price	Lens Type	Light Emission	Port Protocols	Lens Material	Drawing
O2D500	\$1,436.00	Standard	RGBW (red/green/blue/white)	TCP/IP and EtherNet/IP	Gorilla glass	PDF
O2D520	\$1,436.00		Infrared			PDF
O2D502	\$1,436.00	Wide angle	RGBW (red/green/blue/white)			PDF
O2D522	\$1,436.00		Infrared			PDF
O2U540	\$1,988.00	Standard	RGBW (red/green/blue/white)	TCP/IP, EtherNet/IP, and IO-Link		PDF
O2U550	\$1,988.00		Infrared			PDF
O2U542	\$1,988.00	Wide angle	RGBW (red/green/blue/white)			PDF
O2U552	\$1,988.00		Infrared			PDF

Full-Featured Vision Assistant Configuration

The free ifm Vision Assistant configuration software contains several tools to make integration more seamless. The tools in the library include pattern, form, object, location, measurement, diameter, and roundness, just to name a few. The powerful camera features a 35 frames-per-second target speed. Please note that camera speed is dependent on how much processing must be done by the camera.



Screenshot of ifm's Vision Assistant software. The software contains several wizards to assist in efficient integration of the camera into the automation system and PLC to quickly get you up and running.

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Machine Vision 2D Camera



ifm efector Machine Vision 2D Camera Technical Specifications					
Product Characteristics					
Image Resolution	(pixels)	1280 x 960			
Maximum Reading Rate	(Hz)	40			
Electrical Data					
Operating Voltage	(V)	18–30 VDC			
Current Consumption	(mA)	<400 (24 VDC; with switched outputs: <900 mA)			
Reverse Polarity Protection		Yes			
Wavelength	(nm)	Models O2D520, O2D522, O2U550, O2U552: Infrared (850) Models O2D500, O2D502, O2U540, O2U542: Red (625), green (525), blue (453), visible white			
Image Sensor		CMOS image sensor (black/white)			
Inputs					
Trigger		All models: External 24V PNP/NPN, Continuous Models O2U5xx: IO-Link Models O2D5xx: TCP/IP, EtherNet/IP			
Outputs					
Output Function		PNP/NPN (configurable)			
Maximum Current Load Per Output	(mA)	100			
Monitoring Range					
Field of View	(mm [in])	For standard lens (O2D500, O2D520, O2U540, O2U550)		For wide angle lens (O2D502, O2D522, O2U542, O2U552)	
		Operating Distance:	Field of View:	Operating Distance:	Field of View:
		85 [3.35]	28 x 21 [1.10 x 0.83]	35 [1.38]	25 x 19 [0.98 x 0.75]
		300 [11.81]	92 x 69 [3.62 x 2.72]	300 [11.81]	184 x 138 [7.24 x 5.43]
		500 [19.69]	152 x 114 [5.98 x 4.49]	500 [19.69]	304 x 228 [11.97 x 8.98]
		1000 [39.37]	302 x 227 [11.89 x 8.94]	1000 [39.37]	604 x 453 [23.78 x 17.83]
		1500 [59.06]	453 x 340 [17.83 x 13.39]	1500 [59.06]	904 x 678 [35.59 x 26.69]
		2000 [78.74]	603 x 452 [23.74 x 17.80]	2000 [78.74]	1204 x 903 [47.40 x 35.55]
		2500 [98.43]	753 x 564 [29.65 x 22.20]	2500 [98.43]	1504 x 1128 [59.21 x 44.41]
Operating Distance	(mm [in])	>85 [3.35]		>35 [1.38]	
Autofocus Type		Mechanical autofocus			
Ethernet Interface					
Transmission Standard		10Base-T; 100Base-TX			
Transmission Rate		10 Mbps; 100 Mbps			
Protocol		TCP/IP; EtherNet/IP			
Factory Settings		IP address: 192.168.0.69 Subnet mask: 255.255.255.0 (Class C) Gateway IP address: 192.168.0.201			
IO-Link Interface					
Transmission Type		COM3 (230.4 kBaud)			
IO-Link Revision		1.1			
Required Master Port Type		A			
Minimum Process Cycle Time		4.2 ms			
Operating Conditions					
Ambient Temperature		-10 to +50 °C [+14 to +122 °F]			
Storage Temperature		-40 to +70 °C [-40 to +158 °F]			
IP Rating		IP65			
Mechanical Data					
Weight	(g [lb])	612.4 [1.35]			
Material		Housing: Diecast zinc powder coated; Front lens: Gorilla Glass; LED window: PC; Pushbuttons: POM			

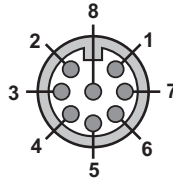
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Machine Vision 2D Camera

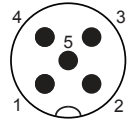


Electrical Connections – Supply

M12 8-Pin Male Connector (02Dxxx)				
Pin	292 Cable*	295 Cable*	Signal	Description
1	White	Brown	+24V	Power supply
2	Brown	White	Trigger	Trigger input
3	Green	Blue	GND	Ground
4	Yellow	Black	OUT5	Switching output 5
5	Gray	Gray	OUT3	Switching output 3
6	Pink	Pink	OUT4	Switching output 4
7	Blue	Violet	OUT2/IN2	Switching input or output 2
8	Red	Orange	OUT1/IN1	Switching input or output 1



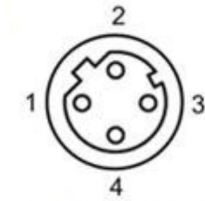
M12 5-Pin Male Connector (02Uxxx)	
1	+24 VDC
2	Trigger input+
3	0 V-
4	Switching output 1 (configurable) IO-Link
5	Switching output 2 (configurable) Trigger output with external illumination



Notes:

* AutomationDirect sells M12 8-pole cables with two different color patterns (7000-170x1-292xxxx and 7000-170x1-295xxxx).

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data -
4	RxD-, receive data -

Accessories

02D and 02U Accessories Selection Guide			
Part Number	Price	Description	Drawing
E21302	\$105.00	Protective lens cover for 02xxx products	PDF
E2D500	\$41.50	Right-angle bracket for 12mm rod	PDF



E2D500



E21302



E21112

316L Stainless Steel Rod Selection Guide				
Part Number	Price	Diameter (mm [in])	Length (mm [in])	Drawing
E21112	\$18.00	12 [0.5]	200 [7.9]	PDF
E21113	\$20.50	12 [0.5]	300 [11.8]	PDF

ifm efector Machine Mount 3D Vision Sensor

**O3D302**

The ifm efector 3D Smart Sensor utilizes the revolutionary PMD Time of Flight Imager to quickly and accurately measure the distance of 23,232 points within the field of view. The imager measures the distance between the sensor and the nearest surface point by point using the time-of-flight principle. The sensor illuminates the scene with an internal infrared light source and calculates the distance by means of the light reflected from the surface.

Features

- Color and lighting independent
- Digital switching between 32 recipes
- Three configurable outputs
- Onboard logic engine
- IP65

Applications

- Volume determination for storage and conveyor technology
- Non-contact dimensioning of rectangular objects such as cardboard packages or parcels
- Measurement of height, width and length to calculate strap length and volume
- Detection of size, orientation and positioning of the objects for automated storage space planning
- Robot navigation

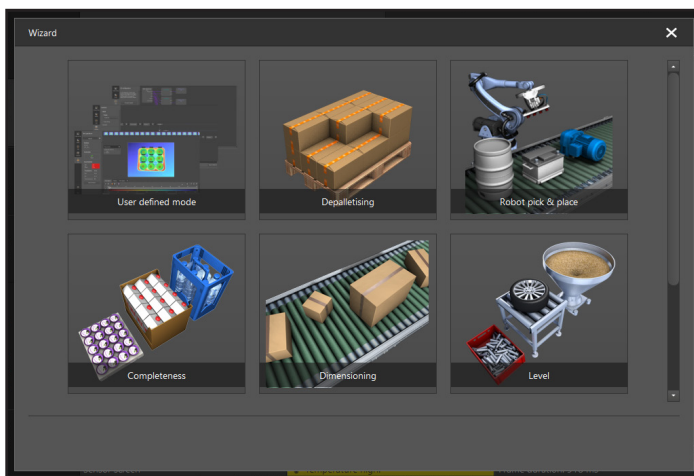
ifm efector Machine Mount 3D Vision Sensor Selection Guide

Part Number	Price	Scanner Capability	Lens Type	Light Emission	Port Protocols	Lens Material	Dimensional Drawing
<u>O3D302</u>	\$1,520.00	3D – Time of Flight	Standard	Infrared	TCP/IP and EtherNet/IP	Gorilla glass	<u>PDF</u>
<u>O3D304</u>	\$1,520.00		Wide angle	Infrared			<u>PDF</u>

Note: For continuous use, a heat sink ([E3D302](#)) is strongly recommended.

Full-Featured Vision Assistant Configuration

The free ifm Vision Assistant configuration software contains several tools to make integration more seamless. The software also comes with several wizards including Robot Pick and Place, Completeness, Dimensioning, and Level.



Screenshot of ifm's Vision Assistant Software. The software contains several wizards to assist in quick integration of the 3D sensor.

Please note that there is a wizard called "Depalletising." However, due to the large number of factors which may impact the implementation of this wizard, at this time AutomationDirect does not support this application.

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Machine Mount 3D Vision Sensor



ifm efector Machine Mount 3D Vision Sensor Technical Specifications				
Electrical Data				
Operating Voltage		(V)	20.4 to 28.8 VDC, to EN 61131-2	
Current Consumption		(mA)	<2400 peak current pulsed, typ. mean value 420; max mean value 1600	
Power consumption		(W)	10 (typical value)	
Inputs				
Trigger			External: 24V PNP/NPN (IEC 61131-2 Type 3) TCP/IP EtherNet/IP Continuous	
Outputs				
Maximum Current Load Per Output		(mA)	100	
Output			Digital outputs: 3 (configurable), 24V PNP/NPN (IEC 61131-2) Analog output: 1 output (configurable as current or voltage output)	
Current Output		(mA)	4–20	
Max Load		(Ω)	500	
Min Load		(Ω)	230	
Voltage Output		(V)	0–10	
Min Load		(Ω)	10,000	
Detection Range				
Operating Distance		(mm [in])	300–8000 [11.81–314.96], with reflectivity of 18% and object size of 200mm x 200mm [7.87in x 7.87in]	
Max Measuring Range			Typically up to 5000mm, but depending on setting and reflectivity can be up to 30m	
Resolution		(pixels)	176 x 132	
Angle of Aperture		(°)	O3D302: 60 x 45 nominal value without lens distortion correction O3D304 70 x 51, nominal value without lens distortion correction	
Interfaces				
Parameter Setting Interface			Ethernet TCP/IP: 10Base-T / 100Base-TX	
Process Interface			Ethernet TCP/IP: EtherNet/IP	
IP Address			192.168.0.69	
Subnet Mask			255.255.255.000	
Gateway IP Address			192.168.0.201	
Environment				
Ambient Temperature			-10 to +50 °C [+14 to +122 °F]	
Storage Temperature			-40 to +85 °C [-40 to +185 °F]	
IP Rating			IP65	
Other Technical Data				
Integrated Lighting			Infrared LED (850nm), invisible radiation of light-emitting diodes	
Other Data				
Field of View Size With Lens Distortion Correction	For Standard Lens (Q3D302)		For Wide-Angle Lens (Q3D304)	
	Measuring Range/ Distance (m [ft])	Length x Width (m [ft])	Measuring Range/ Distance (m [ft])	Length x Width (m [ft])
	0.50 [1.64]	0.37 x 0.50 [1.21 x 1.64]	0.50 [1.64]	0.40 x 0.55 [1.31 x 1.80]
	1.00 [3.28]	0.75 x 1.00 [2.46 x 3.28]	1.00 [3.28]	0.80 x 1.10 [2.62 x 3.61]
	2.00 [6.56]	1.50 x 2.00 [4.92 x 6.56]	2.00 [6.56]	1.60 x 2.20 [5.25 x 7.22]
	3.00 [9.84]	2.25 x 3.00 [7.38 x 9.84]	3.00 [9.84]	2.40 x 3.30 [7.87 x 10.83]
	4.00 [13.12]	3.00 x 4.00 [9.84 x 13.12]	4.00 [13.12]	3.20 x 4.40 [10.50 x 14.44]
	5.00 [16.40]	3.75 x 5.00 [12.30 x 16.40]	5.00 [16.40]	4.00 x 5.00 [13.12 x 16.40]
Mechanical Data				
Weight		(g [lb])	803 [1.77]	
Material			Housing: Diecast aluminum; Front lens: Gorilla Glass; Function display: PA (polyamide)	

For application specific accuracy information, please refer to the datasheet

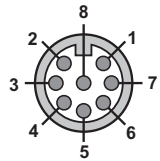
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Machine Mount 3D Vision Sensor



Electrical Connections – Supply

Connection Colors

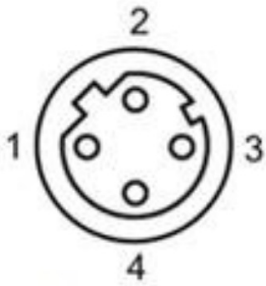
Pin View from Switch
M12 Male

M12 8-Pin Male Connector				
Pin	292 Cable*	295 Cable*	Signal	Description
1	White	Brown	+24 V	Power supply
2	Brown	White	Trigger	Trigger input
3	Green	Blue	GND	Ground
4	Yellow	Black	OUT	Switching Output 1 (digital or analog)
5	Gray	Gray	OUT3	Switching Output 3 Ready
6	Pink	Pink	OUT2	Switching Output 2 (digital)
7	Blue	Violet	IN1	Switching Input 1
8	Red	Orange	IN2	Switching Input 2

Notes:

* AutomationDirect sells M12 8-pole cables with two different color patterns (7000-170x1-292xxx and 7000-170x1-295xxx).

Electrical Connections – Ethernet



M12 4-Pin Male (D-coded Ethernet)	
1	TxD+, transmit data +
2	RxD+, receive data +
3	TxD-, transmit data -
4	RxD-, receive data -

Accessories

O3D Accessories Selection Guide			
Part Number	Price	Description	Drawing
E3D302	\$104.00	Heat sink	PDF
E3D301	\$73.00	Right-angle bracket for 14mm rod	PDF

**E3D302****E3D301****E21228**

316L Stainless Steel Rod Selection Guide				
Part Number	Price	Diameter (mm [in])	Length (mm [in])	Drawing
E21228	\$26.50	14 [0.6]	200 [7.9]	PDF
E21229	\$27.50	14 [0.6]	300 [11.8]	PDF
E21232	\$30.50	14 [0.6]	400 [15.7]	PDF