

Vision sensors



- Robust design and compact metal housings provide long life and reliability in industrial environments
- CMOS image sensor and Digital Signal Processor with no moving parts provide high performance and durability
- Easy-to-use Setup Wizard guides you step-by-step for simple installation
- Flexible connections with Ethernet interface
- Self-contained unit (internal lighting)

### The inspection sensor for error-proofing applications

efector dualis provides reliable performance in production control. Fast processes or moving objects can be detected and precisely evaluated with the sensor's fast image capture and evaluation.

The sensor is an ideal solution for inspection and error-proofing applications such as right part / wrong part, correct orientation, missing component and object character verification.

#### Additional application examples



correct orientation

Feeding technology

Feeder bowls are commonly used to constantly supply an assembly line with small parts. These parts, however, must be in the proper orientation to allow correct assembly.

efector dualis can identify incorrect orientation of parts in a feeder bowl before they are applied.

## Object character verification —



Even the smallest error, such as a missing date on a milk bottle, can cause large problems in a production line. The efector dualis is ideal for object character verification in a moving production line.

In this example, efector dualis detects a series of preset characters that indicate expiration date. In the following picture, efector dualis detects the missing characters and sends an alarm.

### **Built-in intelligence**

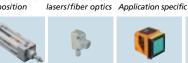


Independent evaluation: efector dualis includes an image sensor, evaluation electronics and lighting integrated in one robust, industrial compatible housing.









Photoelectrics/

72 - 111



Distance /



118 - 119











22 - 55



56 - 61

Capacitive



Cylinder / valve







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Dimensions	Output	Lighting	Max. Field of View Size	Detection Rate	Max. Motion Speed	Operating Voltage	Supply Current	Part No.	List Price (1-pc.)
80 x 42 x 59	PNP	infrared 850 nm	400 x 300 mm	20 Hz	1 m/s	24 VDC ± 10 %	< 300 mA	O2D224	\$978.00
80 x 42 x 53.5	PNP	infrar <mark>ed 8</mark> 50 nm	640 x 4 <mark>80 mm</mark>	20 Hz	1 m/s	24 VDC ± 10 %	< 300 mA	O2D220	\$978.00
80 x 42 x 53.5	PNP	infrared <mark>850</mark> nm	1320 x 945 mm	20 Hz	1 m/s	24 VDC ± 10 %	< 300 mA	O2D222	\$978.00
80 x 42 x 59	NPN	infrared 850 nm	400 x 300 mm	<b>S</b> 20Hz 🦴	1 m/s	24 VDC ± 10 %	< 300 mA	O2D225	\$978.00
80 x 42 x 53.5	NPN	infrared 850 nm	640 x 480 mm	20 Hz	1 m/s	24 VDC ± 10 %	< 300 mA	O2D227	\$978.00
80 x 42 x 53.5	NPN	infrared 850 nm	1320 x 945 mm	20 Hz	1 m/s	24 VDC ± 10 %	< 300 mA	O2D229	\$978.00

#### Cordsets **Accessories**

Туре	Description	Part No.	List Price (1-pc.)
-16	Mounting Set, 100 mm rod	U60042	\$45.00
	Mounting Set, 100 mm rod with rail mount cube	U60043	\$51.00
	Protective plastic cover	E21166	\$102.00
	Plastic lens for diffusing light	E21165	\$119.00
	Protective glass cover	E21168	\$102.00
	Ethernet cable, 2 m, M12 D-coded / RJ45, cross-link	E11898	\$45.00
W 65	Ethernet cable, 5 m, M12 D-coded / RJ45, cross-link	E18422	\$54.00
	Ethernet cable, 10 m, M12 D-coded / RJ45, cross-link	E18423	\$69.00

**List Price** Part Description Type (1-pc.) No. M12 Micro DC (8-pin) 2 m, PUR E11950 \$29.00 \$36.00 M12 Micro DC (8-pin) 5 m, PUR E11807 M12 Micro DC (8-pin) 10 m, PUR \$66.00 E11311 M12 Micro DC (8-pin) 2 m, PUR E11231 \$29.00 M12 Micro DC (8-pin) 5 m, PUR E11232 \$36.00 \$65.00 M12 Micro DC (8-pin) 10 m, PUR E11806



#### **Technical Specs**

Maximum load current: Supply current: Detection rate: Maximum motion speed:

Lighting:

Operating voltage: Operating temperature: Protection rating:

Material:

Trigger mode: Parameter setting / process interface:

100 mA (per switching output)

< 300 mÅ 20 Hz 1 m/s

infrared 850 nm 24 VDC  $\pm$  10 %

14...140 °F (-10...60 °C)

IP67

Housing: die-cast zinc Front pane: glass

LED window: polycarbonate

External 24 V, PNP, NPN, continuous, TCP/IP

Ethernet 10 Base-T, Ethernet TCP, Ethernet IP



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Pressure



Flow











Safety

















Level



Temperature



AS-i







Diagnostic





264 - 277

144 - 155

156 - 175

192 - 207

208 - 225

226 - 239

240 - 251







- Ideal for inspection and error-proofing applications with irregularly shaped objects
- Reliable inspection testing throughout the production process
- CMOS image element and powerful digital signal processor
- Robust housing for use in industrial environments
- Easy application Setup Wizard offers step-by-step instruction with advanced functionality

### efector dualis Pixel Counter



ifm's O2V Series efector dualis Pixel Counter sensor solves a variety of inspection and error-proofing applications throughout the manufacturing process. The compact CMOS vision sensor provides reliable performance in production control. The Pixel Counter analyzes the area of an object by counting the pixels and can identify objects that vary in shape, size or shade

The O2V Series Pixel Counter includes an image sensor, evaluation electronics and integrated lighting in a die-cast metal housing that withstands harsh industrial

environments. Objects are reliably detected and precisely evaluated with the sensor's fast image capture and powerful algorithms. The sensor's pushbutton setup and 4-digit numeric display indicates the sensor's output.

An on-board lighting element illuminates the object and provides the correct amount of image brightness at various ranges. An easily accessible focus tool quickly defines images. The sensor features an easy-to-follow Setup Wizard that guides the user for quick setup and supports Allen-Bradley's Ethernet IP and standard Ethernet TCP products.

#### Additional application examples



Black seat frame



Silver seat frame

The goal is to separate a black seat frame from a silver seat frame. A standard contrast sensor would solve this application, but typically lacks the sensing range required to detect the seat frame.

The Pixel Counter can be used for simple contrast applications when extra distance is needed and can easily detect the silver seat frame in this application.



Correct molding

A piece of metal is inserted in a rubber mold, and it is imperative that the area is covered smoothly. In this case, while in the molding process, an inconsistent shape formed around the insert.

The molding process can leave an inconsistent shape around the insert. The Pixel Counter inspects for a low level of bright pixels, detecting an incorrect molding.

www.sazehqosta Incorrect molding











Distance /

Ultrasonic





















118 - 119





Company

O-Link

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72 - 111



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Type	Maximum Field of View Size [mm]	Type of Light LED	Detection Rat [Hz]	e Motion Speed (M <mark>aximu</mark> m) [m/s]	Process Interface	Transistor Outputs (up to 5)	Part No.	List Price (1-pc.)
3-pin · M12	connector							
	400 x 300	White	20	1	Ethernet TCP / Ethernet IP	PNP	O2V104	\$978.00
	400 x 300	White	20	<u></u>	Ethernet TCP / Ethernet IP	NPN	O2V105	\$978.00
	400 x 300	Infrared	20	ارُ 10 كىي	Ethernet TCP / Ethernet IP	PNP	O2V124	\$978.00
400	400 x 300	Infrared	20	1	Ethernet TCP / Ethernet IP	NPN	O2V125	\$978.00
	640 x 480	White	20	1	Ethernet TCP / Ethernet IP	PNP	O2V100	\$978.00
198	640 x 480	White	20	<b>⇔</b>	Ethernet TCP / Ethernet IP	NPN	O2V101	\$978.00
	640 x 480	Infrared	20		Ethernet TCP / Ethernet IP	PNP	O2V120	\$978.00
	640 x 480	Infrared	20	1	Ethernet TCP / Ethernet IP	NPN	O2V121	\$978.00
	1320 x 945	White	20	1	Ethernet TCP / Ethernet IP	PNP	O2V102	\$978.00
	1320 x 945	White	20	1	Ethernet TCP / Ethernet IP	NPN	O2V103	\$978.00
	1320 x 945	Infrared	20		Ethernet TCP / Ethernet IP	PNP	O2V122	\$978.00
	1320 x 945	Infrared	20		Ethernet TCP / Ethernet IP	NPN	O2V123	\$978.00

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Туре	Description	Part No.	List Price (1-pc.)
-15	Mounting Set, 100 mm rod	U60042	\$45.00
	Mounting Set, 100 mm rod with rail mount cube	U60043	\$51.00
	Protective plastic cover	E21166	\$102.00
	Plastic lens for diffusing light	E21165	\$119.00
	Protective glass cover	E21168	\$102.00
	Ethernet cable, 2 m, M12 D-coded / RJ45, cross-link	E11898	\$45.00
39 65	Ethernet cable, 5 m, M12 D-coded / RJ45, cross-link	E18422	\$54.00
	Ethernet cable, 10 m, M12 D-coded / RI45, cross-link	E18423	\$69.00

#### Cordsets

Туре	Description	Part No.	List Price (1-pc.)
	M12 Micro DC (8-pin) 2 m, PUR	E11950	\$29.00
	M12 Micro DC (8-pin) 5 m, PUR	E11807	\$36.00
	M12 Micro DC (8-pin) 10 m, PUR	E11311	\$66.00
	M12 Micro DC (8-pin) 2 m, PUR	E11231	\$29.00
	M12 Micro DC (8-pin) 5 m, PUR	E11232	\$36.00
	M12 Micro DC (8-pin) 10 m, PUR	E11806	\$65.00

#### **Technical Specs**

Maximum load current? Supply current: Detection rate: Maximum motion speed: Lighting: Operating voltage: Operating temperature:

Protection rating: Material:

100 mA (per switching output) < 300 mÅ

20 Hz 1 m/s infrared 850 nm  $24 \text{ VDC} \pm 10 \%$ 14...140 °F (-10...60 °C) IP67

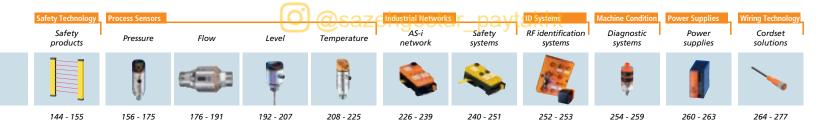
Housing: die-cast zinc Front pane: glass LED window: polycarbonate

External 24 V, PNP, NPN, continuous, TCP/IP

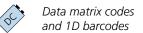
See pages 140 - 141 for illumination.

Trigger mode: Parameter setting / process interface:

Ethernet 10 Base-T, Ethernet TCP, Ethernet IP









- Robust design and compact metal housing provide long life and reliability in industrial environments
- CMOS image sensor and digital signal processor with no moving parts for durability
- Reliably reads dot-peened, laser-etched and printed data matrix codes as well as printed bar codes
- Configurable four-quadrant lighting improves readability, reduces glare and the need for external lighting
- Easy application Setup Wizard guides you step-by-step with advanced functionality for demanding applications

### Reliable identification of data matrix and 1D codes



The ifm Multi-Code Reader is designed to read 2D data matrix codes and 1D bar codes in high speed industrial automation applications.

The versatile Multi-Code Reader can identify, verify and qualify most marking methods including dot-peened, laser-etched and printed data matrix codes as well as printed barcodes.

The Multi-Code Reader features a maximum speed of 7 meters/second. The unit reads three types of 2D codes: ECC200, PDF-417 and QR as well as 26 styles of printed barcodes.

### A better alternative from ifm

Features	ifm
Robust housing	✓
Reads both 2D and 1D codes	✓
CMOS image sensor	✓
Reads all marking methods	✓
Orientation independent	✓
Configurable quadrant lighting	✓
7 meters/second line speed	✓
Easy Setup Wizard	✓
Switching output for I/O	✓
Eth <mark>er</mark> net TCP/IP	✓
Price – 50% lower than current technologies	\$936
=	



readers can only read the 1D code in horizontal or vertical positions.

ifm Solution (1D Barcode)



ifm's camera based Multicode Readers can read 1D barcodes in multiple orientations.











Cylinder / valve





Distance /























Encoders /



Company

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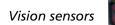
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Dimensions (mm)	Lighting	Max. Field of View Size	Readings	Max. Motion Speed	Process Interface	Operating Voltage	Supply Current	Part No.	List Price (1-pc.)	
CMOS image sensor, black and white, VGA resolution 640 x 480										
80 x 42 x 53.5	Visible red	68 x 48 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I300	\$959.00	
80 x 42 x 53.5	Visible red	132 x 94 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I302	\$959.00	
80 x 42 x 59	Visible red	400 x 300 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I304	\$959.00	
80 x 42 x 53.5	Infrared	68 x 48 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I301	\$959.00	
80 x 42 x 53.5	Infrared	132 x 94 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I303	\$959.00	
80 x 42 x 59	Infrared	400 x 300 mm	20 Hz	7 m/s	Ethernet TCP/IP, EtherNet/IP, RS-23	2 24 VDC ± 10 %	300 mA	O2I305	\$959.00	

#### **Accessories**

#### **Part** List Price Description Type (1-pc.) Mounting Set, 100 mm rod U60042 \$45.00 Mounting Set, 100 mm rod with \$51.00 U60043 rail mount cube Plastic lens for diffusing light E21165 \$119.00 Plastic protective lens for food and \$102.00 E21166 beverage applications \$102.00 E21168 Glass protective lens

See pages 140 - 141 for illumination.

#### Cordsets

Туре	Description	Part No.	List Price (1-pc.)
	M12 Micro DC (8-pin) 2 m, PUR	E11950	\$29.00
	M12 Micro DC (8-pin) 5 m, PUR	E11807	\$36.00
1	M12 Micro DC (8-pin) 10 m, PUR	E11311	\$66.00
/ _	M12 Micro DC (8-pin) 2 m, PUR	E11231	\$29.00
	M12 Micro DC (8-pin) 5 m, PUR	E11232	\$36.00
	M12 Micro DC (8-pin) 10 m, PUR	E11806	\$65.00
	Ethernet cable, 2 m, M12 D-coded / RJ45, cross-link	E11898	\$45.00
39 39	Ethernet cable, 5 m, M12 D-coded / RJ45, cross-link	E18422	\$54.00
5	Ethernet cable, 10 m, M12 D-coded / RJ45, cross-link	E18423	\$69.00



Can't find the right sensor for your application, call 800-441-8246 or visit www.ifm.com/us

#### **Technical Specs**

Maximum load current:

Supply current:

Detection rate:

Maximum motion speed:

Lighting:

Operating voltage: Operating temperature:

Protection rating:

Trigger mode:

Material:

100 mA (per switching output) < 300 mA

≤ 20 Hz

≤ 7 m/s

infrared 850 nm; visible red 625 nm

24 VDC ± 10 %

14...122 °F (-10...50

IP67

Housing: die-cast zinc

Front pane: glass

LED window: polycarbonate

Class 2 laser

External 24 V, PNP, continuous, TCP/IP, Ethernet/IP Parameter setting / process interface: Ethernet 10 Base-T, Ethernet TCP, Ethernet IP





The ifm service center team provides tech support, product quotes, delivery information and order placement.

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Shop for products online Easy ordering via eShop





Pressure



Flow







AS-i



Safety







Power supplies













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226 - 239

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- Uniform and shadow-free illumination of the object
- Permanent or pulsed light operation with optional high intensity light
- White light, red light and infrared versions
- Compact design and robust housing
- Diffuser accessory available for "cloudy day" illumination to balance light source



**NEW!** ifm's vision sensors include an on-board lighting element that illuminates the object and provides the correct amount of image brightness at various ranges.

Some applications, however, may require additional lighting. For example, detecting specific surface characteristics, such as a dot-peened code, scratches or nicks may require high intensity light. In contour sensing, sometimes there is not enough contrast between the object and the background. Additional backlighting may help emphasize the target against the background.

ifm's high-quality LED illumination units provide uniform lighting to solve a large

variety of applications. Models are available with white, red and infrared light in spot light, back light, ring light, bar illumination and dark field illumination units.

An assortment of mounting kits are provided and make installation quick and easy.



#### **Technical Specs**

Light source: LED Operating voltage: 24 V DC Ambient temperature: -10...55 °C Housing material: aluminum Lens material: glass 5...24 V, PNP

Trigger: Protected against yes

reverse polarity: Short-circuit proof:

Mounting: M4 screws Eye safety: IEC 62471

ves

www.sazehgostarsgp

Company









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Cylinder / valve





72 - 111



112 - 117

Distance /



118 - 119

Encoders / Speed monitors



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inspection

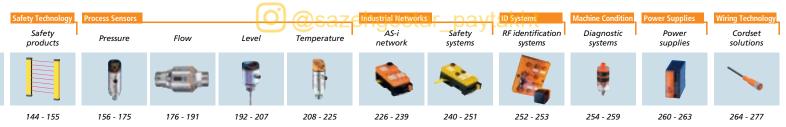
2D/3D

128 - 143





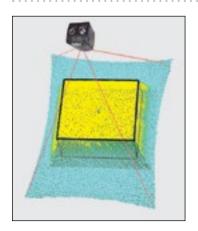
Туре	Dimensions [mm]	Type of Light	Active lighting source size [Ø mm]	Current consumption [mA]	Angle of aperture	Protection	Connector	Part No.	List Price (1-pc.)
Spot light									
	31 x 42 x 54	red		180 / 90*		IP 65	M12	O2D909	\$358.00
Back light									
	33.4 x 66.5 x 9.2	infrared		50 / 25*	مالي	IP 65	0.15 m Pigtail 4-pin M12	2 <b>O2D906</b>	\$348.00
	81 x 103 x 9.8	infrared		200 / 100*	ماوة	IP 65	0.15 m Pigtail 4-pin M1.	2 <b>O2D907</b>	\$385.00
	133 x 156 x 9.8	infrared		450 / 250*	* *	IP 65	0.15 m Pigtail 4-pin M12	2 <b>O2D908</b>	\$426.00
Ring light						7			
	Ø 122 × 20.5	red	Ø 106/Ø <mark>66</mark>	800 / 1300*	60°	IP 65	0.3 m Pigtail 4-pin M12	O2D915	\$779.00
$(\bigcirc)$	Ø 122 × 20.5	infrared	Ø 106 / Ø 66	800 / 1400*	50°	IP 65	0.3 m Pigtail 4-pin M12	O2D917	\$779.00
9	Ø 122 × 20.5	white	Ø 106/Ø 66	800 / 1200*	120°	IP 65	0.3 m Pigtail 4-pin M12	O2D919	\$779.00
Bar illumina	ntion								
	116 x 18 × 13	red	10 x 75	225 / 375*	60°	IP 65	0.3 m Pigtail 4-pin M12	O2D921	\$430.00
	200 x 18 x 13	red	10 x 150	460 / 700*	60°	IP 65	0.3 m Pigtail 4-pin M12	O2D924	\$538.00
	116 x 18 x 13	infrared	10 x 75	185 / 325*	50°	IP 65	0.3 m Pigtail 4-pin M12	O2D922	\$430.00
ų.	200 x 18 x 13	infrared	10 x 150	415 / 640*	50°	IP 65	0.3 m Pigtail 4-pin M12	O2D925	\$538.00
	116 x 18 x 13	white	10 x 75	165 / 275*	120°	IP 65	0.3 m Pigtail 4-pin M12	O2D923	\$430.00
	200 x 18 x 13	white	10 x 150	265 / 475*	•• 120°	IP 65	0.3 m Pigtail 4-pin M12	O2D926	\$538.00
Dark field il	lumination		بالمار	, 0	<u> </u>		<u> </u>		
O	155 x 130 x 9.8	red	Ø 90	400	-	IP 54	0.3 m Pigtail 4-pin M12	O2D920	\$592.00
* current cor	nsumption at high I	ight intensity	ت برق	ملزومار	ننده	مىن ك	فا		
Accessorie	es		<b>O J</b> ·		Cordsets				
Туре	Descrip	tion	Part No. SLis	t Price (1-pc.)	Type (	الکت بکاا	Description	Part No. List Pı	ice (1-pc.)
0	Diffuser for	ring light	E2D202	\$203.00		M12 Mici	o DC (4-pin) 2 m, PUR	EVC001 \$	11.00
					0	AM AM			15.00
0	Mounting kit f	or ring light	E2D201	\$31.00	14.4	M12 Micro	o DC (4-pin) 10 m, PUR	EVC003 \$	19.00
	Mounting k	it for bar	E2D114	\$47.00					11.00
	illuminatio			To bo					15.00
11 (01)	Mounting kit fo	or dark field ation	E2D115.5	\$37.00	ostar	M12 Micro	o DC ( <mark>4-pin</mark> ) 10 m, PUR	EVC006 \$	19.00







- Robust industrial O3D Smart Sensor Application Assistant adds 3rd dimension to machines
- Includes two on-board applications: case completeness and box dimensioning
- Objective lens housing protected behind Corning Gorilla glass defines large field of view
- 4 IR LEDs illuminate large field of view over the 0.3 to 5 meter range protected behind Corning Gorilla glass
- M12 Ethernet connection for parameterization and communication output data via industrial Ethernet networks (TCP/IP & ProfiNet)



**NEW!** Today's manufacturing and logistics environments are becoming more and more automated to meet customer demand. The tools being used, whether it be robots or machines, have to become faster and more flexible to maintain throughput. This requires them to "see" more. 2D is not enough. They must be able to perceive their environment the same as we do... in 3D.

ifm's revolutionary O3D Smart Sensor for industrial automation enables automated machines to perceive their environment in 3D with human-like vision.

#### Innovative pmd imager

ifm's patented pmd time-of-flight imager provides 176 x 132 pixel array to quickly and accurately measure the distance of 23,232 points within its field of view. The

distance to each pixel is calculated by comparing the phase shift of send and returned infrared light. Every measurement is collected simultaneously and made immediately available as a fully calibrated 3D point cloud, which can be sent to a PC or controller via Ethernet.

The technology also features a patented suppression of background illumination technology making it immune to changing lighting conditions in the application environment.

#### **Application Assistant adds third dimension!**

The O3D Smart Sensor - your Application Assistant - adds a third dimension of sight to packaging and material handling machines. The Smart Sensor has four pre-built applications on board: case completeness, box dimensioning, palletizing / de-palletizing and level. The opportunities are endless.

The OJO Smart Sensor

To learn more, visit: www.ifm.com/us/O3DSmartSensor

An outstanding price/performance value, ifm's O3D Sensor can be applied in most areas throughout the plant!







Dimensions	Operating Distance (mm)	Angle of Aperture	Max. Field of View (mm)	Weight (kg)	Part No.	List Price (1-pc.)
	300 10,000	40° x 30°	2,610 x 3,470	0.745	O3D300	\$1,351.00
137 x 75 x 95	300 8,000	60° x 45°	3,750 x 5,000	0.736	O3D302	\$1,351.00
13/	300 8,000	60° x 45°	3,750 x 5,000	1,146	O3D312	\$1,460.00
	300 10,000	40° x 30°	2,610 x 3,470	1.225	O3D310	\$1,460.00

#### Cordsets Accessories **List Price List Price Part Part** Type Description Description Type (1-pc.) (1-pc.) No. No. \$29.00 M12 Micro DC (8-pin) 2 m, PUR E11231 Mounting set for rod mounting E3D301 \$60.00 Ø 14 mm \$36.00 M12 Micro DC (8-pin) 5 m, PUR E11232 \$29.00 M12 Micro DC (8-pin) 2 m, PUR E11950 \$36.00 M12 Micro DC (8-pin) 5 m, PUR E11807 Ethernet cable, 2 m, M12 E11898 \$45.00 D-coded / RJ45, cross-link Ethernet cable, 5 m, M12 E18422 \$54.00 D-coded / RJ45, cross-link Ethernet cable, 10 m, M12 E18423 \$69.00 D-coded / RJ45, cross-link

#### **Technical Specs**

Maximum load current:

< 2400 peak current pulsed; typ. mean value 420; max. Current consumption:

mean value 1600 mA

Image repetition rate: ≤ 25 Hz

Lighting:

infrared LED 850 nm; invisible radiation of light-emitting diodes

Operating voltage: 20.4... 28.8 DC; to EN 61131-2 Operating temperature: 14...122 °F (-10...50 °C)

O3D300 and O3D302 IP65, IP67, Protection rating:

O3D310 and O3D312 IP65, IP67 and IP69K

Lens window: corning gorilla glass Material:

Housing: O3D300 and O3D302 diecast aluminum

O3D310 and O3D312 stainless steel

Ethernet TCP, Ethernet IP: 10BaseT / 100Base-TX Parameter setting / process interface:



