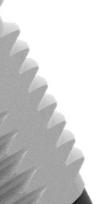
SENSORS



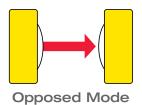
PHOTOELECTRIC page 30

MEASUREMENT page 201

SPECIAL PURPOSE page 268



SENSOR SELECTION GUIDE



The sensor's emitter and receiver are housed in two separate units. The emitter is placed opposite the receiver. An object is detected when it breaks the effective beam.

Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	QS18	20 m	35 x 15 mm (D varies by model)	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	DC: PNP or NPN P-MOSFET N-MOSFET	40
	QS30	60 m	44 x 22 mm (D varies by model)	IP67; NEMA 6	10-30 V dc 12-250 V ac/dc 24-250 V ac/dc	DC: Bipolar NPN/PNP AC/DC: SPDT e/m relay	56
p	Q12	2 m	23 x 8 x 12 mm	IP67	10-30 V dc	Bipolar NPN/PNP, PNP or NPN	66
	Q20	20 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	70
	Q45	60 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 12-250 V ac/dc 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST * AC/DC: SPDT Relay NAMUR: Constant current	84
	MINI-BEAM®	30 m	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST NAMUR: Constant current	76
•	Q25	20 m	50 x 25 x 30 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	78
	Q40	60 m	70 x 40 x 46 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	80
	QM42	10 m	42 x 13 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	94
	QMT42	10 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	95
	Т8	2 m	19 x 19 x 16 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	100
	T18	20 m	DC: 42 x 30 x 30 mm AC: 52 x 30 x 30 mm	IP67; NEMA 6P, IP69K	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	102
	TM18	20 m	41 x 30 x 30 mm	IP67 or IP69K	10-30 V dc	PNP or NPN	106
	T30	60 m	52 x 40 x 45 mm	IP67; NEMA 6P, IP69K	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST* * AC models are solid-state	110

^{*} AC models are solid-state

Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
W. Company	M12	5 m	12 x 67.5 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	116
	S12-2	20 m	ø 12 x 34 mm	IP67	10-30 V dc	PNP or NPN	122
	S12	15 m	16 x 31 mm	IP65	10-30 V dc	PNP or NPN	118
A CONTRACTOR OF THE PARTY OF TH	SB12/SB12T	1.5 m	15.8 x 31 mm	IP65	10-30 V dc	PNP or NPN	120
	S18	20 m	DC: Ø 18 x 59 mm AC: Ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	124
	M18 M18-3 M18-4	20 m 25 m 25 m	ø 18 x 59 mm ø 18 x 88 mm ø 18 x 88 mm	IP67; NEMA 6P, IP69K	10-30 V dc	PNP or NPN	126
	S30	60 m	DC: Ø 30 x 69 mm AC: Ø 30 x 81 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	140
*	SM30	150 m	ø 30 x 99 mm	IP67; NEMA 6P	10-30 V dc 24-240 V ac	Bi-Modal PNP/NPN AC: SPST*	140
	SLM	220 mm	Max size: 12 x 252 x 140 mm	IP67	10-30 V dc	Bipolar NPN/PNP	144
	SL10	10 mm	72 x 52 x 19 mm	IP67	10-30 V dc	Bipolar NPN/PNP	147
1	SL30	30 mm	72 x 52 x 19 mm	IP67	10-30 V dc	Bipolar NPN/PNP	146
Ď	VSM	250 mm	4 x 36.8 mm	IP67	10-30 V dc	PNP or NPN	154
	VS2	3 m	25 x 12 x 4 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	158
	QM26	8.5 m	45 x 14 x 25 mm	IP67, IP69K	10-30 V dc	PNP or NPN	298

^{*} AC models are solid-state

SENSOR SELECTION GUIDE



Retroreflective

Mode



Polarized Retroreflective Mode

The sensor contains both the emitter and receiver elements. The effective beam is established by the size of the retroreflector. As with an opposed-mode sensor, an object is sensed when it interrupts or breaks the effective beam.

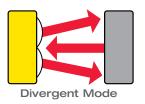
Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	QS18	Retro: 6.5 m Polar Retro: 3.5 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	DC: PNP or NPN P-MOSFET N-MOSFET	40
	QS30	Retro: 12 m Polar Retro: 8 m	44 x 22 x 35 mm	IP67; NEMA 6	10-30 V dc 12-250 V ac/dc 24-250 V ac/dc	DC: Bipolar NPN/PNP AC/DC: SPDT e/m relay	56
p	Q12	Retro: 1.5 m Polar Retro: 1 m	23 x 8 x 12 mm	IP67	10-30 V dc	Bipolar NPN/PNP, PNP or NPN	66
	Q20	Retro: 6 m Polar Retro: 4 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	70
	MINI-BEAM	Retro: 5 m Polar Retro: 3 m	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST* or SPDT Relay NAMUR: Constant current	76
	Q25	Polar Retro: 2 m	50 x 25 x 30 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	78
	Q40	Polar Retro: 6 m	70 x 40 x 46 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	80
	Q45	Retro: 9 m Polar Retro: 6 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac/dc 12-250 V ac/dc 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST or SPDT Relay AC/DC: SPST or SPDT Relay NAMUR: Constant current	84
	QMT42	Polar Retro: 3 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	95
	T18	Retro: 2 m Polar Retro: 2 m	DC: 42 x 30 x 30 mm AC: 52 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	102
	TM18	Polar Retro: 5.5 m	41 x 30 x 30 mm	IP67 or IP69K	10-30 V dc	PNP or NPN	106

^{*} AC models are solid-state

Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	T30	Polar Retro: 6 m	52 x 40 x 45 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	110
W. Common of the	M12	Retro: 2.5 m Polar Retro: 1.5 m	12 x 67.5 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	116
	S18	Retro: 2 m Polar Retro: 2 m	DC : Ø 18 x 59 mm AC : Ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	124
1	M18	Retro: 2 m Polar Retro: 2 m	ø 18 x 59 mm	IP67; NEMA 6P	10-30 V dc or	PNP or NPN	126
	S30	Polar Retro: 6 m	DC : Ø 30 x 69 mm AC : Ø 30 x 81 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	140
	VS3	Polar Retro: 250 mm	26 x 9 x 16 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	160
	QM26	Polar Retro: 3 m	45 x 14 x 25 mm	IP67, IP69K	10-30 V dc	PNP or NPN	298
	Q26	Polar Retro: 800 mm	52 x 14 x 25 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	318

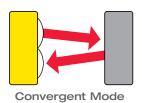
^{*} AC models are solid-state

SENSOR SELECTION GUIDE



Light from the emitter strikes a surface of an object at some arbitrary angle and is diffused from the surface at all angles. The emitted beam and receiver's field-of-view are very wide.

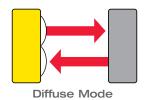
Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	QS18	300 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	45
	MINI-BEAM	130 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc, 24-240 V ac, 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST* or SPDT Relay NAMUR: Constant Current	76



Uses additional optics to create a small, intense and well-defined spot at a fixed distance from the front of the sensor lens.

Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	QS18	43 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	40
	Q45	100 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac/dc 12-250 V ac/dc 5-15 V dc (NAMUR)	Bipolar NPN/PNP AC: SPST* or SPDT Relay AC/DC: SPST* or SPDT Relay NAMUR: Constant current	84
	MINI-BEAM	49 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST* or SPDT Relay NAMUR: Constant Current	76
	PICO-DOT®	305 mm	40.6 x 12.7 x 45.6 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	92
	VS1	15 mm	26 x 8 x 12 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	156
	VS2	30 mm	25 x 12 x 4 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	158

^{*} AC models are solid-state



Light from the emitter strikes a surface of an object at some arbitrary angle and is diffused from the surface at all angles.

Model		Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
	Q4X	600 mm	Q4XT 57.4 x 18 x 43.6 mm Q4XF 57.4 x 18 x 32.5 mm	IP67, IP68, IP69K	10-30 V dc	NPN or PNP Dual Discrete with IO-Link 4-20 mA or 0-10 V	34
	QS18	800 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	DC: PNP or NPN AC/DC: P-MOSFET or N-MOSFET	40
	QS30	1.4 m	44 x 22 x varies	IP67; NEMA 6	10-30 V dc	Bipolar NPN/PNP	56
	Q20	1.5 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	70
	Q45	3 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac 12-250 V dc or 5-15 V dc (NAMUR)	Bipolar NPN/PNP DC: SPST* or SPDT Relay AC: SPST* or SPDT Relay SPST or SPDT Relay NAMUR: Constant current	84
	MINI-BEAM	380 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc, 24-240 V ac, 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST NAMUR: Constant current	76
	QM42	400 mm	42 x 12.7 x 42 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	94
	QMT42	6 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	95
•	T18 DC	500 mm	42 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	102
	T18 AC	300 mm	52 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc	AC: SPST*	103
	TM18	500 mm	41 x 30 x 30 mm	IP67; NEMA 6P or IP69K (when QD PVC jacket is protected)	10-30 V dc	NPN or PNP	106
	S18	300 mm	DC: Ø 18 x 59 mm AC: Ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	NPN or PNP AC: SPST*	124
	M18	300 mm	ø 18 x 59 mm	IP67; NEMA 6P	10-30 V dc	DC: PNP or NPN	126
	VSM	90 mm	4 x 36.8 mm	IP67	10-30 V dc	DC: PNP or NPN	154

PHOTOELECTRIC FEATURED RECTANGLE RIGHT ANGLE BARREL



Photoelectric

A photoelectric sensor is an optical control used in a variety of automated processes. It works by detecting a visible or invisible beam of light, and responding to a change in the received light intensity. Banner supplies sensors to virtually all the manufacturing companies in the Fortune 500. Banner offers the world's most complete line of photoelectric sensors – over 12,000.

PHOTOELECTRIC

FEATURED page 34

RECTANGLE page 74

RIGHT ANGLE page 105

BARREL page 130

SLOT & AREA page 142

MINIATURE page 152

FIBER OPTICS page 162



Featured

The featured sensors are the most versatile sensors available in the photoelectric line. Featured sensors have a variety of mounting styles and options, housing options, configuration modes, ranges, response speeds and many more. Start here to find solutions that meet your sensing needs.

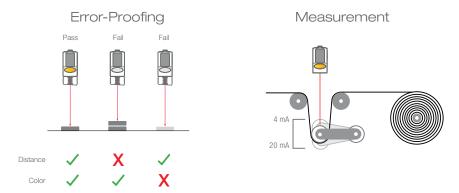
Series	Description	Max Sensing R	ange	Dimensions (H x W x D)	Protection Rating	Housing Material	Power Supply
See Con-	Q4X The Q4X is a versatile, rugged, laser distance sensor that solves the most challenging applications. page 34	Laser Adjustable-Field:	25-610 mm	Q4XT 57.4 x 18 x 43.6 mm Q4XF 57.4 x 18 x 32.5 mm	IP67 IP68 IP69K	Stainless Steel	10 to 30 V dc
ASSE TRANS	Q3X The Q3X is a versatile, rugged, laser contrast sensor that solves challenging applications. page 38	Laser Diffuse: Fixed-Field:	300 mm 200 mm	48.6 x 18 x 24.3 mm	IP67 IP68 IP69K	Nickel-plated Zinc	10 to 30 V dc
The state of the s	QS18 General purpose sensor to solve most applications page 40	Retro: Polarized Retro: Laser Retro Polarized: Convergent:	15 m 6.5 m 3.5 m 10 m 43 mm 1 m 300 mm 100 mm 300 mm	Varies by model	IP67 NEMA 6	ABS	10 to 30 V dc 20 to 140 V ac/dc 20 to 270 V ac/dc
	QS30 Performance sensor page 56	Opposed: Opposed Water Dect: Retro: Retro Clear Object: Polarized Retro: Laser Polarized Retro: Diffuse: Laser Diffuse: Fixed-Field: Adjustable-Field:	213 m 8 m 12 m 2 m 8 m 18 m 1.4 m 800 mm 600 mm	Varies by model	IP67 NEMA 6P	ABS	10 to 30 V dc 24 to 250 V ac 12 to 250 V dc
- COLUMN TO A STATE OF THE PARTY OF THE PART	Q12 Self-contained miniature sensor page 66	Opposed: Retro: Polarized Retro: Fixed-Field:	1.5 m 1 m	22 x 8 x 12.4 mm	IP67	Thermoplastic Elastomer	10 to 30 V dc
(8)	Q20 Universal housing page 70	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	6 m 4 m 1.5 m	32 x 12 x 29 mm	IP67 NEMA 6	ABS	10 to 30 V dc

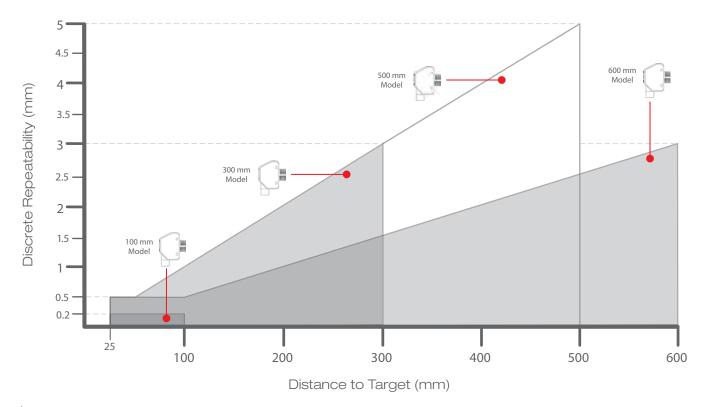
Q4X Series

Versatile, Rugged, Laser Measurement Sensor



- Save time and money with the Q4X which is ready to measure right out of the box
- A simple user experience from installation to setup
 - Bright spot alignment
 - Three push buttons simplify setup
 - Intuitive menus
- Four-digit display shows distance to target in mm
- FDA-grade stainless steel is suitable for IP69K washdown environments





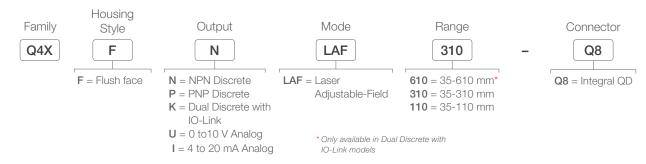
Threaded Q4XT

Example Model Number: Q4XTBLAF300-Q8



Flush Q4XF

Example Model Number: Q4XFNLAF310-Q8



Connection Option: A model with a QD requires a mating cordset. See page 36.

OTHER AVAILABLE MODELS



Clear object ONLY models

314

Cordsets for Analog Models 0 to 10 V, 4 to 20 mA

M12/Euro-Style with Shield Straight connector models listed; for right-angle, add RA to the end of the model number

(example, MQDEC2-506RA)

5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

M12/Euro-Style Washdown (IP68) with Shield Straight connector models only

5-Pin MQDCWD-506 MQDCWD-530 9 m (30')

Additional cordset information is available See page 758

Cordsets for Other Models

Dual Discrete (4-pin) and Bipolar NPN & PNP (5-pin)

M12/Euro-Style Straight connector models listed; for right-angle, add ${\bf RA}$

to the end of the model number (example, MQDC1-506RA)

5-Pin 4-Pin MQDC-406 MQDC1-506 2 m (6.51 2 m (6.5 MQDC-415 MQDC1-515 5 m (151) MQDC-430 MQDC1-530 9 m (30') 9 m (30')

M12/Euro-Style Washdown (IP69K) Straight connector models only

4-Pin MQDC-WDSS-0406 2 m (6.5') MQDC-WDSS-0415 5 m (15' MQDC-WDSS-0430 9 m (30')

5-Pin MQDC-WDSS-0506 2 m (6.51) MQDC-WDSS-0515 5 m (15") MQDC-WDSS-0530 9 m (30')







SMBAMS18P



SMBAMS18RA



SMB46L2



SMBQ4XFA includes 3/8" bolt for mounting

SMBQ4XFAM10 includes 10 mm bolt for mounting

SMBQ4XFAM12

clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

Additional bracket information is available See page 722







Q4XF.. models

Q4X Specifications	Q4X	Spec	cificat	ions
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Q4X Specifications								
Supply Voltage and Current	10 to 30 V d 12 to 30 V d							
Laser Characteristics	Wavelength	: Class 1 La	aser: 655 nm visible red					
Beam Spot Size	Short Range Models			Long Range Models				
	Distance Threaded		ize (Horizontal x Vertical)	Distance Threaded	(mm) Flush	Size (Horizontal x Vertica	al)	
	25	35	2.4 mm x 1.0 mm	25	35	2.6 mm x 1.0 mm		
	50	60	2.3 mm x 0.9 mm	150	160	2.3 mm x 0.9 mm		
	100	110	1.8 mm x 0.7 mm	300	310	2.0 mm x 0.8 mm		
				600	610	1.9 mm × 1.0 mm		
Output Response Time	User select	User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 ms						
Excess Gain	HIGH Exces	HIGH Excess Gain (STANDARD Excess Gain*)						
				cess Gain (90				
	Response	Speed (ms)	Threaded at 25 mm Flush at 35 mm	Threaded at Flush at 110		Threaded at 300 mm Flush at 310 mm		
		1.5	200	100	7 111111	20		
		3	200	100		20		
		10	1000 (500*)	500 (2	50*)	100 (50*)		
		25	2500 (1000*)	1250 (,	250 (100*)		
		50	5000 (2500*)	2500 (1250 *)	500 (250*)		
	* Std excess	gain provid	des increased noise immun	ity (only availa	ıble in 50 ı	ms, 25 ms, 10 ms)		
	Excess Gain (90% white card)							
	Response	Speed (ms)	Threaded at 25 mm Flush at 35 mm	Threaded a		Threaded at 300 mm Flush at 310 mm	Threaded at 600 mm Flush at 610 mm	
		2	280	110		25	6	
		5	280	110		25	6	
		15	1000 (360)	400 (1	50)	80 (30)	20 (7)	
		25	2000 (1000)	800 (4	,	160 (80)	40 (20)	
		50	4000 (2000)	1600 (800)	320 (160)	80 (40)	
Resolution & Linearity	See datashe	et for more	information on analog mod	dels				
Construction	Housing 316	L stainless	steel; PMMA acrylic lens co	over, Polysulfo	ne lightpip	e and display window		
Ambient Light Immunity	Greater than	5,000 lux a	at 300 mm > 2,000 lux at 5	00 mm				
Environmental Rating	IP67 per IEC	60529; IP6	8 per IEC60529; IP69K pe	r DIN40050-9				
Operating Conditions	Temperatur	e: -10 °C to	o +50 °C Humidity: 359	% to 95% rela	tive humic	lity		



Certifications





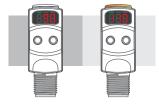
C C ULUS ECOLAB chemical compatibility on some models; contact Banner Engineering for details

Q3X Series

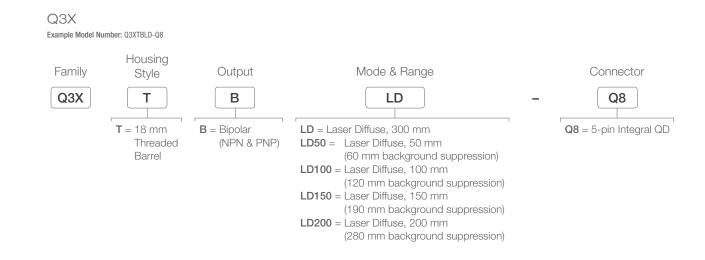
Versatile, Rugged, Laser Contrast Sensors



- Solves contrast applications capturing up to 2,000 events a second
- Rugged metal, laser-marked housing for use in environments with chemical and oil exposure
- Three-digit display offers immediate feedback for easy setup and troubleshooting
- Bright output indicator provides high visibility of sensor operation
- Superior resistance to ambient light interference



Can detect small changes in contrast up to 300 mm



Connection Option: A model with a QD requires a mating cordset.

FIBER OPTIC



Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC1-506RA)

5-Pin MQDC1-501.5 0.5 m (1.5') MQDC1-506 2 m (6') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

M12/ Euro-Style Washdown (IP69K) Straight connector models only

5-Pin MQDC-WDSS-0506 2 m (6') MQDC-WDSS-0515 5 m (15') MQDC-WDSS-0530 9 m (30')

Additional cordset information is available See page 758



SMBQ4XFA

includes 3/8" bolt for mounting

SMBQ4XFAM10 includes 10 mm bolt for mounting

SMBQ4XFAM12

clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

Additional bracket information is available See page 722



SMB18A

Q3X Specifications

Supply Voltage and Current	10 to 30 V dc	10 to 30 V dc						
Laser Characteristics	Wavelength: Class 2 L	aser (655 nm visible red)						
Supply Protection Circuitry	Protected against rever	rse polarity and transient voltages						
Beam Spot Size	For models LD, LD100	, LD150, LD200 (LD50 models*)						
	Distance (mm)	Size (Horizontal x Vertical)						
	20	5.9 mm x 2.3 mm (4.8 mm x 2.0 mm*)						
	50	5.6 mm x 2.1 mm (3.4 mm x 1.4 mm*)						
	100	5.1 mm x 1.9 mm						
	150	4.6 mm x 1.6 mm						
	200	4.1 mm x 1.6 mm						
	300	3.0 mm x 1.2 mm						
	On-state leakage curi	rent: less than 10 μA						
Output Response Time	PNP On-state saturat NPN On-state saturat	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
Output Response Time	PNP On-state saturat NPN On-state saturat User selectable: 250 µ	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
Delay at Power-up	PNP On-state saturat NPN On-state saturat	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
<u> </u>	PNP On-state saturat NPN On-state saturat User selectable: 250 µ	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
Delay at Power-up	PNP On-state saturat NPN On-state saturat User selectable: 250 µ 1 second	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
Delay at Power-up Ambient Light Immunity	PNP On-state saturat NPN On-state saturat User selectable: 250 µ 1 second Greater than 5000 lux 60 µs	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA						
Delay at Power-up Ambient Light Immunity Repeatability	PNP On-state saturat NPN On-state saturat User selectable: 250 µ 1 second Greater than 5000 lux 60 µs Housing nickel-plated z	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA us, 1 ms and 5 ms						
Delay at Power-up Ambient Light Immunity Repeatability Construction	PNP On-state saturat NPN On-state saturat User selectable: 250 µ 1 second Greater than 5000 lux 60 µs Housing nickel-plated z	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA us, 1 ms and 5 ms zinc die-cast; PMMA acrylic lens cover 68 per IEC60529; IP69K per DIN40050-9						
Delay at Power-up Ambient Light Immunity Repeatability Construction Environmental Rating	PNP On-state saturat NPN On-state saturat NPN On-state saturat User selectable: 250 µ 1 second Greater than 5000 lux 60 µs Housing nickel-plated z	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA us, 1 ms and 5 ms zinc die-cast; PMMA acrylic lens cover 68 per IEC60529; IP69K per DIN40050-9						
Delay at Power-up Ambient Light Immunity Repeatability Construction Environmental Rating Connections	PNP On-state saturat NPN On-state saturat NPN On-state saturat User selectable: 250 µ 1 second Greater than 5000 lux 60 µs Housing nickel-plated z IP67 per IEC60529; IP6 5-pin Euro M12 Integra	tion voltage: less than 200 mV at 10 mA load and less than 1.0 V at 100 mA tion voltage: less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA us, 1 ms and 5 ms zinc die-cast; PMMA acrylic lens cover 68 per IEC60529; IP69K per DIN40050-9 al Connector						



QS18 Series

Versatile Sensor for Global Manufacturing Needs



- All-purpose sensors solve the widest variety of sensing applications
- Versatile sensor with many mounting options
- Meets IP67 and NEMA 6 standards for use in harsh environments
- Universal housing for global use
- Cordsets and brackets see page 51



QS18 page 42

The QS18 Standard Sensor requires little to no adjustment. The sensor is available in multiple sensing modes and has a wide variety of connection options.



QS18 Expert™

The QS18 Expert™ offers advanced sensing with single push-button programming and several sensing modes and configuration options.

page 44



QS18 Clear Object

page 45

The QS18 Clear Object sensor is designed for clear object detection in plastic or glass containers.







The QS18 Laser Sensor has a narrow visible beam spot for easy alignment and small object detection.



QS18 Adjustable-Field

The QS18 Adjustable-Field Sensor is ideal for background and foreground suppression. The sensor is available in long-range models for sensing up to 300 mm.

page 48



QS18 Universal Voltage

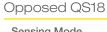
The QS18 Universal Voltage Sensor operates on ac or dc voltage and has several sensing modes available, making it an ideal sensor for many manufacturing environments.

QS18





- All-purpose sensor solves widest variety of sensing applications
- Simple set-up with 270 degree potentiometer and fixed sensitivity models
- Versatile sensor with many mounting options
- Meets IP67 and NEMA 6 standards for use in wet environments
- Universal housing for global use
- Cordsets and brackets see page 51







Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
		2 m	QS186E I	Emitter
	20 m	4-pin Euro QD	QS186E0	8 Emitter
OPPOSED	20111	2 m	QS18VN6R	QS18VP6R
		4-pin Euro QD	QS18VN6RQ8	QS18VP6RQ8
	20 m	2 m	QS186EV	Emitter
OPPOSED		4-pin Euro QD	QS186EV	Q8 Emitter
		2 m	QS186EE	Emitter
	3 m	4-pin Euro QD	QS186EE	Q8 Emitter
OPPOSED	3111	2 m	QS18VN6RB	QS18VP6RB
OI I OOLD		4-pin Euro QD	QS18VN6RBQ8	QS18VP6RBQ8



Box Sorting for Size

Three QS18 opposed mode sensors above the roller conveyor detect any passing object, triggering the horizontal QS18 sensor. Boxes are diverted by size as they continue forward.

Retro & Polar Retro QS18

Sensing Mode Range Connection Models NPN* Models PNP* 2 m QS18VN6LV QS18VP6LV 6.5 m 4-pin Euro QD QS18VN6LVQ8 QS18VP6LVQ8 QS18VN6LP QS18VP6LP 2 m 4-pin Euro QD QS18VN6LPQ8 QS18VP6LPQ8

For more specifications see page 52.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18VN6LV W/30). QD models

- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18VN6LVQ7).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18VN6LVQ5).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18VN6LVQ).
- † Retroreflective range is specified using one model BRT-84 retroreflector.
- Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Convergent QS18



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	16 mm	2 m	QS18VN6CV15 QS18VP6C	QS18VP6CV15
CONVERGENT	- 10111111	4-pin Euro QD	QS18VN6CV15Q8	QS18VP6CV15Q8
	12 mm	2 m	QS18VN6CV45	QS18VP6CV45
CONVERGENT	43 mm	4-pin Euro QD	QS18VN6CV45Q8	QS18VP6CV45Q8

Diffuse QS18



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	450 mm	2 m	QS18VN6D	QS18VP6D
DIFFUSE	400 111111	4-pin Euro QD	QS18VN6DQ8	QS18VP6DQ8
	450 mm	2 m	QS18VN6DB	QS18VP6DB
DIFFUSE	400 111111	4-pin Euro QD	QS18VN6DBQ8	QS18VP6DBQ8
DIFFUSE	600 mm	2 m	QS18VN6DL	QS18VP6DL
	000111111	4-pin Euro QD	QS18VN6DLQ8	QS18VP6DLQ8
	100 mm	2 m	QS18VN6W	QS18VP6W
DIVERGENT DIFFUSE	100 11111	4-pin Euro QD	QS18VN6WQ8	QS18VP6WQ8

Fixed-Field QS18



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	0-50 mm	2 m	QS18VN6FF50	QS18VP6FF50
FIXED-FIELD	Cutoff	4-pin Euro QD	QS18VN6FF50Q8	QS18VP6FF50Q8
0-100 Cuto	0-100 mm	2 m	QS18VN6FF100	QS18VP6FF100
FIXED-FIELD	Cutoff	4-pin Euro QD	QS18VN6FF100Q8	QS18VP6FF100Q8

Coaxial QS18 Clear Object Detection



Sensing Mode	Range**	Connection	Models NPN*	Models PNP*
CLEAR OBJECT	0-3 m	2 m	QS18VN6XLP	QS18VP6XLP
P RETRO	0-3111	4-pin Euro QD	QS18VN6XLPQ8	QS18VP6XLPQ8

For more specifications see page 52.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, $\mbox{QS18VN6LV\,W/30}).$

QD models

- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18VN6LVQ7).
 - For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18VN6LVQ).
- * Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
- ** For use with BRT-92X92C

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Visible Red LED

Visible Red LED

QS18 Expert[™]



Sensors with Push-Button Programming

- Intuitive push-button lock out to prevent accidental configuration changes
- Bright LED status indicators visible from 360°
- Reliable detection of reflective objects
- Cordsets and brackets see page 51

Polar Retro QS18 Expert™





Mail Sorting for Size

Three QS18 opposed mode sensors above the roller conveyor detect any passing object, triggering the horizontal QS18 sensor. Letters pass below the horizontal QS18 undetected and are diverted to the letter conveyor. Parcels are detected and continue forward.

Convergent QS18 Expert™



For more specifications see page 53.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6LP W/30).

- QD models

 For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18EN6LPQ7).
 - For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6LPQ5).
 - For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).
- † Retroreflective range is specified using one model BRT-84 retroreflector.
- Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
- Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

Diffuse QS18 Expert™



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	800 mm	2 m	QS18EN6D	QS18EP6D
DIFFUSE	000 11111	4-pin Euro QD	QS18EN6DQ8	QS18EP6DQ8
	500 mm	2 m	QS18EN6DB	QS18EP6DB
DIFFUSE		4-pin Euro QD	QS18EN6DBQ8	QS18EP6DBQ8
	300 mm	2 m	QS18EN6W	QS18EP6W
DIVERGENT DIFFUSE		4-pin Euro QD	QS18EN6WQ8	QS18EP6WQ8
	600 mm	2 m	QS18EN6DV	QS18EP6DV
DIFFUSE	333 .1111	4-pin Euro QD	QS18EN6DVQ8	QS18EP6DVQ8

Coaxial QS18 Expert™ Clear Object Detection



Sensing Mode	Rar	nge (Connection	Models NPN*	Models PNP*
CLEAR OBJECT	0-3		2 m	QS18EN6XLPC	QS18EP6XLPC
P RETRO	0-3		4-pin Euro QD	QS18EN6XLPCQ8	QS18EP6XLPCQ8

Coaxial QS18 Expert™ Clear Object Detection with IO-Link



Sensing Mode	Range	Connection	Models
CLEAR OBJECT		2 m	QS18EK6XLPC
P	0-3 m	4-pin Euro QD	QS18EK6XLPCQ8

Plastic Fiber QS18 Expert™



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	Range varies by sensing mode and	2 m	QS18EN6FP	QS18EP6FP
PLASTIC FIBER	fiber optics used	4-pin Euro QD	QS18EN6FPQ8	QS18EP6FPQ8

For more specifications see page 53.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6D W/30).

QD models

- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18EN6DQ7). For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6DQ5).
 - For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6DQ).
- Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information. * Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
- ** For use with BRT-92X92C

QS18 Laser

DC-Operated Long-Range Laser Sensors



- The QS18 Laser Emitter has a narrow visible beam spot for easy alignment and small object detection.
- Long sensing ranges
- Available in opposed, diffuse and retroreflective mode (see page 48 for adjustable-field models)
- Cordsets and brackets see page 51





Sensing Mode	Range	Connection	Models NPN*	Models PNP*
CLASS 1	15 m (4500 x excess gain)	2 m	QS186LE E	Emitter**
LASER EMITTER	, , , , , , , , , , , , , , , , , , , ,	4-pin Euro QD	QS186LEQ	8 Emitter**
CLASS 1 LASER SPOT	See datasheet for more information.	2 m	QS186LE10	0
0	See datasneet for more information.	4-pin Euro QD	QS186LE10	0Q8
CLASS 1 LASER SPOT	See datasheet for more information	2 m	QS186LE1	1
T	See datasneet for more information.	4-pin Euro QD	QS186LE1	1Q8
CLASS 1	See datasheet for more information.	2 m	QS186LE1	2
LASER SPOT	dee datasheet for more information.	4-pin Euro QD	QS186LE1	2Q8
CLASS 1 LASER SPOT	See datasheet for more information.	2 m	QS186LE14	4
+		4-pin Euro QD	QS186LE14	4Q8
CLASS 1	0.1-10 m <mark>†</mark>	2 m	QS18VN6LLP	QS18VP6LLP
LASER POLAR RETRO	•	4-pin Euro QD	QS18VN6LLPQ8	QS18VP6LLPQ8
CLASS 1	300 mm	2 m	QS18VN6LD	QS18VP6LD
DIFFUSE LASER		4-pin Euro QD	QS18VN6LDQ8	QS18VP6LDQ8



Package Inspection Using Diffuse-Mode Laser Sensors

When packaging medical supplies, error-proofing and quality control are of the utmost importance. In this application, it's necessary to inspect each package of gauze pads to ensure that the lid has been closed and that tape has been applied to seal the package. Automating this process means greater efficiency and less chance of error.

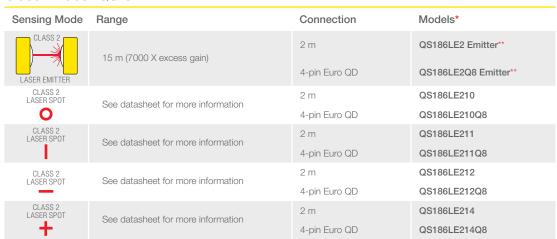
For more specifications see page 52

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS186LE W/30).

- QD models • For 4-pin integral Euro-style QD, add suffix Q7 (example, QS186LEQ7).
 - For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS186LEQ5).
 - For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS186LEQ).
- † Retroreflective range is specified using one model BRT-51X51BM or BRT-TVHG-2X2 retroreflector.
- Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
- Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
- ** Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty envirmonments; the scattered light would greatly reduce excess gain.

For use with standard QS18 opposed mode receivers



Class 1 Laser Sensors

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference IEC 60825-1: 2001, section 8.2.

Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference IEC 60825-1:2001, section 8.2.

For safe laser use (Class 1 or Class 2):

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path.
- Locate open laser beam paths either above or below eye level, where practical.



🌞 Visible Red Laser

For more specifications see page 52

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS186LE2 W/30). QD models

- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS186LE2Q).
- Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
- Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty envirmonments; the scattered light would greatly reduce excess gain.



QS18 Adjustable-Field

Foreground and Background Suppression Sensors



- The QS18 Adjustable-Field Sensor is ideal for background and foreground suppression
- The sensor is available in long-range models for sensing up to 300 mm
- Background suppression models for detection of objects when the background condition is not fixed
- Foreground suppression models for detection when background is fixed and object varies in color or shape
- Visible red LED or laser sensing beam
- Cordsets and brackets see page 51

Adjustable-Field Foreground Suppression

Foreground suppression models for reliable detection when a fixed background is present and the object color or shape varies

- Objects detected to the face of the sensor (no dead zone).
- Simple multiturn screw adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

Adjustable-Field Foreground QS18

Range



Adjustable between 30-200 mm



Adjustable between 15-40 mm Connection

4-pin Euro Pigtail QD

4-pin Euro Pigtail QD

4-pin Euro Pigtail QD

2 m

4-pin Euro Pigtail QD

Visible Red LED

Models NPN* Models PNP*

QS18AB6AFF200 (Bipolar NPN/PNP) QS18AB6AFF200Q5 (Bipolar NPN/PNP)

QS18VN6AFF200 QS18VP6AFF200 QS18VN6AFF200Q5 QS18VP6AFF200Q5

QS18AB6AFF40 (Bipolar NPN/PNP)

QS18AB6AFF40Q5 (Bipolar NPN/PNP)

QS18VN6AFF40 QS18VP6AFF40

QS18VN6AFF40Q5 QS18VP6AFF40Q5

For more specifications see page 52.

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Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18VN6AFF200 W/30). QD models

- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).
- * Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

Adjustable-Field Background Suppression QS18



Adjustable-Field **Background Suppression**

Background suppression models for reliable detection of objects when the background condition is not controlled or fixed

- Simple multiturn screw adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

Class 1 Laser Sensors

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference IEC 60825-1: 2001, section 8.2.

4-pin Euro Pigtail QD

Class 2 Lasers

BACKGROUND SUPPRESSION

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference IEC 60825-1:2001, section 8.2.

For safe laser use (Class 1 or Class 2):

50-250 mm)

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path.
- Locate open laser beam paths either above or below eye level, where practical.



OS18VP6LAF250O5

ulse Power < 5.6 mW, 650 - 670 nm, 15 kHz, 1.5 uS Pulse. Complies to 21 CFR 1040.10 & N60825-1:2001 except for deviations ursuant to laser notice No. 50, dated 7-26-01 ASER LIGHT - DO NOT STARE INTO BEAM CLASS 2 LASER PRODUCT

For more specifications see page 52



Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6LP W/30). QD models

- For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6LPQ5)
- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).
- * Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

OS18VN6LAF250O5

QS18 Universal Voltage

Versatile Sensors Operate on AC or DC Voltage

- The QS18 Universal Voltage Sensor operates on ac or dc voltage
- Versatile sensor with many mounting options
- Ready to hook up out of the box
- Cordsets and brackets see page 51





N-MOSFET (Sinking) P-MOSFET (Sourcing)

Output^{††}

QS18WE Emitter QS18ANWR QS18RNWR

Models Light Operate

QS18RPWR

Models Light Operate Models Dark Operate

Polar Retro & Retro

QS18 Universal Voltage, 20-140 V AC/DC or 20-270 V AC/DC Output^{††}



Models Dark Operate



3.5 m^t

Range

P-MOSFET (Sourcing)

N-MOSFET (Sinking)

N-MOSFET (Sinking)

QS18APWLP

QS18ANWLV

QS18ANWLP

QS18APWR

QS18RNWLP QS18RPWLP

QS18RNWLV



P-MOSFET (Sourcing)

OS18APWI V

OS18RPWIV

Diffuse QS18 Universal Voltage, 20-140 V AC/DC or 20-270 V AC/DC

N-MOSFET (Sinking)



Models Dark Operate

Sensing Mode	Range
DIFFUSE	450 mm

N-MOSFET (Sinking) P-MOSFET (Sourcing)

Output^{††}

QS18APWDL

OS18ANWDI

QS18ANWDXL

Models Light Operate

OS18RNWDI QS18RPWDL

QS18RNWDXL

P-MOSFET (Sourcing)

QS18APWDXL QS18RPWDXL

For more specifications see page 53.

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18WE W/30). QD models

- For 4-pin 150 mm Micro-style pigtail QD, add suffix Q2 to the model number (example, QS18WEQ2).
- 600 V cable models: Standard models are supplied with 300 V cable. For a 600 V cable, add suffix C1 to the 2 m model number (example, QS18WEC1).
- † Retroreflective range is specified using one model BRT-84 retroreflector.
- Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
- ††MOSFET: Metal oxide semiconductor field-effect transistor.

power supply.

Sensors

Conveyor Jam Detection

When an object is lodged in front of the sensor an output is triggered,

alerting personnel to the presence of the jam. QS18 Universal Voltage sensors can be connected to either

ac or dc power, allowing them to

operate in applications already using

ac power without requiring a separate

Using Opposed-Mode





Additional cordset information is available See page 758



Pico QD (for Q7 models) Right-angle snap-on connector









Pico QD (for Q7 models) Right-angle snap-on connector













Additional information is available See page 790



Additional information is available See page 816

Additional bracket information is available See page 722

SMBQS18AF



Opposed, Retroreflective, Laser Retroreflective, Convergent, Diffuse, Laser Diffuse and Fixed-Field Models Suffix E, R, LV, LP, LLP, CV15, CV45, D, DV, LD, LE and FF





Divergent Diffuse Models Suffix EB, RB, DB and W





Suffix AFF, AF and LAF



Opposed, Retroreflective, Polar Retroreflective and Diffuse Models Suffix E, R, LP, LV, DL and XL

QS18, DC, Laser, Adjustable-Field Specifications

	,	Specification		ripple) at less than 15 mA, evaluative of lead		
Supply Voltage and Current	Retroreflective, Diffuse and Adjustable-Field Laser: 10 to 30 V dc (10% max. ripple) at less than 15 mA, exclusive of load Laser Emitters: 10 to 30 V dc (10% max. ripple) at less than 35 mA Adjustable-Field (40, 200 & 300 mm): 10 to 30 V dc (10% max. ripple) at less than 27 mA All Others: 10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load					
Laser Characteristics (Laser models only)	Wavelength: Class 1: 650 nm visible red Class 2: Adjustable-Field — 658 nm visible red Laser Emitter — 650 nm visible red					
Supply Protection Circuitry	Protected against reve	erse polarity and trans	sient voltages			
Laser Control (Emitters only)	Apply 0 V dc to white Apply +10 to 30 V dc Enable Time: Class 1 Disable time: Class 1	to white wire to inhibite —240 ms Class 2	2—8 ms			
Output Configuration*	Rating: 100 mA total OFF-state leakage of Adjustable NPN: less Fixed-Fie ON-state saturation Adjustable NPN: less All others	Solid-state complementary: NPN (current sinking), PNP (current sourcing), or bipolar (both sinking and sourcing) depending on model Rating: 100 mA total output current DFF-state leakage current: Adjustable-Field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser: NPN: less than 200 μA @ 30 V dc (see Application Note 1) FNP: less than 10 μA @ 30 V dc All others: less than 50 μA @ 30 V dc All others: less than 50 μA @ 30 V dc DN-state saturation voltage: Adjustable-Field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser: NPN: less than 1.6 V @ 100 mA All others: less than 1 V @ 10 mA; less than 1.5 V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit of outputs				
Output Response Time*	Opposed: 750 microseconds ON; 375 microseconds OFF Retroreflective Laser, Diffuse Laser and Adjustable-Field (100, 150 & 250 mm): 700 microseconds ON/OFF Adjustable-Field (40, 200 & 300 mm): 2.8 milliseconds ON/OFF Fixed-Field: 850 microseconds ON/OFF All others: 600 microseconds ON/OFF					
Delay at Power-up	Laser Emitters: Class 1—250 milliseconds Class 2—10 milliseconds Adjustable-Field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser: 200 milliseconds; outputs do not conduct during this time. All others: 100 milliseconds; outputs do not conduct during this time.					
Repeatability*	Opposed: 100 micros	seconds r, Diffuse Laser and a D (100 mm): 175 microseconds	Adjustable-Field Laser: 130 micros	econds ED (40, 200 & 300 mm): 250 microseconds		
Adjustments*			Diffuse Laser and Glass & Plastic rew sets cutoff distance between min	Fiber Optic: Single-turn sensitivity (Gain) adjustr . and max. position	ment potentiometer	
Indicators	Laser Emitters: Gree All others, 2 LED ind See datasheet for det	icators: (Green: Pow	d ver ON Yellow: Light sensed)			
Construction	0,	,	tter models have PMMA window) ounting hardware included			
Environmental Rating	Rated IEC IP67; NEM	A 6; UL Type 1				
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (Q), or 4-pin 150 mm pigtail Euro-style QD (Q5), or 4-pin Integral Pico-style QD (Q7), or 4-pin Integral Euro-style QD (Q8), depending on model. QD cordsets are ordered separately. See page 51.					
Operating Conditions	Temperature:	Lasers -10° to +50° C	Adjustable-Field LED (100 mm) 0° to +55° C	Adjustable-Field LED (40, 200 & 300 mm) -20° to +55° C	All others -20° to +70° C	
	Relative humidity:	90% @ 50° C (non-condensing)	95% @ 50° C (non-condensing)	95% @ 50° C (non-condensing)	95% @ 50° C (non-condensing	
Laser Classification (Laser models only)	Class 1 and Class 2 la dated 7-26-01.			FR 1040.10, except deviations pursuant to Laser		
Application Notes			is < 200 μA for load resistances > 3 l akage is < 1% of load current	kΩ or optically isolated loads.		
Certifications	All others: CE		Laser Emitters:			

QS18 Expert™ Specifications and Clear Object Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24 V dc @ greater than 55° C		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Solid-state NPN (current sinking) or PNP (current sourcing), depending on model Light (LO) or Dark Operate (DO) selectable Selectable 30 millisecond output OFF-delay Rating: 100 mA max. OFF-state leakage current: less than 50 µA @ 30 V dc ON-state saturation voltage: less than 1.5 V (2 m cable); 1.7 V (9 m cable) Protected against false pulse on power-up and continuous overload or short circuit of output		
Output Response Time	Expert: 600 microseconds ON/OFF Clear Object Detection: 400 microseconds ON/OFF		
Delay at Power-up	Momentary delay on power-up; outputs do not conduct during this time		
Repeatability	Expert: 75 microseconds Clear Object Detection: 100 microseconds		
Adjustments	Thresholds: Push-button/remote-wire configurable Expert™-style TEACH and SET options: Light/Dark Operate: selectable by programming order (load output follows the first taught target condition) Push-button enable/disable: remote wire only See datasheet for detailed information		
Indicators	2 LED indicators: Green: RUN mode, output short-circuit Yellow: Output ON/marginal, TEACH mode		
Construction	ABS housing		
Environmental Rating	Meets NEMA 6; IEC IP67; UL Type 1		
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (Q), or 4-pin 150 mm pigtail Euro-style QD (Q5), or 4-pin Integral Pico-style QD (Q7), or 4-pin Integral Pico-style QD (Q8). QD cordsets are ordered separately. See page 51.		
Operating Conditions	Temperature: -20° to +70° C Relative humidity: 90% @ 50° C (non-condensing)		
Certifications	C € c %l °us		

QS18 Universal Voltage Specifications

Supply Voltage	P-MOSFET Models: 20 to 140 V ac/dc @ < 10 mA, exclusive of load N-MOSFET Models: 20 to 270 V ac/dc @ < 10 mA, exclusive of load		
Supply Protection Circuitry	Protected against reverse polarity and transient over-voltages		
Output Configuration	Single Discrete Output, 100 mA load rating N-MOSFET or P-MOSFET, depending on model number Light Operate or Dark Operate, depending on model number		
Output Rating	P-MOSFET models 100 mA with short circuit protection OFF-state leakage current: < 400 µA ON-state saturation voltage: 2.75 V N-MOSFET models 100 mA with short circuit protection OFF-state leakage current: < 400 µA ON-state saturation voltage: 2.5 V		
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up. Latching short-circuit protection; reset by cycling power		
Delay at Power-up	100 milliseconds max. dc, 300 milliseconds max. ac; outputs do not conduct during this time		
Repeatability	1.5 milliseconds		
Output Response Time	Opposed mode: 16.6 milliseconds (1 cycle at 60 Hz) All other modes: 8.3 milliseconds (½ cycle at 60 Hz)		
Adjustments	Diffuse, Retroreflective and Polarized Retroreflective models only: 1-turn potentiometer Sensitivity (Gain) adjustment		
Indicators	Green: Power ON Yellow: Light Sensed		
Construction	Housing: ABS Lenses: PMMA Gain Adjuster: Acetal		
Environmental Rating	IEC IP67 (NEMA 6); 1200 PSI washdown NEMA ICS5, Annex F-2002 (PW12); UL Type 1		
Connections	2 m 3-conductor, 22 AWG PVC cable (300 V ac), or 150 mm pigtail PVC cable with 4-pin threaded Micro-style connector; C1 suffix models: 2 m 3-conductor, 22 AWG PVC cable (600 V ac)		
Operating Conditions	Temperature: Less than 140 V ac/dc: -25° to +70° C (N-MOSFET and P-MOSFET models) 140 V ac/dc or greater: -25° to +55° C (N-MOSFET models only) Max. Relative Humidity: 95% @ 55° C (non-condensing)		
Certifications	C C c(VL)us		

High-Performance, Long-Range Sensors



- Right-angle, barrel- and side-mount sensors
- Specialized models for reliable detection of water or liquids containing water
- Specialized photoelectric sensors that have the ability to differentiate colors in low contrast applications
- Cordsets and brackets see page 62



QS30 page 56

Eight sensing modes for solving most applications: opposed, retroreflective, convergent, diffuse, plastic and glass fiber optic, and adjustable-field and fixed-field. High-performance sensing with visible, long-range Class 1 and 2 lasers with narrow effective beam for small object detection and precise position control.



QS30 Water Detection

The QS30 Water Sensors have an infrared wavelength that is tuned to the absorption band of water.

page 58



QS30 Expert™

page 59

Single push-button programming with five advanced sensing options for reliable detection of reflective objects.





QS30 Adjustable-Field

page 60

Background suppression models for detection of objects when the background condition is not fixed, and foreground suppression models for detection when background is fixed and object varies in color or shape.



QS30 Universal Voltage

Compact ac or dc powered sensor can be used in almost any mounting configuration, including 18 mm barrel, base or side mounting.

QS30

DC-Operated Long-Range Sensors

- The QS30 DC sensor is a specialized photoelectric sensor that has high performance and long range with a consistent voltage source.
- Ability to work reliably in low contrast applications
- Ability to detect liquid in translucent and opaque bottles
- Rated to IP67 for use in harsh environments
- Cordsets and brackets see page 62

Opposed QS30



Visible Red LED

Sensing Mode	Range	Connection	Output Type	Model
OPPOSED	60 m	2 m	-	QS30E Emitter*
		5-pin Euro QD		QS30EQ Emitter*
		2 m	Bipolar NPN/PNP	QS30R
		5-pin Euro QD		QS30RQ
HIGH-POWERED OPPOSED	213 m	2 m	Bipolar NPN/PNP LO Bipolar NPN/PNP DO	QS30EX Emitter
		5-pin Euro QD		QS30EXQ Emitter
		2 m		QS30ARX
		5-pin Euro QD		QS30ARXQ
		2 m		QS30RRX
		5-pin Euro QD		QS30RRXQ



Case Entry Detection Using Polar Retroreflective Sensors

The QS30LP verifies that there is a box present to be picked up before being sent to the palletizer. Shrink wrap is placed around the boxes on the pallet before being shipped.

Retro & Polar Retro QS30

Sensing Mode	Range	Connection	Output Type	Model
RETRO	12 m [†]	2 m	Bipolar NPN/PNP	QS30LV
		5-pin Euro QD		QS30LVQ
POLAR RETRO	8 m [†]	2 m	Bipolar NPN/PNP	QS30LP
		5-pin Euro QD	Біроіаі ічету/етче	QS30LPQ

For more specifications see page 63.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30R W/30).

* Standard emitters will only work with standard receivers. † Retroreflective range is specified using one model BRT-84 retroreflector.

Diffuse QS30

Sensing Mode	Range	Connection	Output Type	Model
DIFFUSE	1 m	2 m 5-pin Euro QD	Bipolar NPN/PNP	QS30DQ
		5-piii Edio QD		QOJODQ

Infrared LED

Fixed-Field QS30 Visible Red LED Sensing Mode Range Connection **Output Type** Model 2 m QS30FF200 200 mm Bipolar NPN/PNP Cutoff QS30FF200Q 5-pin Euro QD QS30FF400 400 mm Bipolar NPN/PNP Cutoff 5-pin Euro QD QS30FF400Q QS30FF600 2 m 600 mm Bipolar NPN/PNP Cutoff 5-pin Euro QD QS30FF600Q

For more specifications see page 63.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30D W/30).

- * Super High-Power emitters will only work with Super High-Power receivers.
- † Sensors can be used at ranges greater than listed for applications that require less excess gain. Please consult the factory for assistance on your long-range applications. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

QS30 Water Detection

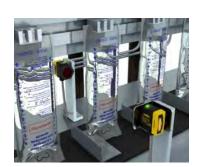
DC-Operated Long-Range Sensors



- Ability to work reliably in low contrast applications
- Ability to detect liquid in translucent and opaque bottles
- Cordsets and brackets see page 62

Opposed Water Detection QS30

Infrared LED



Detection of Clear Liquids in Transparent Packaging

The QS30H2O effectively and accurately detects the presence or absence of water inside clear IV bags.

Sensing Mode	Range	Connection	Output Type	Model
		2 m		QS30EXH2O Emitter*
		5-pin Euro Pigtail QD	_	QS30EXH2OQ5 Emitter*
		2 m	Bipolar NPN/PNP	QS30ARXH2O
	4 m [†]	5-pin Euro Pigtail QD	LO	QS30ARXH2OQ5
OPPOSED	4111	2 m	Bipolar NPN/PNP	QS30RRXH2O
WATER DETECTION		5-pin Euro Pigtail QD	DO	QS30RRXH2OQ5
		2 m	Analog 0-10 V	QS30RXH20U
		5-pin Euro Pigtail QD		QS30RXH20UQ5
	2 m ^t	2 m	Bipolar NPN/PNP LO	QS30ARH2O
		5-pin Euro Pigtail QD		QS30ARH2OQ5
OPPOSED		2 m	Bipolar NPN/PNP	QS30RRH2O
WATER DETECTION		5-pin Euro Pigtail QD	DO	QS30RRH2OQ5
		2 m	_	QS30EXSH2O Emitter*
SUPER HIGH-POWER		5-pin Euro Pigtail QD		QS30EXSH2OQ5 Emitter*
	8 m [†]	2 m	Bipolar NPN/PNP	QS30ARXSH2O
OPPOSED WATER DETECTION	5 III	5-pin Euro Pigtail QD	LO	QS30ARXSH2OQ5
		2 m	Bipolar NPN/PNP	QS30RRXSH2O
		5-pin Euro Pigtail QD	DO	QS30RRXSH2OQ5

For more specifications see page 63

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30D W/30).

^{*} Super High-Power emitters will only work with Super High-Power receivers.

[†] Sensors can be used at ranges greater than listed for applications that require less excess gain. Please consult the factory for assistance on your long-range applications. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



QS30 Expert™

DC-Operation with Push-Button Programming

- The QS30 Expert™ has high-performance sensing for challenging applications and is easy to align with an 8-segment LED bargraph.
- Available in laser retroreflective, diffuse, laser diffuse and retroreflective sensing modes
- Visible red LED or laser for easy alignment
- Models available for small object detection and precision control
- Cordsets and brackets see page 62

Diffuse QS30 Expert™ Visible Red LED Sensing Mode Laser Class Range Connection Model OS30FDV 2 m High-Speed: 1100 mm Normal: 1400 mm 5-pin Euro QD QS30EDVQ 2 m QS30LD Class 1 400 mm 5-pin Euro QD QS30LDQ QS30LDI Class 2 800 mm QS30LDLQ 5-pin Euro QD DIFFUSE LASER

Visible Red LED - Wisible Red Laser Laser Retro & Polar Retro QS30 Expert™ Sensing Mode Laser Class Connection Range Model QS30LLP Class 1 0.2-18 m[†] 5-pin Euro QD QS30LLPQ QS30LLPC Class 1 0.2-18 m^t (low contrast) 5-pin Euro QD QS30LLPCQ QS30ELVC 100 mm to 2 m^{††} 5-pin Euro QD QS30ELVCQ

Connection options: A model with a QD requires a mating cordset (see page 62). For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30EDV W/30).

TEACH Mode

Sensors can be configured via any of five TEACH or SET options (by push button or the remote wire) to define the sensing limits. Sensing limit configuration options include:

- Static TEACH: one switching threshold, determined by two taught conditions
- Dynamic (on-the-fly) TEACH: one switching threshold, determined by multiple sampled conditions
- Light SET and Dark SET: one switching threshold, offset from a single sensing condition (the "dark" condition or the "light" condition
- Window SET: a sensing window, centered around a single sensing condition

Visible Red LED

QS30 Adjustable-Field

Background and Foreground Suppression



- Foreground suppression models for detection when background is fixed and the object varies in color or shape
- Background suppression models for detection of objects when the background condition is not fixed
- Fluorescent light and crosstalk avoidance for reliable sensing
- Long range for reliable sensing up to 600 mm
- Cordsets and brackets see page 62

Adjustable-Field **Foreground Suppression**

- Foreground suppression models for reliable detection when a fixed background is present and the object color or shape varies
- Objects detected to the face of the sensor (no dead zone)
- Simple multiturn screw adjustment of the cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

Adjustable-Field **Background Suppression**

- Background suppression models detect objects of various color, and ignores objects beyond their cutoff range
- Simple multiturn screw adjustment of the cutoff distance
- Enhanced immunity to fluorescent
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

Foreground Suppression QS30

Sensing Mode Range Connection **Output Type** Model QS30AFF400 2 m Adjustable between Bipolar NPN/PNP 50-400 mm 5-pin Euro QD QS30AFF400Q

Background Suppression QS30 Adjustable-Field

Visible Red LED Connection Sensing Mode Range **Output Type** Model 2 m QS30AF Adjustable between Bipolar NPN/PNP 50-300 mm 5-pin Euro QD QS30AFQ QS30AF600 Adjustable between Bipolar NPN/PNP 50-600 mm 5-pin Euro QD QS30AF600Q

Connection options: A model with a QD requires a mating cordset (see page 62)

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30AFF400 W/30).

QS30 Universal Voltage

Versatile Sensors Operate on AC or DC Voltage



• The QS30 Universal Sensor is a versatile, specialized sensor for use in many environments regardless of supply voltage

Visible Red LED

Visible Red LED

- Right-angle, barrel- and side-mount sensors
- Cordsets and brackets see page 62

accord OS30 12-250 V/DC or 24-250 V/AC

Opposed Q550, 12-250 V DC Of 24-250 V AC						
Sensing Mode	Range	Connection	Output Type	Model		
		2 m	_	QS303E Emitter		
OPPOSED	60 m	2 m	SPDT e/m Relay	QS30VR3R		

Polar Retro QS30, 12-250 V DC or 24-250 V AC



Fixed-Field QS30, 12-250 V DC or 24-250 V AC

Sensing Mode	Range	Connection	Output Type	Model
FIXED-FIELD	200 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF200
	400 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF400
	600 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF600

For more specifications see page 64.

Connection options: A model with a QD requires a mating cordset (see page 62).

† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS303E W/30). QD models: Available with modified specification, contact factory at 1-888-373-6767.





(example, MQDC-506RA)

5-Pin MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

Additional cordset information is available See page 758



Additional information is available See page 790



Additional information is available See page 816



SMBQS30L



SMBQS30Y



SMBQS30YL



Additional bracket information is available See page 722



Opposed, Retroreflective, Diffuse, Fixed-Field and Expert Models Suffix E, R, LP, LV, D, AF, FF, LLP, LLPC, LVC, EDV, LD and LDL



Opposed High-Power Models Suffix EX and RX



Adjustable-Field, Fixed-Field and Universial Voltage Models Suffix AFF, FF, R, E, LP

QS30 Specifications

Supply Voltage and Current	Emitters (High-Power): 10 to 30 V dc (10% max. ripple) at less than 70 mA Receivers (High-Power): 10 to 30 V dc (10% max. ripple) at less than 22 mA Analog Receivers (water): 10 to 30 V dc (10% max. ripple) at less than 65 mA All others: 10 to 30 V dc (10% max. ripple) at 40 mA, (exclusive of load) Emitters (Water): 10 to 30 V dc (10% max. ripple) at less than 80 mA Receivers (water): 10 to 30 V dc (10% max. ripple) at less than 65 mA (exclusive of load)					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages					
Output Configuration	Bipolar: One PNP (current sourcing) and one NPN (current sinking); Light Operate (LO) or Dark Operate (DO) selectable or configurable (depending on model)					
Output Response Time	Opposed: 5 milliseconds ON/OFF Opposed (High-Power): 30 milliseconds ON/OFF Opposed (Water): 10 x excess gain or more— Standard: 1 millisecond ON/OFF 2x to 10x excess gain— Standard: 3 milliseconds ON/OFF All others: 2 milliseconds ON/OFF					
Delay at Power-Up	100 milliseconds; outputs do not conduct during this time (except Opposed High-Powered and Water)					
Repeatability	Opposed: not applicable Opposed (High-Power): 5 milliseconds Opposed (Water): 10 x excess gain or more– Standard: 500 microseconds 2x to 10x excess gain– Standard: 2.5 milliseconds All others: 500 microseconds Super High-Power: 25 milliseconds Super High-Power: 25 milliseconds					
Adjustments	Opposed (High-Power and Water): Light Operate/Dark Operate—dependent on model selected Frequency via gray wire: A: Gray (+) B: Gray (-) Emitter only: LED inhibit, via white wire White (-) turns emitter LED OFF (to allow verification of sensor operation) Opposed, Retroreflective, and Polarized Retroreflective: Selectable Light/Dark Operate is achieved via the gray wire Light Operate: Low (0 to 3 V)* Dark Operate: High (open or 5 to 30 V)* Diffuse: Selectable Light/Dark Operate is achieved via the gray wire Light Operate: High (open or 5 to 30 V)* Dark Operate: Low (0 to 3 V)* Diffuse, Retroreflective, and Polarized Retroreflective (only): Single-turn sensitivity (Gain) adjustment potentiometer * Input impedance 10 kΩ See datasheet for more detailed information					
Indicators	Opposed (High-Power): 4-LED Signal Strength light bar Green LED: Power ON Frequency indicator: (A or B) Receiver only: Yellow LED: Output conducting All others (except emitters): Large, oval LED indicator on sensor back Yellow: Output conducting Small indicator on back (adjustable-field only) Blue/Red: End of travel (EOT) LED 2 indicators on top Green: Power ON Yellow: Light sensed					
Construction	ABS plastic housing; acrylic lens cover Opposed High-Power Lenses: Impact resistant lens material					
Environmental Rating	Opposed (High-Power): Cabled: IP67; NEMA 6P Opposed (High-Power) QD: IP69K per DIN 40050-9 Opposed (Water): IEC IP67 (nema 6); PW12 1200 PSI washdown per NEMA PW12 All others: IP67; NEMA 6					
Connections	5-conductor 2 m or 9 m PVC cable, or 5-pin 150 mm pigtail or integral Euro-style quick-disconnect fitting, depending on model. QD cordsets are ordered separately. See page 62.					
Operating Conditions	Opposed (Water), Opposed (High-Power): -20° to +60° C All others: -20° to +70° C Relative humidity: 90% (non-condensing) Relative humidity: 90% (non-condensing)					
Certifications	CF					



QS30 Expert™ Specifications

0	P.W. 15D 1D 1 (1) 15D 401 001/1 (40)				
Supply Voltage and Current	Diffuse LED and Retroreflective LED: 10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load Diffuse Laser and Retroreflective Laser: 10 to 30 V dc (10% max. ripple @ 10% duty cycle) @ 35 mA max current, exclusive of load				
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages and false pulse on power-up				
Sensing Beam	LED models: 660 nm visible Red Laser models: Class 1: 650 nm visible Red Class 2: 658 nm visible Red				
Beam Size at Aperture	Diffuse Laser: Approx. 2 mm Retroreflective Laser: Approx. 3 mm				
Output Configuration	Bipolar: One NPN (current sinking) and one PNP (current sourcing); Light Operate (LO) or Dark Operate (DO) configurable				
Output Response Time	Diffuse LED: High-speed mode: 300 microseconds Normal mode: 1.8 milliseconds Diffuse Laser, Retroreflective Laser and Retroreflective LED: 500 microseconds				
Delay at Power-up	Diffuse LED and Retroreflective LED: 250 milliseconds; outputs do not conduct during this time Diffuse Laser and Retroreflective Laser: 1 second max.; outputs do not conduct during this time				
Repeatability	Diffuse LED: High-speed mode: 100 microseconds Normal mode: 150 microseconds Retroreflective LED: 150 microseconds Diffuse Laser and Retroreflective Laser: 70 microseconds				
Adjustments	2 push buttons and remote wire for TEACH programming and configuration See datasheet for detailed information				
Indicators	2 LEDs: Green: Power ON Yellow: Output conducting See datasheets for more detailed information				
Construction	PC/ABS housing with acrylic lens cover				
Environmental Rating	Retroreflective LED: IEC IP67 (NEMA 6); PW12 1200 PSI washdown All others: IP67; NEMA 6				
Connections	5-conductor 2 m or 9 m attached PVC cable, or 5-pin Euro-style quick-disconnect fitting. QD cordset are ordered separately. See page 62.				
Operating Conditions	Diffuse LED and Retroreflective LED: Temperature: -10° to +55° C Diffuse Laser and Retroreflective Laser: Temperature: -10° to +50° C Relative humidity: 95% @ 55° C (non-condensing) Relative humidity: 95% @ 50° C (non-condensing)				
Application Note	QS30ELVC models: If supply voltage is > 24 V dc, derate maximum output current 1 mA/°C above 25°C				
Certification	CE				

QS30 Universal Voltage Specifications

Supply Voltage	24 to 250 V ac, 50/60 Hz or 12 to 250 V dc (1.0 watt max.)				
Supply Protection Circuitry	Protected against transient voltages				
Output Configuration	SPDT (Single-Pole Double-Throw) electromechanical relay output (all models except emitters)				
Output Response Time	15 milliseconds ON/OFF				
Delay at Power-Up	100 millisecond delay; output does not conduct during this time				
Indicators	2 LED indicators on sensor top: Green: Power ON Yellow: Light sensed Large, oval LED indicator on sensor back (except emitters): Yellow: Output conducting See datasheet for detailed information				
Construction	ABS housing; acrylic lens cover				
Environmental Rating	IEC IP67; NEMA 6				
Connections	2 m or 9 m 5-wire PVC cable				
Operating Conditions	Temperature: -20° to +70° C Relative humidity: 95% @ 50° C (non-condensing)				
Certifications					

QS30 Adjustable-Field Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple); current consumption: AF600 & AFF400 models: Less than 80 mA at 10 V dc, less than 40 mA at 30 V dc AF models: 45 mA max current			
Supply Protection Circuitry	Protected against reverse polarity and transient voltages			
Delay at Power-Up	AF600 & AFF400 models: 200 milliseconds; outputs do not conduct during this time AF models: 250 milliseconds; outputs do not conduct during this time			
Output Configuration	Bipolar: One PNP (current sourcing) and one NPN (current sinking)			
Output Rating	AF600 & AFF400 models: 100 mA total output current (derate 1 mA per °C above 30° C) OFF-state leakage current: less than 5 μA @ 30 V dc ON-state saturation voltage: NPN: less than 1.5 V @ 100 mA PNP: less than 2.0 V @ 100 mA			
	AF models: 150 mA total output current (derate 1 mA per °C above 25° C) OFF-state leakage current: less than 50 μA @ 30 V dc ON-state saturation voltage: NPN: less than 200 mV @ 10 mA; less than 1 V @ 150 mA PNP: less than 1.25 V @ 10 mA; less than 2 V @ 150 mA			
Output Protection	Protected against false pulse on power-up and continuous overload or short circuit of outputs			
Output Response Time	AF600 & AFF400 models: 5 milliseconds ON/OFF AF models: 1 millisecond ON/OFF			
Repeatability	AF600 & AFF400 models: 750 microseconds AF models: 170 microseconds			
Adjustments	AF600 & AFF400 models: Four-turn adjustment screw sets cutoff distance between min. and max. positions, clutched at both ends of travel			
	AF models: 2 push buttons and remote wire Easy push-button configuration Manually adjust (+/-) cutoff (push buttons only) N.O./N.C. and OFF-delay configuration options (push buttons only) Push-button lockout (from remote wire only) push buttons or LO/DO adjustment			
Indicators	AF600 & AFF400 models: Large, oval LED indicator on sensor back Yellow: Output conducting Small indicator on back Blue/Red: End of travel (EOT) LED 2 indicators on top Green: Power ON Yellow: Light sensed AF models: 8-segment red bargraph: Distance relative to cutoff point Green LED: Power ON Yellow LED: Output conducting			
Construction	ABS plastic housing; acrylic lens cover			
Environmental Rating	IEC IP67; NEMA 6			
Connections	5-conductor 2 m or 9 m PVC cable, or 5-pin 150 mm pigtail or integral Euro-style quick-disconnect fitting, depending on model. QD cordsets are ordered separately. See page 62.			
Operating Conditions	AF600 & AFF400 models: -20° to +60° C; 95% relative humidity @ 50° C (non-condensing) AF models: -10° to +55° C; 90% relative humidity @ 55° C (non-condensing)			
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60 Hz max. double amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.			
Certifications	(f			

Q12 Series



Miniature Self-Contained Sensors

- The Q12 sensor is a small sensor with high performance for powerful sensing in confined spaces.
- Overmolded housing
- Short-range background suppression
- Cordsets and brackets see page 68

Opposed Q12 Visible Red LED Output Models LO* Models DO* Sensing Mode Range Connection 2 m Q126E Emitter 2 m 4-Pin Pico Pigtail QD Q126EQ Emitter 3-Pin Pico Pigtail QD Q126EQ3 Emitter Bipolar NPN/PNP Q12AB6R Q12RB6R 4-Pin Pico Pigtail QD Bipolar NPN/PNP Q12AB6RQ Q12RB6RQ PNP 3-Pin Pico Pigtail QD Q12AP6RQ3 Q12RP6RQ3

NPN

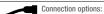
Q12AN6RQ3

Q12RN6RQ3

3-Pin Pico Pigtail QD

Retro & Polar Retro Q12 → Visible Red LED						
Sensing Mode	Range	Connection	Output	Models LO*	Models DO*	
		2 m	Bipolar NPN/PNP	Q12AB6LV	Q12RB6LV	
	1.5 m <mark>†</mark>	4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6LVQ	Q12RB6LVQ	
RETRO		3-Pin Pico Pigtail QD	PNP	Q12AP6LVQ3	Q12RP6LVQ3	
HEIIIO		3-Pin Pico Pigtail QD	NPN	Q12AN6LVQ3	Q12RN6LVQ3	
	1 m [†]	2 m	Bipolar NPN/PNP	Q12AB6LP	Q12RB6LP	
POLAR RETRO		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6LPQ	Q12RB6LPQ	
		3-Pin Pico Pigtail QD	PNP	Q12AP6LPQ3	Q12RP6LPQ3	
		3-Pin Pico Pigtail QD	NPN	Q12AN6LPQ3	Q12RN6LPQ3	

For more specifications see page 69.



Bipolar Models Only: For 9 m cable, add suffix W/30 to the 2 m model number (example, Q126EW/30). QD models: A model with a QD requires a mating cordset (see page 68). For 4-pin 150 mm Euro-style QD, add suffix Q5 (example, Q126EQ5).

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

^{*} For black housing, add prefix D to the model number, for example, DQ12AB6R

[†] Retroreflective range is specified using a BRT-60X40C retroreflector.

Fixed-Field Q12



Sensing Mode	Range	Connection	Output	Models LO*	Models DO*
		2 m	Bipolar NPN/PNP	Q12AB6FF15	Q12RB6FF15
	15 mm Cutoff	4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF15Q	Q12RB6FF15Q
FIXED-FIELD	13 mm Outon	3-Pin Pico Pigtail QD	PNP	Q12AP6FF15Q3	Q12RP6FF15Q3
FIXED-FIELD		3-Pin Pico Pigtail QD	NPN	Q12AN6FF15Q3	Q12RN6FF15Q3
	30 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF30	Q12RB6FF30
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF30Q	Q12RB6FF30Q
FIXED-FIELD		3-Pin Pico Pigtail QD	PNP	Q12AP6FF30Q3	Q12RP6FF30Q3
FIXED-FIELD		3-Pin Pico Pigtail QD	NPN	Q12AN6FF30Q3	Q12RN6FF30Q3
	50 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF50	Q12RB6FF50
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF50Q	Q12RB6FF50Q
FIXED-FIELD	33 min Odion	3-Pin Pico Pigtail QD	PNP	Q12AP6FF50Q3	Q12RP6FF50Q3
FIXED-FIELD		3-Pin Pico Pigtail QD	NPN	Q12AN6FF50Q3	Q12RN6FF50Q3



Bottle Cap Detection Using Fixed-Field Sensors

As bottle caps pass below the fixed-field beam identifies bottle caps regardless of color and rejects bottles missing caps.

PFA-Jacketed Q12



Sensing Mode	Range	Connection	Output	Models LO	Models DO
OPPOSED	1.5 m	2 m	Bipolar NPN/PNP	Q12AB6RCR	Q12RB6RCR
FIXED-FIELD	12 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF15CR	Q12RB6FF15CR
FIXED-FIELD	28 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF30CR	Q12RB6FF30CR
FIXED-FIELD	48 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF50CR	Q12RB6FF50CR

For more specifications see page 69.

Connection options:

Bipolar Models Only: For 9 m cable, add suffix W/30 to the 2 m model number (example, Q12RB6FF15 W/30). QD models: A model with a QD requires a mating cordset (see page 68). For 4-pin 150 mm Euro-style QD, add suffix Q5 (example, Q12RB6FF15Q5).

* For black housing, add prefix D to the model number, for example, DQ12AB6R

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Additional cordset information is available See page 758





Additional bracket information is available See page 722



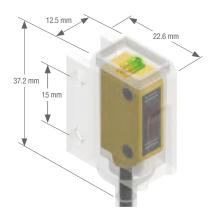
Additional information is available See page 790



Additional information is available See page 816



Opposed, Retroreflective and Fixed-Field Models Suffix E, R, LV and FF



Chemical-Resistant Models Suffix CR

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Q12 Specifications

Sensing Beam	640 nm visible red				
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) @ 20 mA max. current				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Bipolar: 1 NPN (current sinking) and 1 PNP (current sourcing); Light Operate (LO) or Dark Operate (DO), depending on model Single-output: 1 NPN or 1 PNP; Light Operate (LO) or Dark Operate (DO), depending on model				
Output Rating	50 mA total across both outputs with overload and short circuit protection OFF-state leakage current: NPN: 200 μA PNP: 10 μA NPN: 1.25 V @ 50 mA PNP: 1.45 V @ 50 mA				
Output Protection Circuitry	Protected against false pulse on power-up; short-circuit protected				
Output Response Time	Opposed: 1.3 milliseconds ON; 900 microseconds OFF All others: 700 microseconds ON/OFF				
Delay at Power-up	120 milliseconds; outputs do not conduct during this time				
Repeatability	175 microseconds				
Switching Frequency	Opposed models: 385 Hz All other models: 715 Hz				
Indicators	2 LED indicators (Emitters-Green only): Green — Power ON Yellow—Light sensed				
Construction	Polarized Retroreflective: Thermoplastic elastomer housing with glass lens Standard: Thermoplastic elastomer housing with polycarbonate lens Chemical-resistant: Housing encased in PFA jacket; cable encased in 3/16" O.D. PFA tubing				
Environmental Rating	Standard: IEC IP67 Chemical-resistant: IEC IP67 (NEMA 6) and PW12 1200 psi washdown per NEMA ICS 5, Annex F-2002				
Connections	Bipolar: 2 m or 9 m attached PVC cable, or 150 mm pigtail with 4-pin Pico-style (Q) or 4-pin Euro-style (Q5) quick-disconnect fitting. QD cordsets are ordered separately. See page 68. Single output: 150 mm pigtail with 3-pin Pico-style (Q3) quick-disconnect fitting. QD cordsets are ordered separately. See page 68. Chemical-resistant: 2 m attached cable encased in 3/16" O.D. PFA tubing				
Operating Conditions	Temperature: -20° to +55° C Storage temperature: -30° to +75° C Relative humidity: 95% max. @ 50° C (non-condensing)				
Certifications	C E c Tus				

Q20 Series



Industry Standard Global Housing

- The Q20 is a versatile sensor with a universal rectangular housing and multiple mounting options, making it ideal for global manufacturing
- Rated to 1200 psi for use in washdown environments
- Enhanced design for noise immunity and crosstalk avoidance
- Visible red beam for easy alignment on most models
- Cordsets and brackets see page 68

Opposed Q20





Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	12 m	2 m	Q20E Emi	tter
\longrightarrow		4-pin Euro Pigtail QD	Q20EQ5 Emitter	
OPPOSED		2 m	Q20NR	Q20PR
OFFOCED		4-pin Euro Pigtail QD	Q20NRQ5	Q20PRQ5
OPPOSED	20 m	2 m	Q20EL Emitter	
		4-pin Euro Pigtail QD	Q20ELQ5	Emitter
		2 m	Q20NRL	Q20PRL
		4-pin Euro Pigtail QD	Q20NRLQ5	Q20PRLQ5



Unfinished Can Detection Using Polar Retro Sensors

When the unfinished cans pass between the sensor and the retroreflector, the light reflected off the cans has a different polarization than the light returned by the retroreflector. As a result, the beam will be blocked by the cans and the output will be triggered.

Retro & Polar Retro Q20



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
RETRO	6 m [†]	2 m	Q20NLV	Q20PLV Q20PLVQ5 Q20PLP
	OTH	4-pin Euro Pigtail QD	Q20NLVQ5	Q20PLVQ5
POLAR RETRO 4 m [†]	4 mt	2 m	Q20NLP	Q20PLP
	4 111	4-pin Euro Pigtail QD	Q20NLPQ5	Q20PLPQ5

For more specifications see page 73

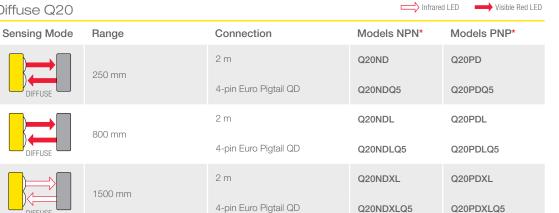


Connection options: A model with a QD requires a mating cordset (see page 72).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q20E W/30). QD models:

- For a 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, Q20NDQ).
- For a 4-pin integral Pico-style QD, add suffix Q7 (example, Q20EQ7).
- * Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.
- † Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

Diffuse Q20



Fixed-Field Q20

Fixed-Field Q20 → Visible Red LED				
Sensing Mode	Range	Connection	Models NPN*	Models PNP*
0-50 mm Cutoff	0-50 mm Cutoff	2 m	Q20NFF50	Q20PFF50
	4-pin Euro Pigtail QD	Q20NFF50Q5	Q20PFF50Q5	
	0-100 mm Cutoff	2 m	Q20NFF100	Q20PFF100
FIXED-FIELD	o ree min eaten	4-pin Euro Pigtail QD	Q20NFF100Q5	Q20PFF100Q5
	0-150 mm Cutoff	2 m	Q20NFF150	Q20PFF150
FIXED-FIELD	0-150 mm Outon	4-pin Euro Pigtail QD	Q20NFF150Q5	Q20PFF150Q5

For more specifications see page 73.

Connection options: A model with a QD requires a mating cordset (see page 72).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q20ND W/30). QD models:

- For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, Q20NDQ5).
- For a 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, Q20NDQ).
- For a 4-pin integral Pico-style QD, add suffix Q7 (example, Q20NDQ7).
- * Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.





Additional cordset information is available See page 758













SMBQ20H

SMBQ20LV

SMBQ20L

SMBQ20U

Additional bracket information is available See page 722









Additional information is available See page 816



Opposed, Retroreflective, Fixed-Field and Diffuse Models Suffix E, EL, R, RL, LP, LV, D, DL, DXL and FF

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Q20 Specifications

Supply Voltage and Current	Fixed-field: 10 to 30 V dc (10% maximum ripple) at less than 25 mA, exclusive of load All others: 10 to 30 V dc (10% maximum ripple) at less than 18 mA, exclusive of load			
Supply Protection Circuity	Protected against reverse polarity and transient voltages			
Output Configuration	Solid-state complementary; PNP (sourcing) or NPN (sinking), depending on model			
Output Rating	100 mA with short circuit protection OFF-state leakage current: NPN: less than 200 μA sinking ON-state saturation voltage: NPN: less than 1.6 V @ 100 mA PNP: less than 10 μA sourcing PNP: less than 3.0 V @ 100 mA			
Output Response Time	Opposed: 1 ms ON/600 ms OFF Fixed-field: 3 ms ON/1.5 ms OFF All others: 800 ms ON/OFF			
Delay at Power-up	100 milliseconds; outputs do not conduct during this time			
Repeatability	Opposed: 140 microseconds Fixed-field: 182 microseconds All others: 155 microseconds			
Adjustments	Diffuse, Retroreflective and Polarized Retroreflective: single-turn sensitivity (Gain) adjustment potentiometer			
Indicators	Emitters: Green power ON only All others: Two LED Indicators: Green: Power ON Yellow: Black (LO) wire conducting			
Construction	Housing: ABS Lenses: PMMA Gain Adjuster(retro and diffuse models only): PBT			
Connections	2 m or 9 m 4-wire PVC cable, 4-pin 150 mm pigtail Pico-style QD (Q), or 4-pin 150 mm pigtail Euro-style QD (Q5), or 4-pin integral Pico-style QD (Q7), depending on model. QD cordsets are ordered separately. See page 72.			
Operating Conditions	Temperature: -20° to +60° C Relative humidity: 95% @ 50° C (non-condensing)			
Enviromental Rating	IEC IP67; NEMA 6			
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2: 30G 11 ms duration, half sine wave			
Application Note	 Opposed mode sensor spacing can be reduced by alternating emitters and receivers or by applying crosstalk filters (visible red models only). NPN OFF-state leakage current is < 200 μA for load resistances > 3 kΩ or optically isolated loads. For load currents of 100 mA, leakage is < 1% of load current. 			
Certification	$C\epsilon$			



Rectangle

Rectangular sensors have a large rugged housing. The rectangle housing style offers side and barrel mounting options.

Series	Description	Max Sensing Range		Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	MINI-BEAM® Comprehensive sensor line with a series of LED colors, gain pots/TEACH modes and ac/dc models. Page 76	Opposed: Clear Plastic: Retro: Retro Polarized: Convergent: Diffuse: Glass/Plastic Fiber:	300 mm 5 m 3 m 43 mm 380 mm	Varies by model	IP67	Thermoplastic Polyester	10 to 30 V dc 24 to 240 V ac 5 to 15 V dc
	Q25 Completely epoxy- encapsulated for use in harsh sensing environments, including food and beverage applications. Page 78	Opposed: Retro Polarized: Fixed-Field:	20 m 2 m 100 mm	50.2 x 25 x 30 mm	IP67 NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 240 V ac
	Q40 Completely epoxy- encapsulated long-range sensor available in ac or dc supply voltages. Page 80	Opposed: Retro Polarized: Fixed-Field:	60 m 6 m 600 mm	69.8 x 41 x 46 mm	QD models: IP69K Other models: IP67 NEMA 6P	Thermoplastic Polyester	10 to 30 V dc 20 to 245 V ac
	Q45 Advanced one-piece, rugged sensor with outstanding optical performance. page 84	Opposed: Retro: Polarized Retro: Laser Polarized Retro: Diffuse: Convergent:		87.6 x 44.5 x 54.1 mm	IP67 NEMA 6P	Thermoplastic Polyester	10 to 30 V dc 90 to 250 V ac 24 to 250 V ac 12 to 250 V dc
	Q60 Laser or LED sensor for low reflectivity targets, regardless of background. page 88	Adjustable-Field: Laser Adjustable-Field:		75 x 25 x 60 mm	IP67 NEMA 6	ABS	10 to 30 V dc 12 to 250 V dc 24 to 250 V ac
	PicoDot® The PicoDot® is a convergent-mode laser sensor with extreme precision. Page 92	Laser Polarized Retro: Laser Convergent:		PD45: 40.6 x 45.6 x 12.7 mm PD49: 42.7 x 49.1 x 15.2 mm	PD45: IP54 PD49: IP67	ABS	10 to 30 V dc
	QM42 & QMT42 Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles. Page 94	QM42 Opposed: Retro Polarized: Diffuse: Adjustable-Field: Plastic Fiber: QMT42 Diffuse: Fixed-Field: Adjustable-Field:	3 m 400 mm 150 mm Varies 6 m 2 m	QM42: 42 x 12.7 x 42 mm QMT42: 58 x 18 x 42 mm	IP67 NEMA 6	Die-cast Zinc Alloy	10 to 30 V dc

MINI-BEAM® Series

Complete Line of Industry Standard Sensors



- AC, DC or universal models available
- Infrared or visible red, green, blue or white sensing beam
- Industry standard mounting holes
- Easy push-button TEACH-mode setup available

Euro-Style
Straight connector models listed;
for right-angle, add RA to the end
of the model number
(example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30') 5-Pin MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

Micro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA) 3-Pin MQDC-306 2 m (6.5') MQDC-315 5 m (15') MQDC-330 9 m (30')

NAMUR Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQD9-406RA)

4-Pin MQD9-406 2 m (6.5') MQD9-415 5 m (15')

Additional cordset information is available See page 758



SMB18A SMB18FA..



SMB18SF



SMB312B



SMB3018SC

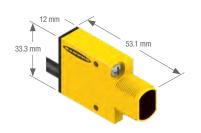
Additional bracket information is available See page 722



Additional information is available See page 790 Apertures



Additional information is available See page 816 Visit Bannerengineering.com for more information on this and other products



MINI-BEAM DC Opposed, Retroreflective, Diffuse and Convergent Models Suffix E, R, EPD, RPD, D, LV, LP, C, C2, CV, CV2, CVB, CV2B, CVG and CV2G



MINI-BEAM DC Diffuse Models Suffix DBZ and W



MINI-BEAM DC Glass Fiber Models Suffix F, FV, FVG and FVB



MINI-BEAM DC Plastic Fiber Models Suffix FP, FPG and FPB



MINI-BEAM AC & Expert Opposed, Retroreflective, Diffuse and Convergent Models Suffix E, R, EPD, RPD, D, DV, LV, LP, C, CV, CV2, CVG, CVB and CVW



MINI-BEAM NAMUR Retroreflective, Diffuse, Opposed and Convergent Models Suffix E, R, LV, D and CV



MINI-BEAM AC, Expert & NAMUR Diffuse Models Suffix DBZ and W



MINI-BEAM AC, Expert & NAMUR Glass Fiber Models Suffix F and FV



MINI-BEAM AC, Expert & Plastic Fiber Models Suffix FP

Q25 Series

Right-Angle Base-Mount Rectangular Sensors



- Completely epoxy-encapsulated for use in harsh sensing environments
- Available in opposed, retroreflective and fixed-field modes
- Available in 10-30 V dc or 20-250 V ac
- Wide operating range from -40° to +70° C
- Models rated to IP67 and IP69K to withstand harsh washdown environments



Euro-Style Straight connector models listed; for right-angle, add RA to the end

of the model number (example, MQDC-406RA)

MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')

Additional cordsett information is available See page 758



MQDC-306RA)

MQAC-406 2 m (6.5') MQAC-415 5 m (15') MQAC-430 9 m (30')



Additional bracket information is available See page 722



Q25 Opposed, Retroreflective and Fixed-Field Models Suffix E, R, LP, and FF

Q25 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Fixed-Field: 35 mA				
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.				
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA OFF-state leakage current: less than 1 μA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc				
Output Response Time	Opposed: 3 milliseconds ON, 1.5 milliseconds OFF Polarized Retroreflective and Fixed-Field: 3 milliseconds ON/OFF				
Delay at Power-up	100 milliseconds; outputs do not conduct during this time				
Repeatability	Opposed: 375 microseconds Polarized Retroreflective and Fixed-Field: 750 microseconds Repeatability and response are independent of signal strength				
Indicators	Two LEDs: Green and Yellow Green: Power ON Green Flashing: output overload Yellow: Light Operate (LO) output energized Yellow Flashing: marginal gain				
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.				
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	CE ® ULISTED ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details				

Q25 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz) Average current: 20 mA Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac				
Output Configuration	Solid-state ac switch; three-wire hookup; Choose Light Operate (LO) or Dark Operate (DO), depending on model Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark				
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 µA ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac				
Output Response Time	Opposed: 16 milliseconds ON, 8 milliseconds OFF Polarized Retroreflective and Fixed-Field: 16 milliseconds ON/OFF				
Delay at Power-up	100 milliseconds				
Repeatability	Opposed: 2 milliseconds; Polarized Retroreflective and Fixed-Field: 4 milliseconds Repeatability and response are independent of signal strength.				
Indicators	Two LEDs: Green and Yellow Solid Green: Power ON Solid Yellow: Light sensed Yellow Flashing: marginal gain				
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.				
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	(€ ∰ ® ∰				

Q40 Series





- Reliable sensing without adjustments
- Completely epoxy-encapsulated for superior durability
- Long-range sensing in harsh environments
- Available in 10-30 V dc or 20-250 V ac
- Available in opposed, retroreflective and fixed-field modes
- Cordsets and brackets see page 82

Opposed Q40, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
60 m	60 m	2 m	Q406E Emi	tter
	60 III	4-Pin Euro QD	Q406EQ Emitter	
		2 m	Q40SN6R	Q40SP6R
OLLOSED	60 m	4-Pin Euro QD	Q40SN6RQ	Q40SP6RQ

Polar Retro Q40, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
P	6 m [†]	2 m	Q40SN6LP	Q40SP6LP
POLAR BETRO	6 m	4-Pin Euro QD	Q40SN6LPQ	Q40SP6LPQ

Fixed-Field Q40, 10-30 V DC



0 - 200 Cutoff 0 - 400 Cutoff	Range	Connection	Models NPN	Models PNP
	0 - 200 mm	2 m	Q40SN6FF200	Q40SP6FF200
	Cutoff	4-Pin Euro QD	Q40SN6FF200Q	Q40SP6FF200Q
	0 - 400 mm	2 m	Q40SN6FF400	Q40SP6FF400
	Cutoff	4-Pin Euro QD	Q40SN6FF400Q	Q40SP6FF400Q
	0 - 600 mm	2 m	Q40SN6FF600	Q40SP6FF600
	Cutoff	4-Pin Euro QD	Q40SN6FF600Q	Q40SP6FF600Q

For more specifications see page 82.

Connection options: A model with a QD requires a mating cordset (see page 82)

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q40SN6R W/30).

† Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Opposed Q40, 20-250 V AC



Sensing Mode	Range	Connection	Models LO	Models DO
60	60 m	2 m	Q403E Emitter	
	00111	4-Pin Micro QD	Q403EQ1 Em	itter
OPPOSED 60	60 m	2 m	Q40AW3R	Q40RW3R
	00111	4-Pin Micro QD	Q40AW3RQ1	Q40RW3RQ1

Polar Retro Q40, 20-250 V AC



Sensing Mode	Range	Connection	Models LO	Models DO
P	2 m	Q40AW3LP	Q40RW3LP	
POLAR RETRO	6 m ^t	4-Pin Micro QD	Q40AW3LPQ1	Q40RW3LPQ1

Fixed-Field Q40, 20-250 V AC



Sensing Mode	Range	Connection	Models LO	Models DO
Conomig Mode	riange	Comicotion		
	0 - 200 mm	2 m	Q40AW3FF200	Q40RW3FF200
	Cutoff	4-Pin Micro QD	Q40AW3FF200Q1	Q40RW3FF200Q1
	0 - 400 mm	2 m	Q40AW3FF400	Q40RW3FF400
FIXED-FIELD	Cutoff	4-Pin Micro QD	Q40AW3FF400Q1	Q40RW3FF400Q1
	0 - 600 mm	2 m	Q40AW3FF600	Q40RW3FF600
	Cutoff	4-Pin Micro QD	Q40AW3FF600Q1	Q40RW3FF600Q1

For more specifications see page 82.

Connection options: A model with a QD requires a mating cordset (see page 82).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q40SN6R W/30).

† Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Euro-Style

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')

Micro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA)

MQAC-406 2 m (6.5') MQAC-415 MQAC-430 9 m (30')

Additional cordset information is available See page 758



SMB30A



SMB30FA..





SMB30SC

SMBAMS30P

Additional bracket information is available See page 722



Opposed, Polarized Retroreflective and Fixed-Field Models Suffix E, R, LP and FF

Reflectors



Additional information is available See page 790

Apertures



Additional information is available See page 816

Q40 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Fixed-Field: 35 mA		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply		
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA OFF-state leakage current: less than 1 µA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc		
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs		
Output Response Time	Opposed: 3 milliseconds ON; 1.5 milliseconds OFF Polarized Retroreflective and Fixed-Field: 3 milliseconds ON/OFF		
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time		
Repeatability	Opposed: 375 microseconds Polarized Retroreflective and Fixed-Field: 750 microseconds Repeatability and response are independent of signal strength		
Indicators	Two LEDs: Green and Yellow Solid Green: Power ON Solid Yellow: Light Operate (LO) output energized See datasheet for detailed information Flashing Green: Output over loaded Flashing Yellow: Marginal excess gain		
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.		
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.		
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 82.		
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)		
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)		
Certifications	€ COLAB® chemical compatibility pending on some models; contact Banner Engineering for details		



SLOT & AREA | MINIATURE | FIBER OPTIC

Q40 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz) Average current: 20 mA Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac		
Supply Protection Circuitry	Protected against transient voltages		
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark		
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 μA ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac		
Output Protection Circuitry	Protected against false pulse on power-up		
Output Response Time	Opposed: 16 milliseconds ON; 8 milliseconds OFF Polarized Retroreflective and Fixed-Field: 16 milliseconds ON/OFF		
Delay at Power-up	100 milliseconds		
Repeatability	Opposed: 2 milliseconds Polarized Retroreflective and Fixed-Field: 4 milliseconds Repeatability and response are independent of signal strength		
Indicators	Two LEDs: Green and Yellow Solid Green: Power ON Solid Yellow: Light sensed Flashing Yellow: magrinal excess gain See datasheet for detailed information		
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.		
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.		
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 82.		
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)		
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)		
Certifications	C E USTED ® ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details		

Q45 Series

Adjustable Output Timing Logic



- The Q45 Standard sensor is available in multiple sensing modes to suit many application needs.
- Opposed, retroreflective, diffuse, convergent, laser and glass and plastic fiber optic modes
- Electromechanical or solid-state options
- Rugged design rated to IP67 to withstand 1200 psi washdown



Euro-Style

Mini-Style

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.5" MQDC-415 5 m (15') MQDC-430

9 m (30')

5-Pin MQDC1-506 2 m (6.5') MQDC1-515 MQDC1-530 9 m (30')

Straight connector models only

3-Pin MBCC-306 2 m (6.5') MBCC-315 5 m (15') MBCC-330 9 m (30')

4-Pin MBCC-406 2 m (6.5') MBCC-415 5 m (15') MBCC-430 9 m (30')

5-Pin MBCC-506 2 m (6.51) MBCC-515 5 m (15') MBCC-530 9 m (30')

Micro-Style Straight connector models listed;

for right-angle, add RA to the end of the model number (example, MQAC-406RA)

Straight connector models listed;

for right-angle, add RA to the end

MQAC-406 2 m (6.51) MQAC-415 MQAC-430 9 m (30')

4-Pin



MQD9-406 2 m (6.5') MQD9-415 5 m (15')

4-Pin

Additional cordset information is available See page 758



SMB30A



SMB30FA..



SMB30SC

Additional bracket information is available See page 722



NAMUR

Euro-Style

of the model number

(example, MQD9-406RA)



Additional information is available See page 790

Apertures



Additional information is available See page 816

Q45 Specifications

Visit Bannerengineering.com for more information on this and other products



Opposed, Retroreflective and Diffuse Models Suffix E, R, D, DL, DX, LV and LP



Convergent Models Suffix CV and CV4



Retroreflective Laser Models Suffix LL and LLP

OTHER AVAILABLE MODELS







Wireless Q45 page 512

Plastic Fiber Q45 see website Glass Fiber Q45 see website

Q45 Wireless





- Improve efficiency by monitoring and coordinating multiple machines and processes without pulling cables
- 1 km line-of-sight
- Built-in antenna
- 2.4 GHz unlicensed frequency
- Used exclusively with Banner's DX80 Gateway (see page 512)

Retroflective Q45 Wireless → Visible Red LED				
Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
POLAR RETRO	6 m	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45LP
Diffuse Q45 \	Wireless			→ Visible Red LED
Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
DIFFUSE	300 mm	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45D
Convergent	Q45 Wireless			Visible Red LED
Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
CONVERGENT	38 mm	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45CV

Fiber Optic Q45 Wireless

				VISIDIE NEU LLD
Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
GLASS FIBER	varies by selected fiber	1,000 m (with line of sight)	Discrete output via gateway	DX80N2Q45F

→ Vicible Red I FD

Q45 Wireless Specifications

Visit Bannerengineering.com for more information on this and other products



OTHER AVAILABLE MODELS





Plastic Fiber Q45 see website Glass Fiber Q45 see website

Visible Red Laser

Q60 Series



Long-Range, Adjustable-Field Sensors

- Detects objects with a defined sensing field, ignoring objects located beyond the sensing point
- Output timing ON/OFF
- Available in 10-30 V dc, 12-250 V dc or 24-250 V ac
- Features two-turn, logarithmic adjustment of sensing field cutoff point from 0.2 to 2 m
- Easy push-button or remote programming of output timing
- Cordsets and brackets see page 90

Adjustable-Field Q60, 10-30 V DC Infrared LED Visible Red LED Connection **Output Type** Sensing Mode Range Models 2 m Q60BB6AFV1000 Min.: 65 - 130 mm[†] Bipolar Cutoff: 200 - 1000 mm NPN/PNP 5-Pin Euro QD Q60BB6AFV1000Q Q60BB6AF2000 Min.: 50 - 125 mm[†] Bipolar Cutoff: 200 - 2000 mm NPN/PNP 5-Pin Euro QD Q60BB6AF2000Q ADJUSTABLE-FIFLD

Laser Adjustable-Field Q60, 10-30 V DC

Sensing Mode	Range	Connection	Output Type	Models
CLASS 1 LASER	Min.: 100 - 260 mm [†] Cutoff: 200 - 1400 mm	2 m	Bipolar NPN/PNP	Q60BB6LAF1400
LASER ADJUSTABLE-FIELD		5-Pin Euro QD		Q60BB6LAF1400Q
CLASS 2 LASER	Min.: 75 - 240 mm [†]	2 m	Bipolar	Q60BB6LAF2000
LASER ADJUSTABLE-FIELD	Cutoff: 200 - 2000 mm	5-Pin Euro QD	NPN/PNP	Q60BB6LAF2000Q

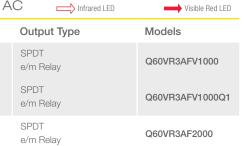
For more specifications see page 91.

Connection options: A model with a QD requires a mating cordset (see page 90).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q60BB6AF2000 W/30).

† Minimum range varies by established cutoff point (see excess gain curves, page 142 and cutoff point deviation curves, page 143).

Adjustable-Field Q60, 12-250 V DC or 24-250 V AC





Sensing Mode

Min.: 50 - 125 mm[†] Cutoff: 200 - 2000 mm

Min.: 65 - 130 mm[†] Cutoff: 200 - 1000 mm

Range

SPDT 4-Pin Micro QD e/m Relay

Connection

4-Pin Micro QD

2 m

Q60VR3AF2000Q1

Laser Adjustable-Field Q60, 12-250 V DC or 24-250 V AC

	Visible	Red	Laser
775	VIOIDIG	1164	Lusti

Sensing Mode	Range	Connection	Output Type	Models
CLASS 1 LASER	Min.: 100 - 260 mm [†] Cutoff: 200 - 1400 mm	2 m	SPDT e/m Relay	Q60VR3LAF1400
LASER ADJUSTABLE-FIELD		4-Pin Micro QD	SPDT e/m Relay	Q60VR3LAF1400Q1
CLASS 2 LASER LASER ADJUSTABLE-FIELD	Min.: 75 - 240 mm [†] Cutoff: 200 - 2000 mm	2 m	SPDT e/m Relay	Q60VR3LAF2000
		4-Pin Micro QD	SPDT e/m Relay	Q60VR3LAF2000Q1

For more specifications see page 91.

Connection options: A model with a QD requires a mating cordset (see page 90).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q60VR3AFV1000 W/30).

† Minimum range varies by established cutoff point (see excess gain curves, page 142 and cutoff point deviation curves, page 143).

Euro-Style
Straight connector models listed;
for right-angle, add RA to the end

Additional cordset information is available

of the model number (example,

MQDC1-506RA)

See page page 758

5-Pin MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

Micro-Style
Straight connector models listed;
for right-angle, add RA to the end
of the model number (example,
MQAC-406RA)

4-Pin MQAC-406 2 m (6.5') MQAC-415 5 m (15') MQAC-430 9 m (30')



Adjustable-Field Models Suffix AF, AFV and LAF







SMBAMSQ60IP SMBA

SMBAMSQ60P SMBQ60

Additional bracket information is available See page page 722



Class 1 Lasers

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing, Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- Locate open laser beam paths either above or below eye level, where practical



Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- Locate open laser beam paths either above or below eye level, where practical

Q60 Specifications

Supply Voltage and Current	Q60BB6AF and Q60BB6AFV models: 10 to 30 V dc (10% max. ripple) at less than 50 mA exclusive of load Q60BB6LAF models: 10 to 30 V dc (10% max. ripple) at less than 35 mA exclusive of load Q60VR3LAF and Q60VR3AFV Universal models: 12 to 250 V dc or 24 to 250 V ac, 50/60 Hz Input power 1.5 W max.		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages (Q60VR3 model's dc hookup is without regard to polarity)		
Output Configuration	Q60BB6AF, Q60BB6AFV and Q60BB6LAF models: Bipolar: one NPN (current sinking) and one PNP (current sourcing) open-collector transistor Q60VR3AF, Q60VR3LAF and Q60VR3AFV cabled models: E/M Relay (SPDT), normally closed and normally open contacts Q60VR3AFQ1, Q60VR3AFVQ1 and Q60VR3LAFQ1 (QD) models: E/M Relay (SPST), normally open contact		
Output Rating	DC models:150 mA max. each output @ 25 °C OFF-state leakage current: less than 5 µA @ 30 V dc Output saturation NPN: less than 200 mV @ 10 mA; less than 1 V @ 150 mA Output saturation PNP: less than 1 V at 10 mA; less than 1.5 V at 150 mA Universal Voltage models: Min. voltage and current: 5 V dc, 10 mA Mechanical life of relay: 50,000,000 operations Electrical life of relay at full resistive load: 100,000 operations Max. switching power (resistive load): Cabled models: 1250 VA, 150 W Max. switching voltage (resistive load): Cabled models: 250 V ac, 125 V dc Max. switching current (resistive load): Cabled models: 5 A @ 250 V ac, 5 A @ 30 V dc derated to 200 mA @ 125 V dc QD models: 3 A @ 250 V ac, 3 A @ 30 V dc derated to 200 mA @ 125 V dc		
Output Protection Circuitry	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: Protected against continuous overload or short circuit of outputs All models: Protected against false pulse on power-up		
Output Response Time	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: 2 milliseconds ON/OFF Q60VR3AF, Q60VR3LAF and Q60VR3AFV Universal models: 15 milliseconds ON/OFF		
Delay at Power-up	150 milliseconds (Q60BB6LAF has 1 second max.); outputs do not conduct during this time		
Repeatability	500 microseconds		
Sensing Hysteresis	2000 mm cutoff - less than 3% of set cutoff distance 1600 mm cutoff - less than 2.25% of set cutoff distance 1200 mm cutoff - less than 1.30% of set cutoff distance 1200 mm cutoff - less than 0.25% of set cutoff distance		
Adjustments	2 momentary push buttons: ON-delay and OFF-delay ON Delay select: 8 milliseconds to 16 seconds OFF Delay select: 8 milliseconds to 16 seconds Push-button lockout: for security Slotted, geared, 2-turn, cutoff range adjustment screw (mechanical stops on both ends of travel)		
Indicators NOTE: Outputs are active during	Q60AF, Q60AFV and Q60LAF models: ON-Delay OFF-Delay Green ON Steady: Run mode, OFF-delay is active Green ON Steady: Run mode, OFF-delay is active 5-Segment Light Bar*: Indicates relative delay time during ON/OFF-delay Selection mode is active 5-Segment Light Bar*: Indicates relative delay time during ON/OFF-delay Selection modes Output Outpu		
on/off timing selection mode.	*Output, Dark Operate, Lockout, Light Operate and Signal indicators function as 5-Segment Light Bar during ON/OFF-delay Selection modes		
Laser Characteristics	Spot Size: approximately 4 x 2 mm throughout range (collimated beam) Angle of Divergence: 5 milliradians NOTE: Contact factory for custom laser spot size.		
Construction	Housing: ABS polycarbonate blend Lens: acrylic Cover: Clear ABS		
Environmental Rating	IEC IP67; NEMA 6		
Connections	2 m or 9 m integral cable. DC models offer a 5-pin Euro-style QD fitting. AC models offer 4-pin Micro-style QD fitting. QD cordsets are ordered separately. See page 90.		
Operating Conditions	Temperature: Q60BB6LAF (DC) models: -10° to +50° C Q60VR3LAF Universal models: -10° to +45° C All others: -20° to +55° C Relative humidity: 90% at 50° C (non-condensing)		
Certifications	(€ c¶ us		

Visible Red LED





Laser Precision Sensors

- Convergent-mode laser sensor delivers precise position detection, inspection and counting
- Powerful retroreflective models offer long-range retroreflective sensing and have a precise, narrow beam to sense small objects at close range or larger objects at 10.6 m
- Convergent models have precise 0.25 mm beam width and ignore objects beyond the maximum sensing distance
- All models have a gain sensitivity potentiometer for fine tuning sensor performance
- Models available with environmentally sealed housing

Laser Polar Retro PicoDot®, 10-30 V DC

CLASS 2





Suffix LLP and C..



Suffix LLP and C.

Laser Convergent PicoDot®, 10-30 V DC



Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, PD45VN6LLP W/30).

Tested using a BRT-51X51BM retro target (included with each sensor). Actual range depends on the efficiency and size of the retroreflective target. Some targets have produced ranges up to 40 m



Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC1-506RA)

See page page 758

5-Pin MDDC-501.5 .5 m (1.6') MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')



SMB46A







SMB46U

SMB46S S

SMB46L

Additional bracket information is available See page page 723

Class 2 Laser Safety Notes

Additional cordset information is available

Low-power lasers are by definition incapable of causing eye injury within the duration of the blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 - 700 nm). Therefore, an ocular hazard can exist only if an individual overcomes their natural aversion to bright light and stares directly into the laser beam.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- The beam emitted by a Class 2 laser product should be terminated at the end of its useful path. Open laser beam paths should be located above or below eye level where practical.



PicoDot® Specifications

'			
Supply Voltage and Current	10 to 30 V dc (10% max ripple) at less than 20 mA, exclusive of load		
Beam Size at Aperture	3.75 x 1.85 mm (Retroreflective Models)		
Beam Divergence	Approx. 1 milliradian (Retroreflective Models)		
Laser Classification	Class 2 safety (CDRH (FDA) 1040.10 and IEC 60875-1)		
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages		
Delay at Power-up	< 1 second		
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models		
Output Rating	150 mA max. (each output) OFF-state leakage current: less than 1 μA at 30 V dc ON-state saturation voltage: less than 0.3 V at 10 mA dc; less than 0.8 V at 150 mA dc		
Output Protection	Protected against continuous overload or short-circuit of outputs; Overload trip point ≥ 220 milliamps		
Output Response Time	0.2 milliseconds (200 microseconds) ON/OFF		
Repeatability	50 microseconds; Rep Rate 20 KHz		
Spot Size at Focus	0.25 mm		
Range	C50 models: 25 to 58 mm; focus at 50 mm ± 5 mm C100 models: 25 to 115 mm; focus at 102 mm ± 5 mm C200 models: 25 to 216 mm; focus at 203 mm ± 5 mm LLP models: 0.2 to 10.6 m, using supplied retroreflective target		
Adjustments	12-turn slotted brass Gain (sensitivity) adjustment potentiometer		
Extinguishing Wire	Gray wire held "low" for laser operation; "high" to turn laser OFF; Low ≤ 1.0 V dc; High ≥ Vsupply -4.0 V dc (< 30 V dc) or disconnect wire; 100 milliseconds delay upon enable		
Indicators	Two LEDs: Solid Green: Power ON Flashing Green: output overloaded Solid Yellow: Light sensed; Light Operate (LO) output conducting See datasheet for detailed information Flashing Yellow: marginal excess gain		
Construction	PD45: Housings are heat-resistant ABS, UL94-VO rated; acrylic lens cover PD49: Housings are sealed, heat resistant ABS/polycarbonate alloy, UL94-VO rated, acrylic lens cover		
Environmental Rating	PD45: IP54; NEMA 3 PD49: IP67; NEMA 6		
Connections	2 m or 9 m attached cable, or 5-pin Euro-style 150 mm pigtail quick-disconnect fitting; mating cordsets for QD models are ordered separately.		
Operating Conditions	Temperature: -10° to +45° C Relative humidity: 90% at 50° C (non-condensing)		
Weight	PD45: Sensor only: 22 g Sensor plus 2 m cable: 62 g Sensor plus 2 m cable: 68 g		
Application Notes	False pulse may occur less than 1 second after power-up		
Certifications	CE		





Rectangle Sensor with Mounting Versatility

- Versatile sensor with several mounting options
- Meets IP67 and NEMA 6 standards for harsh environment
- Universal housing design
- Cordsets and brackets see page 96

Opposed QM42, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
10 m	2 m	QM426E Emitter		
	4-Pin Euro QD	QM426EQ Er	mitter	
	2 m	QM42VN6R	QM42VP6R	
	4-Pin Euro QD	QM42VN6RQ	QM42VP6RQ	

Polar Retro QM42, 10-30 V DC



Sensing Mode Range	sing Mode Range Connection		Models PNP
P 3 m ^t	2 m	QM42VN6LP	QM42VP6LP
POLAR RETRO	4-Pin Euro QD	QM42VN6LPQ	QM42VP6LPQ

Diffuse QM42, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
400 mm	400 mm	2 m	QM42VN6D	QM42VP6D
	400 111111	4-Pin Euro QD	QM42VN6DQ	QM42VP6DQ

Adjustable-Field QM42, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
Cut (adj	5 mm to Cutoff point	2 m	QM42VN6AFV150	QM42VP6AFV150
	(adjustable from 50 to 150 mm)	4-Pin Euro QD	QM42VN6AFV150Q	QM42VP6AFV150Q



QM42 Opposed, Retroreflective, Short-range Diffuse, and Short-range Adjustable-Field Model Suffix E, R, LP, D, AFV150 and FP For more specifications see page 97.

Connection options: A model with a QD requires a mating cordset (see page 96).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QM42VN6 LP W/30). † Tested using a BRT-3 retroreflector. Actual range depends on the efficiency and reflective area of the retroreflector in use. See Accessories for more information.



QMT42 Series

Rectangle Sensor with Mounting Versatility

- Versatile sensor with several mounting options
- Meets IP67 and NEMA 6 standards for harsh environment
- Universal housing design
- All-purpose, go-to sensor for many application needs
- Cordsets and brackets see page 96

Diffuse QMT42, 10-30 V DC



Sensing Mode	Sensing Mode Range Connection		Models NPN	Models PNP
DIFFUSE	40	2 m	QMT42VN6DX	QMT42VP6DX
	10 mm - 6 m	4-Pin Euro QD	QMT42VN6DXQ	QMT42VP6DXQ

Fixed-Field QMT42, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	50 - 500 mm	2 m	QMT42VN6FF500	QMT42VP6FF500
FIXED-FIELD	Cutoff	4-Pin Euro QD	QMT42VN6FF500Q	QMT42VP6FF500Q
	50 - 750 mm	2 m	QMT42VN6FF750	QMT42VP6FF750
FIXED-FIELD	Cutoff	4-Pin Euro QD	QMT42VN6FF750Q	QMT42VP6FF750Q
	50 - 1000 mm	2 m	QMT42VN6FF1000	QMT42VP6FF1000
FIXED-FIELD	Cutoff	4-Pin Euro QD	QMT42VN6FF1000Q	QMT42VP6FF1000Q
	50 - 1500 mm	2 m	QMT42VN6FF1500	QMT42VP6FF1500
FIXED-FIELD Cutoff	Cutoff	4-Pin Euro QD	QMT42VN6FF1500Q	QMT42VP6FF1500Q
	50 - 2000 mm	2 m	QMT42VN6FF2000	QMT42VP6FF2000
FIXED-FIELD	Cutoff	4-Pin Euro QD	QMT42VN6FF2000Q	QMT42VP6FF2000Q

Adjustable-Field QMT42, 10-30 V DC

Sensing Mode	Range	Connection	Models NPN	Models PNP
	25 mm to Cutoff point	2 m	QMT42VN6AFV400	QMT42VP6AFV400
FIXED-FIELD	(adjustable from 125 to 400 mm)	4-Pin Euro QD	QMT42VN6AFV400Q	QMT42VP6AFV400Q

For more specifications see page 97.

Connection options: A model with a QD requires a mating cordset (see page 96). For 9 m cable, add suffix W/30 to the 2 m model number (example, QM42VN6LP W/30).



QMT42 Long-range Diffuse, Fixed-Field and Adjustable-Field Model Suffix DX, FF and AFV400



Euro-Style
Straight connector models listed;
for right-angle, add RA to the end of the model number (example, MQDC-406RA)

4-Pin
MQDC-406
2 m (6.5')
MQDC-415
5 m (15')
MQDC-415
9 m (30')







SMB30SK

SMB46S

SMB46L

Additional cordset information is available See page page 758 Additional bracket information is available See page page 723





Additional information is available See page page 790

Apertures



Additional information is available See page page 816

QM42 and QMT42 Specifications

Sensing Beam	Opposed, Diffuse, Retroreflective, Fixed-Field and Fiber Optic: Infrared, 880 nm; Visible Red, 660 nm Adjustable-Field: Visible Red, 680 nm
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than: Opposed: 30 mA (emitter), 10 mA (receiver) Short-range diffuse and retroreflective: 20 mA Fiber optic: 30 mA Adjustable-Field: 50 mA Fixed -Field and long-range diffuse: 40 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models
Output Rating	100 mA max. (each output) OFF-state leakage current: less than 5 μA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 100 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 150 mA, typical at 20° C
Output Response Time	Opposed: 1 millisecond ON; 0.5 millisecond OFF Diffuse, Retroreflective, Adjustable-Field and Fixed-Field: 1 millisecond ON/OFF Plastic Fiber Optic: 0.25 millisecond ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	Opposed: 120 microseconds Diffuse, Retroreflective, Adjustable-Field and Fixed-Field: 250 microseconds Fiber Optic: 60 microseconds. Repeatability and response are independent of signal strength
Sensing Hysteresis	Long-range diffuse: less than 20% of set sensing distance Adjustable-Field: less than 7% of set cutoff distance Fixed-Field: 2000 mm models – less than 5% of set cutoff distance 1500 mm models – less than 4% of set cutoff distance 1000 mm models – less than 3% of set cutoff distance 750 mm models – less than 2% of set cutoff distance 500 mm models – less than 1% of set cutoff distance
Cutoff Point Tolerance	Fixed-Field: ±10% of nominal cutoff distance
Adjustments	All models (except emitters, Adjustable-Field, Fixed-Field and Long-range Diffuse): 15-turn slotted brass GAIN (sensitivity) adjustment potentiometer 150 mm Adjustable-Field: 12-turn slotted brass cutoff distance adjustment potentiometer 400 mm Adjustable-Field: 15-turn slotted brass cutoff distance adjustment potentiometer Long-range diffuse: 4-turn slotted GAIN (sensitivity) adjustment potentiometer Fixed-Field: No adjustments See datasheet for detailed information
Indicators	Two LEDs: Green and Yellow Solid Green: Power ON; Opposed emitters: Green power ON Green Flashing: output overloaded Solid Yellow: Light sensed; Light Operate (LO) Yellow Flashing: marginal excess gain See datasheet for detailed information
Construction	Housings are die-cast zinc alloy with black acrylic polyurethane finish; lenses are acrylic
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 96.
Operating Conditions	Temperature: Long-range Diffuse, Adjustable-Field and Fixed-Field: -20° to +55° C All others: -20° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Certifications	C € c 71 °us

BARREL



Right Angle

Right angle sensors offer industry standard 8, 18 and 30 mm barrel mounting options. The right angle housing allows mounting in confined areas, and easy viewing of LED indicators.

Series	Description	Max Sensing Rang	je	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	T8 Compact sensor provides reliable sensing without adjustments. Page 100	Opposed: Diffuse:	2 m 100 mm	19 x 16.3 x 15.8 mm	IP67; NEMA 6	ABS	10 to 30 V dc
	T18 Epoxy-encapsulated right-angle barrel sensors provide reliable sensing without adjustments. Page 102	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	20 m 2 m 2 m 500 mm 100 mm	Varies by model	QD models: IP6K Other models: IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc, 20 to 250 V ac
	TM18 Robust die-cast metal sensors provide reliable sensing without adjustments in high-pressure washdown environments. Page 106	Opposed: Polarized Retro: Diffuse: Fixed-Field:	20 m 5.5 m 500 mm 100 mm	41 x 30 x 30 mm	QD models: IP6K Other models: IP67; NEMA 6	Zinc die-cast with nickel plating	10 to 30 V dc
	T30 Compact sensor provides reliable sensing without adjustments. Page 110	Opposed: Polarized Retro: Fixed-Field:	60 m 6 m 600 mm	51.5 x 40 x 44.8 mm	QD models: IP6K Other models: IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc, 20 to 250 V ac

OTHER AVAILABLE MODELS









T8 Series



Self-Contained, Right-Angle Barrel-Mount

- Powerful optics
- Short-range background suppression
- Highly visible red sensing beam for easy alignment
- Easily replaces range-limited 8 mm inductive proximity sensors

Opposed T8

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
		2 m		T86EV Em	itter
		3-Pin Pico Pigtail QD	_	T86EVQ E	mitter
	2 m	2 m	LO	T8AN6R	T8AP6R
OPPOSED		3-Pin Pico Pigtail QD		T8AN6RQ	T8AP6RQ
OTT OOLD		2 m	DO	T8RN6R	T8RP6R
		3-Pin Pico Pigtail QD	DO	T8RN6RQ	T8RP6RQ

Diffuse T8

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
		2 m	10	T8AN6D50	T8AP6D50
\longrightarrow	50 mm	3-Pin Pico Pigtail QD	LO	T8AN6D50Q	T8AP6D50Q
DIFFUSE	30 11111	2 m	DO	T8RN6D50	T8RP6D50
		3-Pin Pico Pigtail QD	DO	T8RN6D50Q	T8RP6D50Q
	100 mm	2 m	LO	T8AN6D100	T8AP6D100
DIFFUSE		3-Pin Pico Pigtail QD	LO	T8AN6D100Q	T8AP6D100Q
		2 m	DO	T8RN6D100	T8RP6D100
		3-Pin Pico Pigtail QD	DO	T8RN6D100Q	T8RP6D100Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T8AN6D50 W/30).

Pico-Style

Pico-Style
Straight connector models listed;
for right-angle, add RA to the end
of the model number (example,
PKG3M-2RA)

Additional cordset information is available See page 758

PKG3M-2 2 m (6.5') PKG3M-5 5 m (16.4') PKG3M-7 7 m (22.9')

4-Pin PKG3M-99 m (29.5') **PKG3M-10**10 m (32.8')



SMB8MM

Additional bracket information is available See page 723



Opposed and Diffuse Models Suffix E, R and D

T8 Specifications

18 Specifications				
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)			
Supply Protection Circuitry	Protected against reverse polarity and transient voltages			
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model. Light Operate (LO) or Dark Operate (DO), depending on model			
Output Rating	50 mA max. OFF-state leakage current: less than 1 μA at 24 V dc ON-state saturation voltage: less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc			
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA			
Output Response Time	1 millisecond ON; 0.5 milliseconds OFF			
Delay at Power-up	Maximum 100 milliseconds (150 milliseconds for Diffuse); output does not conduct during this time			
Repeatability	Opposed: 100 microseconds Diffuse: 160 microseconds			
Indicators	Opposed: Receiver has Green and Red LED Emitter has one Green LED Solid Green: power ON Solid Red: light sensed Diffuse: Red: light is sensed Receiver has Green and Red LED Flashing green: output overloaded Yellow flashing: marginal excess gain			
Construction	Reinforced polycarbonate/ABS alloy housing, acrylic window with 8 mm ABS nut			
Environmental Rating	IEC IP67; NEMA 6			
Operating Conditions	Temperature: -20° to +55° C Relative humidity: 80% at 50° C (non-condensing)			
Vibration and Mechanical Shock	Vibration: All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak Shock: All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape			
Certifications	CE			

T₁₈ Series



Self-Contained Sensors

- Completely epoxy-encapsulated barrel-mount sensors
- Design rated NEMA 6P, IP67
- Wide operating range from -40° C to +70° C
- Advanced diagnostics warn of marginal sensing conditions or output overload
- Cordsets and brackets see page 104

Opposed T18, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
OPPOSED	20 m	2 m	T186E Em	itter
		4-pin Euro QD	T186EQ E	mitter
		2 m	T18SN6R	T18SP6R
		4-pin Euro QD	T18SN6RQ	T18SP6RQ

Retro & Polar Retro T18, 10-30 V DC





Sensing Mode	Range	Connection	Models NPN	Models PNP
RETRO	2 m [†]	2 m	T18SN6L	T18SP6L
		4-pin Euro QD	T18SN6LQ	T18SP6LQ
POLAR RETRO	2 m [†]	2 m	T18SN6LP	T18SP6LP
		4-pin Euro QD	T18SN6LPQ	T18SP6LPQ
D'11 T40 44	001150			

Diffuse T18, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
500 mm	500	2 m	T18SN6D	T18SP6D
	4-pin Euro QD	T18SN6DQ	T18SP6DQ	

Fixed-Field T18, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
		2 m	T18SN6FF25	T18SP6FF25
FIXED-FIELD	0 - 25 mm Cutoff	4-pin Euro QD	T18SN6FF25Q	T18SP6FF25Q
	0 - 50 mm Cutoff	2 m	T18SN6FF50	T18SP6FF50
FIXED-FIELD		4-pin Euro QD	T18SN6FF50Q	T18SP6FF50Q
FIXED-FIELD	0 - 100 mm Cutoff	2 m	T18SN6FF100	T18SP6FF100
		4-pin Euro QD	T18SN6FF100Q	T18SP6FF100Q

For more specifications see page 105

Connection options: A model with a QD requires a mating cordset (see page 104).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T18SN6L W/30).

[†] Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of theretroreflector used. See Accessories section for more information.

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of theretroreflector used.

See Accessories section for more information.



Euro-Style Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.51) MQDC-415 5 m (15') MQDC-430 9 m (30')

Micro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA)



Additional cordset information is available See page 758







SMB18A

SMBAMS18P

SMB1815SF

SMB18FM

Additional bracket information is available See page 723



Additional information is available See page 790

Apertures



Additional information is available See page 816



DC Sensors (all models)



AC Sensors (all models)

T18 Specifications

Supply Voltage and Current	T18 DC 10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Diffuse: 25 mA Non-polarized Retroreflective: 25 mA Fixed-Field: 35 mA
	T18AC 20 to 250 V ac (50/60 Hz) Average current: 20 mA Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	T18 DC Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
	T18AC Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark
Output Rating	T18 DC 150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA. OFF-state leakage current: less than 1 µA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
	T18 AC 300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 μA ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	T18 DC Opposed: 3 milliseconds ON, 1.5 milliseconds OFF Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 3 milliseconds ON/OFF T18 AC Opposed: 16 milliseconds ON, 8 milliseconds OFF Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Adjustments	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn SENSITIVITY control for adjustment of system gair
Repeatability	T18 DC Opposed: 375 microseconds Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 750 microseconds Repeatability and response are independent of signal strength T18 AC Opposed: 2 milliseconds Repeatability and response are independent of signal strength.
Indicators	Two LEDs: Solid Green: Power ON Solid Yellow: Light Operate (LO) output energized Flashing Green: output overloaded Flashing Yellow: marginal excess gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 104.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	C E ® UD ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

TM18 Series



Heavy-Duty, Right Angle, Metal Sensors

- Robust die-cast metal sensors provide reliable sensing without adjustments
- Extremely bright LED red sensing beam for easy alignment
- Quick-disconnect models available
- Fixed-field models have enhanced immunity to fluorescent lights
- Polarized/fixed-field models have crosstalk avoidance so two sensors can be in close proximity
- Cordsets and brackets see page 90

Opposed TM18



Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
		2 m		TM186E Emi	tter
		4-pin Euro QD	_	TM186EQ8 E	mitter
	20 m	2 m	LO	TM18AN6R	TM18AP6R
		4-pin Euro QD		TM18AN6RQ8	TM18AP6RQ8
OPPOSED		2 m	DO	TM18RN6R	TM18RP6R
UPPUSEU		4-pin Euro QD		TM18RN6RQ8	TM18RP6RQ8
		2 m	LO/DO	TM18VN6R	TM18VP6R
		4-pin Euro QD	LO/DO	TM18VN6RQ8	TM18VP6RQ8

Polar Retro TM18



Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
POLAR RETRO		2 m	LO	TM18AN6LP	TM18AP6LP
	5.5 m [†]	4-pin Euro QD	LO	TM18AN6LPQ8	TM18AP6LPQ8
		2 m	DO LO/DO	TM18RN6LP	TM18RP6LP
		4-pin Euro QD		TM18RN6LPQ8	TM18RP6LPQ8
		2 m		TM18VN6LP	TM18VP6LP
		4-pin Euro QD		TM18VN6LPQ8	TM18VP6LPQ8

For more specifications see page 109.

Connection options: A model with a QD requires a mating cordset (see page 108).

For 9 m cable, add suffix W/30 to the 2 m model number (example, TM186E W/30). QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 to the 2 m model number (example, TM186EQ5).

Diffuse TM18



Fived-Field TM18

Fixed-Field	TM18			-	Visible Red LED Infrared LED
Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
		2 m	LO	TM18AN6FF25	TM18AP6FF25
	0.5	4-pin Euro QD	LO	TM18AN6FF25Q8	TM18AP6FF25Q8
	25 mm	2 m	LO/DO	TM18VN6FF25	TM18VP6FF25
FIXED-FIELD		4-pin Euro QD	LO/DO	TM18VN6FF25Q8	TM18VP6FF25Q8
		2 m	LO	TM18AN6FF50	TM18AP6FF50
	FO	4-pin Euro QD	LO	TM18AN6FF50Q8	TM18AP6FF50Q8
	50 mm	2 m	LO/DO	TM18VN6FF50	TM18VP6FF50
FIXED-FIELD		4-pin Euro QD	LO/DO	TM18VN6FF50Q8	TM18VP6FF50Q8
		2 m	LO	TM18AN6FF100	TM18AP6FF100
\rightarrow	100 0000	4-pin Euro QD	LO	TM18AN6FF100Q8	TM18AP6FF100Q8
	100 mm	2 m	LO/DO	TM18VN6FF100	TM18VP6FF100
FIXED-FIELD		4-pin Euro QD		TM18VN6FF100Q8	TM18VP6FF100Q8
	25 mm	2 m	LO	TM18AN6FF25IR	TM18AP6FF25IR
		4-pin Euro QD		TM18AN6FF25IRQ8	TM18AP6FF25IRQ8
	20 111111	2 m	LO/DO	TM18VN6FF25IR	TM18VP6FF25IR
FIXED-FIELD		4-pin Euro QD	LO/DO	TM18VN6FF25IRQ8	TM18VP6FF25IRQ8
		2 m	LO	TM18AN6FF50IR	TM18AP6FF50IR
	50 mm	4-pin Euro QD	LO	TM18AN6FF50IRQ8	TM18AP6FF50IRQ8
	30 111111	2 m	LO/DO	TM18VN6FF50IR	TM18VP6FF50IR
FIXED-FIELD		4-pin Euro QD	20/20	TM18VN6FF50IRQ8	TM18VP6FF50IRQ8
		2 m	LO	TM18AN6FF100IR	TM18AP6FF100IR
	100 mm	4-pin Euro QD		TM18AN6FF100IRQ8	TM18AP6FF100IRQ
	100 11111	2 m	LO/DO	TM18VN6FF100IR	TM18VP6FF100IR
FIXED-FIELD		4-pin Euro QD	20/00	TM18VN6FF100IRQ8	TM18VP6FF100IRQ8

For more specifications see page 109.

Connection options: A model with a QD requires a mating cordset (see page 108).

For 9 m cable, add suffix W/30 to the 2 m model number (example, TM18AP6FF25 W/30). QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 to the 2 m model number (example, TM18AP6FF25Q5).



Additional cordset information is available See page 758



Additional bracket information is available See page 723





Opposed, Polar Retroreflective, Diffuse and Fixed-Field Models Suffix E, R, LP, DV and FF

SLOT & AREA | MINIATURE | FIBER OPTIC

TM18 Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple within specified limits); supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflector: 20 mA Diffuse and Fixed-Field: 35 mA				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state dc switch; NPN (current sinking) or PNP (current sourcing), depending on model Light Operate: Output conducts when sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor does not see its own (or the emitter's) modulated light				
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate about 1 mA per °C) OFF-state leakage current: less than 1 μA @ 30 V dc ON-state saturation voltage: less than 1 V @ 10 mA dc; less than 1.5 V @ 150 mA dc				
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs				
Output Response Time	Opposed: 1.5 milliseconds ON, 0.75 milliseconds OFF Polarized Retroreflective: 1 milliseconds ON/OFF Diffuse and Fixed-Field: 3 milliseconds ON, 1.5 milliseconds OFF				
Delay at Power-up	100 milliseconds Outputs do not conduct during this time				
Repeatability	Opposed: 190 microseconds Polarized Retroreflective: 585 microseconds Diffuse and Fixed-Field: 185 microseconds				
Adjustments	Diffuse models only: single turn rear panel sensitivity control				
Indicators	4-wire Two LEDs: Solid Green: Power ON Solid Yellow: Output energized 3-wire Two LEDs: Solid Green: Power ON Solid Yellow: Output energized Solid Yellow: Output energized				
Construction	Housing: Zinc die-cast with nickel plating Lens: PC or PMMA Black Cover: PBT polyester housing; polycarbonate (opposed mode) or acrylic lens				
Environmental Rating	Leakproof design rated NEMA 6; IP67, IP69K QD models and cable models when PVC jacket is protected				
Connections	2 m or 9 m attached cable, or 4-pin Euro-style integral or pigtail QD, depending on model. QD cordsets are ordered separately. See page 108.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% @ 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06" acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	(h)				



T30 Series





- Epoxy-encapsulated sensors provide reliable sensing without adjustments.
- Features 30 mm plastic threaded barrel
- Available in opposed, retroreflective and fixed-field modes
- Designed for use in harsh sensing environments
- Advanced diagnostics warn of marginal sensing conditions or output overload
- Cordsets and brackets see page 112

Opposed T30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
OPPOSED	60 m 4-P	2 m	T306E Emi	tter
		4-Pin Euro QD	T306EQ En	nitter
		2 m	T30SN6R	T30SP6R
		4-Pin Euro QD	T30SN6RQ	T30SP6RQ

Polar Retro T30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	6 m [†]	2 m	T30SN6LP	T30SP6LP
POLAR RETRO	OTH	4-Pin Euro QD	T30SN6LPQ	T30SP6LPQ

Fixed-Field T30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	0 - 200 mm Cutoff	2 m	T30SN6FF200	T30SP6FF200
FIXED-FIELD		4-Pin Euro QD	T30SN6FF200Q	T30SP6FF200Q
	0 - 400 mm Cutoff	2 m	T30SN6FF400	T30SP6FF400
FIXED-FIELD	o ree min eaten	4-Pin Euro QD	T30SN6FF400Q	T30SP6FF400Q
	0 - 600 mm Cutoff	2 m	T30SN6FF600	T30SP6FF600
FIXED-FIELD	0 - 600 mm Cuton	4-Pin Euro QD	T30SN6FF600Q	T30SP6FF600Q

For more specifications see page 112.



For 9 m cable, add suffix W/30 to the 2 m model number (example, T30SN6LP W/30)

† Retroreflective range is specified using a BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
		2 m	T303E Emitter	
	60 m	4-Pin Micro QD	T303EQ1 Emitter	
OPPOSED	00 111	2 m	T30AW3R	T30RW3R
011 0025		4-Pin Micro QD	T30AW3RQ1	T30RW3RQ1

Polar Retro T30, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
P a s	6 m [†]	2 m	T30AW3LP	T30RW3LP
POLAR RETRO	OTH	4-Pin Micro QD	T30AW3LPQ1	T30RW3LPQ1

Fixed-Field T30, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
	0 - 200 mm Cutoff	2 m	T30AW3FF200	T30RW3FF200
FIXED-FIELD		4-Pin Euro QD	T30AW3FF200Q1	T30RW3FF200Q1
	0 - 400 mm Cutoff	2 m	T30AW3FF400	T30RW3FF400
FIXED-FIELD	0 - 400 Min Outon	4-Pin Euro QD	T30AW3FF400Q1	T30RW3FF400Q1
	0 - 600 mm Cutoff	2 m	T30AW3FF600	T30RW3FF600
FIXED-FIELD M	0 - 000 Hilli Outoli	4-Pin Euro QD	T30AW3FF600Q1	T30RW3FF600Q1

For more specifications see page 112.

Connection options: A model with a QD requires a mating cordset (see page 112).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30AW3LP W/30).

† Retroreflective range is specified using a BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Straight connector models listed; for right-angle, add RA to the end

4-Pin MQDC-406 2 m (6.51) MQDC-415 5 m (151) MQDC-430 9 m (30')

Micro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA)

4-Pin MQAC-406 2 m (6.51) MQAC-415 5 m (151) MQAC-430 9 m (30')



Opposed, Polarized Retroreflective and Fixed-field Models Suffix E, R, LP and FF

Additional cordset information is available See page 758

of the model number (example,



SMB30A

Euro-Style

MQDC-406RA)



SMBAMS30P



SMB1815SF



Additional bracket information is available See page 723

Reflectors





Apertures



Additional information is available See page 816

T30 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Fixed-Field: 35 mA				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state dc switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark				
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA OFF-state leakage current: less than 1 µA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc				
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs				
Output Response Time	Opposed: 3 milliseconds ON; 1.5 milliseconds OFF Polarized Retroreflective and Fixed-Field: 3 milliseconds ON/OFF				
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time				
Repeatability	Opposed: 375 microseconds Repeatability and response are independent of signal strength.				
Indicators	Two LEDs: Solid Green: Power ON Solid Yellow: Light operate (LO) output energized Flashing Green: output overload Flashing Yellow: marginal excess gain				
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.				
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.				
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 112.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	(((U)				

ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

SLOT & AREA | MINIATURE | FIBER OPTIC

T30 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). Average current: 20 mA Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac			
Supply Protection Circuitry	Protected against transient voltages			
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark			
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 µA ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac			
Output Protection Circuitry	Protected against false pulse on power-up			
Output Response Time	Opposed: 16 milliseconds ON; 8 milliseconds OFF Polarized Retroreflective and Fixed-Field: 16 milliseconds ON/OFF			
Delay at Power-up	100 milliseconds			
Repeatability	Opposed: 2 milliseconds Polarized Retroreflective and Fixed-Field: 4 milliseconds Repeatability and response are independent of signal strength			
Indicators	Two LEDs: Solid Green: Power ON Solid Yellow: Light sensed Flashing Yellow: marginal excess gain			
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.			
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.			
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 112.			
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)			
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)			
Certifications	C E UL LISTED			



BARREL

Barrel Sensors

Barrel sensors are available in industry standard 12, 18 and 30 mm barrel mounting options. The compact barrel size allows for easy replacement and easy viewing of LED indicators.

Series	Description	Max Sensing Ra	ange	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	M12 Rugged, threaded metal sensor with fully encapsulated electronics. Page 116	Polarized Retro:	2.5 m 1.5 m 400 mm	12 ø x 67.5 mm	IEC IP67; NEMA 6, IEC IP68 and 1200 PSI washdown	Nickel-plated brass	10 to 30 V dc
	S12-2/S12 Barrel sensors provide reliable sensing without adjustments. Page 118	Opposed:	20 m	S12-2 : 30.4 x ø 12 mm S12 : 64 x ø 12 mm	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	SB12/SB12T Economical sensors provide reliable sensing without adjustments. Page 120	Opposed:	1.5 m	SB12: 15.8 Ø x 31 mm SB12T: 15.8 Ø x 30.4 mm	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	S18 Epoxy-encapsulated barrel sensors operate on dc voltage and provide reliable sensing without adjustments. Page 124	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	2 m 2 m 300 mm	ø 18 x 58.8 mm	QD models: IP69K Other models: IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 250 V ac
	S18-2 A self-contained powerful sensor with bright visible red emitter beam for easy alignment and set-up. Page 122		6m 7.5 m 750 mm	Varies by model	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	M18 Epoxy-encapsulated metal barrel sensors provide reliable sensing without adjustments. Page 126	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	300 mm	18 ø x 59.2 mm	QD models: IP69K Other models: IEC IP67; NEMA 6	Stainless steel	10 to 30 V dc
	M18-3 Nickel plated brass housing is well protected against industrial fluids and mechanical damage. Page 128	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	6 m 7.5 m 750 mm	18 ø x 63.5 mm	IEC IP67 and IP69K	Nickel-plated	10 to 30 V dc
	M18-4 Epoxy-encapsulated metal barrel sensors provide reliable sensing without adjustments. Page 130	Opposed: Retro: Polarized Retro: Diffuse: Fixed-Field:	6 m 7.5 m 750 mm	18 ø x 63.5 mm	IEC IP67, IP68 and IP69K	Stainless steel	10 to 30 V dc
	S30 Epoxy-encapsulated sensors provide superior durability and reliable sensing over a long range. Page 138	Opposed: Polarized Retro: Fixed-Field:	6 m	Varies by model	QD models: IP69K Other models: IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 250 V ac
	SM30 Powerful epoxy-encapsulated sensor with a long range and the stainless steel model can be used in abusive environments.	Opposed:	150 m	30 ø x 102 mm	IEC IP67; NEMA 6	Thermoplastic Polyester or Stainless steel	10 to 30 V dc 24 to 240 V ac

Page 140

M12 Series





- Metal sensor with fully encapsulated electronics.
- Easily replaces inductive sensors when target is too close to the sensor
- Available in NEMA 6P, IP67, IP69K and up to 1200 psi washdown depending on model
- Highly visible red sensing beam for easy alignment

Opposed M12



Sensing Mode	Range	Connection	Models NPN	Models PNP
OPPOSED	5 m	2 m	M12E (Emitter)	
		4-Pin Euro QD	M12EQ8 (Emitter)	
	5 m	2 m	M12NR	M12PR
		4-Pin Euro QD	M12NRQ8	M12PRQ8

Retro & Polar Retro M12



Sensing Mode	Range	Connection	Models NPN	Models PNP
→	2.5 m [†]	2 m	M12NLV	M12PLV
RETRO	2.5 III	4-Pin Euro QD	M12NLVQ8	M12PLVQ8
	1.5 m [†]	2 m	M12NLP	M12PLP
POLAR RETRO	'm c.1	4-Pin Euro QD	M12NLPQ8	M12PLPQ8

Fixed-Fleld M12



Sensing Mode	Range	Connection	Models NPN	Models PNP
	25 mm Cutoff	2 m	M12NFF25	M12PFF25
FIXED-FIELD	20 mm Caton	4-Pin Euro QD	M12NFF25Q8	M12PFF25Q8
	50 mm Cutoff	2 m	M12NFF50	M12PFF50
FIXED-FIELD	30 mm Cuton	4-Pin Euro QD	M12NFF50Q8	M12PFF50Q8
$\longrightarrow \bigcap \bigvee$	75 mm Cutoff	2 m	M12NFF75	M12PFF75
FIXED-FIELD	73 mm Gaton	4-Pin Euro QD	M12NFF75Q8	M12PFF75Q8

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, M12PD W/30). QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, M12PDQ5).

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

[†] Retroreflective range is specified using a BRT-84 retroreflector.

Diffuse M12

				<u> </u>
Sensing Mode	Range	Connection	Models NPN	Models PNP
	400 mm	2 m	M12ND	M12PD
DIFFUSE		4-Pin Euro QD	M12NDQ8	M12PDQ8

Euro QD (for Q5 models)
Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

4-Pin

MQDC-406
2 m (6.')
MQDC-415
5 m (15')
MQDC-430
9 m (30')

Additional bracket information is available See page 758



SMBQS12PD

12-ga. stainless steel

Additional bracket information is available See page 723

Reflectors



Additional information is available See page 790

Apertures



Additional information is available See page 816



Visible Red LED

Opposed, Retroreflective Diffuse and Fixed-Field Models Suffix E, R, LP, LV, D and FF

M12 Specifications

Sensing Beam	Fixed-Field: 680 nm visible red All others: 660 nm visible red				
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) @ 20 mA max current (exclusive of load)				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Complementary (1 normally open and 1 normally closed) solid-state, NPN or PNP, depending on model				
Output Ratings	100 mA total across both outputs with overload and short circuit protection OFF-state leakage current: NPN: less than 200 μA @ 30 V dc (see Application Note) NPN: less than 1.6 V @ 100 mA PNP: less than 3.0 V @ 100 mA				
Output Protection Circuitry	Protected against false pulse on power-up, short-circuit protected				
Output Response Time	Opposed: 625 microsecond ON/375 microseconds OFF All others: 500 microseconds ON/OFF				
Delay at Power-up	100 milliseconds; outputs do not conduct during this time				
Repeatability	Opposed: 85 microseconds All others: 95 microseconds				
Indicators	2 LED indicators: Solid Green: power ON Yellow: light sensed Flashing Green: output overloaded Flashing Yellow: marginal excess gain				
Adjustments	Fixed-Field: none All others: single-turn Gain (sensitivity) potentiometer				
Construction	Housing: Nickel-plated brass Lenses: PMMA Cable endcap and Gain potentiometer adjuster: PBT				
Environmental Rating	IEC IP67; NEMA 6, IEC IP68 and 1200 PSI washdown, NEMA 1CS 5 Annex F-2002				
Connections	2 m or 9 m 4-wire PVC-jacketed cable, 4-pin integral Euro-style QD (Q8), or 150 mm pigtail with 4-pin Euro-style quick-disconnect fitting (Q5), depending on model. QD cordsets ordered separately.				
Operating Conditions	Operating temperature: -20° to +60° C Relative humidity: 90% max @ +50° C				
Application Notes	NPN off-state leakage current is < 200 μA for load resistances > 3 kΩ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current				
Certifications	CE				

S12 Series





- Housing rated to IP67 for heavy-duty industrial sensing
- Sensing range up to 20 m
- Wide beam pattern makes sensor alignment easy at long ranges
- Available in opposed mode

Opposed S12



Sensing Mode	Range	Connection	Models NPN	Models PNP
	15 m	2 m	S126E Emitter	
OPPOSED	OPPOSED 15 m	2 M	S12SN6R	S12SP6R

Opposed S12-2



Sensing Mode	Range	Input	Connection	Models NPN	Models PNP
OPPOSED	20 m	_	2 m	S12-2NAEL-	2M Emitter
		Beam Inhibit		S12-2NAEJ-	2M Emitter
		_		S12-2ANRL-2M	S12-2APRL-2M
		_		S12-2RNRL-2M	S12-2RPRL-2M

Connection options: A model with a QD requires a mating cordset.

QD models: For a 4-pin 150 mm Pico-style pigtail QD, add suffix QP (example, S12SN6RQP).

SLOT & AREA | MINIATURE

FIBER OPTIC



PKG4M-2 PKG4M-5 5 m (15') PKG4M-9 9 m (30')

Pico QD (for Q7 models) Straight snap-on connector model Pico QD (for Q7 models)

Right Angle` snap-on connector model

PKG4-2 2 m (6') PKW4Z-2 2 m (6')



Additional cordset information is available See page 758



SMB12MM

(example, PKW4M-2)

Additional bracket information is available See page 723



Additional information is available See page 790



Additional information is available See page 816



S12-2 Opposed Models

S12 & S12-2 Specifications

'	
Supply Voltage and Current	S12: 10 to 30 V dc (10% max. ripple); 25 mA (emitters) or 20 mA (receivers) exclusive of load S12-2: 10 to 30 V dc; < 25 mA (emitters) or 15 mA (receivers) exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	S12: Complementary solid-state dc switch; choose NPN (current sinking) or PNP (current sourcing) models Light Operate: N.O. output conducts when the sensor sees the emitter's modulated light Dark Operate: N.C. output conducts when the sensor sees dark; The N.C. (normally closed) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply S12-2: One solid state output, NPN (sinking) or PNP (sourcing), depending on model
Output Ratings	100 mA maximum (each) in standard hookup; when wired for alarm output, the total load may not exceed 100 mA OFF-state leakage current: less than 1 µA @ 30 V dc ON-state saturation voltage: less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	S12: 3 milliseconds ON, 1.5 milliseconds OFF S12-2: 11 milliseconds ON, 7 milliseconds OFF
Delay at Power-up	S12:100 millisecond; outputs are non-conducting during this time S12-2: 1 second; outputs are non-conducting during this time
Repeatability	S12: 375 microseconds S12-2: 1.5 milliseconds
Indicators	Green LED (emitter and receiver): power ON Amber LED (receiver only): light sensed
Construction	Housings are reinforced thermoplastic polyester; lenses are Lexan®; Polyurethane end cap
Environmental Rating	Leakproof design rated NEMA 6P (IEC IP67)
Connections	S12: 2 m or 9 m cable, or a 150 mm pigtail with 4-pin Pico-style QD S12-2: 2 m or 9 m cable, or a 150 mm pigtail with 3-pin Pico-style QD QD cordset ordered separately.
Operating Conditions	S12: Temperature: -40° to +70° C Maximum relative humidity: 90% at 50°C (non-condensing) S12-2: Temperature: -25° to +50° C Maximum relative humidity: 90% at 50°C (non-condensing)
Vibration and Mechanical Shock	Meets Mil. Std. 202F requirements. Method 201A (Vibration: frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation).
Certifications	CE

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FEATURED

SB12 & SB12T



Plastic Barrel-Mount Sensors

- Narrow beam for precise leading edge detection
- Ideal for compact areas
- No adjustment necessary
- SB12T has a threaded housing for robust monitoring in applications with vibration, rough handling or vandalism

Opposed SB12



Sensing Mode	Range	Connection	Output	Models NPN	Models PNP
1.5 m		2 m	_	SB12E	1 Emitter
	1.5 m		LO	SB12ANR	SB12APR
		DO	SB12RNR	SB12RPR	

Opposed SB12T



Sensing Mode	Range	Connection	Output	Models NPN	Models PNP
		2 m	_	SB12TE	1 Emitter
OPPOSED 1.	1.5 m		LO	SB12TANR	SB12TAPR
			DO	SB12TRNR	SB12TRPR

Connection options: A model with a QD requires a mating cordset

QD models: For a 3-pin 150 mm Pico-style pigtail QD, add suffix Q3 (example, SB12E1Q3).



Straight connector models listed; for right-angle, W replaces G in the model number. (example, PKW4M-2)

PKG4M-2 PKG4M-5 5 m (15') PKG4M-9 9 m (30')

Pico QD (for Q7 models) Straight snap-on connector model

Pico QD (for Q7 models) Right Angle snap-on connector model

PKG4-2 2 m (6') PKW4Z-2 2 m (6')

Additional cordset information is available See page 758



Additional bracket information is available See page 723



SB12 Opposed Models



SB12T Opposed Models

SB12/SB12T Specifications

Supply Voltage and Current	10 to 30 V dc; less than 15 mA max exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	One solid state output, NPN (sinking) or PNP (sourcing), depending on model
Output Ratings	SB12/SB12T: 100 mA OFF-state leakage current: < 10 μ A ON-state saturation voltage: < 0.2 V @ 10 mA; < 0.6 V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	2.5 milliseconds ON, 1.75 milliseconds OFF
Delay at Power-up	Less than 1 second
Repeatability	350 microseconds
Switching Frequency	235 Hz
Indicators	Solid Green (emitter and receiver): power ON Solid Amber (receiver only): light sensed Flashing Green (emitter and receiver): output short circuited Flashing Amber (receiver only): marginal excess gain
Construction	Housing: ABS Lens: Polycarbonate; epoxy encapsulant Cable: PVC-jacketed
Environmental Rating	SB12: IP65 SB12T: IP67
Connections	2 m cable or 150 mm pigtail with 3-pin Pico-style QD. QD cordset ordered separately.
Operating Conditions	Temperature: -20° to +50° C Maximum relative humidity: 90% at 50° C (non-condensing)
Certifications	CE

S18-2 Series



Plastic Barrel-Mount Sensors

- Bright visible red emitter beam for easy alignment and set-up
- Available in multiple operating modes
- Wide operating range from -40° C to +70° C
- High performance sensing
- Beam inhibit or gain adjustment on select models
- Cordsets and brackets see page 132

Opposed S18-2

Visible Red LED

S	Sensing Mode	Range		Connection	Models NPN	Models PNP
				2 m	S18-2NAE	EL-2M
(4-pin Euro QD	S18-2NAE	EL-Q8
		05	Emitter	2 m	S18-2NAE	J-2M (with Beam inhibit)
l	OPPOSED 25	25 m	Emiller	4-pin Euro QD	S18-2NAE	J-Q8 (with Beam inhibit)
				2 m	S18-2NAE	S-2M (with Adjustment)
				4-pin Euro QD	S18-2NAE	J-Q8 (with Adjustment)
				2 m	S18-2VNLP-2M	S18-2VPLP-2M
		25 m	Receiver	4-pin Euro QD	S18-2VNLP-Q8	S18-2VPLP-Q8
l		25 111	Neceivei	2 m	M18-3VNRS-2M (with Adjustme	ent) M18-3VPRS-2M (with Adjustment)
	OPPOSED			4-pin Euro QD	M18-3VNRS-Q8 (with Adjustme	ent) M18-3VPRS-Q8 (with Adjustment)

Polar Retro S18-2

Visible Red LED

Sensing Mode	Range*	Connection	Models NPN	Models PNP
POLAR RETRO	6 m	2 m	S18-2VNLP-2M	S18-2VPLP-2M
		4-pin Euro QD	S18-2VNLP-Q8	S18-2VPLP-Q8
		2 m	S18-2VNLPC-2M (with Adjustment)	S18-2VPLPC-2M (with Adjustment)
		4-pin Euro QD	S18-2VNLPC-Q8 (with Adjustment)	S18-2VPLPC-Q8 (with Adjustment)

For more specifications see page 133.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix 9M to the 2 m model number (example, S18-2NAEL-9M). For a 4-pin Euro M12 pigtail QD, add suffix Q5 to the model number (example, S18-2VNRL-Q5) For a 4-pin Pico M8 pigtail QD, add suffix Q3 to the model number (example, S18-2VNRL-Q3) * Range specified with BRT-84 reflector

Retro S18-2



Sensing Mode	Range*	Connection	Models NPN	Models PNP
RETRO	7.5 m	2 m	S18-2VNLV-2M (with Adjustment)	S18-2VPLV-2M (with Adjustment)
	7.5111	4-pin Euro QD	S18-2VNLV-Q8 (with Adjustment)	S18-2VPLV-Q8 (with Adjustment)

Diffuse S18-2



Sensing Mode	Range*	Connection	Models NPN	Models PNP
DIFFUSE	750 mm	2 m	S18-2VNDL-2M (with Adjustment)	S18-2VPDL-2M (with Adjustment)
		4-pin Euro QD	S18-2VNDL-Q8 (with Adjustment)	S18-2VPDL-Q8 (with Adjustment)
DIFFUSE	300 mm	2 m	S18-2VNDS-2M (with Adjustment)	S18-2VPDS-2M (with Adjustment)
		4-pin Euro QD	S18-2VNDS-Q8 (with Adjustment)	S18-2VPDS-Q8 (with Adjustment)

Fixed-Field S18-2



				VIOIDIO TICA EED
Sensing Mode	Range*	Connection	Models NPN	Models PNP
	30 mm	2 m	S18-2VNFF30-2M	S18-2VPFF30-2M
FIXED-FIELD		4-pin Euro QD	S18-2VNFF30-Q8	S18-2VPFF30-Q8
	50 mm	2 m	S18-2VNFF50-2M	S18-2VPFF50-2M
FIXED-FIELD	30 11111	4-pin Euro QD	S18-2VNFF50-Q8	S18-2VPFF50-Q8
	75 mm	2 m	S18-2VNFF75-2M	S18-2VPFF75-2M
FIXED-FIELD		4-pin Euro QD	S18-2VNFF75-Q8	S18-2VPFF75-Q8
	100 mm	2 m	S18-2VNFF100-2M	S18-2VPFF100-2M
FIXED-FIELD	100 111111	4-pin Euro QD	S18-2VNFF100-Q8	S18-2VPFF100-Q8
	150 mm	2 m	S18-2VNFF150-2M	S18-2VPFF150-2M
FIXED-FIELD		4-pin Euro QD	S18-2VNFF150-Q8	S18-2VPFF150-Q8
$\longrightarrow \square \overline{\mathbb{V}}$	000	2 m	S18-2VNFF200-2M	S18-2VPFF200-2M
FIXED-FIELD	200 mm	4-pin Euro QD	S18-2VNFF200-Q8	S18-2VPFF200-Q8

For more specifications see page 133.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix 9M to the 2 m model number (example, S18-2NAEL-9M).

For a 4-pin Euro M12 pigtail QD, add suffix Q5 to the model number (example, S18-2VNRL-Q5)

For a 4-pin Pico M8 pigtail QD, add suffix Q3 to the model number (example, S18-2VNRL-Q3) * Range specified with BRT-84 reflector



PHOTOELECTRIC FEATURED RECTANGLE RIGHT ANGLE BARREL



S18 Series

Plastic Barrel-Mount Sensors

- Epoxy-encapsulated barrel sensors
- Available in multiple operating modes
- Meets IP69K standards
- Wide operating range from -40° C to +70° C
- Cordsets and brackets see page 132

Opposed S18, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	20 m	2 m	S186E Emitter	
		4-pin Euro QD	S186EQ Emitter	
OPPOSED		2 m	S18SN6R	S18SP6R
		4-pin Euro QD	S18SN6RQ	S18SP6RQ

Retro and Polar Retro S18, 10-30 V DC





Sensing Mode	Range	Connection	Models NPN	Models PNP
	2 m*	2 m	S18SN6L	S18SP6L
RETRO		4-pin Euro QD	S18SN6LQ	S18SP6LQ
	POLAR RETRO 2 m*	2 m	S18SN6LP	S18SP6LP
POLAR RETRO		4-pin Euro QD	S18SN6LPQ	S18SP6LPQ

Diffuse S18, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	100 mm	2 m	S18SN6D	S18SP6D
		4-pin Euro QD	S18SN6DQ	S18SP6DQ
DIFFUSE	300 mm	2 m	S18SN6DL	S18SP6DL
5 7 002		4-pin Euro QD	S18SN6DLQ	S18SP6DLQ

Fixed-Field S18, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	0 - 25 mm Cutoff	2 m	S18SN6FF25	S18SP6FF25
		4-pin Euro QD	S18SN6FF25Q	S18SP6FF25Q
	0 - 50 mm Cutoff	2 m	S18SN6FF50	S18SP6FF50
		4-pin Euro QD	S18SN6FF50Q	S18SP6FF50Q
	0 - 100 mm Cutoff	2 m	S18SN6FF100	S18SP6FF100
		4-pin Euro QD	S18SN6FF100Q	S18SP6FF100Q

For more specifications see page 133.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S18SP6R W/30).

* Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

Opposed S18, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
20 m		2 m	S183E	Emitter
	20 m	4-pin Micro QD	S183EQ	1 Emitter
	20 111	2 m	S18AW3R	S18RW3R
		4-pin Micro QD	S18AW3RQ1	S18RW3RQ1

Retro & Polar Retro S18, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
2 m [†]	2 m	S18AW3L	S18RW3L	
	2 111'	4-pin Micro QD	S18AW3LQ1	S18RW3LQ1
	2 m [†]	2 m	S18AW3LP	S18RW3LP
POLAR RETRO		4-pin Micro QD	S18AW3LPQ1	S18RW3LPQ1

Diffuse S18, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
	100 mm	2 m	S18AW3D	S18RW3D
	100 mm	4-pin Micro QD	S18AW3DQ1	S18RW3DQ1
DIFFUSE	300 mm	2 m	S18AW3DL	S18RW3DL
BILLOGE		4-pin Micro QD	S18AW3DLQ1	S18RW3DLQ1

Fixed-Field S18, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
FIXED-FIELD	0 - 25 mm Cutoff	2 m	S18AW3FF25	S18RW3FF25
		4-pin Micro QD	S18AW3FF25Q1	S18RW3FF25Q1
	0 - 50 mm Cutoff	2 m	S18AW3FF50	S18RW3FF50
		4-pin Micro QD	S18AW3FF50Q1	S18RW3FF50Q1
	0 - 100 mm	2 m	S18AW3FF100	S18RW3FF100
	Cutoff	4-pin Micro QD	S18AW3FF100Q1	S18RW3FF100Q1

For more specifications see page 134.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S183E W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used.

See Accessories section for more information.

M18 Series



Metal Barrel-Mount Sensors

- Epoxy-encapsulated metal barrel sensors
- Available in multiple operating modes
- Meets IP69K standards
- Wide operating range from -40 to +70° C
- High performance sensing
- Cordsets and brackets see page 132

Opposed M18 Infrared LED Models NPN Models PNP Sensing Mode Range Connection 2 m M186E Emitter M186EQ Emitter 4-pin Euro QD 20 m 2 m M18SP6R M18SN6R 4-pin Euro QD M18SN6RQ M18SP6RQ

Retro & Polar Retro M18			Infrared LED Sisible Red LE		
	Sensing Mode	Range	Connection	Models NPN	Models PNP
		2 m [†]	2 m	M18SN6L	M18SP6L
	RETRO		4-pin Euro QD	M18SN6LQ	M18SP6LQ
	P	POLAR RETRO 2 m [†]	2 m	M18SN6LP	M18SP6LP
	POLAR RETRO		4-pin Euro QD	M18SN6LPQ	M18SP6LPQ

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18SP6D W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used.

See Accessories section for more information.

Diffuse M18



Sensing Mode	Range	Connection	Models NPN	Models PNP
100 mm	2 m	M18SN6D-2M	M18SP6D-2M	
	100 mm	4-pin Euro QD	M18SN6DQ-Q8	M18SP6DQ-Q8
300 r		2 m	M18SN6DL-2M	M18SP6DL-2M
	300 mm	4-pin Euro QD	M18SN6DLQ-Q8	M18SP6DLQ

Fixed-Field M18



Sensing Mode	Range	Connection	Models NPN	Models PNP
0 - 25 mm Cutoff	2 m	M18SN6FF25	M18SP6FF25	
	0 - 25 mm Cutoir	4-pin Euro QD	M18SN6FF25Q	M18SP6FF25Q
	0 - 50 mm Cutoff	2 m	M18SN6FF50	M18SP6FF50
FIXED-FIELD		4-pin Euro QD	M18SN6FF50Q	M18SP6FF50Q
	0 - 100 mm Cutoff	2 m	M18SN6FF100	M18SP6FF100
FIXED-FIELD	0 - 100 mm Cuton	4-pin Euro QD	M18SN6FF100Q	M18SP6FF100Q

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18SP6D W/30).

M18-3 Series

Heavy-Duty Metal Barrel-Mount Sensors



- Powerful and bright visible red emitter beam for easy alignment and set-up
- Advanced ASIC technology is resistant to optical and electrical noise source

4-pin Euro QD

- Robust 250° adjustment potentiometer on select models
- Cordsets and brackets see page 132

Opposed M18-3 Visible Red LED Sensing Mode Range Connection Models NPN Models PNP M186-3NAEL-2M 2 m 4-pin Euro QD M186-3NAEL-Q8 2 m M186-3NAEJ-2M (with Beam inhibit) 25 m Emitter M186-3NAEJ-Q8 (with Beam inhibit) 4-pin Euro QD 2 m M186-3NAES-2M (with Adjustment) M186-3NAES-Q8 (with Adjustment) 4-pin Euro QD 2 m M18-3VNRL-2M M18-3VPRL-2M 4-pin Euro QD M18-3VNRL-Q8 M18-3VPRL-Q8 Receiver 2 m M18-3VNRS-2M (with Adjustment) M18-3VPRS-2M (with Adjustment)

M18-3VNRS-Q8 (with Adjustment) M18-3VPRS-Q8 (with Adjustment)

Retro & Polar Ret		Retro M	118-3	Infrared LED	Visible Red LED
	Sensing Mode	Range †	Connection	Models NPN	Models PNP
		7.5 m	2 m	M18-3VNLV-2M (with Adjustment)	M18-3VPLV-2M (with Adjustment)
	RETRO	7.5111	4-pin Euro QD	M18-3VNLV-Q8 (with Adjustment)	M18-3VPLV-Q8 (with Adjustment)
		0	2 m	M18-3VNLP-2M	M18-3VPLP-2M
	P		4-pin Euro QD	M18-3VNLP-Q8	M18-3VPLP-Q8
		2 m	2 m	M18-3VNLPC-2M (with Adjustment)	M18-3VPLPC-2M (with Adjustment)
	POLAR RETRO		4-pin Euro QD	M18-3VNLPC-Q8 (with Adjustment)	M18-3VPLPC-Q8 (with Adjustment)

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNRLQ5.

† Retroreflective range is specified using one model BRT-84.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.



Sensing Mode	Range	Connection	Models NPN	Models PNP
75C	750 222	2 m	M18-3VNDL-2M (Adjustment)	M18-3VPDL-2M (Adjustment)
	750 mm	4-pin Euro QD	M18-3VNDL-Q8 (Adjustment)	M18-3VPDL-Q8 (Adjustment)
JOD 300	300 mm	2 m	M18-3VNDS-2M (Adjustment)	M18-3VPDS-2M (Adjustment)
	300 mm	4-pin Euro QD	M18-3VNDS-Q8 (Adjustment)	M18-3VPDS-Q8 (Adjustment)

Fixed-Field M18-3



Sensing Mode	Range	Connection	Models NPN	Models PNP
FIXED-FIELD	30 mm	2 m	M18-3VNFF30-2M	M18-3VPFF30-2M
		4-pin Euro QD	M18-3VNFF30-Q8	M18-3VPFF30-Q8
FIXED-FIELD	50 mm	2 m	M18-3VNFF50-2M	M18-3VPFF50-2M
		4-pin Euro QD	M18-3VNFF50-Q8	M18-3VPFF50-Q8
FIXED-FIELD	75 mm	2 m	M18-3VNFF75-2M	M18-3VPFF75-2M
		4-pin Euro QD	M18-3VNFF75-Q8	M18-3VPFF75-Q8
FIXED-FIELD	100 mm	2 m	M18-3VNFF100-2M	M18-3VPFF100-2M
		4-pin Euro QD	M18-3VNFF100-Q8	M18-3VPFF100-Q8
FIXED-FIELD	150 mm	2 m	M18-3VNFF150-2M	M18-3VPFF150-2M
		4-pin Euro QD	M18-3VNFF150-Q8	M18-3VPFF150-Q8
FIXED-FIELD	200 mm	2 m	M18-3VNFF200-2M	M18-3VPFF200-2M
		4-pin Euro QD	M18-3VNFF200-Q8	M18-3VPFF200-Q8

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNDL-Q5.

M18-4 Series

Metal Barrel-Mount Sensors



- Chemically robust stainless steel sensors for wash-down applications
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Advanced ASIC technology is resistant to optical and electrical noise source
- Robust 250° adjustment potentiometer on select models
- Cordsets and brackets see page 132

Opposed M18-4

Visible Red LED

BARREL

Sensing Mode	Range	Connection	Models NPN	Models PNP
		2 m	M18-4NAEL-2M Emitt	er
		4-pin Euro QD	M18-4NAEL-Q8 Emitte	er
	05	2 m	M18-4NAEJ-2M Emitte	er (Beam inhibit)
	25 m	4-pin Euro QD	M18-4NAEJ-Q8 Emitte	er (Beam inhibit)
OPPOSED		2 m	M18-4NAES-2M Emitt	er (Adjustment)
		4-pin Euro QD	M18-4NAES-Q8 Emitte	er (Adjustment)
	0.5	2 m	M18-4VNRL-2M	M18-4VPRL-2M
OPPOSED		4-pin Euro QD	M18-4VNRL-Q8	M18-4VPRL-Q8
	25 m	2 m	M18-4VNRS-2M (Adjustment)	M18-4VPRS-2M (Adjustment)
		4-pin Euro QD	M18-4VNRS-Q8 (Adjustment)	M18-4VPRS-Q8 (Adjustment)

Retro & Polar Retro M18-4





Sensing Mode	Range †	Connection	Models NPN	Models PNP
7 RETRO	7.5 m	2 m	M18-4VNLV-2M (Adjustment)	M18-4VPLV-2M (Adjustment)
	7.0111	4-pin Euro QD	M18-4VNLV-Q8 (Adjustment)	M18-4VPLV-Q8 (Adjustment)
	2 m	2 m	M18-4VNLP-2M	M18-4VPLP-2M
POLAR RETRO		4-pin Euro QD	M18-4VNLP-Q8	M18-4VPLP-Q8
		2 m	M18-4VNLPC-2M (Adjustment)	M18-4VPLPC-2M (Adjustment)
		4-pin Euro QD	M18-4VNLPC-Q8 (Adjustment)	M18-4VPLPC-Q8 (Adjustment)

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

 $For 150 \ mm \ cable \ with \ a \ 4-pin \ M12/Euro-style \ quick \ disconnect \ model, \ add \ the \ suffix \ ``Q5". For example, \ M18-4VNRL-Q5.$

† Retroreflective range is specified using one model BRT-84.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information



Sensing Mode	Range	Connection	Models NPN	Models PNP
DIFFUSE		2 m	M18-4VNDL-2M (Adjustment)	M18-4VPDL-2M (Adjustment)
	750 mm	4-pin Euro QD	M18-4VNDL-Q8 (Adjustment)	M18-4VPDL-Q8 (Adjustment)
DIFFUSE	300 mm	2 m	M18-4VNDS-2M (Adjustment)	M18-4VPDS-2M (Adjustment)
		4-pin Euro QD	M18-4VNDS-Q8 (Adjustment)	M18-4VPDS-Q8 (Adjustment)

Fixed-Field M18-4



Sensing Mode	Range	Connection	Models NPN	Models PNP
	30 mm	2 m	M18-4VNFF30-2M	M18-4VPFF30-2M
FIXED-FIELD	30 111111	4-pin Euro QD	M18-4VNFF30-Q8	M18-4VPFF30-Q8
	50 mm	2 m	M18-4VNFF50-2M	M18-4VPFF50-2M
FIXED-FIELD	00111111	4-pin Euro QD	M18-4VNFF50-Q8	M18-4VPFF50-Q8
	75 mm	2 m	M18-4VNFF75-2M	M18-4VPFF75-2M
FIXED-FIELD	7011111	4-pin Euro QD	M18-4VNFF75-Q8	M18-4VPFF75-Q8
	100 mm	2 m	M18-4VNFF100-2M	M18-4VPFF100-2M
FIXED-FIELD	100 11111	4-pin Euro QD	M18-4VNFF100-Q8	M18-4VPFF100-Q8
	150 mm	2 m	M18-4VNFF150-2M	M18-4VPFF150-2M
FIXED-FIELD	130 11111	4-pin Euro QD	M18-4VNFF150-Q8	M18-4VPFF150-Q8
	200 mm	2 m	M18-4VNFF200-2M	M18-4VPFF200-2M
FIXED-FIELD	200 11111	4-pin Euro QD	M18-4VNFF200-Q8	M18-4VPFF200-Q8

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNDL-Q5.



Euro-Style

See page 758

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

Additional cordset information is available

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')



Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA)



Reflectors

Additional information is available See page 790



Additional information is available See page 816







SMB3018SC



SMB18FAM12

SMB18A SMBAMS18P

Additional bracket information is available See page 723



S18-2 dc Polarized Retroreflective and Fixed-Field Models Suffix LP and FF



S18 dc Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L and D



S18 ac Opposed, Retroreflective, Polarized Retroreflective, Diffuse and Fixed-Field Models Suffix E, R, L, LP, D and FF



M18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L, D and DL



M18-3 Opposed, Retroreflective, Polarized Retroreflective, Fixed-Field and Diffuse Models Suffix E, R, L, D and DL



M18-4 Opposed, Retroreflective, Polarized Retroreflective, Fixed-Field and Diffuse Models Suffix E, R, L, D and DL

S18-2 and S18 DC Specifications

Supply Voltage and Current	S18: 10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): S18-2: 10 to 30 V dc ≤ 55° C; 10 to 24 V dc > 55° C (10% max. ripple); Supply current (exclusive of load current): S18-2: Opposed Emitters: 17 mA Opposed Receivers: 8 mA Opposed Receivers: 8 mA Polarized Retroreflective: 16 mA Opposed Retroreflective: 30 mA Non-polarized Retroreflective: 25 mA Fixed-Field: 35 mA Diffuse: 25 mA				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model S18: The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply				
Output Rating	S18: 150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA S18-2: Less than or equal to 100 mA total current through both outputs at less than or at 55 °C Less than or equal to 50 mA total current for ambient temperatures greater than 55 °C OFF-state leakage current: S18-2: less than 50 µA at 30 V dc S18: less than 1 µA at 30 V dc ON-state saturation voltage: S18-2: less than 1.5 V at 10 mA dc; less than 2.75 V at 100 mA dc S18: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc				
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs				
Output Response Time	S18-2: Opposed: 1.5 milliseconds ON, 1.0 milliseconds OFF Retro, Polarized Retroreflective and Diffuse: 1.5 milliseconds ON, 0.75 milliseconds OFF S18: Opposed: 3 milliseconds ON, 1.5 milliseconds OFF Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 3 milliseconds ON/OFF				
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time				
Repeatability	S18-2: Opposed: 170 microseconds Polarized Retroreflective and Diffuse: 100 microseconds S18: Opposed: 375 microseconds Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 750 microseconds. Repeatability and response are independent of signal strength.				
Adjustments	Diffuse (DL), Emitter (ES), Receiver (RS), Polarized Retroreflective (LPC), Retroreflective (LV) models: Single turn sensitivity (gain) adjustment potentiometer Emitter Beam Inhibit (EJ) models: Tie black wire to 10 to 30 V dc for beam inhibit				
Indicators	S18-2: Three LED's: Green: Power is ON S18: Two LEDs: Green: Power is ON Green Flashing: Marginal sensing signal Green Flashing: Output overloaded Yellow: Pin 4 (black wire) output conducting Yellow: Light Operate (LO) output is energized				
Construction	S18-2 models: ABS housing S18 models: thermoplastic polyester housing Lenses are polycarbonate or acrylic; S18 models come with two jam nuts				
Environmental Rating	S18-2: IEC 60529 IP67 S18: Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.				
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: S18: 90% at 50° C (non-condensing) S18-2: 95% @ 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	S18-2, S18 models:				

S18 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). Average current: 20 mA. Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac					
Supply Protection Circuitry	Protected against transient voltages					
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark					
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 µA ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac					
Output Protection Circuitry	Protected against false pulse on power-up					
Output Response Time	Opposed: 16 milliseconds ON, 8 milliseconds OFF Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 16 milliseconds ON/OFF					
Delay at Power-up	100 milliseconds					
Repeatability	Opposed: 2 milliseconds Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 4 milliseconds Repeatability and response are independent of signal strength.					
Indicators	Two LEDs: Green: Power ON Yellow: Light sensed Yellow Flashing: Marginal excess gain					
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.					
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.					
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately.					
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)					
Certifications	CE ®					

M18 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Fixed-Field: 35 mA Opposed Receivers: 25 mA Diffuse: 25 mA				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply				
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA OFF-state leakage current: less than 1 μ A at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc				
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs				
Output Response Time	Opposed: 3 milliseconds ON, 1.5 milliseconds OFF Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 3 milliseconds ON/OFF				
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time				
Repeatability	Opposed: 375 microseconds Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse: 750 microseconds. Repeatability and response are independent of signal strength.				
Indicators	Two LEDs: Green: Power is ON Green Flashing: Output overloaded Yellow: Light Operate (LO) output is energized Yellow Flashing: Marginal excess gain				
Construction	Stainless steel housing Lenses are polycarbonate or acrylic; come with two jam nuts				
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.				
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.				
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	CF				





S30 Series

Plastic Barrel-Mount Sensors

- Long-range opposed mode
- Features 30 mm plastic threaded barrel
- Available in 10-30 V dc or 20-250 V ac
- Ideal for use in harsh sensing environments
- Cordsets and brackets see page 138

Opposed S30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
OPPOSED	60 m	2 m	S306E Emitter	
		4-Pin Euro QD	S306EQ Emitter	
		2 m	S30SN6R	S30SP6R
		4-Pin Euro QD	S30SN6RQ	S30SP6RQ

Polar Retro S30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	6 m [†]	2 m	S30SN6LP	S30SP6LP
POLAR RETRO	O III	4-Pin Euro QD	S30SN6LPQ	S30SP6LPQ

Fixed-Field S30, 10-30 V DC



Sensing Mode	Range	Connection	Models NPN	Models PNP
	0 - 200 mm Cutoff	2 m	S30SN6FF200	S30SP6FF200
FIXED-FIELD	200 11111 Gates	4-Pin Euro QD	S30SN6FF200Q	S30SP6FF200Q
FIXED-FIELD (0 - 400 mm Cutoff	2 m	S30SN6FF400	S30SP6FF400
		4-Pin Euro QD	S30SN6FF400Q	S30SP6FF400Q
FIXED-FIELD	0 - 600 mm Cutoff	2 m	S30SN6FF600	S30SP6FF600
		4-Pin Euro QD	S30SN6FF600Q	S30SP6FF600Q

Connection options: A model with a QD requires a mating cordset (see page 138).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S30SP6LP W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
OPPOSED	60 m	2 m	S303E Emitter	
		4-Pin Micro QD	S303EQ1 Emitter	,
		2 m	S30AW3R	S30RW3R
		4-Pin Micro QD	S30AW3RQ1	S30RW3RQ1

Polar Retro S30, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
POLAR RETRO 6 m [†]	6 mt	2 m	S30AW3LP	S30RW3LP
	O III	4-Pin Micro QD	S30AW3LPQ1	S30RW3LPQ1

Fixed-Field S30, 20-250 V AC



Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
	0 - 200 mm Cutoff	2 m	S30AW3FF200	S30RW3FF200
FIXED-FIELD	0 - 200 Milli Gutoli	4-Pin Micro QD	S30AW3FF200Q1	S30RW3FF200Q1
	0 - 400 mm Cutoff	2 m	S30AW3FF400	S30RW3FF400
FIXED-FIELD		4-Pin Micro QD	S30AW3FF400Q1	S30RW3FF400Q1
	0 - 600 mm Cutoff	2 m	S30AW3FF600	S30RW3FF600
FIXED-FIELD	0 - 600 MM Cutoli	4-Pin Micro QD	S30AW3FF600Q1	S30RW3FF600Q1

For more specifications see page 139.

Connection options: A model with a QD requires a mating cordset (see page 138).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S30SP6LP W/30).

 $\ensuremath{\uparrow}$ Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

Additional cordset information is available

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')

Micro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-306RA)

MQAC-406 m (6.51 MQAC-415 5 m (15') MQAC-430 9 m (30')



S30 DC Opposed, Polarized Retroreflective and Fixed-Field Models Suffix E, R, LP and FF



S30 AC Opposed, Polarized Retroreflective and Fixed-Field Models Suffix E, R, LP and FF



SMB18A

See page 758



SMBAMS18P



SMB3018SC



Additional bracket information is available See page 724



Additional information is available See page 790

Apertures



S30 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): Opposed Emitters: 25 mA Opposed Receivers: 20 mA Polarized Retroreflective: 30 mA Fixed-Field: 35 mA					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages					
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.					
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA OFF-state leakage current: less than 1 µA at 30 V dc ON-state saturation voltage: less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc					
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs					
Output Response Time	Opposed: 3 milliseconds ON; 1.5 milliseconds OFF Polarized Retroreflective and Fixed-Field: 3 milliseconds ON/OFF					
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time					
Repeatability	Opposed: 375 microseconds Polarized Retroreflective and Fixed-Field: 750 microseconds Repeatability and response are independent of signal strength					
Indicators	Two LEDs: Solid Green: Power ON Solid Yellow: Light Operate (LO) energized See datasheet for detailed information Flashing Green: output over loaded Flashing Yellow: marginal excess gain					
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.					
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.					
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.					
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)					
Certifications	CEUSTER BOOK AR® chamical compatibility panding on come models; contact Rapper Engineering for datails					

ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

SLOT & AREA | MINIATURE | FIBER OPTIC

S30 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). Average current: 20 mA Peak current: 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac					
Supply Protection Circuitry	Protected against transient voltages					
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models; Light Operate: Output conducts when the sensor sees its own (or the emitter's) modulated light Dark Operate: Output conducts when sensor sees dark					
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/ $^{\circ}$ C above +50 $^{\circ}$ C Inrush capability: 1 amp for 20 milliseconds, non-repetitive OFF-state leakage current: less than 100 μ A ON-state voltage drop: 3 V at 300 mA ac; 2 V at 15 mA ac					
Output Protection Circuitry	Protected against false pulse on power-up					
Output Response Time	Opposed: 16 milliseconds ON; 8 milliseconds OFF Polarized Retroreflective and Fixed-Field: 16 milliseconds ON/OFF					
Delay at Power-up	100 milliseconds					
Repeatability	Opposed: 2 milliseconds Polarized Retroreflective and Fixed-Field: 4 milliseconds Repeatability and response are independent of signal strength					
Indicators	Two LEDs: Solid Green: Power ON Solid Yellow: Light Operate (LO) energized See datasheet for detailed information Flashing Yellow: marginal excess gain					
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included					
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9					
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting QD cordsets are ordered separately.					
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation).					
Certifications	C E UL STED ® ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details					







Long-Range, Opposed-Mode Barrel Sensors

- Available with ac or dc supply voltages
- Ideal in equipment washdown environments
- Epoxy-encapsulated
- Sensing range up to 200 m

Opposed SM30 Emitters, 10-30 V DC or 12-240 V AC, Frequency A[†]



Sensing Mode	Housing	Range	Connection	Output Type	Models
	Plastic	150 m	2 m	N/A	SMA30PEL
OPPOSED	i idatio	150111	3-Pin Mini QD	IVA	SMA30PELQD
	Stainless Steel	150 m	2 m	N/A	SMA30SEL
	Otali liess Steel	100 111	3-Pin Mini QD	IV/A	SMA30SELQD

Opposed SM30 Receivers, 10-30 V DC Frequency A[†]



Sensing Mode	Housing	Range	Connection	Output Type	Models
	Plastic	150 m	2 m 4-Pin Mini QD	Bi-Modal™ NPN or PNP	SM30PRL SM30PRLQD
OPPOSED	Stainless Steel	150 m	2 m	Bi-Modal™	SM30SRL
			4-Pin Mini QD	NPN or PNP	SM30SRLQD

Opposed SM30 Receivers, 24-240 V AC, Frequency A[†]



Sensing Mode	Housing	Range	Connection	Output Type	Models
	Plastic	150 m	2 m	LO	SM2A30PRL
	riadio	100111	3-Pin Mini QD	LO	SM2A30PRLQD
	Stainless Steel	150 m	2 m	LO	SM2A30SRL
			3-Pin Mini QD	20	SM2A30SRLQD
OPPOSED	Plastic	150 m	2 m	DO	SM2A30PRLNC
			3-Pin Mini QD		SM2A30PRLNCQD
	Stainless Steel	150 m	2 m	DO	SM2A30SRLNC
	Stall liess Steel	130 111	3-Pin Mini QD	DO	SM2A30SRLNCQD

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, SMA30PEL W/30).

[†] Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" at the end of the standard model number (example, SMA30PELB or SMA30PELC).





Additional cordset information is available See page 758









SMB30A

SMBAMS30P

SMB3030SC

SMB30FA..

Additional bracket information is available See page 724



Opposed Models—All Frequencies Suffix E and R (Metal Housing Shown)



(Plastic Housing Shown)

SM30 Specifications

Supply Voltage and Current	Emitters: 12 to 240 V ac (50/60 Hz) or 10 to 30 V dc (10% max. ripple) at 20 mA DC Receivers: 10 to 30 V dc (10% max. ripple) at 10 mA max, exclusive of load AC Receivers: 24 to 240 V ac (50/60 Hz)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	DC Receivers: Bi-Modal™ output (PNP sourcing or NPN sinking). Selection of sourcing or sinking configuration depends upon receiver's power supply hookup polarity. Once wired, the unit performs as a solid-state switch. AC Receivers: Solid-state switch offer Light Operate (LO) or Dark Operate (DO) by model
Output Rating	DC Receivers: 250 mA continuous Output saturation voltage: (PNP & NPN configuration) less than 1 volt at 10 mA; less than 2 volts at 250 mA OFF-state leakage current: less than 10 μA AC Receivers: Max. steady-state load capability is 500 mA Inrush capability: 10 amps for 1 second (non-repeating) OFF-state leakage: current less than 1.7 mA rms ON-state voltage drop: less than 3.5 volts rms across a 500 mA load; less than 5 volts rms across a 15 mA load
Output Protection Circuitry	Outputs of dc receivers are short circuit protected
Output Response Time	10 milliseconds ON/OFF
Repeatability	"A" frequency units: 1 millisecond "B" frequency units: 1.5 milliseconds "C" frequency units: 2.3 milliseconds
Indicators	Internal Red LED, visible through the lens or from side of the sensor. Emitters: Red "Power ON" indicator LED DC Receivers: Lights whenever receiver sees its modulated light source AC Receivers: Lights whenever receiver's output is conducting
Construction	Fully epoxy-encapsulated tubular threaded housing, positive sealed at both ends, quad-ring sealed acrylic lens Plastic models: 30 mm diameter thermoplastic polyester housing and jam nuts Stainless Steel models: 30 mm diameter 303 stainless steel housing and jam nuts
Environmental Rating	Exceeds NEMA 6P; IEC IP67 standards
Connections	PVC-jacketed 2 m or 9 m cables or Mini-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Certifications	CE ® c SLLus



BARREL

Slot & Area

Slot sensors, also known as fork sensors, provide easy and reliable opposed-mode sensing of objects as small as 0.3 mm. Slot sensors are offered in a wide variety of sizes to meet your application needs.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	SLM Easy to mount, focus-beamed sensors with powerful optics. Page 144	Opposed : 220 mm	Varies by model	IP67; NEMA 6	Die-cast zinc	10 to 30 V dc
	SL30 & SL10 A fixed-distance slot sensor with a slot that offers high speed sensing with expert push-button TEACH options. Page 146	Opposed: 30 mm	72 x 52 x 18.8 mm	IP67; NEMA 6	ABS/polycarbonate	10 to 30 V dc
	LX Part-Sensing Arrays provides wide area detection used for detecting small parts on conveyors, part ejection verification and leading edge detection. Page 148	Opposed: 2 m	Varies by model	IP65	Aluminum housing, die-cast zinc with black e-coated painted endcaps	10 to 30 V dc

PHOTOELECTRIC | FEATURED | RECTANGLE | RIGHT ANGLE | BARRE

SLM Series



Rugged, Nickel-Plated, Fixed-Distance Slot Sensors

- Easy to mount, focus-beamed sensors with powerful optics.
- Powerful optics for detecting between sheets of plastic
- Requires no alignment, with easy and economical mounting that uses molded in-beam guides to simplify beam placement
- Rugged metal housing rated to IP67

SLM Nickel-Plated



Sensing Mode	Slot Width/ Depth	Width (W)	Depth (D)	Connection	Response	Models NPN	Models PNP
				2 m		SLM10B6 (Bipola	r NPN/PNP)
	10 mm/ 60.8 mm	42 mm	80 mm	4-Pin Euro Pigtail QD	500 µs	SLM10B6QPMA	(Bipolar NPN/PNP)
SLOT	001011111			3-Pin Pico QD		SLM10N6Q	SLM10P6Q
				2 m		SLM20B6 (Bipola	ır NPN/PNP)
	20 mm/ 60.8 mm	52 mm	80 mm	4-Pin Euro Pigtail QD	500 µs	SLM20B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM20N6Q	SLM20P6Q
	00 /			2 m		SLM30B6 (Bipola	ır NPN/PNP)
	30 mm/ 60.8 mm	62 mm	80 mm	4-Pin Euro Pigtail QD	500 µs	SLM30B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM30N6Q	SLM30P6Q
	<i>'</i>			2 m		SLM50B6 (Bipola	ır NPN/PNP)
	50 mm/ 60.8 mm	82 mm	80 mm	4-Pin Euro Pigtail QD	500 µs	SLM50B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM50N6Q	SLM50P6Q
	00 /			2 m		SLM80B6 (Bipola	ır NPN/PNP)
	80 mm/ 60.8 mm	112 mm	80 mm	4-Pin Euro Pigtail QD	500 µs	SLM80B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM80N6Q	SLM80P6Q
	100/			2 m		SLM120B6 (Bipol	lar NPN/PNP)
	120 mm/ 120.7 mm	152 mm	140 mm	4-Pin Euro Pigtail QD	500 µs	SLM120B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM120N6Q	SLM120P6Q
	180 mm/			2 m		SLM180B6 (Bipol	lar NPN/PNP)
	180 mm/ 120.7 mm	202 mm	140 mm	4-Pin Euro Pigtail QD	500 µs	SLM180B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM180N6Q	SLM180P6Q
	000 mm/			2 m		SLM220B6 (Bipol	lar NPN/PNP)
	220 mm/ 120.7 mm	252 mm	140 mm	4-Pin Euro Pigtail QD	500 µs	SLM220B6QPMA	(Bipolar NPN/PNP)
SLOT				3-Pin Pico QD		SLM220N6Q	SLM220P6Q

Connection options: A model with a QD requires a mating cordset

For 9 m cable, add suffix W/30 to the 2 m model number (example, SLM10B6 W/30).

MQDC-406 Euro QD (for ..Q8 or ..Q5 models) 2 m (6') MQDC-415 Straight connector models listed; for right-angle, add RA 5 m (15') to the end of the model number **MQDC-430** (example, MQDC-406RA) 9 m (30')

Additional cordset information is available See page 758

Pico QD (for Q models) Straight connector models listed; for right-angle, W replaces G in the model number. (example, PKW3M-5) *There are no PKW3M-7, or PKW3M-10 models available

PKG3M-2 2 m (6.5') PKG3M-5 5 m (151) PKG3M-7 7 m (23') PKG3M-9 9 m (30') PKG3M-10 10 m



SLM Specifications

Slot Opening	10, 20, 30, 50	, 80, 120, 180 or 2	220 mm (dependir	ng on model); bean	n is 5 mm from out	er edge				
Supply Voltage and Current	10 to 30 V dc	10 to 30 V dc (10% ripple) @ less than 25 mA, exclusive of load								
Supply Protection Circuitry	Protected aga	Protected against reverse polarity and transient voltages								
Output Configuration		Cabled and Euro-style QD models: Bipolar: One current sourcing (PNP) and one current sinking (NPN) Pico-style QD models: Current sourcing (PNP) or current sinking (NPN), depending on model								
Output Rating	OFF-state lea	100 mA with short circuit protection OFF-state leakage current: less than 10 μA sourcing; less than 200 μA sinking ON-state saturation voltage: NPN: 1.6 V @ 100 mA PNP: 2.0 V @ 100 mA								
Output Protection Circuitry		Protected against output short-circuit and false pulse on power up. 100 milliseconds max. delay at power up; outputs do not conduct during this time.								
Minimum Object Detection*	SLM10	SLM20	SLM30	SLM50	SLM80	SLM120	SLM180	SLM220		
at Max. dalli	1.00 mm	1.25 mm	1.50 mm	1.65 mm	1.80 mm	1.80 mm	1.80 mm	2.40 mm		
Minimum Object Detection* at 2X Excess Gain	0.30 mm	0.30 mm	0.40 mm	0.60 mm	0.75 mm	0.90 mm	0.90 mm	1.00 mm		
Hysteresis**	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.20 mm	0.20 mm	0.20 mm	0.20 mm		
Repeatability†	0.02 mm	0.02 mm	0.02 mm	0.04 mm	0.06 mm	0.08 mm	0.08 mm	0.08 mm		
Output Response Time	500 microseco	onds								
Repeatability	95 microsecor	nds								
Adjustments		ometer Sensitivity a / Dark Operate Se								
Indicators			· ·	en: output short cir	cuit					
Construction	Housing: Die-	cast zinc Endcaps	:: ABS Opti	c windows: Acrylic	0					
Environmental Rating	IEC IP67; NEN	1A 6								
Connections	Pico-style QE	ols: 2 m or 9 m 4-c models: 3-pin, the models: 4-pin, the	nreaded	cketed cable	thane (PUR) cable					
Operating Conditions	Temperature:	-20° to +60° C	Relative humi	dity: 95% @ 55° C	C (non-condensing)					
Certifications	CE									

^{*} Minimum Object Detection: Smallest diameter rod that can be detected when passed slowly through sensing beam.



NOTE: Minimum object detection is measured midway between the emitter and receiver. For best results, objects to be detected should be placed in the midway position when possible. The minimum object detection size may increase if the object is very close to the receiver side.

Hysteresis: Distance an object must move to toggle between output OFF and output ON conditions.

Repeatability: Variation in switching distance for a standard target at controlled sensing conditions.

SL30 Series



Fixed-Distance Slot Sensors

- Uses molded in-beam guides to simplify beam placement
- Provides easy-to-use self-contained opposed-mode sensor pair in rugged U-shaped housing
- Features manual sensitivity adjustment or easy push-button TEACH-mode setup, depending on model
- Cordsets and brackets see page 148

SL30						Visible Red LED
Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
		2 m	Bipolar			SL30VB6V
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	1 ms	250 μs	SL30VB6VQ
		2 m	Bipolar			SL30VB6VY
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	300 µs	75 μs	SL30VB6VYQ
SLO30						Infrared LE
Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
		2 m	Bipolar			SLO30VB6
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	1 ms	250 μs	SLO30VB6Q
		2 m	Bipolar		75	SLO30VB6Y
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	300 µs	75 μs	SLO30VB6YQ
SLE30 <i>Expe</i> i	$rt^{{\scriptscriptstyle TM}}$					Visible Red LED
Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
		2 m	Bipolar			SLE30B6V
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	500 µs	100 µs	SLE30B6VQ
		2 m	Bipolar	450		SLE30B6VY
SLOT	30 mm	5-Pin Euro QD	NPN/PNP	150 µs	75 μs	SLE30B6VYQ
For more specifications see	page 148.					
Connection op	otions: A model with a 0	D requires a mating cordset (se	e page 148).			

For 9 m cable, add suffix W/30 to the 2 m model number (example, SL30VB6V W/30).

SL10 Series



Fixed-Distance Slot Sensors

- •Uses molded in-beam guides to simplify beam placement
- Provides easy-to-use self-contained opposed-mode sensor pair
- Features manual sensitivity adjustment or easy push-button TEACH-mode setup, depending on model
- Cordsets and brackets see page 148

SL10						Visible Red LED
Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
	10 mm	2 m	Bipolar	1 ms	250 µs	SL10VB6V
SLOT		5-Pin Euro QD	NPN/PNP		200 pc	SL10VB6VQ
	10 mm	2 m	Bipolar	000	75	SL10VB6VY
SLOT	TO MIM	5-Pin Euro QD	NPN/PNP	300 µs	75 μs	SL10VB6VYQ
SLE10 Exper	T ™					Visible Red LED
Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
	10 mm	2 m	Bipolar	500 µs	100 µs	SLE10B6V
SLOT		NPN/PNP				
OLOT		5-Pin Euro QD				SLE10B6VQ
	10 mm	5-Pin Euro QD 2 m	Bipolar	150 µs	75 µs	SLE10B6VQ SLE10B6VY

For more specifications see page 148.

Connection options: A model with a QD requires a mating cordset (see page 148).

For 9 m cable, add suffix W/30 to the 2 m model number (example, SL10VB6V W/30).



Euro-Style Straight connector models listed; for right-angle, add RA to the end

MQDC1-506RA)

of the model number (example,

5-Pin MQDC1-501.5 0.5 m (1.6') MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

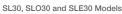
Additional cordset information is available See page 758

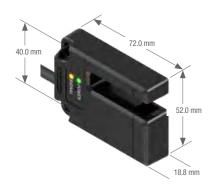


SMBSL 12-ga. stainless steel

Additional bracket information is available See page 724







SL10 and SLE10 Models

SL30, SL10 and SLO30 Specifications

	·
Supply Voltage and Current	10 to 30 V dc, 30 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sinking (NPN) and one current sourcing (PNP) open-collector transistor
Output Rating	150 mA, each output
Output Protection Circuitry	Protected against false pulse on power-up and short-circuit of outputs
Output Response Time	1 millisecond or 300 microseconds, depending on model
Repeatability	250 microseconds or 75 microseconds, depending on model
Adjustments	SL30 and SL10: 4-turn clutched potentiometer sensitivity adjustment SL030: None
Indicators	Green: Power ON/OFF indicator Yellow: Signal condition indicator
Construction	Housing: ABS/polycarbonate Lenses: Acrylic
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m 5-conductor PVC-jacketed attached cable, or 5-pin Euro-style quick-disconnect (QD) fitting. QD cordsets are ordered separately.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% @ 50° C (non-condensing)
Certifications	CE

SLE30 and SLE10 $\textit{Expert}^{\text{TM}}$ Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈1 mA per ° C) OFF-state leakage current: less than 5 µA @ 30 V dc ON-state saturation current: less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 500 microseconds (or 150 microseconds, depending on model) or longer duration, 1 kHz max
Delay at Power-up	1 second; outputs are non-conducting during this time
Repeatability	100 microseconds or 75 microseconds, depending on model
Adjustments	Pushbutton TEACH-mode sensitivity setting; remote TEACH-mode input
Indicators	Two LEDs: Yellow and Bicolor Green/Red Green (RUN Mode): ON when power is applied Flashes when received light level approaches the switching threshold Red (TEACH Mode): OFF when no signal is received. Pulses to indicate signal strength (received light level). Rate is proportional to signal strength (the stronger the signal, the faster the pulse rate). This is a function of Banner's Alignment Indicating Device (AID™). Alternating Red/Green: Microprocessor memory error Flashing Yellow (Static TEACH): ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition Yellow (Dynamic TEACH): Pulses at 0.5 Hz when ready to sample ON to indicate Dynamic TEACH sampling OFF to indicate sampling was accepted Yellow (RUN Mode): ON when outputs are conducting
Construction	Housing: ABS/polycarbonate Lenses: Acrylic
Environmental Rating	IEC IP67; NEMA 6
Connections	PVC-jacketed 5-conductor 2 m or 9 m unterminated cable, or 5-pin Euro-style quick-disconnect (QD) fitting. QD cordsets are ordered separately.
Operating Conditions	Temperature: -20° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Application Notes	The first condition presented during TEACH mode becomes the output ON condition
Certifications	(£





High-Speed Part-Sensing Array

- Detects objects as small as 5.6 mm and extremely flat objects passing anywhere through the screen
- Responds in 0.8 to 6.5 milliseconds, faster than comparable products even at the slowest speed
- Features rugged silver anodized housing rated to IP65
- Uses integrated T-slot mounting channel for unique mounting flexibility

LX Light Screens Short-Range (75-200 mm)

Sensing			Min object detection	size: 5.6 mm dia.
Array Length	Connection	Output Type	Emitters	Receivers
67 mm	2 m	Bipolar NPN/PNP	LX3ESR	LX3RSR
143 mm	2 m	Bipolar NPN/PNP	LX6ESR	LX6RSR
295 mm	2 m	Bipolar NPN/PNP	LX12ESR	LX12RSR

LX Light Screens Standard Range (150 mm-2 m)

Sensing			Min object detection	size: 9.5 mm dia.
Array Length	Connection	Output Type	Emitters	Receivers
67 mm	2 m	Bipolar NPN/PNP	LX3E	LX3R
143 mm	2 m	Bipolar NPN/PNP	LX6E	LX6R
218 mm	2 m	Bipolar NPN/PNP	LX9E	LX9R
295 mm	2 m	Bipolar NPN/PNP	LX12E	LX12R
371 mm	2 m	Bipolar NPN/PNP	LX15E	LX15R
447 mm	2 m	Bipolar NPN/PNP	LX18E	LX18R
523 mm	2 m	Bipolar NPN/PNP	LX21E	LX21R
599 mm	2 m	Bipolar NPN/PNP	LX24E	LX24R

Connection options: A model with a QD requires a mating cordset.

For 5-pin 150 mm Euro-style Pigtail QD, add suffix Q to the 2 m model number (example, LX3ESRQ).

Euro-Style
Straight connector models listed;
for right-angle, add RA to the end
of the model number (example,
MQDC1-506RA)

5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

Additional cordset information is available See page 758





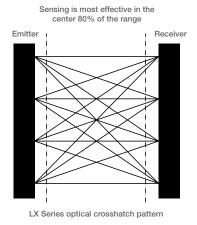
SMBLX

SMBLXR

Additional bracket information is available See page 724



Models	Length (L)
LX3	113.4 mm
LX6	189.6 mm
LX9	265.8 mm
LX12	342.0 mm
LX15	418.2 mm
LX18	494.4 mm
LX21	570.6 mm
LX24	646.8 mm



LX Specifications

Sensing Range	1	Normal (see hookups)	Reduced			
	Short-range models:	100 to 200 mm	75 to 150 mm			
	Standard-range models:	300 mm to 2 m	150 to 600 mm			
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 1 watt each for emitter and receiver (exclusive of load)					
Supply Protection Circuitry	Protected against reverse polarity	and transient voltages				
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor					
Output Rating	125 mA max. each output OFF-state leakage current: less than 5 µA Output saturation voltage (PNP output): less than 1 volt at 10 mA and less than 1.5 volts at 100 mA Output saturation voltage (NPN output): less than 0.5 volts at 10 mA and less than 0.6 volts at 100 mA					
Output Protection Circuitry	Protected against false pulse on	power-up and continuou	s overload or short circuit of outputs			
Output Response Time	LX3: 0.8 milliseconds ON-time; 6 LX6: 1.6 milliseconds ON-time; 7 LX9: 2.4 milliseconds ON-time; 7 LX12: 3.2 milliseconds ON-time; LX15: 4.0 milliseconds ON-time; LX18: 4.8 milliseconds ON-time; LX21: 5.6 milliseconds ON-time; LX24: 6.4 milliseconds ON-time;	milliseconds OFF-time (5.5 milliseconds OFF-time 8.5 milliseconds OFF-time 9 milliseconds OFF-time 10 milliseconds OFF-time 11 milliseconds OFF-time 11 milliseconds OFF-time	milliseconds OFF-delay) (5 milliseconds OFF-delay) e (5 milliseconds OFF-delay) (5 milliseconds OFF-delay) (5 milliseconds OFF-delay) (6 milliseconds OFF-delay) (6 milliseconds OFF-delay)			
Minimum Object Detection Size	Smallest diameter rod that can	be detected in sensing	range: 5.6 mm (short-range) or 9.5 mm (standard-range), depending on model			
Indicators	Emitter: LED1 (Green) ON: Power ON, good OFF: Reduced Rang	e OFF: Nor	d) ced range mal range Emitter hardware failure			
	Receiver: LED1 (Yellow) ON: Output conducti OFF: Output not con	ng Green: Normal range ducting Red: Red	color Green/Red) uced range Red: Receiver hardware failure			
Construction	Aluminum housing, die-cast zinc	with black e-coated pain	ted encaps, acrylic lens window			
Environmental Rating	IEC IP65					
Connections	2 m 5-conductor (with drain) PVC Cordsets are ordered separately.		nm pigtail with 5-pin Euro-style quick-disconnect fitting, depending on model.			
Operating Conditions	Temperature: -20° to +70° C	Relative humidity: 90	0% at 50° C (non-condensing)			
Application Notes	The best sensing resolution occurs within the center 80% of the sensing range Low-profile packages can be reliably detected Outputs are active while the light screen is interrupted For reliable detection, successive parts must be spaced up to the total of ON-time plus OFF-time apart. (i.e., 12 milliseconds for the LX12)					
Certifications	(€ c A L°us					



Miniature

Miniature photoelectric sensors are extremely compact, conveniently fitting into limited spaces with barrel and right angle housings.

Sensors have high-power performance for close range detection. Six sensing modes are available with an opposed mode sensing range up to 3 meters.

Series	Description	Max Sensing Rang	ie	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	VSM Series Heavy-duty metal sensors that are compact and ideal for use in confined areas. Page 154	Opposed: Diffuse:	250 mm 200 mm	Varies by model	IP67; NEMA 6P	Stainless steel	10 to 30 V dc
0	VS1 Small, high performance sensor can easily be embedded into the application. Page 156	Convergent:	15 mm	25.7 x 8.3 x 11.6 mm	IP54, NEMA3	ABS/ polycarbonate	10 to 30 V dc
	VS2 Ultra-thin VS2 miniature sensors are suited to work well in confined areas while providing high performance. Page 158	Opposed: Convergent:		25.1 x 12 x 4.3 mm	IP67; NEMA 6P	ABS	10 to 30 V dc
	VS3 Provides coaxial optics for close-range retro detection of the sensor. Page 160	Coaxial Retro: Coaxial Polar Retro:		25.4 x 9 x 15.6 mm	IP67; NEMA 6P	ABS	10 to 30 V dc

OTHER AVAILABLE MODELS



Q12

page 66



VSM Series

Self-Contained Metal Sensors

- Heavy-duty, compact, metal sensors that are ideal for use in confined areas.
- Sapphire lens
- Tough 300 series stainless steel body withstands a wide variety of chemicals and cutting fluids
- Smooth barrel models are ideal for hygienic applications that require frequent cleaning
- Advanced optical design provides high performance with repeatable sensing

VSMQ (Flat-Pack, Side-Looker)

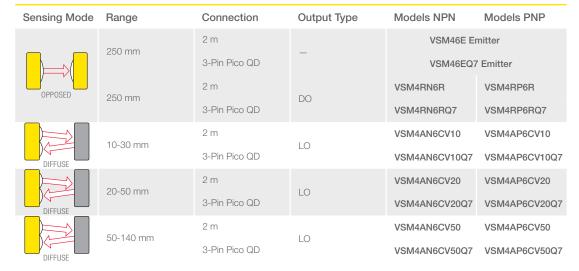




Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
DIFFUSE	20-50 mm	2 m	LO	VSMQAN6CV20	VSMQAP6CV20
DIFFUSE	50-140 mm	2 m	LO	VSMQAN6CV50	VSMQAP6CV50
DIFFUSE	90-200 mm	2 m	LO	VSMQAN6CV90	VSMQAP6CV90

VSM4 (4 mm Smooth Barrel)







Connection options: A model with a QD requires a mating cordset.

VSM5 (5 mm Threaded Barrel)



Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
	250 mm	2 m	_	VSM56	E Emitter
OPPOSED		3-Pin Pico QD		VSM56E	Q7 Emitter
	250 mm	2 m	DO	VSM5RN6R	VSM5RP6R
OPPOSED	230 11111	3-Pin Pico QD	DO	VSM5RN6RQ7	VSM5RP6RQ7
	10-30 mm	2 m	LO	VSM5AN6CV10	VSM5AP6CV10
DIFFUSE	10-30 11111	3-Pin Pico QD		VSM5AN6CV10Q7	VSM5AP6CV10Q7
	20-50 mm	2 m	LO	VSM5AN6CV20	VSM5AP6CV20
DIFFUSE	20 00 111111	3-Pin Pico QD	LO	VSM5AN6CV20Q7	VSM5AP6CV20Q7
	50-140 mm	2 m	LO	VSM5AN6CV50	VSM5AP6CV50
DIFFUSE	00-140 MIII	3-Pin Pico QD	LO	VSM5AN6CV50Q7	VSM5AP6CV50Q7



Connection options: A model with a QD requires a mating cordset.





SMBVSM4

Additional cordsett information is available See page 758

Additional bracket information is available See page 722

VSM Specifications

VOIVI OPECINEATIONS	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Single-output: 1 NPN or 1 PNP, Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	100 mA max. OFF-state leakage current: less than 1 μA ON-state saturation voltage: less than 2 V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Response Time	2.5 milliseconds
Delay at Power-up	20 milliseconds
Repeatability	1 millisecond
Indicators	Yellow LED: light sensed
Construction	300 series stainless steel with PVC cable CV10 & CV20: sapphire lens CV50 & Opposed: Glass lens
Environmental Rating	IP67
Connections	2 m PVC-jacketed cable or 3-pin Pico-style integral QD (Q7), depending on model. QD cordsets ordered separately.
Operating Conditions	Operating temperature: 0° to +55° C
Certification	(C (4)

VS1 Series



Miniature Self-Contained Sensors

- Small housing for powerful sensing performance in confined areas
- Available with 10 or 15 mm focal length
- Reliable sensing without adjustments

Convergent \	VS1			Red L	.ED Infrared LED
Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
		2 m	LO	VS1AN5CV10	VS1AP5CV10
	10 mm	3-Pin Pico Pigtail QD	LO	VS1AN5CV10Q	VS1AP5CV10Q
CONVERGENT	focus	2 m	DO	VS1RN5CV10	VS1RP5CV10
CONVENDENT		3-Pin Pico Pigtail QD	50	VS1RN5CV10Q	VS1RP5CV10Q
		2 m	LO	VS1AN5CV20	VS1AP5CV20
	15 mm focus /ERGENT	3-Pin Pico Pigtail QD	LO	VS1AN5CV20Q	VS1AP5CV20Q
CONVERGENT		2 m	DO	VS1RN5CV20	VS1RP5CV20
CONVENDENT		3-Pin Pico Pigtail QD		VS1RN5CV20Q	VS1RP5CV20Q
	10 mm	2 m	LO	VS1AN5C10	VS1AP5C10
		3-Pin Pico Pigtail QD		VS1AN5C10Q	VS1AP5C10Q
CONVERGENT	focus	2 m	DO	VS1RN5C10	VS1RP5C10
OONVEHGENT		3-Pin Pico Pigtail QD		VS1RN5C10Q	VS1RP5C10Q
		2 m	LO	VS1AN5C20	VS1AP5C20
	15 mm	3-Pin Pico Pigtail QD		VS1AN5C20Q	VS1AP5C20Q
CONVERGENT	focus	2 m	DO	VS1RN5C20	VS1RP5C20
CONVERGENT		3-Pin Pico Pigtail QD		VS1RN5C20Q	VS1RP5C20Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS1AN5CV10 W/30).



Additional cordsett information is available See page 758



Additional information is available See page 790



SMBVS1T



SMBVS1TC





SMBVS1S

SMBVS1SC

Additional bracket information is available See page 724



VS1 Specifications

voi specifications					
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO) models				
Output Rating	50 mA max. OFF-state leakage current: less than 1 μA at 24 V dc ON-state saturation voltage: less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc				
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA				
Output Response Time	1 millisecond ON/OFF				
Repeatability	250 microseconds				
Indicators	Two LEDs: Solid Green: power ON Solid Yellow: light sensed Flashing Yellow: magrinal excess gain				
Construction	Black ABS/polycarbonate housing with clear acrylic lens				
Environmental Rating	IP54; NEMA 3				
Connections	2 m or 9 m attached cable, or 150 mm pigtail with 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately.				
Operating Conditions	Temperature: -20° to +55° C Relative humidity: 80% at 50° C (non-condensing)				
Application Notes	M2 stainless steel mounting hardware is included. Optional mounting brackets are available.				
Certifications	(f				

PHOTOELECTRIC FEATURED RECTANGLE RIGHT ANGLE BARREL

VS2 Series



Flat Pack Miniature Sensors

- Offers flat-front mounting or optional bracket
- Reliable sensing without adjustments
- Models available in opposed or convergent modes

Opposed VS2 Range Sensing Mode Connection Output Type Models NPN[†] Models PNP[†] 2 m VS25EV Emitter 3-Pin Pico Pigtail QD VS25EVQ Emitter Optimum VS2AN5R 2 m VS2AP5R up to 600 mm, VS2AP5RQ 3-Pin Pico Pigtail QD VS2AN5RQ 1.2 m max. VS2RN5R VS2RP5R 2 m VS2RN5RQ 3-Pin Pico Pigtail QD VS2RP5RQ 2 m VS25E Emitter 3-Pin Pico Pigtail QD VS25EQ Emitter VS2AN5R 2 m VS2AP5R 3.0 m 3-Pin Pico Pigtail QD VS2AN5RQ VS2AP5RQ 2 m VS2RN5R VS2RP5R DO 3-Pin Pico Pigtail QD VS2RN5RQ VS2RP5RQ Convergent VS2 Visible Red LED



VS2RN5CV30Q

VS2RP5CV30Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS2RP5R W/30).

† Opposed-mode models also sold as pairs. Contact factory for more information 1-888-373-6767.

3-Pin Pico Pigtail QD



Additional cordsett information is available See page 758



Additional information is available See page 790



Additional information is available See page 816



SMBVS2RA

Additional bracket information is available See page 724





VS2 Specifications

VOL OPCOMORMONO	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) Emitter: 25 mA (visible red); 30 mA (infrared) Receiver (Convergent): at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	50 mA max. OFF-state leakage current: less than 1 μA at 24 V dc ON-state saturation voltage: less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	Opposed: 1 millisecond ON; 0.5 millisecond OFF Convergent: 1 millisecond ON; OFF
Delay at Power-up	Maximum 100 millisecond (opposed) and 150 millisecond (convergent); output does not conduct during this time
Repeatability	Opposed: 100 microseconds Convergent: 160 microseconds
Indicators	Two LEDs: Solid Green: power ON Solid Yellow: light sensed Flashing Green: output overload Flashing Yellow(opposed mode only): marginal excess gain
Construction	Opposed: Black ABS housing with clear MABS lens Convergent: Black ABS housing with acrylic lens
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m attached cable or 150 mm pigtail with 3-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately.
Operating Conditions	Temperature: -20° to +55° C Relative humidity: 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	Vibration: All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M2 stainless steel mounting hardware is included. Optional mounting brackets are available.
Certifications	(f





VS3 Series

Miniature Sensors with Advanced Optics

- Reliable sensing without adjustments
- Uses coaxial optics to eliminate blind areas at close range
- Accurately detects shiny objects
- Visible sensing beam for easy alignment

Coaxial & Coaxial Polar Retro VS3

Sensing Mode	Ranget	Connection	Output Type	Models NPN	Models PNP
		2 m	LO	VS3AN5XLV	VS3AP5XLV
	250 mm	3-Pin Pico QD	LO	VS3AN5XLVQ	VS3AP5XLVQ
	200 111111	2 m	DO	VS3RN5XLV	VS3RP5XLV
COAXIAL RETRO		3-Pin Pico QD		VS3RN5XLVQ	VS3RP5XLVQ
COAXIAL POLAR RETRO		2 m	LO	VS3AN5XLP	VS3AP5XLP
	250 mm	3-Pin Pico QD		VS3AN5XLPQ	VS3AP5XLPQ
	230 11111	2 m	DO	VS3RN5XLP	VS3RP5XLP
		3-Pin Pico QD	DO	VS3RN5XLPQ	VS3RP5XLPQ

Connection options: A model with a QD requires a mating cordset .

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS3AN5XLV W/30).

† Retroflective range is specified using one model BRT-32X20AM retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See accessories for more information.



Additional cordsett information is available See page 758



Additional information is available See page 790







SMBVS3T SMBVS3S

Additional bracket information is available See page 724

VS3 Specifications

voo opeemeations	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Rating	50 mA max. OFF-state leakage current: less than 1 μA at 24 V dc ON-state saturation voltage: less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
Output Response Time	1 millisecond ON/OFF
Delay at Power-up	150 millisecond; output does not conduct during this time
Repeatability	160 microseconds
Indicators	Two LEDs: Solid Green: power ON Solid Yellow: light sensed Flashing Green: output over loaded
Construction	Non-polarized Retroreflective: Black ABS housing with acrylic lens Polarized Retroreflective: Black ABS housing with glass lens and acrylic cover
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m attached cable, or 3-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately.
Operating Conditions	Temperature: -20° to +55° C Relative humidity: 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	Vibration: All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak Shock: All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M3 stainless steel mounting hardware is included. Optional mounting brackets are available.
Certifications	CE



BARREL

Fiber Optics

Fiber optic cables are ideal for harsh conditions including high vibration, extreme heat, noisy, wet, corrosive or explosive environments. Fiber optic sensors have thin profiles, allowing for close mounting of multiple units and mounting in confined areas. Sensors can be positioned precisely where needed with flexible fibers.

Series	Description	Output Response Time	Dimensions H x W x D	Housing Material	Power Supply
	DF-G3 Long-range easy to read dual display fiber amplifier page 164	500 µs varies by model	33.0 x 72.0 x 10.0 mm	Thermoplastic	NPN/PNP models: 10 to 30 V dc IO-Link models: 18 to 30 V dc
	DF-G2 High-speed easy to read dual display fiber amplifier page 166	10 μs (varies by model)	33.0 x 72.0 x 10.0 mm	Thermoplastic	NPN/PNP models: 10 to 30 V dc IO-Link models: 18 to 30 V dc
	DF-G1 Easy to read dual display fiber amplifier page 168	High Speed: 200 μs Long Range: 2 ms Extra Long Range: 5 ms	33.0 x 72.0 x 10.0 mm	Thermoplastic	NPN/PNP models: 10 to 30 V dc IO-Link models: 18 to 30 V dc
	D10 Advanced fiber optic amplifier page 172	varies by model	35.9 x 68.1 x 10.0 mm	Thermoplastic	12 to 24 V dc
	Plastic Fibers page 174				
	Glass Fibers page 192				

OTHER AVAILABLE MODELS



R55F see website

PHOTOELECTRIC FEATURED RECTANGLE RIGHT ANGLE BARREL

DF-G3 Series



Long-range Fiber Optic Amplifiers

- World-class long-range sensing capability, more than 3 m (10 ft) with opposed mode fibers
- Easy to read dual digital displays show both signal level and threshold simultaneously
- Cross-talk avoidance function allows seven inspections in dense sensing point applications
- Models with IO-Link enable a point-to-point communication link between a master device and a sensor, facilitating remote monitoring, teaching, and configuration
- Operator control of the sensitivity (hysteresis) provides additional detection sensitivity, or a stabilized output depending on the application details

IO-Link DF-G3

Sensing Beam Color	Range*	Connection	Output	Models
Visible Red, 635 nm	3,000 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G3-KD-2M
Infrared, 850 nm**	6,000 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G3IR-KD-2M

Single Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Visible Red	3,000 mm	2 m	DF-G3-NS-2M	DF-G3-PS-2M
Infrared, 850 nm**	6,000 mm	2 m	DF-G3IR-NS-2M	DF-G3IR-PS-2M

Dual Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Visible Red	3,000 mm	2 m	DF-G3-ND-2M	DF-G3-PD-2M
Infrared, 850 nm**	6,000 mm	2 m	DF-G3IR-ND-2M	DF-G3IR-PD-2M

Analog DF-G3

Sensing Beam Color	Range*	Connection	Supply Voltage	NPN Models	PNP Models
Visible Red	2 000 mm	Voltage: 12-30 V DC 2 m Current: 10-30 V DC	Voltage: 12-30 V DC	DF-G3-NU-2M	DF-G3-PU-2M
	0,000 11111		Current: 10-30 V DC	DF-G3-NI-2M	DF-G3-PI-2M
Infrared, 850 nm**	0.000	0	Voltage: 12-30 V DC	DF-G3IR-NU-2M	DF-G3IR-PU-2M
	6,000 mm	2 m	Current: 10-30 V DC DF-G3IR-NI-2M	DF-G3IR-NI-2M	DF-G3IR-PI-2M

For more specifications see page 169

Connection Option: A model with a QD requires a mating cordset. (see page 169)

- * Excess gain = 1, Long Range response speed, opposed mode sensing.
- ** IR models require T5 terminated glass fiber optic cables



DF-G3 Series

Water Detection Fiber Optic Amplifiers

- 1450 nm infrared wavelength to enhance contrast of clear liquids
- Reliable detection of presence or absence of water-based liquids
- Easy to read dual digital displays show both signal level and threshold simultaneously
- Cross-talk avoidance function allows seven inspections in dense sensing point applications
- Models with IO-Link enable a point-to-point communication link between a master device and a sensor, facilitating remote monitoring, teaching, and configuration
- Cordsets and brackets see page 169

Single Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	2 m	DF-G3LIR-NS-2M	DF-G3LIR-PS-2M

Dual Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	2 m	DF-G3LIR-ND-2M	DF-G3LIR-PD-2M

Analog DF-G3

Sensing Beam Color	Range*	Connection	Supply Voltage	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	0 m	Voltage: 12-30 V DC	DF-G3LIR-NU-2M	DF-G3LIR-PU-2M
	900 11111	2 m	Current: 10-30 V DC	DF-G3LIR-NU-2M DF-G3LIR-PU-2M	DF-G3LIR-PI-2M

For more specifications see page 169



Connection Option: A model with a QD requires a mating cordset. (see page 169)

- $\label{eq:excess_pain} Excess \ gain = 1, Long \ Range \ response \ speed, opposed \ mode \ sensing.$
- IR models require T5 terminated glass fiber optic cables







High-Speed Expert™ Fiber Optic Amplifiers

- The high speed DF-G2 fiber amplifiers now offer several LED colors to maximize contrast in challenging low-contrast applications
- Best in Class response time
- Programming via displays and switches/buttons or remote input teach wire
- Expert TEACH and SET methods ensure optimal gain and threshold for all applications, especially low contrast applications
- Cross talk avoidance algorithm allows two sensors to operate in close proximity for many applications

IO-Link DF-G2

Sensing Beam Color	Range	Connection	Output	Models
Visible Red, 635 nm	1,100 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G2-KD-2M
Infrared, 850 nm*	2,100 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G2IR-KD-2M

DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Visible Red	Range varies by response speed and fiber optics used	2 m	DF-G2-NS-2M	DF-G2-PS-2M



DF-G2 Multiple color Multiple LED color options available.

Multiple Color DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Broad Spectrum White	50% of Visible Red Range	2 m	DF-G2W-NS-2M	DF-G2W-PS-2M
Visible Green	60% of Visible Red Range	2 m	DF-G2G-NS-2M	DF-G2G-PS-2M
Visible Blue	70% of Visible Red Range	2 m	DF-G2B-NS-2M	DF-G2B-PS-2M
Infrared*	190% of Visible Red Range	2 m	DF-G2IR-NS-2M	DF-G2IR-PS-2M

For more specifications see page 170.

Connection options: A model with a QD requires a mating cordset (see page 169).

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G2-NS-9M). For M8 pico pigtali, change the suffix 2M to Q3 in the 2 m model number (example, DF-G2-NS-Q3). For M12 euro pigtali, change the suffix 2M to Q5 in the 2 m model number (example, DF-G2-NS-Q5).

* IR models require T5 terminated glass fiber optic cables



DF-G2 Series

Small Object Fiber Optic Amplifiers

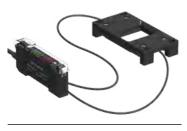
- The DF-G2 Series uses Banner's unique firmware designed to achieve accurate, high speed, low contrast performance for small object detection applications
- Percent-based threshold selectable from 2% to 50% for sensitivity adjustment
- Automatic Gain Compensation (AGC) algorithm compensates for dust build-up on fiber optics to extend counting cycle and maintain count accuracy
- Intelligent Dynamic Event Stretcher (DES) minimizing chance for double-counting, even with non-uniform objects (i.e. gel caps,

DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Visible Red, 635 nm	Range varies by response speed and fiber optics used	2 m	DF-G2-NC-2M	DF-G2-PC-2M

Fiber Optic Arrays for DF-G2

Sensing Beam Color	Window Size	Fiber Exit	Minimum Object Size	Model
\\(\frac{1}{2} \rightarrow \f	10 x 25 mm	Side Exit	1.5 mm	PFCVA-10X25-S
Visible Red, 635 nm		End Exit		PFCVA-10X25-E
Visible Ded COF and	25 x 25 mm	Side Exit	3 mm	PFCVA-25X25-S
Visible Red, 635 nm		End Exit		PFCVA-25X25-E
\6-ibl- D-d-005	34 x 25 mm	Side Exit	4	PFCVA-34X25-S
Visible Red, 635 nm		End Exit	4 mm	PFCVA-34X25-E



DF-G2 and array fibers

Multiple array fiber models available.

For more specifications see page 170.

Connection options: A model with a QD requires a mating cordset (see page 169)

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G2-NC-9M).

DF-G1 Series



Expert™ Dual-Display Fiber Optic Amplifiers

- The DF-G1 Series has a simple user interface to ensure easy sensor set-up and programming via displays and switches/buttons, remote input teach wire or IO-Link
- End user has full control over operating parameters, including Light/ Dark Operate, output timing functions, gain level and response speed
- Cross talk avoidance algorithm allows multiple sensors to operate in close proximity
- Light receiver models detect light emission from a wide variety of sources

IO-Link DF-G1

Sensing Beam Color	Range	Connection	Output	Models
Visible Red, 660 nm	Range varies by Speed Selection used and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	Channel1: IO-Link, push/pul Channel 2: PNP only output, or input	DF-G1-KS-2M

DF-G1

Sensing Beam Color	Range	Connection	NPN Models	PNP Model
Visible Red, 660 nm	Range varies by Speed Selection used and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	DF-G1-NS-2M	DF-G1-PS-2M

Light Receiver DF-G1

Sensing Beam Color	Range	Connection	NPN Models	PNP Model
Visible Red, 660 nm	Range varies by response speed used, gain setting, target light source intensity, ambient light level and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	DF-G1-NR-2M	DF-G1-PR-2M

Connection options: A model with a QD requires a mating cordset

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G1-NS-9M). For M8 Pico pigtail change the suffix 2M to Q3 in the 2 m model number (example, DF-G1-NS-Q3). For M12 Euro pigtail change the suffix 2M to Q5 in the 2 m model number (example, DF-G1-NS-Q5).



Additional cordset information is available See page 758



SA-DIN-BRACKET

Additional bracket information is available See page 730



Right-angle snap-on connector



DF-G1 Specifications

Supply Voltage and Current	NPN/PNP Models: 10 to 30 V Standard Mode: 960 mW, Curr	dc (10% max ripple) rent consumption < 40 mA @ 24 V dc	IO-Link Models: 18 to 30 V dc (10% max ripple) ECO Display Mode: 720 mW, Current consumption < 30 mA @ 24 V dc			
Supply Protection Circuitry	Protected against reverse polari	ty, over voltage, and transient voltages				
Output Configuration		ourcing (PNP) or 1 current sinking (NPN and 1 PNP (complementary outputs)	N) output, depending on model			
Output Rating	100 mA max. load (derate 1 mA per °C above 30 °C) OFF-state leakage current: NPN/PNP: < 5 μA at 30 V dc IO-Link: < 50 μA at 30 V dc ON-state saturation voltage: NPN: < 1.5 V PNP: < 2 V IO-Link: < 2 V					
Output Protection Circuitry	Protected against output short-	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up				
Output Response Time	High Speed: 200 us Standard: 500 us Long Range: 2 ms Extra Long Range: 5 ms Light receiver models: 50 ms, 150 ms					
Delay at Power-up	500 milliseconds max.; outputs	do not conduct during this time				
Adjustments	3-way RUN/PRG/ADJ Mode Sw 2-way LO/DO Switch 3-way +/SET/- Rocker Button See datasheet for detailed inform					
Indicators	Red 4-digit Display: Signal Level Green 4-digit Display: Threshold Yellow LED: Output conducting (In Program Mode, Red and Green displays are used for programming menus)					
Construction	Black ABS/polycarbonate alloy	(UL94 V-0 rated) housing, clear polyca	rbonate cover			
Environmental Rating	IEC IP50, NEMA 1					
Operating Conditions	Temperature: -10 to +55 °C	Storage: -20 to +85 °C	Relative Humidity: 90% @ 60 °C (non-condensing)			
Certifications	C E CUL US LISTED 3T.J.J ND. CONT. EQ.	IO-Link®				

PHOTOELECTRIC FEATURED RECTANGLE RIGHT ANGLE BARRE

DF-G2 Specifications

Supply Voltage and Current	10 to 30 V dc (10% max ripple)					
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages Standard display mode: 960 mW, Current consumption less than 40 mA at 24 V dc ECO display mode: 720 mW, Current consumption less than 30 mA at 24 V dc					
Output Configuration	NPN/PNP Models: 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model, plus 1 Health Mode output					
Output Rating	100 mA max. load (derate 1 mA per °C above 30 °C) OFF-state leakage current: NPN/PNP: < 5 μA at 30 V dc ON-state saturation voltage: NPN: < 1.5 V PNP: < 2 V					
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up					
Sensing Beam	DF-G2: Visible red, 635 nm DF-G2W: Broad spectrum white, 450 to 650 nm DF-G2B: Visible blue, 470 nm DF-G2G: Visible green, 525 nm DF-G2IR: Infrared, 850 nm					
Output Response Time	Super High Speed: 10 μs High Speed: 15 μs Fast: 50 μs Standard: 250 μs Medium Range: 500 μs Long Range with immunity to Energy Efficient Lights: 2000 μs					
	Super High Speed: 10 μs High Speed: 15 μs Fast: 50 μs Standard: 250 μs Medium Range: 500 μs Long Range: 1000 μs					
	DF-G2 Small Object Counter: $25~\mu s$ $50~\mu s$ $150~\mu s$ $250~\mu s$ $500~\mu s$					
Repeatability	Super High Speed: 5 μs Fast: 12 μs Medium Range: 80 μs Long Range with immunity to Energy Efficient Lights: 165 μs DF-G2 Small Object Counter: 12 μs 12 μs 30 μs 50 μs					
	80 µs					
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover					
· · · · · · · · · · · · · · · · · · ·	IEC IP50, NEMA 1					
Environmental Rating	<u> </u>					

SLOT & AREA | MINIATURE | FIBER OPTIC

DF-G3 Specifications

Supply Voltage and Current	NPN/PNP Models: 10 to 30 V do Voltage output models: 12 to 30 Standard Mode: 960 mW, Currer		IO-Link Models: 18 to 30 V dc (10% max ripple) Current output models: 10 to 30 V dc (10% max ripple) ECO Display Mode: 720 mW, Current consumption < 30 mA @ 24 V dc				
Supply Protection Circuitry	Protected against reverse polarity,	Protected against reverse polarity, over voltage, and transient voltages					
Sensing Beam	DF-G3: Visible red, 635 nm DF-G3IR: Infrared, 850 nm DF-G3LIR: Long Infrared, 1450 n						
Output Configuration	IO-Link Models: 1 push-pull and Voltage output models: 1 analog 1 curren	NPN/PNP Models: 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model IO-Link Models: 1 push-pull and 1 PNP (complementary outputs) Voltage output models: 1 analog voltage output (user configurable as 1 V to 5 V or 0 V to 10 V) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output Current output models: 1 analog current output (4 mA to 20 mA) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output					
Output Rating	100 mA max. load (derate 1 mA per °C above 30 °C) OFF-state leakage current: NPN/PNP/current: < 5 μA at 30 V dc IO-Link: < 50 μA at 30 V dc						
		PN: < 1.5 V IP: < 2 V -Link: < 2 V					
Output Protection Circuitry	Protected against output short-cir	cuit, continuous overload, transient o	over-voltages, and false pulse on power up				
Output Response Time	High Speed: 500 us Fast: 1000 us Standard: 2 ms Long Range: 8 ms Extra Long Range: 24 ms						
Delay at Power-up	500 milliseconds max.; outputs do	not conduct during this time					
Indicators	Red 4-digit Display: Signal Level Green 4-digit Display: Threshold Yellow LED: Output conducting (In Program Mode, Red and Green displays are used for programming menus)						
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover						
Environmental Rating	IEC IP50, NEMA 1						
Operating Conditions	Temperature: -10 to +55 °C	Storage: -20 to +85 °C	Relative Humidity: 50% @ +50 °C (non-condensing)				
Certifications	C C CUL US LISTED 3T.LI	IO-Link®					



D10 Series

High-Speed Expert™ Fiber Optic Amplifiers

- Available with visible red or green beam
- Available in Light or Dark Operate
- Includes specially designed models for reliable detection of objects as small as 1.5 mm
- Features bussable models for side-by-side mounting and simplified wiring of up to 16 sensors
- Features thin 10 mm housing for standard 35 mm DIN-rail mounting

D10

Sensing Beam Color	Range	Connection	Output Type	Response Speed	Models
Visible Red	Range varies by Power	2 m		500 ms	D10AFP
Visible Green	Level/Speed Selection used and with fiber optics used. See fibers section on page 174 or reference datasheet for range	2 m	Bipolar NPN/PNP	500 ms	D10AFPG
Visible Red		2 m		200 ms	D10AFPY
Visible Green	information.	2 m		200 ms	D10AFPGY

Connection options: A model with a QD requires a mating cordset

For 4-pin Snap-on Pico QD cable, add suffix ${\bf Q}$ to the ${\bf 2}$ m model number (example, ${\bf D10AFPQ}$).

SLOT & AREA | MINIATURE | FIBER OPTIC

Pico QD (for Q7 models) Straight snap-on connector

Pico QD (for Q7 models) Right-angle snap-on connector

See page 758

Additional cordset information is available

PKG4-2 2 m (6')

PKW4Z-2 2 m (6')

6-Pin PKG6Z-2 2 m (6')

PKW6Z-2 2 m (6')







Additional bracket information is available See page 730



D10—Discrete Specifications

DIO—Discrete Spec	ancator is
Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 174)
Supply Voltage & Current	10 to 30 V dc (10% max. ripple) @ less than 25 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltage
Output Configuration	Bipolar: 1 current sourcing (PNP) and 1 current sinking (NPN)
Output Rating	100 mA per output with short circuit protection OFF-state leakage current: less than 10 μA sourcing; 200 μA sinking ON-state saturation voltage: NPN: 1.6 V @ 100 mA PNP: 2.0 V @ 100 mA
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up
Delay at Power-up	Max. 100 milliseconds; outputs do not conduct during this time
Output Response Time	Standard models (with crosstalk avoidance circuitry): 500 microseconds High-speed models: 200 microseconds
Repeatability	Standard models: 95 microseconds High-speed models: 50 microseconds
Adjustments	12-turn Sensitivity potentiometer with relative position indicator; LO/DO Selection switch; 0 or 40 milliseconds OFF-delay switch NOTE: Use proper ESD techniques while making adjustments under cover
Indicators	Two LEDs: Green and Yellow Green: Power ON Yellow: Light Sensed Signal strength indicator See datasheet for detailed information
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover
Environmental Rating	IEC IP50; NEMA 1
Operating Conditions	Temperature: -10 to +55 °C Storage: -20 to +85 °C Relative humidity: 90% @ 55 °C (non-condensing)
Certifications	CE c Tus



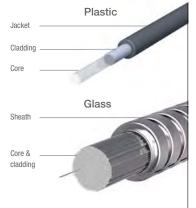
Plastic Fiber Optics

Provide an economical alternative to glass fiber optics for piping photoelectric sensing light to and from confined areas with suitable environments

- Ideal for detecting small objects
- Withstand repeated flexing and bending
- · Available in individual or bifurcated styles
- Available with core diameters of 0.25, 0.50, 0.75, 1.0 and 1.5 mm

Choosing Plastic or Glass

Plastic fibers are for general purpose use. They tolerate severe flexing, can be cut to length in the field and cost less than glass fibers. Glass fibers are the best choice for challenging environments such as high temperatures, corrosive materials and moisture.



Fiber Construction

Core: Thin glass or plastic center of the fiber through which light travels

Cladding: Outer optical material

surrounding the core that reflects light back into the core

Jacket/

Sheath: Protective layer to protect fiber

from damage and moisture



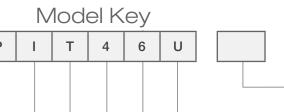


Plastic fibers page 174

- · Inexpensive and easily cut to length during installation
- · Bend for a precise fit
- Available in high-flex models to withstand flexing
- Offered with special jackets that withstand corrosion, impact and abrasion
- Available for applications requiring articulated or reciprocating motion
- Available in diameters of 0.25, 0.5, 1.0 Or 1.5 mm
- Can be quickly custom designed and built for your unique applications

page 192

- Solve numerous challenging sensing requirements
- Ideal for hostile environments such as high temperatures to 480° C. corrosive materials and extreme moisture
- · Withstand high levels of shock and vibration
- Inherently immune to extreme electrical noise
- · Available with choice of sheathings: standard stainless-steel flexible conduit, PVC or other flexible tubing
- · Can be quickly custom designed



B = Bifurcated fiber SENSING END

I = Individual fiber*

A = 90° Angle
AT = 90° Angle/Thread
CF = Coaxial Ferrule
CT = Coaxial Thread

E = EncapsulatedEFP =Extended Ferrule ProbeF = Ferrule

PLASTIC FIBER FAMILY

Same for all plastic fibers

ASSEMBLY STYLE

DI = Dual Individual fiber*

FM = Ferrule Miniature

FMP = Ferrule Miniature Probe

L = LensedP = Probe

PF = Probe Ferrule

PMSB = Probe Miniature

Side-view Bendable

PS = Probe Side-view **PSB** = Probe Side-view Bendable

PSM = Probe Side-view Miniature

R = Rectangular

RS = Rectangular Side-view

T = Thread

TA = Thread/90° Angle

TP = Thread/Probe

MODIFICATIONS[†]

MFR = Flex relief

MSW = Slot width

MTA = Tight angle

MTL = Thread length

MAL = Array length

MPL = Probe length
MFL = Ferrule length

CONTROL END

U = Unterminated straight cable**UC = Unterminated Coiled cable

UHF = Unterminated DURA-BEND™ multi-core cable

T5 = Terminated

TMB5 = SteelSkin™ braiding over monocoil reinforcement

FIBER LENGTH

3 = 1 m (1000 mm) **6** = 2 m (2000 mm) **30** = 9 m (9,000 mm) **100** = 30 m (30,000 mm)

15 = 5 m (5000 mm)

FIBER CORE DIAMETER

1 = 0.25 mm2 = 0.50 mm $1x4 = 4 \times 0.25 \text{ mm}$

3 = 0.75 mm

 $1x16 = 16 \times 0.265 \text{ mm}$ $1x32 = 32 \times 0.265 \text{ mm}$

4 = 1.00 mm

6 = 1.50 mm

 All individual plastic fiber optics are sold and used in pairs. Bifurcated fibers are two-way fibers with a single sensing end that both emits and receives light and with dual-control sensor ends that attach separately to the sensor's LED and photodetector.

** Plastic fibers with "U" in the suffix of the model numbers have unterminated control ends; cut them to the required length using the supplied cutter.

† Not all modifications can be applied to all fiber assemblies. Please consult factory for verification of modifications.

Specialty fibers for specific sensing applications





DURA-BEND™ for extremely tight radius bends



Fluoropolymer Focus encapsulated fibers fibers



Focused beam



Convergent beam



Linear array fibers



Liquid level detection fibers



High temperature



SteelSkin™ for impact and abrasion

Vantage Line Plastic Fibers

- OEM friendly packaging
- No fiber cutter included
- Opposed models come as a pair

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
	M6 threaded tip and integrated lens with flex relief 20 mm spot size at 100 mm	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	2000 [†] 2000 2000	PITL23UM6-VL*
	M4 threaded tip and integrated lens with flex relief 30 mm spot size at 100 mm	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	2000† 2000 1680	PITL23UM4-VL*
	M4 & M2.6 threaded tip with flex relief	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1	2000† 1460 900	PIT43U-VL*
	M4 threaded tip with flex relief	25 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	1980 410 255	PIT23UM4-VL*
	M3 threaded tip with flex relief	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1	2000 [†] 1450 895	PIT43UM3-VL*
	M3 threaded tip with flex relief	25 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	2000 [†] 440 270	PIT23U-VL*
	M4 & M2.6 threaded tip with flex relief 90° angle/thread	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1	2000 [†] 1250 770	PIAT43UTA-VL*
	M4 & M2.6 threaded tip with flex relief 90° angle/thread	2 mm	1 mm	%<	DF-G3 DF-G2 DF-G1	2000 [†] 1200 740	PIAT43UHFTA-VL*
	Rectangular housing with front exit 14.5 mm array	60 mm	32 x 0.25 mm	-	DF-G3 DF-G2 DF-G1	2000† 1510 930	PIR1X323T-VL*
	M4 & M2.6 threaded tip with stainless protective jacket	25 mm	1 mm	_	DF-G3 DF-G2 DF-G1	2000 [†] 1700 1060	PIT43TSL5-VL*
	M4 & M2.6 threaded tip with stainless protective jacket 90° angle/thread	25 mm	1 mm	-	DF-G3 DF-G2 DF-G1	2000 [†] 1170 720	PIAT43TSL5TA-VL

^{*} For two meter cable lengths replace ...3.. with 6 in the model number (example, PIT46U-VL)

 $[\]ensuremath{^{\dagger}}$ Max range determined by cable length 1 m = 2,000 mm

Diffuse Vantage Line Fibers	-						
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (m		Models
	M6 threaded tip with flex relief	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1	2000 [†] 455 280	PBT43U-VL*
	M3 threaded tip with flex relief	25 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	855 180 110	PBT23U-VL*
	M4 & M2.6 thread non-bendable tip	25 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1	815 170 105	PBT23UM4-VL*
	M6 threaded tip with flex relief 90° angle/thread	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1	2000 [†] 390 240	PBAT43UTA-VL*
	M6 threaded tip with flex relief 90° angle/thread	2 mm	1 mm	*	DF-G3 DF-G2 DF-G1	2000 [†] 365 225	PBAT43UHFTA-VL*
	Rectangular housing with front exit 14.5 mm array	25 mm	32 x 0.25 mm	*	DF-G3 DF-G2 DF-G1	2000 [†] 350 215	PBR1X323U-VL*
	M6 threaded tip with stainless protective jacket	25 mm	1 mm	-	DF-G3 DF-G2 DF-G1	2000 [†] 500 310	PBT43TSL5-VL*
www.commen	M6 threaded tip with stainless protective jacket 90° angle/thread	25 mm	1 mm	_	DF-G3 DF-G2 DF-G1	2000 [†] 435 270	PBAT43TSL5TA-VL*

^{*} For two meter cable lengths replace ...3.. with 6 in the model number (example, PBT46U-VL) † Max range determined by cable length 1 m = 2,000 mm (does not apply to diffuse models)





Array and Slot Fibers

Array and Slot fibers are customizable for a simple setup and provide an optimal solution for small part counting applications. Array fibers are ideal for broad spectrum detection and slot fibers are pre-aligned and easy to install.

- Quick and easy setup and alignment
- Small part counting applications
- Multiple beams can be customized for different array lengths
- Wide area detection
- Ideal for tracking applications, profiling parts, edge guiding, finding the edge of objects
- Opposed models come as a pair

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
⊕ ⊕	Ultra-compact head 5.25 mm straight exit Aluminium	5 mm	16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1040 640 260	PIR1X166U
→ 15.0 →	Ultra-compact head 5.25 mm side exit Aluminium	5 mm	16 x 0.25 mm	%<	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1040 640 260	PIRS1X166U
20.0 ———————————————————————————————————	Compact head 10 mm side exit Aluminium	5 mm	16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1230 760 260	PIRS1X166UM.4
38.0 ————————————————————————————————————	19 mm side exit Plastic	5 mm	16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1245 770 270	PIRS1X166UMPM.75
38.0 ————————————————————————————————————	34 mm side exit Plastic	5 mm	16 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1100 680 260	PIRS1X166UMPMAL
32.0 ————————————————————————————————————	Easy mount "fork" head Plastic	5 mm	1 mm	%<	DF-G3 DF-G2 DF-G1 D10A	12 12 12 12	PDIS46UM12
83.0	10 x 25 mm coverage Side (S) or end exit (E) Min. object detection of 1.5 mm	5 mm	16 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	25 25 25 25 25	PFCVA-10X25-S PFCVA-10X25-E
25.0	25 x 25 mm coverage Side (S) or end exit (E) Min. object detection of 3 mm	5 mm	16 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	25 25 25 25	PFCVA-25X25-S PFCVA-25X25-E
34.0 = 42.0 = Q	34 x 25 mm coverage Side (S) or end exit (E) Min. object detection of 4 mm	5 mm	16 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	34 34 34 34	PFCVA-34X25-S PFCVA-34X25-E

[†] Max range determined by cable length 2 m = 4,000



SteelSkin[™] Fibers

SteelSkin $\ensuremath{^{\text{TM}}}$ rugged fiber models resist kinking, cutting and snagging and have a low profile to easily embed in machines. Ideal for busy assembly stations, embedded in stations, part presence or places where equipment is constantly moved on and off a production line.

- Abrasion resistant while maintaining flexibility
- Bend to tighter radius and thinner than standard plastic fiber optics
- Superior resistance to wear, chemicals and other environmental conditions
- Assembly stations, part presence, busy assembly cells
- Opposed models come as a pair

Opposed Fibers	-						
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)		Models
M4 x 0.7 ———————————————————————————————————	Probe Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G2 DF-G1	2000 [†] 1200 740 350	PITP43TMB5
ø 3.0 — — 15.0 —	Ferrule Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 DF-G2 DF-G1 D10A	2000 [†] 1200 740 350	PIF43TMB5
M2.5 x 0.45 M4 x 0.7 — 13.0 —	Thread Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G2 DF-G1	2000 [†] 1200 740 350	PIT43TMB5

Diffuse Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)		Models
M6 x 0.75	Thread Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 DF-G2 DF-G1 D10A	1780 370 230 80	PBT43TMB5
M3 x 0.5 — ——————————————————————————————————	Coaxial Thread Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	855 180 110 40	PBCT23TMB5
M4 x 0.7	Coaxial Threaded right angle Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	620 130 80 30	PBCT23TMB5MTA
M4 x 0.7————————————————————————————————————	Coaxial Thread Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 DF-G2 DF-G1 D10A	855 180 110 40	PBCT23TMB5M4
M6 x 0.75	Threaded right angle Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 DF-G2 DF-G1 D10A	1630 340 210 80	PBAT43TMB5MTA

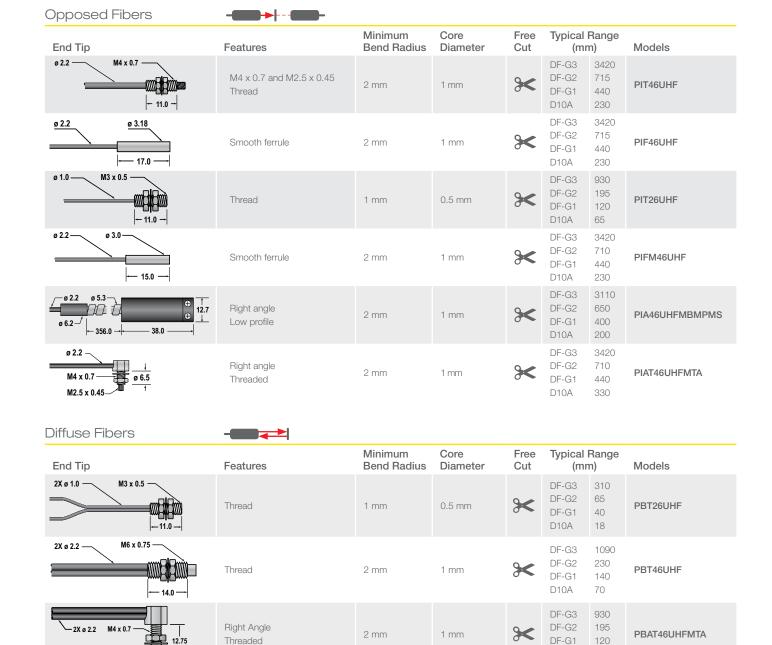
[†] Max range determined by cable length 1 m = 2,000 (does not apply to diffuse models)



DURA-BEND™ Fibers

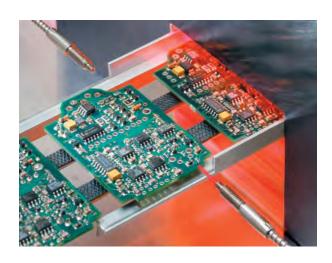
DURA-BEND $^{\text{TM}}$ fiber models provide improved flexibility for limited space setups and difficult-to-access locations. These fibers are best for use when fibers need to be integrated into a small fixture where a great deal of bending in tight spaces is needed.

- Minimal transmission loss under extreme bend radius
- Maintains performance regardless of flexing
- Multicore assemblies available
- Can almost kink fiber without affecting performance
- Works well in constant flexing applications
- Opposed models come as a pair



D10A

70



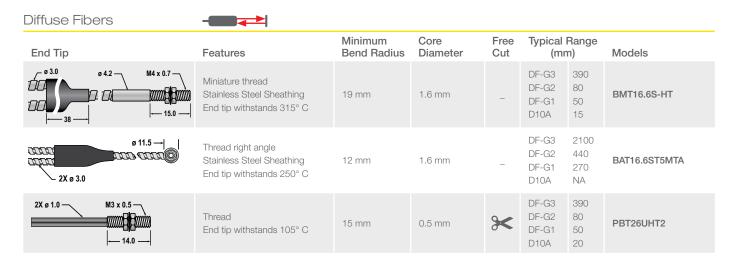
High Temp Fibers

High temp fiber optics are used in situations where the temperature is above a certain limit for most plastic fibers. These are usually used in thermal process applications and Banner offers the widest selection of plastic and glass fibers for high temperature situations.

- For high temp applications above 100° C
- Thermal process applications
- For sensing near manufacturing ovens
- Manufacturing of solar panels, colored glass and ceramics
- Widest selection of plastic and glass fibers for high temp applications

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
Ø 3.0 → Ø 4.2 → M4 x 0.7 → M4 x	M2.5 x 0.45 thread Stainless Steel Sheath End tip withstands 315° C	19 mm	1.2 mm	-	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1260 775 325	IMT.756.6S-HT
Ø 3.0 \ Ø 4 \ Ø 0.5 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Smooth ferrule Side exit Stainless steel 250° C	19 mm	0.5 mm	-	DF-G3 DF-G2 DF-G1 D10A	1320 275 170 53	IA.31.7ST5ETA
Ø 3.0 PVC \ Ø 4.0 \ R 9.4 \ Ø 3.0 \	Smooth ferrule 90° angle Stainless steel tip End tip withstands 105° C	19 mm	1.3 mm	-	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1310 810 310	IA.82.5PT5
25.0 — 8.0 Ø 3.1 — 8.0	Smooth ferrule Side exit Stainless steel 480° C	19 mm	1.3 mm	-	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1310 810 300	IA.83.3ST5ETA
<u>0 2.2</u> M4 x 0.7	Thread End tip withstands 105° C	15 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 960 600 210	PIT46UHT1

[†] Max range determined by cable length 2 m = 4,000





Specialty Fibers

Specialty and custom fibers are designed for specific sensing applications. Many of the standard fibers can be customized and ready for use in days, not weeks. Banner excels in customization and will work with you to find the right solution.

- Chemical resistance
- Extreme environments
- Liquid level detection
- Customize bifurcations, material, lengths and other fiber features

Liquid Level Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
2X ø 2.2 Do not bend this area 16.5 this area 1830	Fluoropolymer encapsulated Sensor switches when tip of fiber is immersed in liquid	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	PBE46UTMLLP
2X ø 2.2 Do not bend this area 16.5 — 1830 Ø 6.0 —	Fluoropolymer encapsulated Sensor switches when tip of fiber is immersed in liquid End tip withstands 105° C	15 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	PBE46UTMLLPHT1
0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Clear tube mount, 2 to 25 mm diameter	2 mm	1 mm	*	Sensor switches when liquid meniscus reaches optical axis	PDI46U-LLD

Diffuse Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
2X ø 0.9	Coaxial ferrule probe Non-metalic end tip	25 mm	1 x 1.0 & 16 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	1710 360 220 120	PBCFP46UMLR
2X Ø 2.2 Ø 5.7	Fluoropolymer encapsulated tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	1710 360 220 12	PBE46UTMNL
4X o 1.0 2X o 2.5	Dual bifurcated Light "OR" or Dark "AND" logic	15 mm	0.5 mm	-	DF-G3 DF-G2 DF-G1 D10A	NA	PDBF26T5

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
2X o 2.2 26.2 —————————————————————————————	Specialty slot sensor 90° angle; compact "fork" head	2 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	5 5 5 5	PDISM46UM5MA
Ø 2.2	Sold as a pair Fluoropolymer encapsulated; lens	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 3080 1900 1600	PIE46UT
9 2.2 9 4.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18	Sold as a pair Fluoropolymer encapsulated; lens	40 mm	1.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000† 1540 950 300	PIE66UTMNL
8 2.2 Ø 4.0 22.0 22.0 1830 Ø 5.0 1	Sold as a pair Fluoropolymer encapsulated; Side-view prism	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	400 280	PIES46UT
35.1	Sold as a pair Flat sides for easy alignment Brass housing	40 mm	1.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1100 680 350	PIPS66UMSQMAP

Vacuum Applications

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
ø 4.2 M4 x 0.7 Ø 3.0	Vacuum compatible No epoxy	19 mm	1.6 mm	-	Varies by feed through and amp used	BMT13SMVF
-18.29 - 0 33.78	Aluminum Vacuum feed through	-	-	-	DF-G3 DF-G2 DF-G1 D10A	DVFT-2.ONWQ50
M2.5 x 0.45 M4 x 0.7	Miniature thread No epoxy used For use on vacuum side Entire cable withstands 480 °C	19 mm	1.2 mm	-	Varies by feed through and amp used	IMT.753SMVF
o 2.2 —	For use with Vacuum feed through on ambient side Opposed mode sold as a pair	40 mm	1.5 mm	><	DF-G3 4000 [†] DF-G2 2140 DF-G1 1320 D10A 350	PIF66UMVFA
22.23 M8 x 1.25	Stainless steel Vacuum feed through	-	-	-	DF-G3 DF-G2 DF-G1 D10A	VFT-M8MVS



Standard Fibers

Standard fiber optics come in a variety of materials with standard fiber tips in various sizes. If a standard fiber does not meet your application requirements, modifications can be made to give you a customized

- Plastic individual fibers ideal for use in small, confined areas
- Available in side view/right angles
- Available in bifurcated models
- Opposed models come as a pair

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
ø 1.0 ø 2.2 —	Smooth ferrule Stainless steel tip	15 mm	0.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 75	PIF26U
ø 2.2	Smooth ferrule Stainless steel tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1330 820 300	PIF46U
ø 2.2 ø 3.18	Smooth ferrule Stainless steel tip	40 mm	1.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 2140 1320 525	PIF66U
ø 1.0 — ø 1.5 — <u>10.0</u>	Stainless steel tip Best for repetitive flexing (1,000s of cycles)	5 mm	4 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	1940 405 250 70	PIFM1X46U
ø 2.2 — ø 3.0 —	Smooth ferrule Stainless steel tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1330 820 300	PIFM46U
e 1.0 - 15.0 —	Smooth ferrule Stainless steel tip	5 mm	0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	505 105 65 20	PIF16U
9 2 2 9 3.0 —15.0 —	Smooth ferrule Stainless steel tip Thick jacket (ø 2.2 mm)	15 mm	0.5 mm	* <	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 80	PIF26UMLS
<u>Ø 2.2</u> <u>Ø 3.18</u> <u>Ø 1.47</u> <u>3.0</u> <u>2.5</u>	Smooth ferrule Stainless steel tip 90° angle sideview	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	2720 565 350 160	PIPS46U
922 93.0	Smooth ferrule Stainless steel tip 90° angle sideview	40 mm	1.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	2950 615 380 350	PIPS66U
<u>91.0</u> <u>91.3</u> <u>90.91</u> -7.6 - 25.4	Probe Stainless steel tip	5 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	505 105 65 20	PIP16U

[†] Max range determined by cable length 2 m = 4,000

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mi	0	Models
<u>61.0</u> <u>M3 x 0.5</u> <u>6 0.91</u>	Probe Stainless steel tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	1825 380 235 80	PIP26U
9 2.2 M4 x 0.7 9 1.47	Probe Stainless steel tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1230 760 265	PIP46U
<u>Ø 1.0</u> <u>M2.5 x 0.45</u>	Stainless steel threaded tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	465 100 60 15	PIT16U
φ 1.0 — M3 x 0.5 — 11.0	Nickel plated brass threaded tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	1710 220 75	PIT26U
<u>M2.5 x 0.45</u> <u>M4 x 0.7</u> 	Nickel plated brass threaded tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1120 690 240	PIT415U
M2.5 x 0.45 M4 x 0.7	Nickel plated brass threaded tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1330 820 300	PIT46U
<u>M2.5 x 0.45</u>	Nickel plated brass threaded tip	40 mm	1.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 2140 1320 525	PIT66U
<u>Ø 2.2</u> <u>M4 x 0.7</u>	Nickel plated brass threaded tip	40 mm	1.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 1815 1120 450	PIT615U
Ø 1.0 Ø 0.91 4.8	Stainless steel 90° angle tip	5 mm	0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	230 50 30 15	PIA16U
Ø 1.0 Ø 0.91 4.8	Stainless steel 90° angle tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	930 195 120 50	PIA26U
Ø 1.47	Nickel plated brass threaded 90° angle tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	465 100 60 10	PIAT16U
0 1.0 0 1.47 R 5.1 9.6 M3 x 0.5 11.0	Nickel plated brass threaded 90° angle tip	15 mm	0.5 mm	%<	DF-G3 DF-G2 DF-G1 D10A	1555 325 200 50	PIAT26U

 $[\]uparrow$ Max range determined by cable length 2 m = 4,000

Opposed Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
e 3.3 e 1.47 R 12.7 M4 x 0.7 10.9 M2.5 x 0.45	Stainless steel threaded 90° angle tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1360 840 275	PIAT46U
e 2.2 — 13.9 — 25.4 — 25.4 — 10.9 — 1	Stainless steel threaded 90° angle tip	40 mm	1.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 2075 1280 350	PIAT66U
8 2.2 R 7.9 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10	Stainless steel threaded 90° angle tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 1360 840 275	PIAT46UM.4X.4MT
0 2.2 0 3.3 R 12.7 16.5 M4 x 0.7 10.9 M2.5 x 0.45 1 3.0	Stainless steel threaded 90° angle tip	2 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 970 600 210	PIAT46UHF
2.2 - 12.0 - 1.0 3.0	Delrin side exit	2 mm	1 mm	≫<	DF-G3 DF-G2 DF-G1 D10A	2000 [†] 710 440 230	PIA46UHFMB8X12

Diffuse Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mı		Models
2X Ø 1.0 — Ø 4.1 — — 16.0 — —	Smooth ferrule Stainless steel tip	15 mm	0.5 mm	3 <	DF-G3 DF-G2 DF-G1 D10A	620 130 80 25	PBF26U
2X Ø 2.2	Smooth ferrule Stainless steel tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 85	PBF46U
2X Ø 1.3	Smooth ferrule Stainless steel tip Thin jacket (ø 1.3)	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 85	PBF46UM3MJ1.3
2X Ø 2.2 Ø 5.1 — — 17.0 — —	Smooth ferrule Stainless steel tip	40 mm	1.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	2410 500 310 170	PBF66U
2X Ø 2.2 Ø 5.2 — — 17.0 — —	Smooth ferrule Stainless steel tip	2 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1445 300 186 65	PBF46UHF
2X ø 2.2	Smooth ferrule Stainless steel tip Coaxial	5 mm	1 x 1.0 and 16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	2140 445 275 96	PBCF46U
2X Ø 1.0 Ø 1.65	Smooth ferrule Stainless steel tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	175 160 100 35	PBEFP26U
2X Ø 2.2 Ø 5.1 Ø 3.05	Smooth ferrule Stainless steel tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	1980 410 255 90	PBFM46U
2X ø 2.2 ø 5.1 ø 3.05	Smooth ferrule Stainless steel tip	2 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1440 300 185 65	PBFM46UHF
2X Ø 1.0 Ø 3.0 Ø 0.82 ————————————————————————————————————	Smooth ferrule Stainless steel tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	4000† 1120 690 240	PBFMP16UMP.2
2X Ø 1.0	Smooth ferrule Stainless steel tip 90° angle sideview	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	230 50 30 15	PBPS26U
2X @ 2.2	Smooth ferrule Stainless steel tip 90° angle sideview	25 mm	1 mm	%<	DF-G3 DF-G2 DF-G1 D10A	275 160 100 50	PBPS46U
2X ø 1.0	Probe ferrule Stainless steel tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	545 115 70 30	PBPF215U
2X ø 1.0	Probe ferrule Bendable stainless steel tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	620 130 80 25	PBP26U

Diffuse Fibers	-						
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mı		Models
2X Ø 2.2 M6 x 0.75 Ø 3.0	Probe ferrule Bendable stainless steel tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 85	PBP46U
2X Ø 1.0 M3 x 0.5	Probe ferrule Stainless steel tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	155 30 20 10	PBFM16U
2X Ø 1.0 M3 x 0.5 Ø 0.81	Probe ferrule Bendable stainless steel tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	115 25 15 5	PBP16U
2X ø 2.2 M6 x 0.75 ø 3.0	Probe ferrule Bendable stainless steel tip	2 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1475 310 190 65	PBP46UHF
2X ø 1.0 M4 x 0.7 Ø 1.65 Ø 1.27	Probe ferrule Stainless steel tip	15 mm	0.5 mmv	><	DF-G3 DF-G2 DF-G1 D10A	620 130 80 25	PBPF26U
2X ø 1.25 — M4 x 0.7 — — — — — — — — — — — — — — — — — — —	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	700 145 90 40	PBCT26U
2X ø 1.25 M3 x 0.5 o 3.0 - 13.0 -	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	700 145 90 40	PBCT26UM3
2X ø 1.25 — M2.5 x 0.45 — M4 x 0.7 — 11.0 —	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	700 145 90 40	PBCT26UM4M2.5
2X © 1.25	Coaxial Threaded Stainless steel tip Overmolded flex relief	15 mm	1 x 0.5 10 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	1555 325 200 110	PBCT26UMFR
2X ø 2.2	Coaxial Threaded Nickel plated Brass tip	5 mm	1 x 1.0 & 16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 120	PBCT46U
2X ø 2.2 ← 15 → 11.5 → 11.5 →	Coaxial Threaded Stainless steel tip Overmolded flex relief	25 mm	1 x 1.0 16 x 0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	1555 325 200 110	PBCT46UMFR
2X ø 1.0 — M3 x 0.5 — — — — — — — — — — — — — — — — — — —	Threaded Stainless steel tip	5 mm	0.25 mm	><	DF-G3 DF-G2 DF-G1 D10A	80 15 10 5	PBT16U
2X ø 1.0 — M3 x 0.5 — — — — — — — — — — — — — — — — — — —	Threaded Nickel plated Brass tip	15 mm	0.5 mm	*	DF-G3 DF-G2 DF-G1 D10A	620 130 80 25	PBT26U
2X ø 1.0 M3 x 0.5 ø 3.0 — 10.0 —	Stainless steel tip	12 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	620 130 80 25	PBT26UMSSMFF

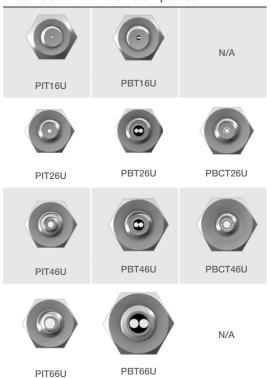
Diffuse Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical (mr		Models
2X Ø 2.2 M6 x 0.75 Ø 4.0 ———————————————————————————————————	Threaded Nickel plated Brass tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1710 355 220 85	PBT46U
2X ø 2.2 M6 x 0.75 ø 4.0 — 14.0 —	Threaded Nickel plated Brass tip	40 mm	1.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	2400 500 310 170	PBT66U
2X Ø 2.2 M6 x 0.75 Ø 4.0 ———————————————————————————————————	Threaded Nickel plated Brass tip	25 mm	1 mm	><	DF-G3 DF-G2 DF-G1 D10A	1400 290 180 70	PBT415U
2X ø 2.2 M6 x 0.75 Ø 4.0 ———————————————————————————————————	Threaded Nickel plated Brass tip	15 mm	0.5 mm	><	DF-G3 DF-G2 DF-G1 D10A	740 155 95 30	PBT26UM6M.1
Ø 5.1 R 12.7 Ø 3.0 M6 x 0.75 14.0 Ø 4.0	Stainless steel threaded 90° angle tip	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	930 195 120 70	PBAT46U
3X M3 x 0.5 2X Ø 2.2 15.0 1-13.0	10.9 mm front exit Aluminium	5 mm	32 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	1555 325 200 65	PBR1X326U
3X M3 x 0.5 - 13.0 - 20.0 20.0	10.9 mm side exit Aluminium	5 mm	32 x 0.25 mm	*	DF-G3 DF-G2 DF-G1 D10A	1555 325 200 65	PBRS1X326U
2x o 2.2 2x o 3.5 21.0 9.5 9.5 1	Dual lens straight exit Aluminium	25 mm	1 mm	*	DF-G3 DF-G2 DF-G1 D10A	4000 [†] 950 590 210	PBL46U

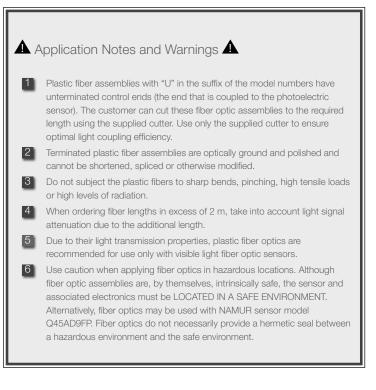
 $[\]ensuremath{\uparrow}$ Max range determined by cable length 2 m = 4,000

Plastic Fiber Optics Specifications

Construction	Optical Fiber: Acrylic (PMMA) monofilament, except as noted Protective Jacket: Black polyethylene, except as noted Threaded End Tips and Hardware: Nickel-plated brass, except as noted Probe End Tips: Annealed (bendable) 304 stainless steel Angled End tips: Hardened 304 stainless steel Ferrule End Tips: 303 stainless steel
Sensing Range	Refer to the specific fiber optic/sensor combination
Implied Dimensional Tolerance	All dimensions are in millimeters: $x = \pm 2.5$ mm, $x.x = \pm 0.25$ mm and $x.xx = \pm 0.12$ mm, unless specified "L" = ± 40 mm per meter
Minimum Bend Radius	8 mm for 0.25 mm diameter fibers 12 mm for 0.5 mm diameter fibers (except DURA-BEND™) 25 mm for 1.0 mm diameter fibers (except DURA-BEND™) 38 mm for 1.5 mm diameter fibers
Repeat Bending/Flexing	Life expectancy of plastic fiber optic cable is in excess of one million cycles at bend radii of no less than the minimum and a bend of 90° or less. Avoid stress at the point where the cable enters the sensor ("control end") and at the sensing end tip. Coiled plastic fiber optic assemblies are recommended for any application requiring reciprocating fiber motion.
Chemical Resistance	The acrylic core of the monofilament optical fiber will be damaged by contact with acids, strong bases (alkalis) and solvents. The polyethylene jacket will protect the fiber from most chemical environments. However, materials may migrate through the jacket with long term exposure. Samples of fiber optic material are available from Banner for testing and evaluation.
Temperature Extremes	Temperatures below –30 °C will cause embrittlement of the plastic materials but will not cause transmission loss. Temperatures above +70 °C will cause both transmission loss and fiber shrinkage.
Operating Temperature	-30 to +70 °C, unless otherwise specified

Fiber Core Diameter Comparison





Fiber Optic Accessories

	Model Specific Features	General Features	S	Image	Model Number
		single cutter			PFC-4
Fiber Cutters	Plastic fiber cutter	100 cutters			PFC-4-100
Fiber 0	For use with 0.25 and 0.5 mm diameter cables.	These kits are use plastic fiber cables	d with unterminated	NOTE A LANGUE AND STAN	PFK20
	For use with 1 and 1.5 mm diameter cables.	Each kit contains 4 10 cutter assemble	40 sensor adaptors and ies	NOTE: Adaptors used with Q45, OMNI-BEAM, ECONO-BEAM, MAXI-BEAM and VALU-BEAM sensors only.	PFK40
athing	May be used with bifurcated fiber assemblies having M6 x 0.75 threaded end tips (e.g., PBCT46U, PBP46U, PBT46UHT1 and PBT66U).		eathing with stainless steel		PFS69S6T
Field-Installable Sheathing	May be used with individual or bifurcated fiber assemblies having M4 x 0.7 threaded end tips (e.g., PBCT26U, PBPF26U, PIP46U, PIT46U and PIT66U).	capture fiber end t threaded) is used i	tips, other end non- in applications where red for plastic fiber optic		PFS53S6T
Field-	May be used with individual fiber assemblies having M3 x 0.5 threaded end tips (e.g., PIP26U, PIT26U and PIT1X46U).	Other lengths are a Banner Application	available by contacting ns Department		PFS44S6T
er Adapters	Use to adapt plastic fiber optic cables with outside jacket diameter of 1.0 mm, such as PIT26U and PBP16U.	small-diameter und cables Use when interfact	g adapters are used with terminated plastic fiber ing small-diameter plastic 2, QM42, QS18, R55F, F122	Fiber end	UPFA-1-100
Plastic Fiber Adapters	Use to adapt plastic fiber optic cables with outside jacket diameter of 1.25 mm or 1.3 mm, such as PBCT26U and PBF46UM3MJ1.3.	and MINI-BEAM p • Each kit contains pair will interface e	lastic fiber sensor families 100 pairs of adapters. One sither one bifurcated fiber air of individual cables to a	Adapter	UPFA-2-100
	Core	Length	Туре	Drawing	Model Number
	0.5	9 m			PIU230U
(0	0.5 mm	18 m	Single		PIU260U
Fibers		9 m			PIU430U
Bifurcated Plastic Fibers	1.0 mm	18 m	Single		PIU460U
ated P		9 m			PIU630U
Bifurcated Plastic Fibers	1.5 mm	18 m	Single		PIU660U

PBU430U

PBU460U

Duplex

9 m

18 m

1.0 mm



Glass Fiber Optics

Solve numerous challenging sensing applications in the most hostile environments, including temperatures up to 480° C, corrosive materials and extreme moisture

- Withstand severe shock and vibration
- Ignore extreme electrical noise
- Constructed of a combination of optical glass fiber, stainless steel, PVC, brass, molded thermoplastics and optical-grade epoxy

Choosing Glass or Plastic

Plastic fibers are for general purpose use. They tolerate severe flexing, can be cut to length in the field and cost less than glass fibers. Glass fibers are the best choice for challenging environments such as high temperatures, corrosive materials and moisture.





Fiber Construction

Core: Thin glass or plastic center of the fiber through which light

travels

Cladding: Outer optical material

surrounding the core that

reflects light back into the core

Jacket/

Sheath: Protective layer to protect fiber

from damage and moisture





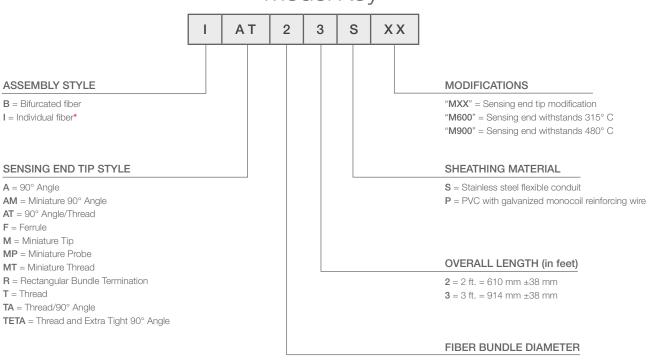
Glass fibers page 192

- Solve numerous challenging sensing requirements
- Ideal for hostile environments such as high temperatures to 480° C, corrosive materials and extreme moisture
- Withstand high levels of shock and vibration
- Inherently immune to extreme electrical noise
- Available with choice of sheathings: standard stainless-steel flexible conduit, PVC or other flexible tubing
- Can be quickly custom designed

Plastic fibers page 174

- Inexpensive and easily cut to length during installation
- Bend for a precise fit
- Available in high-flex models to withstand flexing
- Offered with special jackets that withstand corrosion, impact and abrasion
- Available for applications requiring articulated or reciprocating motion
- Available in diameters of 0.25, 0.5, 1.0 Or 1.5 mm
- Can be quickly custom designed and built for your unique applications

Model Key



^{*} Individual glass fibers are packaged separately.

.75 = 0.046 in = 1.17 mm

1 = 0.062 in = 1.57 mm

1.5 = 0.09 in = 2.29 mm 2 = 0.125 in = 3.18 mm

2.5 = 0.156 in = 3.96 mm

Opposed Glass Fibers							
End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical F (mm		Models
<u>9 6.4</u> -12.7 - 27.9 - 27.9 - 20.3	90° angle	19 mm	3.18 mm	M600 M900	QS18 R55F SME312 D12E D12	715 1050 250 975 550	IA23S
9 6.4 -12.7- 27.9 27.9 27.9 20.3 R 12.7 38.1	90° angle/thread Lenses available	19 mm	3.18 mm	<u>M600</u> <u>M900</u>	QS18 R55F SME312 D12E D12	900 1050 250 975 550	IAT23S
<u>0.5.8</u> <u>0.7.4</u> <u>0.4.8</u>	Smooth ferrule	19 mm	3.18 mm	M600 M900	QS18 R55F SME312 D12E D12	990 1050 975 550	IF23P
<u>\$\sigma 3.0</u>	Miniature thread	9.5 mm	0.69 mm		QS18 R55F SME312 D12E D12	NA 75 25 102 70	IMT.442P
<u>σ 6.4</u> <u>σ 8.0</u> <u>12.7</u> <u>38.1</u>	Thread Lenses available	19 mm	3.18 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	900 1050 250 975 550	IT23S
e 6.4 12.7 38.1 15.8 R 9.7 27.9	90° angle/thread	19 mm	3.18 mm	M600 M900	QS18 R55F SME312 D12E D12	1100 1050 250 925 550	ITA23S
9 6.4 9 8.0 9 1.5 4.8 R 3.05 1	Miniature probe 90° angle	19 mm	1.17 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	110 130 50 180 170	IAM.752S
964 974 946 91.5	Miniature probe Non-bendable probe	19 mm	1.17 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	NA 130 50 180 170	IM.752S
<u>ø 3.0</u> <u>ø 3.8</u> <u>ø 1.5</u> <u> </u>	Miniature probe	9.5 mm	1.17 mm		QS18 R55F SME312 D12E D12	NA 130 50 180 170	IMP.753P

M600 Available 315 °C models. Add M600 to end of model number (example, IA23SM600).

Available 480 °C models. Add M900 to end of model number (example, IA23SM900). M900 Dimensions may vary for these models.

NA: Not recommended.

-----Opposed Glass Fibers Minimum Core Typical Range **End Tip Features Bend Radius** Diameter Temp Models (mm) — 38.1 — QS18 760 ø 6.4 M600 R55F 1175 Straight exit; 38 mm width 19 mm 3.7 mm SME312 350 IR2.53S 25.4 50.8 D12E 975 D12 580 2x 4.8 QS18 ø 6.4 M600 R55F 1050 11.7 19.1 IR23S Straight exit; 10 mm width 19 mm 3.2 mm SME312 250 D12E 925 19.1 D12 550 QS18 250 ø 5.1 ø 5.3 ø 4.8 M600 R55F 600 *-000000* 5.3 19 mm 2.3 mm SME312 180 IA1.53SMETA Stainless steel D12E 500 12.7 D12 450 QS18 340 R55F 600 Side exit *000000* M600 19 mm 2.3 mm SME312 180 IA1.53SMTA Stainless steel D12E 500 D12 450 QS18 390 5/16-24 thd brass 2 jam nuts included ø 3.05 ø 6.4 M600 R55F 600 Side exit 19 mm 2.3 mm SME312 180 ITETA1.53S *-000000* Stainless steel D12E 500 12.7 D12 450 M2.5 x 0.45 ø 4.2 For use in vacuum applications Contact factory for 19 mm 1.3 mm IMT.753SMVF No epoxy sensing range 5/16" - 24 thread Glass lens withstands 315 °C L9 ø 14.3 Contact factory for range 5/16" - 24 thread lens optic Plastic housing withstands 105 °C L16F ø 28.6 Contact factory for range 58.4 5/16" - 24 thread Aluminum housing withstands 315 °C L16FAL ø 28.6 Contact factory for range 58.4 5/16" - 24 thread



58.4

ø 28.6

L16FSS

Stainless steel housing withstands 480 °C

Contact factory for range

Diffuse Glass Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical F (mm		Models
9 6.4 12.7 27.9 38.1 9 4.8 20.3	Stainless steel 90° angle	19 mm	3.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	80 110 25 180 150	BA23S
9 6.4 12.7 27.9 10.3 38.1 38.1 5/16-24 UNF brass 2 brass jam nuts included	Stainless Steel/Brass 90° angle	19 mm	3.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	90 110 25 180 150	BAT23S
95.8 97.4 94.8 12.7 12.7	PVC sheath	19 mm	3.2 mm	-	QS18 R55F SME312 D12E D12	100 110 25 180 150	BF23P
#8-32 thd brass 2 jam nuts included	PVC over Moncoil Sheathing Brass	9.5 mm	0.7 mm	-	QS18 R55F SME312 D12E D12	NA NA 1 10 5	BMT.442P
0 6.4 0 8.0 5/16-24 thd brass 2 jam nuts included 38.1 12.7 38.1	Stainless Steel/Brass	19 mm	3.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	100 110 25 180 150	BT23S
9 6.4 12.7 38.1 15.8 9 8.0 5/16-24 thd brass 2 jam nuts included 9 4.8 27.9	Stainless steel/Brass 90° angle	19 mm	3.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	85 110 25 180 150	BTA23S
9 6.4 98.0 e1.5 4.8 R 3.05 I	Stainless Steel 90° angle	19 mm	1.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BAM.752S
38.1 12.7 12.7 25.4	Stainless Steel Probe	19 mm	1.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BM.752S
03.0 03.8 01.5 12.7 25.4	PVC over Moncoil Sheathing Probe	9.5 mm	1.2 mm	-	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BMP.753P

M600 Available 315 °C models. Add w to end of model number (example, BA23SM600).

Available 480° C models. Add M900 to end of model number (example, BA23SM900). Dimensions may vary for these models.

NA: Not recommended.

Diffuse Glass Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical F (mm		Models
9 6.4 2x 4.8 25.4 1 50.8 1 50.8 1 50.8 1 1 25.4 1 50.8 1 1 50.8 1 1 25.4 1 25.4 1 50.8 1 1 25.4 1 25	Straight exit; 38 mm width	19 mm	3.7 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	75 120 30 180 155	BR2.53S
0 6.4 2.54 11.7 19.1 1.7 19.1 2x 3.2 1.9.1	Straight exit; 9.7 mm width	19 mm	3.2 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	110 110 25 180 150	BR23S
0 5.1 0 4.8 0 3.05 0 4.8 0 3.05 12.7 25.4	90° angle	19 mm	2.3 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	45 65 20 135 125	BA1.53SMETA
9 5.3 9 6.4 9 3.05 1 35.1	90° angle	19 mm	2.3 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	50 60 20 135 125	BA1.53SMTA
0 5.4 0 8.0 2 5/16-24 thd brass 0 4.8 0 3.05 2 jam nuts included 1 2.7 38.1 25.4	90° angle	19 mm	2.3 mm	<u>M600</u>	QS18 R55F SME312 D12E D12	30 60 20 135 125	BTETA1.53S
	Glass lens; withstands 315 °C Focuses light to .80 mm with				ontact factory		L10

M600 Available 315 °C models. Add M600 to end of model number (example, BA23SM600).

ø 1.6 mm fiber

range information

Glass Fiber Optics Specifications

Construction	Combination of optical glass fiber, stainless steel or PVC, brass, molded thermoplastics, and optical-grade epoxy. Optical fiber is F2 core, EN1 clad, approx. 50 µm diameter per strand. Flexible steel interlock sheathing is 302 stainless.
Sensing Range	Refer to the specific fiber optic to be used
Bend Radius	Inside bend radius must be 12 mm or greater for PVC covered fiber optic assemblies, and 25 mm or greater for stainless steel armored cable covered fibers
Length	Standard length for assemblies is 915 mm; see dimension diagrams Most models are available from the factory with shorter or longer cable lengths, up to 18 m max
Length Dimension Tolerance	Overall assembly length: ±12 mm per 300 mm of length Shrink junction dimensions: ±12 mm
Implied Dimensional Tolerances	All dimensions are in millimeters: $x = \pm 2.5$ mm, $x.x = \pm 0.25$ mm and $x.xx = \pm 0.12$ mm, unless specified.
Operating Conditions	Fiber assemblies with stainless-steel (SS) sheathing and metal end tips: -140° to +249° C Fiber assemblies with PVC sheathing and/or plastic end tips: -40° to +105° C Special order assemblies with SS sheathing and metal end tips and model suffix "M600": -140° to +315° C* Special order assemblies with SS sheathing and metal end tips and model suffix "M900": -140° to +480° C*; note dimensional changes from STD models * sensing end tip only

Application Notes and Warnings

- The ends of glass fiber optic assemblies are optically ground and polished. Care taken in this manufacturing process accounts for the light coupling efficiency of the fiber optic assembly. As a result, glass fiber assemblies cannot be shortened, spliced or otherwise modified.
- Use caution when applying fiber optics in hazardous locations. Although fiber optic assemblies are by themselves, intrinsically safe, the sensor and associated electronics must be LOCATED IN A SAFE ENVIRONMENT. Alternatively, fiber optics may be used with sensor model SMI912FQD. This sensor is approved for use inside hazardous areas when used with an appropriate intrinsic barrier. Also, see NAMUR sensor models Q45AD9F and MIAD9F. Fiber optics do not necessarily provide a hermetic seal between a hazardous environment and the safe environment.
- In applications where glass fibers are used to insulate the control from high voltage, specify silicone rubber, Teflon®, or high-density polyethylene sheathing with no reinforcing wire in the cable. It is the responsibility of the user to test each fiber optic assembly for insulation capacity.
- Do not subject the fibers to sharp bends, pinching, repeated flexing or high levels of radiation.
- When ordering fiber lengths in excess of 1 m, take into account light signal reduction of 5 percent per 300 mm of additional length.

Teflon® is a registered trademark of Dupont™.

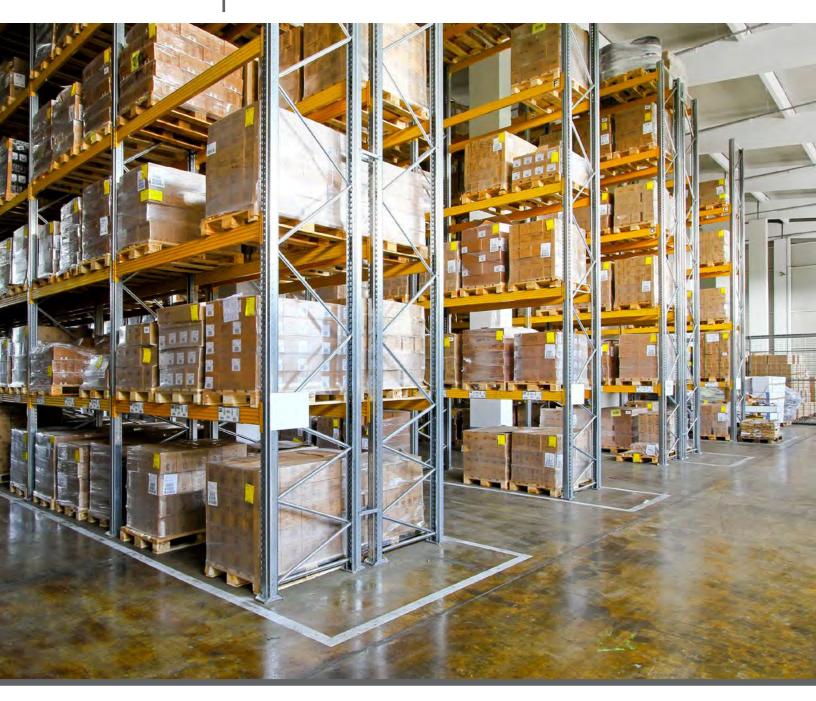
SLOT & AREA | MINIATURE | FIBER OPTIC

Additional Models Available

In addition to the configurations shown, Banner offers thousands of readily available alternative fiber models:

- Substitute PVC over monocoil sheathing for stainless steel
- Reduce or increase glass fiber optic bundle diameters
 Suppose a Colon and Suppose and Suppose
- Example: Change ø 3.18 mm bundle to ø 1.57 mm
- \bullet Substitute a rectangular-shaped fiber bundle (0.5 x 2.5 mm) for a circular bundle
- Change endtip material from brass to stainless steel
- Modify straight or angled probe tip dimensions
- Modify overall fiber length in intervals of 305 mm (standard lengths are 914 and 610 mm)

MEASUREMENT LASER ULTRASONIC RADAR



Measurement

High-quality optical, ultrasonic, radar and measuring array sensors help to solve the most challenging measurement applications.

MEASUREMENT

LASER page 202

ULTRASONIC page 216

RADAR page 240

ARRAYS page 246

TEMPERATURE & page 260
VIBRATION



Laser

Laser distance measurement sensors provide accurate non-contact measuring and monitoring of targets with varying color, shape and temperature.

Series	Description	Max Sensing Range	Dimensions H x W x D	Resolution	Housing Material	Power Supply
B. Lindson	LTF High-performance LTF Series Sensors detect targets regardless of color, material or sheen from up to 12 m away, straight-on or at an angle page 204	12 m	77 x 26 x 56 mm	0.3 to 3 mm	Die-cast zinc	12 to 30 V dc
O TRANSPORT	LE A laser sensor with a range of 100 up to 1000 mm right out of the box with 2-line LCD display easy adjustment, setup and use. page 206	1 m	60 x 26 x 56 mm	0.02 to 1.0 mm	Die-cast zinc	12 to 30 V dc
	LH High-precision laser measurement page 208	200 mm	80 x 33 x 65 mm	0.001 to 0.01 mm	Aluminum	18 to 30 V dc
P	LG High-precision short-range laser measurement page 210	125 mm	55.3 x 20.2 x 82.3 mm	0.003 to 0.01 mm	Zinc alloy die-cast, plated and painted finish	12 to 30 V dc
	LT3 Time-of-flight laser distance-gauging page 212	Diffuse: 5 m Retro: 50 m	68.5 x 35.3 x 87 mm	1.0 to 1.25 mm	ABS	12 to 24 V dc
A second of the	LT7 Time-of-flight laser distance-gauging page 214	Diffuse: 10 m Retro: 250 m	93 x 42 x 95 mm	4.0 to 8.0 mm	ABS	18 to 30 V dc

OTHER AVAILABLE MODELS





Q4X page 34 Q50

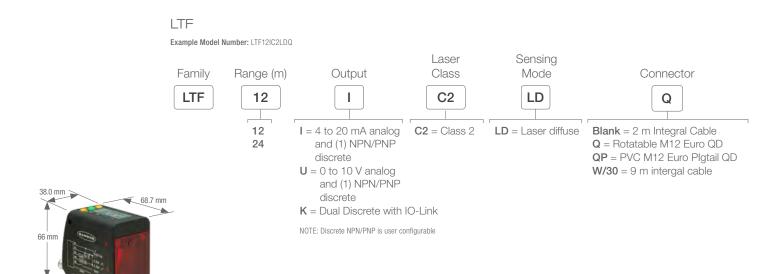
Q50 Website Only

LTF Series



High-Preformance Laser Time of Flight

- Best in class combination of range, repeatability and accuracy enable highly reliable target detection and precise distance measurement
- Two-line, eight-character display and push-button programming for easy setup, troubleshooting and real-time distance measuring
- Durable IP67 housing, high ambient light immunity and stable performance across temperatures provide reliable performance in challenging environments
- Advanced options, including delay timers, advanced triggered measurement modes and cross-talk avoidance





M12/Euro-Style with Shield

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA) 5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

Additional cordset information is available See page 758









SMBLTFL

SMBLTFU

SMBAMSSLTFP

Additional bracket information is available See page 724 SMBLTFFA includes 3/8" bolt for mounting SMBLTFFAM10 includes 10 mm bolt for mounting SMBLTFFAM12 clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

LTF Specifications

LTF Specifications	1							
Supply Voltage and Current	12 to 30 V dc							
Normal Run Mode:	< 2.1 W. Current consumption < 85 mA at 24 V dc							
Sensing Beam	Visible red laser; class 2							
Beam Spot Size	Distance (mm)	Si	ize					
	50	6.5 m						
	7500	10 mr						
	12000	12.5 r						
Response Time	Fast: 1.5 ms Standard:	:8 ms Medium:	32 ms Slow: 256 ms					
Range and Linearity / Accuracy		Accura	acy					
Lineality / Accuracy	Reflectance	±10 mm	±20 mm					
	6% Black Card	5 m	7 m					
	18% Gray Card	8 m	11 m					
	90% White Card	12 m	_					
Slow 256 ms shown (for more info see datasheet)	14 (0.55) (12 (0.47) (10 (0.39) (10 (0.39) (11 (0.39) (12 (0.47) (13 (0.39) (14 (0.39) (15 (0.39) (16 (0.24) (16 (0.24) (17 (0.47) (18 (0.39) (19 (0.47) (6 (13.12) (19.7) Distance in m (Slow: 256 ms		10 (0.39) 10 (0.39) 11 (0.40) 12 (0.08) 12 (0.08) 14 (0.16) 16 (0.08)	2 (6.6) (13.12) Dis	6 8 (19.7) (26.2) stance in m (ft) Fast: 1.5 ms	9% Black Card 18% Gray Card 90% White Card	
Resolution	< 0.3 to 3 mm*							
Construction	Die-cast zinc housing; ac	crylic window						
Environmental Rating	IEC IP67; NEMA 6							
Connections	5-Pin Threaded M12/Eur	ro-Style Cordsets	—with Shield					
Operating Conditions	Temperature: -20 to +5 Humidity: 90% at +55 °		ve humidity (non-conde	ensing)				
Certifications	C € cULus							

^{*}Resolution measured as twice repeatability with white target at slow response speed at 20 °C. See repeatability curves for more detail.

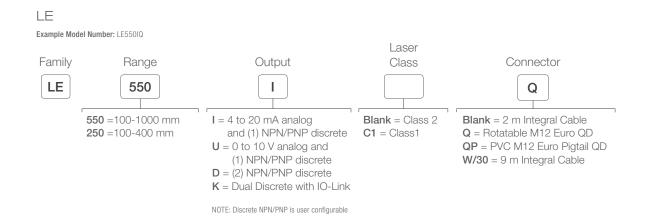


LE Series



Laser Sensor

- The LE laser sensors are ready to measure right out of the box with easy adjustment, setup and use.
- Easy adjustment with a two-line, eight-character intuitive display
- Repeatability and accuracy for challenging targets, from metal to black rubber
- Visible class 2 laser for small spot size and simple alignment



M12/Euro-Style with Shield

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

Additional cordset information is available See page 758









SMBLEU **SMBLEL**

SMBLEFA

Additional bracket information is available See page 724



mounting plate



LE Specifications

Sensing Beam	Nisible red Class 2 laser, 650 nm										
	VISIDIE red Class 2 la	Visible red Glass 2 laser, 000 tilli									
Supply Voltage and Current	12 to 30 V dc Normal Run Mode: 1.7 W, Current consumption less than 70 mA at 24 V dc										
Supply Protection Circuitry	Protected against reverse polarity and transient over voltages										
Spot Size			L	E550 Models	1			LE	E250 Models	1	
				Distance			Distance				
			100 mm	550 mm	1000 mm			100 mm	250 mm	400 mm	
	y Beam Spot Pattern	Х	8.4 mm	10.5 mm	12.1 mm	X	(3.2 mm	2.1 mm	1.2 mm	
	Pattern	Υ	3.5 mm	4.2 mm	4.9 mm	Υ	1	2.2 mm	1.5 mm	0.9 mm	
Temperature Effect		LE250: ±0.03 to ±0.15 mm/°C LE550: ±0.25 to ±0.5 mm/°C									
Analog Linearity	LE250 : ±0.375 to ±0 LE550 : ±2 to ±4.5 n		nm								
Analog Resolution	LE550: Less than 0. Less than 1 LE250: Less than 0. Less than 0.	mm 02 n	(600 – 1000 nm (100 – 25	mm) [*] 50 mm)							
Construction	Housing: die-cast zi	nc L	ens: polyca	rbonate							
Vibration/Mechanical Shock	IEC 60947-5-2										_
Operating Conditions	Temperature: -20 to) +5	5°C Hu	umidity: 90%	at +55 °C						 _
Environmental Rating	IP67, NEMA 6										
Certifications											_

LH Series



High-Precision Laser Measurement

- Highly precise laser technology of a 1024 pixel CMOS linear imager provides reliable and accurate measurement on most materials, including machined metal, wood, ceramic, paper and painted targets.
- Automatic laser power and measurement rate control for reliable measurement under changing or challenging conditions such as moving processes, hot parts, machined parts and a variety of colors and textures
- Robust, self-contained laser displacement sensor

Class 2 Laser LH

→ Wisible Red Laser

	_	ľ	/leasureme	ent				Spot Size at	
Se	ensing Mode	Span	Start of Range	End of Range	Reference Distance	Connection	Output	Reference Distance	Models
D	IFFUSE LASER	10 mm	25 mm	35 mm	30 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	50 micron	LH30IX485QP
D	IFFUSE LASER	40 mm	60 mm	100 mm	80 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	125 micron	LH80IX485QP
D	IFFUSE LASER	100 mm	100 mm	200 mm	150 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	225 micron	LH150IX485QP

ARRAYS

TEMP & VIBRATION



Additional cordset information is available See page 758



MQLH-830-MF

9 m (30')

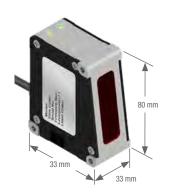


Euro QD—Splitter with Shield

CSB-M1280M1280-LH
Branches 2 x 0 m
CSB-M1281M1282-LH
Branches 2 x 0.6 m (2')
Trunk 0.3 m (1')
CSB3-M1281M1282-LH
Branches 3 x 0.6 m (2')
Trunk 0.3 m (1')



Additional bracket information is available See page 724



LH Specifications

Li i opecifications								
Sensing Beam	670 nm (1mW) visible red IEC and CDRH Class 2 laser							
Supply Voltage and Current	18 to 30 V dc (10% max. ripple); 250 mA max. @ 24 V dc (exclusive of load)							
Supply Protection Circuitry	rotected against reverse polarity and transient over voltages							
Delay at Power-up	.25 seconds							
Temperature Effect	0.01% of measurement range/ °C							
Linearity	0.1% of measurement range							
Resolution	H30: 1 µm LH80: 4 µm LH150: 10 µm esolution obtained with an average of 64 readings on a white ceramic target							
Ambient Light	3000 Lux							
Measurement Frequency	Dynamically adjusted from 300 to 4000 Hz depending on target conditions, or locked via LH Series configurator software							
Indicators	Green: Power ON; Flashing = target at reference distance Orange: Target inside measurement range							
Construction	Housing: Aluminum Cover: Aluminum Lens: Glass Cable: PVC and nickel-plated brass							
Environmental Rating	IP67							
Output Configuration	Analog current output: 4 to 20 mA (current sourcing) Analog output rating: 1 k Ω max. @ 24 V dc, max. load resistance = [(Vcc-4.5)/0.02] Ω							
Operating Conditions	Operating Temperature: -10 to +45 °C Storage Temperature: -10 to +80 °C Maximum relative humidity: 85% at +45 °C, non-condensing							
Vibration and Mechanical Shock	Vibration: 60 Hz, 30 minutes, 3 axes Shock: 30G for 11 milliseconds, half sine wave, 3 axes							
Application Notes	Allow 30-minute warm-up for specified performance							
Factory Default Settings	Mode: Displacement Mode Baud Rate: 115200 Sensor Address: Unset (address 0) Analog Output: 4-20 mA, positive slope, full range							
Certifications	CE							

LG Series



High-Precision Short-Range Laser Measurement

- The LG5 uses an ultra-narrow beam for applications requiring precise measurement of distance, height or thickness as well as gauging applications
- Replaces two-piece laser gauging sensors with completely selfcontained, compact housing
- Houses discrete (switched) and analog outputs in the same unit, each independently programmable

Diffuse LG5

─**※** Visible Red Laser

Sensing Mode	Laser Class	Sensing Distance	Beam Size	Connection	Analog Output	Models NPN	Models PNP
Class DIFFUSE LASER		45-60 mm	At 53 mm: 0.4 mm × 0.6 mm Focus: 70 mm	2 m 8-pin Euro Pigtail QD	0-10 V dc	LG5A65NU LG5A65NUQ	LG5A65PU LG5A65PUQ
	Class 2			2 m 8-pin Euro Pigtail QD	4-20 mA	LG5A65NI LG5A65NIQ	LG5A65PI LG5A65PIQ
	Class 2	45-60 mm	At 53 mm: 0.1 mm	2 m 8-pin Euro Pigtail QD	0-10 V dc	LG5B65NU LG5B65NUQ	LG5B65PU LG5B65PUQ
DIFFUSE LASER			Focus: 53 mm	2 m 8-pin Euro Pigtail QD	4-20 mA	LG5B65NI LG5B65NIQ	LG5B65PI LG5B65PIQ

Diffuse LG10

🌞 Visible Red Laser

•	Sensing Mode	Laser Class	Sensing Distance	Beam Size	Connection	Analog Output	Models NPN	Models PNP
			Diotarioc		2 m		LG10A65NU	LG10A65PU
	DIFFUSE LASER	Class 2	75-125 mm	At 125 mm: 0.6 mm x 0.8 mm Focus: 180 mm	8-pin Euro Pigtail QD	0-10 V dc 4-20 mA	LG10A65NUQ	LG10A65PUQ
					2 m		LG10A65NI	LG10A65PI
					8-pin Euro Pigtail QD		LG10A65NIQ	LG10A65PIQ

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, LG10A65PU W/30).



Additional cordset information is available See page 758



Additional bracket information is available See page 724



LG5 and LG10 Specifications

Sensing Beam	650 nm visible Red IEC and CDRH Class 2 laser; 0.20 mW max. radiant output power
Supply Voltage and Current	12 to 30 V dc (10% max. ripple); 50 mA max. @ 24 V dc (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Delay at Power-up	1.25 second
Output Rating	Discrete (switched) and Alarm outputs: 100 mA max. OFF-state leakage current: less than 5 μA Output saturation voltage PNP outputs: less than 1.2 V at 10 mA and less than 1.6 V at 100 mA NPN outputs: less than 200 mV at 10 mA and less than 600 mV at 100 mA Analog Current output: 1 kΩ max. @ 24 V dc, max. load resistance = [(Vcc - 4.5)/0.02]Ω Analog Voltage output: 2.5 kΩ min. load impedance
Output Configuration	Discrete (switched) & alarm outputs: Solid-state switch; choose NPN (current sinking) or PNP (current sourcing) models Analog output: 4 to 20 mA (current sourcing) or 0 to 10 V dc (voltage sourcing), depending on model
Output Protection	Discrete and alarm outputs are protected against continuous overload and short circuit
Output Response Time	Discrete Outputs (ON/OFF) Fast: 2.0 milliseconds Medium: 10 milliseconds Slow: 100 milliseconds Analog Output (-3dB) Fast: 450 Hz (1 millisecond average/1 millisecond update rate) Medium: 45 Hz (10 millisecond average/2 millisecond update rate) Slow: 4.5 Hz (100 millisecond average/5 millisecond update rate)
Analog Resolution and Repeatability of Discrete Trip Point*	LG5: Fast: Less than 40 μm @ 50 mm LG10: Fast: Less than 150 μm @ 100 mm Medium: Less than 12 μm @ 50 mm Medium: Less than 50 μm @ 100 mm Slow: Less than 3 μm @ 50 mm Slow: Less than 10 μm @ 100 mm
Analog Linearity*	LG5: +/- 60 µm over 45 to 60 mm sensing window
Minimum Window Size (Analog or Discrete)	LG5: 1.5 mm
Discrete Output Hysteresis	LG5: Less than 0.2 mm LG10: Less than 1.0 mm
Color Sensitivity (typical)	LG5: Less than 75 μm for white to dark gray ceramic target LG10: Less than 100 μm for white to dark gray ceramic target
Temperature Effect	LG5: +/- 7 μm/ °C LG10: +/- 25 μm/ °C
Adjustments	Response speed: Push button toggles between Slow, Medium, and Fast (see Output Response Time) Window limits (analog or discrete): TEACH-mode programming of near and far window limits. Limits may also be taught remotely using TEACH wire Analog output slope: The first limit taught is assigned to the minimum analog output (0 V dc or 4 mA)
Indicators	Green Power ON LED: Indicates when power is ON, overloaded output and laser status Yellow Output LED: Indicates when discrete load output is conducting Red Signal LED: Indicates when target is within sensing range and the condition of the received light signal Tri-color Red/Green/Yellow TEACH LED: Indicates sensor is ready for programming each limit (indicates Red for analog output, Green for discrete, and Yellow for simultaneous analog and discrete) Yellow Fast/Slow LEDs: Combination of 2 lights ON or OFF indicates 1 of 3 response speeds
Construction	Housing: Zinc alloy die-cast, plated and painted finish Cover plate: Aluminum with painted finish Lens: Acrylic
Environmental Rating	IP67; NEMA 6
Operating Conditions	Temperature: -10 to +50 °C Relative humidity: 90% at 50 °C (non-condensing)
Vibration and Mechanical Shock	Vibration: 60 Hz, 30 minutes, 3 axes Shock: 30G for 11 milliseconds, half sine wave, 3 axes
Certifications	C € c 71 °us

LT3 Series



Time-of-Flight Laser Distance-Gauging Sensors

- The LT3 uses advanced "time-of-flight" technology for precise, long-distance gauging.
- Reliably detects targets regardless of angles
- Visible red laser spot for easy alignment
- Offers push-button programming for other output response times or remote programming for added security and convenience

Diffuse LT3, Class 2 Laser



Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP	
	0.3 to 5 m*	2 m	None	LT3BD (Dual NPN or PNP selectable)		
		8-pin Euro QD	None	LT3BDQ (Dual NPN or PNP selectable)		
DIFFUSE LASER	0.3 to 5 m* 0.3 to 5 m*	2 m	0 to 10 V do	LT3NU	LT3PU	
		8-pin Euro QD	0 to 10 V dc	LT3NUQ	LT3PUQ	
		2 m	4 to 20 m/	LT3NI	LT3PI	
		8-pin Euro QD	4 to 20 mA	LT3NIQ	LT3PIQ	

Retro LT3, Class 1 Laser



Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP	
	0.5 to 50 m [†]	2 m	None	LT3BDLV (Dual NPN	I or PNP selectable)	
		8-pin Euro QD	140110	LT3BDLVQ (Dual NPN or PNP selectable)		
LASER RETRO	0.5 to 50 m [†] 0.5 to 50 m [†]	2 m	0 to 10 V dc	LT3NULV	LT3PULV	
		8-pin Euro QD	0 10 10 4 40	LT3NULVQ	LT3PULVQ	
		2 m	4 to 20 mA	LT3NULVQ	LT3PILV	
		8-pin Euro QD	4 to 20 IIIA	LT3NILVQ	LT3PILVQ	

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, LT3BD W/30).

- * Based on a 90% reflectivity white card
- † Retroreflective range is specified using a BRT-TVHG-8X10P high-grade target.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



Additional cordset information is available See page 758



Additional bracket information is available See page 724



Reflectors



Additional information is available See page 790

L-GAGE® LT3 Specifications

Sensing Beam	Typical beam diameter: 6 mm @ 3 m Typical laser lifetime: 75,000 hours Diffuse: 658 nm visible red IEC and CDRH Class 2 laser; 0.5 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 2 laser; 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max. radiant output power Retroreflective: 658 nm visible red IEC and CDRH Class 1 laser, 0.15 mW max.								
Sensing Range	Diffuse: 90% white card: 0.3 to 5 m 18% gray card: 0.3 to 3 m 6% black card: 0.3 to 2 m	Retroreflective: 0.5 to 50 m (using supplied target)							
Supply Voltage and Current	12 to 24 V dc (10% max. ripple); 108 mA max. @ 24 V dc or [2600/V dc] mA								
Supply Protection Circuitry	Protected against reverse polarity and transient voltages								
Delay at Power-up	1 second; outputs do not conduct during this time								
Output Rating	Discrete (switched) output: 100 mA max. OFF-state leakage current: less than 5 μA Output saturation NPN: less than 200 mV @ 10 mA; less than 600 mV @ 100 mA Output saturation PNP: less than 1.2 V at 10 mA; less than 1.6 V at 100 mA Analog voltage output: 2.5 kΩ min. load impedance (voltage sourcing) Analog current output: 1 kΩ max. @ 24V; max. load resistance = [Vcc-4.5/0.02 Ω] (current sourcing)								
Output Protection	Protected against short circuit conditions	rotected against short circuit conditions							
Output Response Time	Discrete output Fast: 1 millisecond ON/OFF Medium: 10 milliseconds ON/OFF Slow: 1	00 milliseconds ON/OFF							
	Diffuse Analog Voltage output (-3 dB) Fast: 450 Hz (1 ms average/1 ms update rate) Medium: 45 Hz (10 ms average/2 ms update rate) Slow: 4.5 Hz (100 ms average/4 ms update rate) Slow: 2.5 Hz (192 ms average/1 ms update rate)								
Color Sensitivity (typical)	Diffuse: 90% white to 18% gray: less than 10 mm; 90% white to 6% black: less than 20 mr	n.							
Analog Linearity	, , ,	rom 0.3 to 1.5 m; ± 20 mm from 1.5 to 5 m ed @ 24 V dc, 22° C using a 90% reflectance white car							
Discrete Output Hysteresis	Diffuse Fast: 10 mm Medium: 5 mm Slow: 3 mm	Retroreflective Fast: 20 mm Medium: 10 mm Slow: 6 mm							
Temperature Effect	Diffuse: less than 2 mm/ ° C	Retroreflective: less than 3 mm/° C							
Minimum Window Size	Diffuse: 20 mm	Retroreflective: 40 mm							
Remote TEACH Input	18 kΩ min. (65 kΩ at 5 V dc)								
Remote TEACH	To teach: Connect yellow wire to +5 to 24 V dc To disable: Connect yellow wire	re to 0 to +2 V dc (or open connection)							
Construction	Housing: ABS/polycarbonate blend Window: Acrylic Quick-disconnect:	ABS/polycarbonate blend							
Environmental Rating	IP67; NEMA 6								
•									

LT7 Series



Time-of-Flight Laser Distance-Gauging Sensors

- Visible red laser spot during programming mode for easy alignment
- Features TEACH-mode programming using integrated push-buttons or a serial interface
- Onboard LCD display for easy troubleshooting
- Long-range retroreflective models up to 250 m and diffuse models up to 10 m

Diffuse L-GAGE® LT7



Sensing Mode	Laser Class	Sensing Distance*	Connection	Discrete Output	Analog Output	Serial	Models
DIFFUSE LASER	Class 1 Infrared Sensing Laser (Class 2 Visible Red Alignment Laser)	0.5 to 10 m	12-pin M16 QD	2 PNP	4-20 mA	RS-422 or SSI	LT7PIDQ

Retro L-GAGE® LT7



Sensing Mode Laser Class	Sensing Distance*	Connection	Discrete Output	Analog Output	Serial	Models
Class 1 Infrared Sensing Laser (Class 2 Visible Red Alignment Laser)	0.5 to 250 m	12-pin M16 QD	2 PNP	-	RS-422 or SSI	LT7PLVQ

Connection options: A model with a QD requires a mating cordset.

*Diffuse-mode range specified using a 90% reflectance white card. Retroreflective range is specified using a BRT-250, BRT-540 or BRT-700 retroreflective target (see page page 790). Euro QD (w/ Shield)
Straight connector models listed;
for right-angle, replace ST with RA
at the end of the model number
(example, MQDC-1210RA)

12-Pin MQDC-1210ST 3 m MQDC-1213ST 10 m

Additional cordset information is available See page 758



SMBLT7

Additional bracket information is available See page 724



Reflectors



Additional information is available See page 790

L-GAGE® LT7 Specifications

Sensing Range	LT7PLVQ: 0.5 to 250 m (using specified reflector) LT7PIDQ: 6% Black card: 0.5 to 3 m 18% Gray card: 0.5 to 7 m 90% White card: 0.5 to 10 m				
Supply Voltage and Current	18 to 30 V dc (10% max. ripple)				
Power Consumption	Less than 4.5 W @ 25° C				
Measuring Laser	Infrared, 900 nm, Class 1				
Laser Control	Measurement laser is ON when sensor is ON. Pilot (visible) laser enabled during Programming mode; alternates with measurement laser.				
Spot Size	Distance Spot Size Distance Spot Size				
Pilot Laser (Alignment)	Visible red, 650 nm, Class 2				
Discrete & Analog Output Protection	Protected against continuous overload and short circuit				
Discrete Outputs	(2) 100 mA, PNP				
Discrete Switch Points	Adjustable in 1 mm steps				
Discrete Output Hysteresis	Adjustable, 10 mm min.				
Alarm Outputs	50 mA, PNP (NO)				
Analog Output	LT7PLVQ: None LT7PIDQ: 4-20 mA				
Output Response Time	12 milliseconds				
Linearity	±10 mm				
Resolution/Repeatability	LT7PLVQ: ±2 mm LT7PIDQ: ±4 mm				
Temperature Effect	Less than \pm 5 mm over the total sensing range				
Minimum Analog Window Size	LT7PLVQ: Not Applicable LT7PIDQ: 300 mm				
Adjustments	Push-button directed password enable/disable, measurement unit select, offset value select, output limits set, output mode select, analog output slope select (diffuse models only) and output limit manual adjust. See datasheet for information.				
Serial Measurement Speed	SSI: 1.4 milliseconds (SSI cycle 80 microseconds) RS-422: 2.9 milliseconds @ 57.6 kBaud				
Construction	ABS shock-resistant housing; PMMA window; polycarbonate displays				
Weight	Approximately 230 g				
Environmental Rating	IEC IP67				
Operating Conditions	Temperature: -10 to +50 °C in continuous operation				
Storage Temperature	−30 to +75 °C				
Vibration/Shock	EN 60947-5-2				
Certifications	CE				



Ultrasonic

Ultrasonic sensors use sound waves rather than light, making them ideal for stable detection of uneven surfaces, liquids, clear objects, and objects in dirty environments. These sensors work well for applications that require precise measurements between stationary and moving objects.

Series	Description	Max Sensing Range	Dimensions H x W x D (mm)	Protection Rating	Housing Material	Power Supply
0	QT50U The QT50U features a completely sealed, shock-resistant housing that is ideal for monitoring levels of liquids and solids. page 218	8 m	84.2 × 74.1 × 67.4	IP67; NEMA 6P	ABS/ Polycarbonate	10 to 30 V dc, 85 to 264 V ac
0	S18U The S18U is ideal for material handling and packaged goods applications, such as bottling or liquid level detection and as a control for small containers. page 222	300 mm	80.8 x ø 18	IP67; NEMA 6P	Thermoplastic polyester	10 to 30 V dc
(10)	T30U/T30UX The T30UX features T-style, right-angle sensor package with a 30 mm threaded barrel and a wide variety of mounting options. page 226	3 m	51.5 x 40 x 45	IP67; NEMA 6	PTB polyester	10 to 30 V dc, 12 to 24 V dc, 15 to 24 V dc
	M25U The M25U Ultrasonic Sensor features a smooth 316 series stainless steel construction to withstand the toughest sanitary challenges. page 226	500 mm	103 × ø 25	IP67; NEMA 6, IP69K	316 Stainless Steel	10 to 30 V dc
	T18U The T18U offers versatile mounting, and a response time of 1 millisecond. page 230	600 mm	51.5 x 40 x 30	IP67; NEMA 6P	PTB polyester	12 to 30 V dc
O	Q45U The Q45U accepts programming storage cards for fast and easy sensing parameter changes. page 232	3 m	87.6 x 44.5 x 60.5	IP67; NEMA 6P	PTB polyester	12 to 24 V dc, 15 to 24 V dc
	Q45UR The Q45UR has sensing head choices of 18 mm diameter threaded barrel housing in plastic or stainless steel, or ultra-compact plastic Flat-Pak. page 234	250 mm	87.6 x 44.5 x 60.5 (Remote sensors vary by model)	IP67; NEMA 6P	Thermoplastic polyester	12 to 24 V dc, 15 to 24 V dc
	QS18U The QS18U senses clear and transparent materials, as well as color variations, including clear web material, clear or shiny bottles, highly reflective surfaces and liquid or dry bulk materials inside cramped locations. page 236	500 mm	41.5 x 15 x 33.5	IP67 or IP68; NEMA 6P	ABS	12 to 30 V dc
	K50U Designed for plug-and-play use with the Q45U wireless node, creating a cost-effective and easy-to-use solution for monitoring mobile or remote tanks and totes page 238	3 m	59.5 × ø 50	IP67 NEMA 6P	PTB polyester	3.6 to 5.5 V dc or 10 to 30 V dc

QT50U Series



Long-Range Ultrasonic Sensors

- Features a small ultrasonic dead zone of 200 mm
- Available in a chemically resistant model with a Teflon® flange
- Detects targets at long ranges within confined areas, such as a storage tank, without interference from the tank walls
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

QT50U, 10-30 V DC

Range	Connection	Output	Models*
200 mm to 8 m	2 m		QT50ULB
	5-pin Mini QD	Selectable 0 to 10 V dc or 4 to 20 mA	QT50ULBQ
	5-pin Euro QD	0 10 10 1 00 01 1 10 20 11/11	QT50ULBQ6
200 mm to 8 m	2 m		QT50UDB
	5-pin Mini QD	Selectable Dual NPN or PNP	QT50UDBQ
	5-pin Euro QD		QT50UDBQ6

QT50U Universal Voltage, 85-264 V AC/48-250 V DC

Range	Connection	Output Operation Mode	Output	Models*
	2 m			QT50UVR3W
200 mm to 8 m	5-pin Micro QD	Window-limit (complementary outputs)	SPDT e/m relay	QT50UVR3WQ1
	5-pin Mini QD			QT50UVR3WQ
	2 m			QT50UVR3F
200 mm to 8 m	5-pin Micro QD	Pump/level control (pump-in and pump-out logic)	SPDT e/m relay	QT50UVR3FQ1
	5-pin Mini QD			QT50UVR3FQ

For more specifications see page 220-221.

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QT50ULB W/30).

^{*} For sensors with Teflon®-protected face and transducer, add suffix -CRFV to the model number (example, QT50ULB-CRFV). Teflon® is a registered trademark of Dupont™.



Euro-Style with Shield

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

MQDEC2-506 2 m (6.5') MQDEC2-55 5 m (15') MQDEC2-530 9 m (30')



Straight connector models listed; for right-angle, add RA to the end of the model number (example,

MQVR3S-506RA)

MQVR3S-506 2 m (6.5') MQVR3S-515 5 m (15') MQVR3S-50 9 m (30')

5-Pin



MBCC2-506 2 m (6.5') MBCC2-512 4 m (15') MBCC2-530 9 m (30')

Additional cordset information is available See page 758







SMB30A SMB30MM

SMB30SC

Additional bracket information is available See page 725



DC and Universal Voltage Models



Teflon®-protected Models (Suffix -CRFV)

QT50U DC Specifications

Q 1500 DC Specifics	RUOIS
Supply Voltage and Current	Analog models: 10 to 30 V dc (10% max. ripple); 100 mA max @ 10 V, 40 mA max. @ 30 V (exclusive of load) Dual-discrete models: 10 to 30 V dc (10% max. ripple); 100 mA max. @ 10 V, 40 mA @ 30 V (exclusive of load)
Ultrasonic Frequency	75 kHz burst, rep. rate 96 milliseconds
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Output Protection	Protected against short circuit conditions
Delay at Power-up	1.5 seconds
Output Configuration	Analog models: Voltage sourcing: 0 to 10 V dc Current sourcing: 4 to 20 mA Dual-discrete models: Dual PNP or NPN, selectable using DIP switch
Output Ratings	Analog Voltage Output: 0 to 10 V dc Minimum load resistance = 500Ω Minimum required supply voltage for full 0-10 V output span = $(1000 + 13)$ V dc Analog Current Output: 4 to 20 mA Maximum load resistance = $1 \text{ k}\Omega$ or $(\frac{\text{V supply - 5}}{0.02}) \Omega$, whichever is lower
	Minimum required supply voltage for full 4-20 mA output span = 10 V dc or [(RLoad x 0.02)+5] V dc, whichever is greater. 4-20 mA output calibrated at 25° C with 250 Ω load. Discrete Output: 150 mA max. OFF-State leakage current: less than 5 μA Output saturation: NPN: less than 200 mV @ 10 mA; less than 650 mV @ 150 mA PNP: less than 1.2 V @ 10 mA; less than 1.65 V @ 150 mA
Temperature Effect	Uncompensated: 0.2% of distance/° C Compensated: 0.02% of distance/° C
Linearity (Analog Models)	+/- 0.2% of span from 200 to 8000 mm; +/- 0.1% of span from 500 to 8000 mm (1 mm minimum)
Resolution/Repeatability	1.0 mm
Hysteresis	5 mm
Output Response Time	Analog models: 100 to 2300 milliseconds Dual-discrete models: 100 to 1600 milliseconds
Minimum Window Size	20 mm
Adjustments	Sensing window limits: TEACH-Mode programming of near and far window limits may be set using the buttons or remotely using TEACH input
Indicators	Green Power ON LED: Indicates power is ON Red Signal LED: Indicates target is within sensing range, and the condition of the received signal Teach/Output indicator (bicolor Yellow/Red): Yellow: Target is within taught limits Yellow OFF (Discrete): Target is outside taught window limits Red: Sensor is in TEACH mode Yellow Flashing (Analog): Target is outside taught window limits
Remote TEACH	See data sheet
Construction	Transducer: Ceramic/Epoxy composite Membrane Switch: Polyester Housing: ABS/Polycarbonate Lightpipes: Acrylic
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 100%
Vibration and Mechanical Shock	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.
Temperature Warmup Drift	Less than 0.8% of sensing distance upon power-up with Temperature Compensation enabled
Application Notes	Objects passing inside the specified near limit (200 mm) may produce a false response For best accuracy, allow 30 minute warm-up before programming or operating
Certifications	CE

TEMP & VIBRATION

QT50U Universal Voltage Specifications

Supply Voltage	85 to 264 V ac, 50/60 Hz/48 to 250 V dc (1.5 watts max., exclusive of load)
Ultrasonic Frequency	75 kHz burst, rep. rate 96 milliseconds
Supply Protection Circuitry	Protected against transient over voltages. DC hookup is without regard to polarity.
Output Protection	Protected against short circuit conditions
Delay at Power-up	1.5 seconds
Output Configuration	SPDT (Single-Pole, Double-Throw) electromechanical relay output One normally open (NO) and one normally closed (NC)
Output Ratings	Max. switching power (resistive load): 2000 VA, 240 W (1000 VA, 120 W for sensors with Micro QD Max. switching voltage (resistive load): 250 V ac, 125 V dc Max. switching current (resistive load): 8A @ 250 V ac, 8A @ 30 V dc derated to 200 mA @ 125 V dc (4A max. for sensors with Micro QD) Min. voltage and current: 5 V dc, 10 mA Mechanical life of relay: 50,000,000 operations Electrical life of relay at full resistive load: 100,000 operations NOTE: Transient suppression is recommended when switching inductive loads
Temperature Effect	Uncompensated: 0.2% of distance/ °C Compensated: 0.02% of distance/ °C
Repeatability	1.0 mm
Hysteresis	Window-limit sensor models: 5 mm Fill-level control sensor models: 0 mm
Output Response Time	Selectable 1600, 400 or 100 milliseconds
Minimum Window Size	20 mm
Adjustments	Sensing limits: TEACH-Mode programming of near and far limits may be set using the TEACH push button Sensor configuration: Output response time and temperature compensation mode may be set using the Speed push button Factory default settings: 400 milliseconds output response time; temperature compensation enabled
Indicators	Green Power ON LED: Indicates power is ON Red Signal LED: Indicates target is within sensing range, and the condition of the received signal Output indicator (bicolor Yellow/Red): Indicates output status or TEACH mode Response indicator (bicolor Yellow/Red): Indicates output response time selection
Construction	Transducer: Ceramic/Epoxy composite Housing: ABS Membrane Switch: Polyester
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 100%
Vibration and Mechanical Shock	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.
Temperature Warmup Drift	Less than 1.0% of sensing distance upon power-up with Temperature Compensation enabled
Application Notes	Objects passing inside the specified minimum sensing distance (200 mm) may produce a false response
Certifications	CE



S18U Series



Barrel Ultrasonic Sensors

- Features minimal dead zone and can eliminate dead zone if used in retrosonic mode
- Compensates for temperature to provide greatest sensing accuracy
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience



S18U

	Range	Connections	Output	Housing Configuration	Models
	30 to 300 mm	2 m	0 to 10 V dc	Straight	S18UUA
		5-pin Euro QD			S18UUAQ
	30 to 300 mm	2 m	4 to 20 mA	Straight	S18UIA
		5-pin Euro QD			S18UIAQ
	20 to 200 mm	2 m	Bipolar	Straight	S18UBA
	30 to 300 mm	5-pin Euro QD	NPN/PNP	Straight	S18UBAQ



S18U Right-Angle

	Range	Connections	Output	Housing Configuration	Models
	30 to 300 mm	2 m	0 to 10 V dc	Right-Angle	S18UUAR
	30 to 300 mm	5-pin Euro QD	0 to 10 v dc	Tilgitt-Atigie	S18UUARQ
/	30 to 300 mm	2 m	4 to 20 mA	Right-Angle	S18UIAR
	30 to 300 mm	5-pin Euro QD	4 to 20 IIIA	riigite / trigio	S18UIARQ
	30 to 300 mm	2 m	Bipolar	Right-Angle	S18UBAR
	30 to 300 mm	5-pin Euro QD	NPN/PNP	Hight-Angle	S18UBARQ

Connection options: A model with a QD requires a mating cable.

For 9 m cable, add suffix W/30 to the 2 m model number (example, S18UUA W/30).

MQDEC2-506 Euro-Style with Shield 2 m (6.5') Straight connector models listed; MQDEC2-515 for right-angle, add RA to the end 5 m (15') MQDEC2-530 of the model number (example, MQDEC2-506RA) 9 m (30')

Additional cordset information is available See page 758







SMB18A SMB18FM

SMB18SF

Additional bracket information is available See page 723

Ultrasonic Wave Guides



Inside Diameter

Model

5.0 mm

UWG18-5.0 UWG18-6.4

Additional wave guide information is available See page 959

S18U Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); 65 mA max. (exclusive of load), 40 mA typical @ 25 V input				
Ultrasonic Frequency	300 kHz, rep. rate 2.5 milliseconds				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Protection	Protected against short circuit conditions				
Output Ratings	Analog Voltage Output: 2.5 kΩ min. load resistance Minimum supply for a full 10 V output is 12 V dc (for supply voltages between 10 and 12, V out max is at least V supply -2) Analog Current Output: 1 kΩ max @ 24 V input Max load resistance = (Vcc-4)/0.02 Ω Discrete: 100 mA max. OFF-state leakage current: less than 5 μA NPN saturation: less than 200 mV @ 10 mA and less than 600 mV @ 100 mA PNP saturation: less than 1.2 V @ 10 mA and less than 1.6 V @ 100 mA				
Output Configuration	Analog: 0 to 10 V dc or 4 to 20 mA, depending on model Discrete: Bipolar: One NPN (current sinking) and one PNP (current sourcing) output in each model. Solid-state switch conducts when target is sensed within sensing window.				
Output Response Time	Analog: 30 milliseconds: Black wire at 0 to 2 V dc (or open) Discrete: 5 milliseconds 2.5 milliseconds: Black wire at 5 to 30 V dc				
Delay at Power-up	300 milliseconds				
Linearity	Analog output models: 2.5 milliseconds response: ± 1 mm 30 milliseconds response: ± 0.5 mm				
Resolution	Analog output models: 2.5 milliseconds response: 1 mm 30 milliseconds response: 0.5 mm				
Repeatability	Discrete models: 0.5 mm				
Temperature Effect	0.02% of distance/ °C				
Temperature Warmup Drift	Less than 1.7% of sensing distance upon power-up				
Minimum Window Size	5 mm				
Switching Hysteresis	Discrete output models: 0.7 mm				
Adjustments	Sensing window limits: TEACH-Mode programming of near and far window limits may be set using the push button or remotely using TEACH input				
Indicators	Power/Signal Strength (Red/Green): Teach/Output Indicator (Yellow/Red): Green: Target is within sensing range Yellow: Target is within taught limits Red: Target is outside sensing range OFF: Target is outside taught window limits OFF: Sensing power is OFF Red: Sensor is in TEACH mode				
Remote TEACH Input	Impedance: 12 kΩ				
Construction	Threaded Barrel: Thermoplastic polyester Push Button: Santoprene Push Button Housing: ABS/PC Lightpipes: Acrylic				
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P				
Operating Conditions	Temperature: -20 to +60 °C Relative humidity: 100%				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave				
Application Notes	Objects passing inside the specified near limit may produce a false response				
Certifications	C € c 71 2us				

T30UX Series



Right-Angle, Long-Range Ultrasonic Sensors

- Built-in temperature compensation for high-accuracy across a wide range of ambient temperatures
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

T30UX

Range	Frequency	Connection	Response Time	Output	Models*
100 mm to 1 m 224 kHz	224 kHz	2 m	45 ms	Discrete:	T30UXDA
		4-Pin Euro QD		NPN, PNP, NO, NC, Selectable	T30UXDAQ8
200 mm to 2 m	174 kHz	2 m	92 ms	Discrete:	T30UXDB
200 111111110 2 111		4-Pin Euro QD		NPN, PNP, NO, NC, Selectable	T30UXDBQ8
300 mm to 3 m	114 kHz	2 m	135 ms	Discrete:	T30UXDC
000 111111110 0 111		4-Pin Euro QD		NPN, PNP, NO, NC, Selectable	T30UXDCQ8
100 mm to 1 m	224 kHz	2 m	Selectable	Analog: 0 to 10 V dc	T30UXUA
		4-Pin Euro QD			T30UXUAQ8
100 mm to 1 m	224 kHz	2 m	Selectable 45 or 105 ms	Analog: 4 to 20 mA	T30UXIA
		4-Pin Euro QD			T30UXIAQ8
200 mm to 2 m	174 kHz	2 m	Selectable	Analog: 0 to 10 V do	T30UXUB
		4-Pin Euro QD	92 or 222 ms	-	T30UXUBQ8
200 mm to 2 m	174 kHz	2 m	Selectable	Analog: 4 to 20 mA	T30UXIB
		4-Pin Euro QD	92 or 222 ms		T30UXIBQ8
300 mm to 3 m	114 kHz	2 m	Selectable	Analog: 0 to 10 V dc	T30UXUC
		4-Pin Euro QD	135 or 318 ms	-	T30UXUCQ8
300 mm to 3 m	114 kHz	2 m	Selectable	Analog: 4 to 20 mA	T30UXIC
		4-Pin Euro QD	135 or 318 ms		T30UXICQ8

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UXDA W/30).

 $\label{eq:QD_models} \textbf{QD} \ \textbf{models} : For \ \textbf{a} \ \textbf{4-pin} \ \textbf{150} \ \textbf{mm} \ \textbf{Euro-style} \ \textbf{PUR} \ \textbf{pigtail} \ \textbf{QD}, \textbf{add} \ \textbf{suffix} \ \textbf{QPMA} \ \textbf{the} \ \textbf{2} \ \textbf{m} \ \textbf{model} \ \textbf{number} \ \textbf{(example, T30UXDAQPMA)}.$

* Contact factory to request chemically resistant flange or fill-level control models.

Euro-Style with Shield
Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-406RA)

MQDEC2-415
5 m (15')
MQDEC2-430
9 m (30')

Additional cordset information is available See page 758



Additional bracket information is available See page 723



T30UX (Long-range) Models

T30UX Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at 40 mA, exclusive of load					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages					
Output Configuration	Discrete (switched) output models: SPST solid-state switch. Configurable as NPN (sinking) or PNP (sourcing) via Mode push button. Normally Open (NO) or Normally Closed (NC) operation is also selectable via Mode push button. The default setting is PNP/NO. Analog output models: 0 to 10 V dc or 4 to 20 mA, depending on model					
Output Ratings	Discrete output models: 100 mA max. OFF-state leakage current: NPN: < 200 µA @ 30 V dc (see NOTE 1) ON-state saturation voltage: NPN: < 1.6 V @ 100 mA Analog output Models: Analog output Models:					
	Analog Voltage Output: $2.5 \text{ k}\Omega$ min. load resistance Minimum supply for a full 10 V output is 12 V dc (for supply voltages between $10 \text{ and } 12, \text{ V}$ out max. is at least V supply $-2 \text{ Analog Current Output: } 1 \text{ k}\Omega$ max. @ 24 V input; max. load resistance = $(\text{Vcc-4})/0.02\Omega$ For current output (4-20 mA) models, ideal results are achieved when the total load resistance $R = [(\text{Vin} - 4)/0.020]\Omega$. Example, at $V = 24 \text{ V}$ dc, $R \approx 1 \text{ k}\Omega$ (1 watt)					
Output Protection Circuitry	Protected against short circuit conditions					
Output Response Time	"A" suffix models: 45 milliseconds "B" suffix models: 92 milliseconds "C" suffix models: 135 milliseconds					
Delay at Power-up	500 milliseconds					
Temperature Effect	0.02% of distance/ °C					
Linearity (analog models)	0.25% of distance					
Repeatability/Resolution	"A" suffix models: 0.1% of distance (0.5 mm min.) "B" suffix models: 0.1% of distance (1.0 mm min.) "C" suffix models: 0.1% of distance (1.5 mm min.)					
Sensing Hysteresis (discrete models)	"A" suffix models: 2 mm "B" suffix models: 3 mm "C" suffix models: 4 mm					
Minimum Window Size	10 mm					
Adjustments	Sensing window limits: TEACH-Mode configuration of near and far window limits may be set using the push button or remotely viaTEACH input Discrete output models: Output Configuration: NPN, PNP, Normally Open (NO), Normally Closed (NC) select Advanced configuration options: Push button enabled/disabled, temperature compensation enabled/disabled					
	Analog output models: Response speed selection: Fast or Slow Advanced configuration options: Analog output slope, push button enabled/disabled, temperature compensation enabled/disabled					
Indicators	Green Power LED ON: Power ON, RUN mode Red Signal LED: Target signal strength Amber Output LED: Output enabled; sensor receiving a signal within the window limits Amber Mode LED: Currently selected mode					
Loss of Signal Indication (analog models)	0 to 10 V dc models: Analog output goes to 0 V 4 to 20 mA models: Analog output goes to 3.6 mA					
Construction	Housing: PBT polyester					
Environmental Rating	Leakproof design, rated IEC IP67 (NEMA 6)					
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 95% at 50 °C non-condensing					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.					
Application Notes	The temperature warmup drift upon power-up is less than 1% of the sensing distance					
Certifications	C € c us					

NOTE: NPN < 200 μA for load impedance > 3 $k\Omega;$ for load current of 100 mA, leakage < 1% of load current



T30U Series





- Dual-discrete models for ON/OFF switching or pump-level control
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Chemically resistant models with a Telfon® coating
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

T30U, 12-24 V DC

Range	Frequency	Connection	Response Time	Discrete Output(s)	Analog Output	Models*
		2 m		NPN		T30UINA
150 mm to 1 m	228 kHz	5-pin Euro QD	48 ms	INFIN	4 to 20 mA	T30UINAQ
130 11111 to 1 111	220 NI IZ	2 m	40 1113	PNP	4 to 20 min	T30UIPA
		5-pin Euro QD				T30UIPAQ
		2 m		NPN		T30UINB
300 mm to 2 m [†]	128 kHz	5-pin Euro QD	96 ms		4 to 20 mA	T30UINBQ
000 11111 to 2 111	120 1112	2 m	00 1110	PNP	1 10 20 110 1	T30UIPB
		5-pin Euro QD				T30UIPBQ
		2 m		Dual NPN		T30UDNA
150 mm to 1 m	228 kHz	5-pin Euro QD	48 ms		None	T30UDNAQ
100 11111 10 1 111	2201112	2 m		Dual PNP		T30UDPA
		5-pin Euro QD		Dadi F W		T30UDPAQ
		2 m		Dual NPN		T30UDNB
300 mm to 2 m [†]	128 kHz	5-pin Euro QD	96 ms	Dadi I II I	None	T30UDNBQ
000 11111 10 2 111	1201112	2 m	000	Dual PNP	. 101.0	T30UDPB
		5-pin Euro QD		Dadi i i ii		T30UDPBQ
150 mm to 1 m	228 kHz	2 m	48 ms			T30UHNA
100 11111 10 1 111	2201112	5-pin Euro QD		Pump/Level Control	None	T30UHNAQ
300 mm to 2 m [†]	128 kHz	2 m	96 ms	Dual NPN	140110	T30UHNB
000 11111 to 2 111	120 1112	5-pin Euro QD	00 ms			T30UHNBQ
150 mm to 1 m	228 kHz	2 m	48 ms			T30UHPA
100 11111110 1 111	LLO IVIL	5-pin Euro QD	10 1110	Pump/Level Control	None	T30UHPAQ
300 mm to 2 m [†]	128 kHz	2 m	96 ms	Dual PNP		T30UHPB
330 11111 to 2 111	120 10 12	5-pin Euro QD	001110			T30UHPBQ

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UXDA W/30).

QD models: For a 4-pin 150 mm Euro-style PUR pigtail QD, add suffix QPMA the 2 m model number (example, T30UXDAQPMA).

^{*} Contact factory to request chemically resistant flange or fill-level control models.

 $[\]dagger$ Teflon®-encapsulated models have a range of 300 mm - 1.5 m $\,$

T30U, 15-24 V DC

Range	Frequency	Connection	Response Time	Analog Output	Models NPN*	Models PNP*
150 mm to 1 m	228 kHz	2 m	48 ms	0 to 10 V dc	T30UUNA	T30UUPA
100 11111 10 1 111	220 1112	5-pin Euro QD	401115 0 10 10	0 10 10 1 40	T30UUNAQ	T30UUPAQ
300 mm to 2 m [†]	128 kHz	2 m	96 ms	0 to 10 V dc	T30UUNB	T30UUPB
000 11111 to 2 111	120 1112	5-pin Euro QD	30 m3	0 10 10 1 40	T30UUNBQ	T30UUPBQ

Connection options: A model with a QD requires a mating cordset

For 9 m cable, add suffix W/30 to the 2 m model number (example, $T30UUNA\ W/30$).

- * For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UUNB-CRFV).
- $\ensuremath{^{\dagger}}$ Teflon®-encapsulated models have a range of 300 mm 1.5 m.

Teflon® is a registered trademark of Dupont $^{\text{TM}}$.

Euro-Style with Shield
Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

S-Pin
MQDEC2-506
2 m (6.5')
MQDEC2-515
5 m (15')
MQDEC2-515
9 m (30')

Additional cordset information is available See page 758



Additional bracket information is available See page 723



T30U Specifications

Supply Voltage and Current	Current sourcing analog output models: 12 to 24 V dc (10% max. ripple); 90 mA (exclusive of load) Voltage sourcing analog output models: 15 to 24 V dc (10% max. ripple); 90 mA (exclusive of load) Dual-discrete output models: 12 to 24 V dc (10% max. ripple); 90 mA (exclusive of load)					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages					
Ultrasonic Frequency	Short Range ("A" suffix modesl): 228 kHz Long Range ("B" suffix models): 128 kHz					
Output Protection	Protected against continuous overload and short-circuit; transient over-voltage; no false pulse on power-up					
Output Configuration	Discrete (switched) output: Solid-state switch conducts when target is sensed within sensing window; choose NPN (current sinking) or PNP (current sourcing) models Analog output: Choose 0 to 10 V dc sourcing or 4 to 20 mA sourcing output models; output slope may be selected using TEACH sequence					
Output Ratings	Discrete (switched) output: 100 mA max., total-both outputs OFF-state leakage current: less than 10 μA Analog Output: Voltage sourcing: 0 to 10 V dc (at 1 kΩ min. resistance) Current sourcing: 4 to 20 mA, 1 Ω to Rmax Rmax = Vsupply - 7V 20 mA					
Output Response Time	Discrete output: "A" suffix models: 48 milliseconds "B" suffix models: 96 milliseconds Analog output: "A" suffix models: 48 milliseconds average, 16-millisecond update "B" suffix models: 96 milliseconds average, 32-millisecond update					
Sensing Performance (Specified using a 100 x 100 mm aluminum target at 25° C under fixed sensing conditions.)	Analog sensing resolution or discrete output repeatability: ±0.25% of measured distance "A" suffix models: .5 mm min Analog linearity: ±0.5% of full-scale span Min. window size: 10 mm Hysteresis of discrete output: 2.5 mm Temperature effect: 0.2% of sensing distance per °C					
Indicators	Four status LEDs: In RUN mode: Green ON Steady: Power ON, RUN mode Green Flashing: Discrete output is overloaded Red Flashing: Relative received signal strength Yellow analog ON Steady: Target is inside window limits Yellow discrete ON Steady: Output conducting In Program mode: Green OFF: PROGRAM mode Red Flashing: Relative received signal strength Yellow ON Steady: Ready for first window limit Yellow Flashing: Ready for second limit Yellow OFF: Not teaching this output					
Construction	Molded reinforced thermoplastic polyester housing					
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P					
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 100%					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G) Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.					
Certifications	((

M25U Series





- 316 stainless steel with no thread, gaps or seams to trap debris
- Constructed with FDA approved materials and rated to IP69K,
 IEC IP67 (NEMA 6) with fully encapsulated electronics
- Withstands high-temperatures sprays of up to 80° C and 1500 psi occurring every few hours
- Features high-immunity to ambient electrical and sonic noise

M25U

Range*	Frequency	Connection	Output	Response Time	Models
Normal Speed: 500 mm	140 kHz	4-pin Euro QD	-	-	M25UEQ8 Emitter
High Speed: 250 mm	140 KHZ	5-pin Euro QD	Bipolar NPN/PNP	Normal Speed: 4.0 ms High Speed: 3.0 ms	M25URBQ8 Receiver

Connection options: A model with a QD requires a mating cordset.

* M25U receivers may be wired for either of two speed modes: Normal or High, depending on hookup. The Normal-Speed mode offers a sensing range of 500 mm.

The Normal-Speed mode maximizes sensing energy, as is required in demanding environments. The High-Speed mode offers a sensing range of 250 mm.

The High-Speed mode maximizes sensing response, as is needed in high-speed counting applications.



5-Pin

MQDCWD-506
2 m (6.5')
MQDCWD-530
9 m (30')



Additional cordset information is available See page 758





SMBM25A

SMBM25B

Additional bracket information is available See page 725

M25U Specifications

Sensing Range	Normal Speed: 500 mm High Speed: 250 mm				
Ultrasonic Frequency	140KHz				
Supply Voltage and Current	Emitter: 10 to 30 V dc (10% max. ripple) at less than 85 mA Receiver: 10 to 30 V dc (10% max. ripple) at less than 38 mA (exclusive of load)				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Receiver Output Configuration	Bipolar (1 NPN & 1 PNP) solid-state output; Normally Open (output is activated when an object blocks the sensing beam)				
Output Rating	100 mA (each output) with short circuit protection; see Note 1 OFF-state leakage current: NPN: < 200 μA sinking ON-state saturation voltage: NPN: < 1.6 V @ 100 mA PNP: < 10 μA sourcing PNP: < 3.0 V @ 100 mA				
Output Protection Circuitry	Protected against short circuit conditions				
Output Response Time	Normal Speed: 4.0 milliseconds High Speed: 3.0 milliseconds				
Repeatability	1 millisecond				
Delay at Power-up	< 250 milliseconds				
Delay for Switching Between Normal and High Speed	20 milliseconds				
Indicators	Green Power LED: indicates Power ON Amber Output LED: indicates output activated				
Construction	Housing: 316 Stainless Steel LED window: Polysulphone				
Environmental Rating	Leakproof design, rated IEC IP67 (NEMA 6), IP69K				
Operating Conditions	Temperature: -20 to +70 °C Max. Relative Humidity: 95% at 50° C non-condensing				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max. amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration.				
Notes	1. NPN < 200 μA for load impedance > 3 KΩ; for load current of 100 mA, leakage < 1% of load current 2. When mounting the M25U, care should be taken to acoustically isolate the emitter and receiver to eliminate sound energy coupling between the sensor pair. This is best accomplished with elastomeric materials between the sensor and rigid mounting brackets.				
Certifications	CE				

T18U Series



Opposed Dual-Range Ultrasonic Sensors

- T-style right-angle sensor package with an 18 mm threaded mounting hub, for versatile mounting
- Response time of 1 millisecond and ranges up to 600 mm suitable for high-speed applications such as counting
- Offers high immunity to electrical and acoustic noise
- Includes signal strength indicator to make alignment easy
- Ideal for small object and clear object detection

T18U

Range [†]	Connection	Response Time	Models NPN*	Models PNP*
NORMAL resolution: 600 mm	2 m	NORMAL resolution: 2 ms	T186UE	Emitter
HIGH resolution: 300 mm	4-pin Euro QD	HIGH resolution: 1 ms	T186UE	Q Emitter
NORMAL resolution: 600 mm	2 m	NORMAL resolution: 2 ms	T18VN6UR	T18VP6UR
HIGH resolution: 300 mm	4-pin Euro QD	HIGH resolution: 1 ms	T18VN6URQ	T18VP6URQ

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T18VN6UR W/30).

† Receivers may be wired for either resolutions: Normal or High.

* Sensor pair requires one emitter and one receiver.



Additional cordset information is available See page 758



Additional bracket information is available See page 723



Ultrasonic Wave Guides



Inside
Diameter Model

5.0 mm **UWG18-5.0** 6.4 mm **UWG18-6.4**

Additional wave guide information is available See page 959

T18U Specifications

Sensing Range (no minimum range)	NORMAL resolution mode: to 600 mm HIGH resolution mode: to 300 mm			
Supply Voltage and Current	12 to 30 V dc, 10% max. ac ripple 50 mA (emitters); 35 mA (receivers), exclusive of output load			
Ultrasonic Frequency	230 kHz			
Minimum spacing (adjacent pairs)	50 mm for emitter-to-receiver separations of up to 150 mm Add 10 mm of adjacent-pair spacing for every 100 mm of emitter-to-receiver spacing beyond 150 mm			
Receiver Output Configuration	T18VN models: NPN sinking, NO and NC (complementary) T18VP models: PNP sourcing, NO and NC (complementary)			
Receiver Output Rating	150 mA max. each output at 25 °C, derated to 100 mA at 70 °C (derate ≈ 1 mA per °C) Both outputs may be used simultaneously. ON-state saturation voltage: less than 1.5 V at 10 mA; less than 2.0 V at 150 mA OFF-state leakage current: less than 1 µA at 30 V dc Output protection: Overload and short-circuit protected. No false pulse upon receiver power-up: false pulse protection causes a 100 millisecond delay upon power-up.			
Output Response Time	NORMAL resolution mode: 2 milliseconds ON/OFF HIGH resolution mode: 1 millisecond ON/OFF			
Rep Rate	NORMAL resolution mode: 125 Hz max. HIGH resolution mode: 200 Hz max.			
Mechanical Sensing Repeatability at 300 mm range	NORMAL resolution mode: less than 2 mm HIGH resolution mode: less than 1 mm			
Beam Angle (-3dB full angle)	15 ± 2°			
Indicators	Emitters have a green LED for dc power ON. Solid Green: power ON Flashing Green: output overloaded Yellow: sonic signal received (flash rate is proportional to received signal strength; flash is from full to half intensity) See data sheet for detailed information			
Construction	T-style yellow PBT polyester housing with black PBT polyester back cover. Transducer housing is threaded M18 x 1. Mating jam nut is supplied for mounting. Acoustic face is epoxy reinforced. Circuitry is epoxy-encapsulated.			
Environmental Rating	IEC IP67; NEMA 6P			
Operating Temperature	-40 to +70 °C			
Vibration and Mechanical Shock	All models meet Mil.Std 202F requirements method 201A (Vibration: frequency 10 to 60 Hz, max., and double amplitude 0.06", maximum acceleration 10G) and method 213B conditions H&I (Shock: 75G with unit operation; 100G for non-operation). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.			
Certifications	CE			

Q45U Series

Versatile Ultrasonic Sensors



- The Q45U accepts programming storage cards for fast, easy sensing parameter changes with ranges up to 3 m
- Bipolar discrete models have switches for ON/OFF presence detection and HIGH/LOW level control
- In ON/OFF mode, bipolar discrete models detect when the target is within the set range or when it is outside the range
- In HIGH/LOW mode, bipolar discrete models detect when the target is outside the configured range, for fill level control, web tensioning control and similar applications
- Response time is programmed with switches in discrete models and with a potentiometer in analog models
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience



Q45U Discrete Output, 12-24 V DC

Range	Temperature Compensation	Connection	Output Type	Response Time	Models
100 mm to 1.4 m	No	2 m 5-pin Mini QD 5-pin Euro QD	Bipolar NPN/PNP	Programmable for 20, 40, 160 or 640 ms	Q45UBB63DA Q45UBB63DAQ Q45UBB63DAQ6
100 mm to 1.4 m	Yes	2 m 5-pin Mini QD 5-pin Euro QD	Bipolar NPN/PNP	Programmable for 20, 40, 160 or 640 ms	Q45UBB63DAC Q45UBB63DACQ Q45UBB63DACQ6
250 mm to 3 m [†]	Yes	2 m 5-pin Mini QD 5-pin Euro QD	Bipolar NPN/PNP	Programmable for 40, 80, 320 or 1280 ms	Q45UBB63BC Q45UBB63BCQ Q45UBB63BCQ6



Q45U Analog Output, 15-24 V DC

Range	Temperature Compensation	Connection	Output Type	Response Time	Models
		2 m	Selectable		Q45ULIU64ACR
100 mm to 1.4 m	Yes	5-pin Mini QD	0 to 10 V dc or	Adjustable from 40 to 1280 ms	Q45ULIU64ACRQ
		5-pin Euro QD	4 to 20 mA	40 to 1200 ms	Q45ULIU64ACRQ6
		2 m	Selectable		Q45ULIU64BCR
250 mm to 3 m [†] Yes	Yes	5-pin Mini QD	0 to 10 V dc or	Adjustable from 80 to 2560 ms	Q45ULIU64BCRQ
		5-pin Euro QD	4 to 20 mA	00 to 2000 mg	Q45ULIU64BCRQ6

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45UBB63DA W/30).

† The far limit may be extended as far as 3.9 m for good acoustical targets—hard surfaces with area greater than 100 cm².

5-Pin MQDEC2-506 Euro-Style with Shield 2 m (6.5') MQDEC2-515 Straight connector models listed; for right-angle, add **RA** to the end 5 m (15') of the model number (example, MQDEC2-506RA) MQDEC2-530 9 m (30')

5-Pin MBCC2-506 2 m (6.5') Mini-Style with Shield MBCC2-515 Straight connector 5 m (15') MBCC2-530 models only 9 m (30')







SMB30SC

Additional bracket information is available See page 722

See page 758

Additional cordset information is available

Q45U Specifications

Sensing Range	"A" suffix: Near limit: 100 mm min. (239 kHz) "B" suffix: Near limit: 250 mm min. (128 kHz) "A" suffix: Far limit: 1.4 m max. (239 kHz) "B" suffix: Far limit: 3.0 m max. (128 kHz) NOTE: The far limit may be extended on long range units, as far as 3.9 m for good acoustical targets (hard surfaces with area greater than 100 cm2)						
Supply Voltage and Current	Discrete: 12 to 24 V dc (10% max	Discrete: 12 to 24 V dc (10% max. ripple); 100 mA (exclusive of load) Analog: 15 to 24 V dc (10% max. ripple); 100 mA (exclusive of load)					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages						
Output Protection Circuitry	Protected against false pulse on p	ower-up and continuous overloa	ad or short-circuit of output	ts			
Output Configuration		Discrete: Bipolar: One current sourcing (PNP) and one current sinking (NPN) open collector transistor Analog: One voltage sourcing and one current sourcing; one or the other output is enabled by internal programming switch #2					
Output Ratings	ON-state saturation voltage: less						
Performance Specifications		"A" suffix		"B" suffix			
	Analog resolution or discrete repeatability:	± 0.1% of sensing distance	e (± 0.25 mm min.)	± 0.1% of sensing distance (± 0.5 mm min.)			
	Analog Linearity:	1% of full scale	- (=,	1% of full scale			
	Temperature effect:	0.05% of sensing distance 0.2% of sensing distance/		0.05% of sensing distance/ °C			
	Min. window size:	10 mm		25 mm			
	Hysteresis (discrete output):	5 mm		10 mm			
Indicators	Switch 3: Loss of ech Switch 4: Loss of ech	out mode or voltage output mode or min/max mode or loss of echo o min/max default output value	o Hold Mode				
Indicators	Switch 4: Loss of ech Discrete: Three status LEDs: Solid Green: power C Yellow: outputs are co Red: indicates relative Analog: Three status LEDs: Green: power ON	o min/max default output value N Flashing Green: o onducting (Yellow LED also indic strength of received echo Flashing Green: current outp	output overloaded ates programming status of out fault (4-20 mA current p	path to ground is open)			
	Yellow: target is sensed within the window limits (Yellow LED also indicates programming status during setup mode) Red flashing: indicates relative strength of received echo						
	5-segment moving dot LED indica	tes the position of the target wit	hin the sensing window. So	ee data sheet for detailed information.			
Construction				cover, and stainless steel hardware. las a ½"-14NPS internal conduit thread.			
Environmental Rating	Leakproof design is rated IEC IP67	; NEMA 6P					
Operating Conditions	Temperature: -25 to +70 °C	Relative humidity: 100%					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Method 213B conditions H & I (Shock: 75G with unit operating; 100G for non-operation). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.						
Application Notes	"A" suffix: Min. target size: 10 x 10 mm aluminum plate at 500 mm 35 x 35 mm aluminum plate at 1.4 m "B" suffix: Min. target size: 50 x 50 mm aluminum plate at 3 m Discrete: Enable/Disable; Connect yellow wire to +5 to 24 V dc to enable sensor and 0 to +2 V dc to disable sensor. When the sensor is disabled, the last output state is held until the sensor is re-enabled. The wire must be held to the appropriate voltage for at least 40 milliseconds for the sensor to enable or disable.						
Certifications	CE						

Q45UR Series

Remote Transducer Ultrasonic Sensors



- Q45 housing with an available plastic or a stainless steel 18 mm threaded barrel sensing head or an ultra-compact plastic Flat-Pak sensing head
- The Q45UR has sensing ranges up to 250 mm
- Resolution/repeatability +/- 0.2% of sensing distance
- Analog models feature a selectable positive or negative output slope
- Environmental rating is IEC IP65 and NEMA 4
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

Q45UR Discrete Output, 12-24 V DC

Sensor Range	Controller Connection	Controller Output	Kit Models	Kit Include
	2 m		Q45UR3BA63CK	Q45UR3BA
50 to 250 mm	5-pin Mini QD	Bipolar NPN/PNP	Q45UR3BA63CQK	Q45UR3BA
	5-pin Euro QD	1010110	Q45UR3BA63CQ6K	Q45UR3BA
	2 m	Bipolar NPN/PNP	Q45UR3BA63CKQ	Q45UR3BA
50 to 250 mm	50 to 250 mm 5-pin Mini (31)		Q45UR3BA63CQKQ	Q45UR3BA
		1010110	Q45UR3BA63CQ6KQ	Q45UR3BA
	2 m		Q45UR3BA63CKS	Q45UR3BA
50 to 250 mm	5-pin Mini QD	Bipolar NPN/PNP	Q45UR3BA63CQKS	Q45UR3BA
	5-pin Euro QD		Q45UR3BA63CQ6KS	Q45UR3BA

les: Controller & Sensor

463C A63CQ 463CQ6 A63C A63CQ A63CQ6 463C



Q13C2.0 Flat-Pak

M18C2.0

Stainless Steel Barrel



S18C2.0 Molded Barrel

Q45UR Analog Output, 15-24 V DC

Sensor Range	Controller Cable	Controller Output	Kit Models	Kit Includes: Controller & Sensor
	2 m		Q45UR3LIU64CK	Q45UR3LIU64C M18C2.0
50 to 250 mm	5-pin Mini QD		Q45UR3LIU64CQK	Q45UR3LIU64CQ Stainless
	5-pin Euro QD		Q45UR3LIU64CQ6K	Q45UR3LIU64CQ6 Steel Barrel
	2 m	Selectable	Q45UR3LIU64CKQ	Q45UR3LIU64C
50 to 250 mm	5-pin Mini QD	0 to 10 V dc	Q45UR3LIU64CQKQ	Q45UR3LIU64CQ Q13C2.0
	5-pin Euro QD	4 to 20 mA	Q45UR3LIU64CQ6KQ	Q45UR3LIU64CQ6
	2 m		Q45UR3LIU64CKS	Q45UR3LIU64C \$18C2.0
50 to 250 mm	5-pin Mini QD		Q45UR3LIU64CQKS	Q45UR3LIU64CQ Molded
	5-pin Euro QD		Q45UR3LIU64CQ6KS	Q45UR3LIU64CQ6 Barrel

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45UR3BA63CK W/30).



87 6 mn



Euro-Style with Shield Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

See page 758

Additional cordset information is available

MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30') 5-Pin

MBCC2-506
2 m (6.5')
MBCC2-512
4 m (12')
MBCC2-530
9 m (30')







SMB30A SMB30MM

SMB30SC

Additional bracket information is available See page 722

	Q45UR	High-Gain	Controllers
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Version	Model	
Discrete	63060	Q45UR3BA63CQ6-63060
Analog	63667	Q45UR3LIU64CQ6-63667

NOTE: Special High-Gain controllers are available for small object detection. Contact factory for more information.

Q45UR Remote Sensors Specifications

Supply Voltage and Current	Discrete: 12 to 24 V dc (10% max. ripple); 100 mA (exclusive of load) Analog: 15 to 24 V dc (10% max. ripple); 100 mA (exclusive of load)		
Ultrasonic Frequency	400 kHz		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Protection Circuitry	Both outputs are protected against continuous overload and short circuit		
Output Rating	Discrete: 150 mA max. (each output) OFF-state leakage current: less than 25 µA at 24 V dc ON-state saturation voltage: less than 1.5 V at 10 mA;	Analog: Voltage sourcing: 0 to 10 V dc, 10 mA max. Current sourcing: 4 to 20 mA, 1 to 500 Ω impedance	
Output Configuration	Discrete: Bipolar: One current sourcing (PNP) and one current sinking (NPN) open collector transistor Analog: One voltage sourcing and one current sourcing; one or output is enabled by internal programming switch #2		
Performance Specifications	Discrete: Response Speed: 40 or 160 ms (switch selectable) Repeatability*: ±0.2% of measured distance Temperature stability: ±0.03% of the window limit positions per °C from 0 to 50 °C, (±0.05% per °C over remainder of operating temperature range) Sensing window width: 5 to 200 mm, when independent near and far limits are taught; 1, 2, 3, or 4 mm (switch selectable), when a sensing distance set point is taught Hysteresis: 0.5 mm Ultrasonic beam angle: ±3.5° Analog:Response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.2% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.4% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.4% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.4% of sensing distance at 320 ms response Speed: 10 to 320 ms (2 to 64 cycles) selection*: 0.4% of sensing distance at 32		
	* Repeatability and analog resolution and linearity are specified using a 50 using the 4 to 20 mA output @ 15 V dc)) x 50 mm aluminum plate at 22° C under fixed sensing conditions (Analog:	
Adjustments	Discrete: The following may be selected by a 4-position DIP switch Switch 1: Output normally open (output is energized when target is within sensing window limits), or normally closed (output is energized when target is outside sensing window limits) Switches 2 & 3: Sensing window size (1, 2, 3 or 4 mm) Switch 4: Response speed selection (40 or 160 milliseconds)	Analog: Push-button TEACH-mode programming of window limits. The following may be selected by a 4-position DIP switch located on top of the controller, beneath a transparent o-ring sealed acrylic cover and beneath the black inner cover. Switch 1: Output slope: output value increases or decreases with distance Switch 2: Output mode: current output or voltage output Switches 3 & 4: Response to loss of echo Response Speed Adjustment: Single-turn potentiometer selects six response values from 10 to 320 milliseconds	
Indicators	Discrete: Three status LEDs: Green: Power ON Yellow: Output are conducting (Yellow also indicates programming status during setup) Red: Relative strength of received echo 5-segment moving dot LED indicates the position of the target within the sensing window Analog: Three status LEDs: Solid Green: Power ON Flashing Green: current output fault (4-20 mA current parts to ground is open) Yellow: Target is sensed within the window limits (Yellow also indicates programming status during setup Red: Relative strength of received echo 5-segment moving dot LED indicates the position of the target with sensing window (See data sheet for detailed information)		
Construction	Controller: Molded thermoplastic polyester housing, o-ring sealed transp Sensors: M18C2.0: Stainless steel M18 threaded barrel housing and jar polyurethane rear cover S18C2.0: Thermoplastic polyester S18 threaded barrel housin polyurethane rear cover Q13C2.0: Molded 30% glass reinforced thermoplastic polyest	n nuts, polyetherimide front cover, ceramic transducer, g and jam nuts, polyetherimide front cover, ceramic transducer,	
Environmental Rating	Controller: IEC IP67; NEMA 6P Sensor: IEC IP65; NEMA 4		
Operating Conditions	Controller and sensor: -25 to +70 °C Relative humidity: 85% (non-condensing)		
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A Vibration: 10 Method 213B conditions H & I (Shock: 75G with unit operating; 100G for milliseconds duration, half sine wave.		
Certifications	C€		

QS18U Series



Right-Angle Ultrasonic Sensors

- Senses clear and transparent materials, as well as color variations, including clear web material, clear or shiny bottles, highly reflective surfaces and liquid or dry bulk materials inside cramped locations
- Sensing range up to 500 mm.
- Features a universal housing with an 18 mm threaded lens or side mount
- Available in encapsulated IP68 models rated for a range of harsh conditions
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

QS18U

Range	Connection	TEACH Options	Models NPN	Models PNP
50 to 500 mm	2 m	Integral push button and remote TEACH	QS18UNA	QS18UPA
	4-pin Euro QD	(IP67; NEMA 6P)	QS18UNAQ8	QS18UPAQ8
50 to 500 mm	2 m	Remote TEACH (epoxy-encapsulated,	QS18UNAE*	QS18UPAE*
	4-pin Euro QD	IP68; NEMA 6P)	QS18UNAEQ8*	QS18UPAEQ8*

^{*} Models are epoxy-encapsulated, IP68; NEMA 6P with remote TEACH programming

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18UNA W/30). QD models:

- For 4-pin integral Euro-style QD, add suffix Q8 (example, QS18UNAQ8).
- \bullet For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18UNAQ7).
- For 4-pin 150 mm Euro-style pigtail, add suffix Q5 (example, QS18UNAQ5).
- \bullet For 4-pin 150 mm Pico-style pigtail, add suffix Q (example, QS18UNAFQ).

TEMP & VIBRATION



Euro-Style with Shield Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-406RA)

4-Pin MQDEC2-406 2 m (6.5') MQDEC2-415 5 m (15')

MQDEC2-430 9 m (30')



Straight Right-Angle 4-Pin 4-Pin

Pico-Style with Shield

PKG4S-2 PKW4ZS-2 2 m (6.5') 2 m (6.5')

Additional cordset information is available See page 758



SMB18A





SMB18FA..

SMB1815SF

Additional bracket information is available See page 722

Ultrasonic Wave Guides



Inside Model Diameter 5.0 mm UWG18-5.0 6.4 mm UWG18-6.4

Additional wave guide information is available See page 959



QS18U Specifications

Q0100 opecification				
Sensing Range	50 to 500 mm			
Supply Voltage and Current	12 to 30 V dc (10% max. ripple); 25 mA max. (ex	clusive of load)		
Ultrasonic Frequency	300 kHz, rep. rate 7.5 milliseconds			
Supply Protection Circuitry	Protected against reverse polarity and transient ve	oltages		
Output Protection	Protected against short circuit conditions			
Delay at Power-Up	300 milliseconds			
Output Configurations	Solid-state switch conducts when target is sensed	within sensing window; one NPN (current sinking) or one PNP (current sourcing), depending on mode		
Temperature Effect		Non-encapsulated models: ± 0.05% per °C from -20 to +50 °C, ± 0.1% per °C from +50 to +60 °C Encapsulated models: ± 0.05% per ° C from 0° to +60° C, ± 0.1% per ° C from -20° to 0° C		
Repeatability	0.7 mm			
Hysteresis	1.4 mm			
Output Ratings	100 mA max. (see Application Note 1) OFF-state leakage current: less than 10 μA (sourcing); less than 200 μA (sinking); See Application Note 2 NPN ON-state saturation voltage: less than 1.6 V @ 100 mA PNP ON-state saturation voltage: less than 3.0 V @ 100 mA			
Output Response Time	15 milliseconds			
Minimum Window Size	5 mm			
Adjustments	Sensing window limits: TEACH-Mode programming of near and far window limits may be set using the push button or remotely using TEACH input			
Indicators	Range Indicator (Red/Green) Green: Target is within sensing range Red: Target is outside sensing range OFF: Sensing power is OFF	Teach/Output Indicator (Yellow/Red) Yellow: Target is within taught limits OFF: Target is outside taught window limits Red: Sensor is in TEACH mode		
Construction	Housing: ABS Push Button Housing: ABS Push Button: TPE Lightpipes: Polycarbonate			
Environmental Rating	Leakproof design, rated IEC IP67 or IP68; NEMA 6P, depending on model; UL type 1			
Operating Conditions	Temperature: -20 to +60 °C Relative humidity: 100% (non-condensing)			
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.			
Temperature Warmup Drift	See data sheet			
Application Notes	 If supply voltage is > 24 V dc, derate maximum output current 5 mA/ °C above 50 °C. NPN OFF-state leakage current is < 200 μA for load resistances > 3 kΩ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current. Objects passing inside the specified near limit may produce a false response. 			
Certifications	CC			

K50U Series

Ultrasonic Sensor for Wireless Level and Tank Monitoring



- Three meter sensing range with a 300 mm dead zone
- Provides a distance measurement from the target to the sensor
- Built-in temperature compensation
- Rugged design for demanding sensing environments; rated IEC IP67, NEMA 6P
- Functions as a Modbus slave device using RS-485

K50U

Range and Frequency	Supply Voltage	I/O	Models
Range: 300 mm to 3 m Frequency: 114 kHz	3.6 to 5.5 V dc	Distance to target using a 1-wire serial interface	K50UX1RA
Range: 300 mm to 3 m Frequency: 114 kHz	3.6 to 5.5 V dc or 10 to 30 V dc	Distance to target using Modbus RS-485	K50UX2RA



2.44 m (8')

Additional cordset information is available See page 758

female



BWA-BK-006 Mounts both the K50U Ultrasonic sensor and a Wireless Q45 Node



K50U Specifications

K500 Specifications	,
Supply Voltage and Current	3.6 to 5.5 V dc or 10 to 30 V dc
Current	Active comms: 11.3 mA at 30 V dc
Indicators	Two LEDs
Performance	Sensing range: 300 mm to 3 m (11.8 in to 118 in) Ultrasonic frequency: 114 kHz Temperature effect: 0.02% of distance/°C Resolution: 0.1% of distance (1.5 mm minimum)
Discrete Inputs	300 milliseconds
Output Configurations	One Sinking Rating: 3 mA max current at 30 V dc ON Condition: Less than 0.7 V OFF Condition: Greater than 2 V or open
Communication Protocol	Modbus RTU
Communication Hardware	RS-485 Serial Baud Rates: 9.6k, 19.2k (default), or 38.4k Data Format: 8 data bits, No parity (default), even parity, or odd parity 1 stop bit Do not use a termination resistor
Communications Line	Level Receive ON: Greater than 2 V Level Receive OFF: Less than 0.7 V Level Transmit ON: 2.7 to 3 V Level Transmit OFF: 0 V (pulldown resistor of 10 kOhm)
Construction	Housing: PBT polyester
Environmental Rating	Leakproof design, rated IEC IP67 (NEMA 6)
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 95% at +50 °C maximum relative humidity (non-condensing)
Vibration and Mechanical Shock	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 Hz to 60 Hz max., double amplitude 0.06 inch, maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 ms duration, half sine wave
Certifications	CE



Radar

Radar sensors use Frequency Modulated Continuous Wave (FMCW) radar to reliably detect moving or stationary targets, including cars, trains, trucks and cargo in rain, snow, high and low temperatures and wind.

Series	Description	Max. Sensing Range	Beam Angle	Outputs	Dimensions H x W x D	Power Supply
	Q120R FMCW Radar dual-zone, narrow-beam, high-sensitivity, sensor ideal for port crane anticollision and train detection. page 242	40 m	24° x 50°	DIP-switch-selectable NPN or PNP; N.O. or N.C.	159.5 x 90.8 x 62 mm	12 to 30 V dc
Man II	Q240RA Radar-based dual-zone narrow-beam sensors for detection of moving and stationary targets page 243	100 m	11° x 13°	DIP-switchselectable NPN or PNP; N.O. or N.C.	186.9 x 159.9 x 55.5 mm	12 to 30 V dc
	QT50R FMCW Radar wide-beam easy-to-configure sensor ideal for traffic monitoring, ships, tollways, and car parking. page 244	24 m	90° x 76°	Bipolar NPN/PNP; DIP switch-selectable N.O. or N.C.	100.2 x 74.1 x 46.1 mm	12 to 30 V dc

Q120R Series



Radar-Based Adjustable-Field Sensor

- Radar-based narrow-beam sensors with high sensitivity for detection of moving and stationary targets
- Unaffected by wind, falling rain or snow, fog, humidity, air temperatures or light.
- FMCW (true-presence) radar detects moving and stationary objects
- 1 or 2 independent, adjustable sensing zones
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Cordsets and brackets available see page 245

Q120R Narrow Beam (24° x 50°)

Sensing Mode	Max Range [†]	Connection	Telecom Approval*	Output	Model
ADJUSTABLE-FIELD	12 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea	Bipolar NPN/PNP Selectable NO or NC	Q120RA-US-AFQ Q120RA-EU-AFQ Q120RA-KR-AFQ
ADJUSTABLE-FIELD	40+ m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea	(2) Selectable Dual NPN/PNP Selectable NO or NC	Q120RA-US-AF2Q Q120RA-EU-AF2Q Q120RA-KR-AF2Q
ADJUSTABLE-FIELD	26 m	5-pin M12 QD	US and Canada Europe, UK, Australia, New Zealand, Japan and China South Korea	(2) Selectable Dual NPN/PNP Selectable NO or NC	Q120RA-US-AF2WQ Q120RA-EU-AF2WQ Q120RA-KR-AF2WQ

For more specifications see page 245.

QD models: A model with a QD requires a mating cordset (see page 245).

Cabled models: For cabled models, omit Q at the end of the QD model (example, Q120RA-US-AF2).

- † Range is dependent on target object.
- * Contact factory at 1-888-373-6767 for additional information.



Q240R Series

Radar-Based Adjustable-Field Sensor

- Radar-based sensor has a very narrow beam pattern, making it an extremely robust solution for applications where users need to monitor a specific area without detecting adjacent objects
- FMCW (true-presence) radar detects moving and stationary objects
- Narrow beam pattern, high sensitivity, and long range
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Two independent adjustable sensing zones (far and near proximity warning signal)
- Cordsets and brackets available see page 245

Q240R Narrow Beam (11° x 13°)

Sensing Mode	Max Range [†]	Connection	Telecom Approval*	Output	Model
ADJUSTABLE-FIELD	40+ m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand and Japan China	(2) Selectable Dual NPN/PNP Selectable NO or NC	Q240RA-US-AF2Q Q240RA-EU-AF2Q Q240RA-CN-AF2Q
ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada Europe, UK, Australia, New Zealand and Japan China	(2) Selectable Dual NPN/PNP Selectable NO or NC	Q240RA-US-AF2LQ Q240RA-EU-AF2LQ Q240RA-CN-AF2LQ
ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada Europe, UK, Australia, New Zealand and Japan China	(1) 0-10 V Analog and (1) Selectable NPN/PNP Selectable NO or NC	Q240RA-EU-ULQ Q240RA-EU-ULQ Q240RA-CN-ULQ
ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada Europe, UK, Australia, New Zealand and Japan China	(1) 4-20 mA Analog and (1) Selectable NPN/PNP Selectable NO or NC	Q240RA-EU-ILQ Q240RA-EU-ILQ Q240RA-CN-ILQ

For more specifications see page 245.

QD models: A model with a QD requires a mating cordset (see page 245).

Cabled models: For cabled models, omit Q at the end of the QD model (example, Q240RA-US-AF2).

- † Range is dependent on target object.
- * Contact factory at 1-888-373-6767 for additional information.



QT50R Series



Radar-Based Sensor

- Sensor's functions are unaffected by wind, rain, fog, light, humidity and temperature, making it ideal for outdoor environments
- Uses Frequency Modulated Continuous Wave (FMCW) to detect moving and stationary objects
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Retroreflective models use a reference target, enabling reliable detection of weak targets in the foreground
- Adjustable-field models ignore objects beyond the set point

QT50R Wide Beam (90° x 76°)

Sensing Mode	Max Range [†]	Connection	Telecom Approval*	Output	Model
ADJUSTABLE-FIELD	24 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	Bipolar NPN/PNP Selectable NO or NC	QT50R-US-AFHQ QT50R-EU-AFHQ QT50R-KR-AFHQ QT50R-TW-AFHQ
ADJUSTABLE-FIELD	24 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	(2) Selectable NPN/PNP Selectable NO or NC	QT50R-US-AF2Q QT50R-EU-AF2Q QT50R-KR-AF2Q QT50R-TW-AF2Q
ADJUSTABLE-FIELD	3.75 m	5-pin M12 QD	Europe, UK, Australia, New Zealand, Japan and China South Korea	Bipolar NPN/PNP Selectable NO or NC	QT50R-EU-AFSQ QT50R-KR-AFSQ
RETRO	12 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	Bipolar NPN/PNP Selectable NO or NC	QT50R-US-RHQ QT50R-EU-RHQ QT50R-KR-RHQ QT50R-TW-RHQ

QD models: A model with a QD requires a mating cordset.

Cabled models: For cabled models, omit Q at the end of the QD model (example, QT50R-US-AF2W).

- † Range is dependent on target object.
- * Contact factory at 1-888-373-6767 for additional information.



Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

5-Pin

MQDEC2-506
2 m (6.5')

MQDEC2-55
5 m (15')

MQDEC2-530

9 m (30')

Additional cordset information is available See page 758



SMB30A



SMB30MM



SMB30SC







SMBQ240SS1 SMBQ240SS2 SMBQ240SS3

Additional bracket information is available See page 725

Weather Deflectors







Q240WS

QT50RCK SMBWSQ120

Retro Wave Radar Target











R-GAGE® Specifications

Range	The sensor is able to detect a proper object (see Detectable Objects) from 0 to 100 m, depending on model
Detectable Objects	Objects containing metal, water or similar high-dielectric material
Operating Principle	Frequency Modulated Continuous Wave (FMCW) radar
Operating Frequency	24.00-24.25 GHz, ISM Band (varies slightly by model and national telecom regulations)
Supply Voltage	12 to 30 V dc, less than 100 mA (exclusive of load) KR models: 12 to 24 V dc
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Delay at Power-up	Less than 2 seconds
Output Configuration	NPN and PNP, N.O. and N.C., 150 mA each
Output Protection	Protected against short circuit conditions
Indicators	Power LED: Green (Power ON) Signal Strength LED: Red, flashes in proportion to signal strength Output LEDs: Yellow (output energized)/Red (configuration) See data sheets for more detailed information
Response Time	DIP-switch configurable ON/OFF response time
Adjustments	DIP-Switch configurable sensing distance, sensitivity, response time, and output configuration. Remote line TEACH for retroreflective models.
Construction	Housing: ABS/polycarbonate Lightpipes: Acrylic Access Cap: Polyester
Operating Temperature	-40 to +65 °C
Environmental Rating	IP67
Certifications	For more information regarding telecom approvals consult datasheet



Arrays

Using an array of closely spaced light beams, measuring light screens are designed for profiling, inspections and process monitoring.

Series	Description	Minimum Object Detection Size	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
10000	EZ-ARRAY™ Two piece measuring array page 248	5 mm	H (varies by model) 36 x 45.2 mm	IP65	Aluminum with clear anodized finish	12 to 30 V dc
	MINI ARRAY® For inspections and profiling with a long range page 252	19.1 mm	H (varies by model) 38.1 x 38.1 mm	IP65	Aluminum with black anodized finish	Controller: 16 to 30 V dc
	High Res MINI ARRAY® Excels at high-speed, precise monitoring and inspection applications page 256	2.5 mm	H (varies by model) 38.1 x 38.1 mm	IP65	Aluminum with black anodized finish	Controller: 16 to 30 V dc



EZ-ARRAYTM

Two-Piece Measuring Light Screens

- Two-piece light-screen design eliminates the need for a separate controller
- 5 mm beam spacing provides edge resolution of 2.5 mm
- High excess gain option for detecting opaque objects in single and double edge scan mode
- Seven zone LEDs provide instant alignment and beam blockage information
- Remote TEACH capable
- Rugged aluminum housing

EZ-ARRAY™, 12-30 V DC, 5 mm Beam Spacing

Housing Length (L)	Array Length	Total Beams	Range*	Analog Output	Emitter Model	Receiver Model NPN Outputs	Receiver Model PNP Outputs
			riango	Current (4 to 20 mA)		EA5R150NIXMODQ	EA5R150PIXMODQ
227 mm	150 mm	30		Voltage (0 to 10 V)	EA5E150Q	EA5R150NUXMODQ	EA5R150PUXMODQ
070	000	00		Current (4 to 20 mA)		EA5R300NIXMODQ	EA5R300PIXMODQ
379 mm	300 mm	60		Voltage (0 to 10 V)	EA5E300Q	EA5R300NUXMODQ	EA5R300PUXMODQ
529 mm	450 mm	90		Current (4 to 20 mA)	EASE4500	EA5R450NIXMODQ	EA5R450PIXMODQ
529 11111	450 11111	90		Voltage (0 to 10 V)	EA5E450Q	EA5R450NUXMODQ	EA5R450PUXMODQ
678 mm	600 mm	120		Current (4 to 20 mA)	EA5E600Q	EA5R600NIXMODQ	EA5R600PIXMODQ
070111111	000 111111	120		Voltage (0 to 10 V)	EASEBOOQ	EA5R600NUXMODQ	EA5R600PUXMODQ
828 mm	750 mm	150		Current (4 to 20 mA)	EA5E750Q	EA5R750NIXMODQ	EA5R750PIXMODQ
020 111111	7 30 11111	130		Voltage (0 to 10 V)	EASE/SUQ	EA5R750NUXMODQ	EA5R750PUXMODQ
978 mm	900 mm	180		Current (4 to 20 mA)	EA5E900Q	EA5R900NIXMODQ	EA5R900PIXMODQ
970111111	900 11111	100	0.4 to 4 m	Voltage (0 to 10 V)	EASE900Q	EA5R900NUXMODQ	EA5R900PUXMODQ
1128 mm	1050 mm**	210	0.4 to 4 m	Current (4 to 20 mA)	EASE10500	EA5R1050NIXMODQ	EA5R1050PIXMODQ
1120111111	100011111	210		Voltage (0 to 10 V)	EA5E1050Q	EA5R1050NUXMODQ	EA5R1050PUXMODQ
1278 mm	1200 mm**	240		Current (4 to 20 mA)	EA5E1200Q	EA5R1200NIXMODQ	EA5R1200PIXMODQ
127011111	120011111	240		Voltage (0 to 10V)	EASE1200Q	EA5R1200NUXMODQ	EA5R1200PUXMODQ
1578 mm	1500 mm**	300		Current (4 to 20 mA)	EA5E1500Q	EA5R1500NIXMODQ	EA5R1500PIXMODQ
137011111	130011111	300		Voltage (0 to 10 V)	EASETSOUQ	EA5R1500NUXMODQ	EA5R1500PUXMODQ
1878 mm	1800 mm**	360		Current (4 to 20 mA)	EA5E1800Q	EA5R1800NIXMODQ	EA5R1800PIXMODQ
107011111	100011111	300		Voltage (0 to 10 V)	EASETOULQ	EA5R1800NUXMODQ	EA5R1800PUXMODQ
2178 mm	2100 mm**	420		Current (4 to 20 mA)	EA5E2100Q	EA5R2100NIXMODQ	EA5R2100PIXMODQ
21/0111111	210011111	420		Voltage (0 to 10 V)	EASEZTOUQ	EA5R2100NUXMODQ	EA5R2100PUXMODQ
2478 mm	2400 mm**	480		Current (4 to 20 mA)	EAFE24000	EA5R2400NIXMODQ	EA5R2400PIXMODQ
24/0 111111	2400 IIIII	400		Voltage (0 to 10 V)	EA5E2400Q	EA5R2400NUXMODQ	EA5R2400PUXMODQ

For more specifications see page 251.

QD models: A model with a QD requires a mating cordset (see page 252).

^{*} Models with a range of 300 mm to 1500 mm models are available upon request. Contact factory at 1-888-373-6767 for more information.

^{**} Models with array lengths 1050 mm and longer ship with a center bracket and two end-cap brackets.

EZ-ARRAY™ IO-Link, 0-10 V DC-5 mm Beam Spacing

Housing Length (L)	Array Length	Total Beams	Range*	Emitter Model	Receiver Model PNP Outputs
227 mm	150 mm	30		EA5E150Q	EA5R150XKQ
379 mm	300 mm	60		EA5E300Q	EA5R300XKQ
529 mm	450 mm	90		EA5E450Q	EA5R450XKQ
678 mm	600 mm	120		EA5E600Q	EA5R600XKQ
828 mm	750 mm	150		EA5E750Q	EA5R750XKQ
978 mm	900 mm	180	0.4 to 4 m	EA5E900Q	EA5R900XKQ
1128 mm	1050 mm**	210	0.4 (0 4 111	EA5E1050Q	EA5R1050XKQ
1278 mm	1200 mm**	240		EA5E1200Q	EA5R1200XKQ
1578 mm	1500 mm**	300		EA5E1500Q	EA5R1500XKQ
1878 mm	1800 mm**	360		EA5E1800Q	EA5R1800XKQ
2178 mm	2100 mm**	420		EA5E2100Q	EA5R2100XKQ
2478 mm	2400 mm**	480		EA5E2400Q	EA5R2400XKQ

For more specifications see page 251.

QD models: A model with a QD requires a mating cordset (see page 252).

^{*} Models with a range of 300 mm to 1500 mm models are available upon request. Contact factory at 1-888-373-6767 for more information.

^{*} Models with array lengths 1050 mm and longer ship with a center bracket and two end-cap brackets.

LASER

ULTRASONIC

RADAR

M12/Euro-Style

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MAQDC-815RA)

8-Pin MAQDC-815 4 m (13') MAQDC-830 9 m (30') MAQDC-850 15 m (49')

Additional cordset information is available See page 758



Communication Cordsets Straight connector models

listed; for right-angle, add RA to the end of the model number (example, MQDMC-506RA)



9 m (30')



8-Pin DEE2R-81D 0.31 m (1.0')

DEE2R-83D

0.91 m (3.01)

DEE2R-88D

2.44 m (8.01)

DEE2R-815D

4.57 m (15.0')

DEE2R-825D 7.62 m (25.0') **DEE2R-850D** 15.3 m (50.0') DEE2R-875D 22.9 m (75.0') DEE2R-8100D 30.5 m (100.0')

For IO-Link splitters see datasheet





EZA-MBK-20

SMBLBCZB

Additional bracket information is available See page 725







EZA-USB485-01

INTUSB485-1

Additional adapter information is available See page 819





Additional information is available See page 802

Enclosures



Additional information is available See page 808



Additional information is available See page 812



EZ-ARRAY Light Screen

D = 45.2 mm

L = Length (see model chart page 255)

EZ-ARRAY™ Specification

Supply Voltage (Limit Values)	Emitter: 12 to 30 V dc Receiver Analog Current Models: 12 to 30 V dc Receiver Analog Voltage Models: 15 to 30 V dc IO-Link receiver: 18 to 30 V dc
Supply Power Requirements	Emitter/Receiver Pair (Exclusive of discrete load): Less than 9 watts Power-up delay: 2 seconds
Emitter/Receiver Range	400 mm to 4 m
Field of View	Nominally ± 3°
Beam Spacing	5 mm
Light Source	Infrared LED
Minimum Object Detection Size	Straight Scan, Low-Contrast: 5 mm Straight Scan, High-Excess-Gain: 10 mm
Sensor Positional Resolution	Straight Scan: 5 mm Double-Edge Scan: 2.5 mm Single-Edge Scan: 2.5 mm
Teach Input (Receiver Gray Wire)	Low: 0 to 2 volts High: 6 to 30 volts or open (input impedance 22 kΩ)
Two Discrete Outputs	Solid-State NPN or PNP (current sinking or sourcing) Rating: 100 mA max. each output OFF-State Leakage Current: NPN: less than 200 uA @ 30 V dc ON-State Saturation Voltage: NPN: less than 1.6 V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit. IO-Link Model: Discrete Output 1 (SIO Mode) Type: Solid-State Push-Pull Rating: 100 mA maximum (sourcing or sinking)
	ON-State Saturation Voltage: less than 3V @100mA (sourcing or sinking)
Two Analog Outputs	Voltage Sourcing: 0 to 10 V (maximum current load of 5 mA) Current Sourcing: 4 to 20 mA (maximum resistance load = (Vsupply-3)/0.020)
Serial Communication Interface	EIA-485 Modbus RTU (up to 15 nodes per communication ring) RTU binary format Baud Rate: 9600, 19.2K or 38.4K IO-Link Baud Rate: 38,400 bps (COM2) 8 Data Bits, 1 Stop Bit, and Even, Odd, or 2 Stop Bits and No Parity Process data width: 16 bits
Scan Time	Scan times depend on scan mode and sensor length. Straight scan times range from 2.8 to 26.5 milliseconds.
Status Indicators	Emitter: Red Status LED IO-Link: Green: IO-Link OK ON Steady—Status Yellow flashing: IO-Link Comm Flashing at 1 hz—Error Solid Red: IO-Link error Receiver: 7 Zone Indicators Red—Blocked channels within zone Green—All channels clear within zone 3-digit 7-segment indicators for measurement mode/diagnostic information Sensor Status Bicolor Indicator LED Red—Hardware Error or Marginal Alignment Green—OK Modbus Activity Indicator LED: Yellow Modbus Error Indicator LED: Red
System Configuration (Receiver Interface)	6-position DIP switch: Used to set scanning type, measurement modes, analog slope and discrete output 2 function. Alternate software GUI interface provides additional options; see full manual. Push Buttons: Two momentary push buttons for alignment and gain level selection IO-Link models: Supplied IODD files provide all configuration options (see manual)
Connections	Serial communication: The receiver uses a PVC-jacketed, 5-conductor 22-gauge quick-disconnect cable, 5.4 mm diameter. QD cordsets are ordered separately. Other Sensor connections: 8-conductor quick-disconnect cordsets (one each for emitter and receiver), ordered separately (may not exceed 75 m long), PVC-jacketed cordsets measure 5.8 mm diameter, have shield wire; 22-gauge conductors.
Construction	Aluminum housing with clear-anodized finish; acrylic lens cover
Environmental Rating	IEC IP65
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 95% at 50 °C (non-condensing)
Certification	CE OIO-Link®

MINI-ARRAY® Series



Measuring Light Screens

The MINI-ARRAY® is a programmable measuring light screen for inspections and profiling with a long range up to 16.5 m.

- Offers programmable controller with a selection of measurement modes, scan modes and output configurations
- Available with 9.5 or 19 mm beam spacing for detecting objects as small as 12.7 mm
- Advanced software GUI
- Highly visible indicators for status monitoring

MINI-ARRAY® 19.1 mm Beam Spacing

Max	Minimum	Total	al 3-Piece Models*			2-Piece Models			
Range	Object Size	Beams	Length (L)	Emitter	Receiver	Length (L)	Emitter	Receiver	
		8	201 mm	BMEL616A	BMRL616A	231 mm	MAE616Q	MAR616NX485Q	
		16	356 mm	BMEL1216A	BMRL1216A	384 mm	MAE1216Q	MAR1216NX485Q	
	Interlaced Mode:	24	505 mm	BMEL1816A	BMRL1816A	536 mm	MAE1816Q	MAR1816NX485Q	
16.5 m	25.4 mm Other scan modes:	32	659 mm	BMEL2416A	BMRL2416A	689 mm	MAE2416Q	MAR2416NX485Q	
	38.1 mm	40	810 mm	BMEL3016A	BMRL3016A	841 mm	MAE3016Q	MAR3016NX485Q	
		48	963 mm	BMEL3616A	BMRL3616A	993 mm	MAE3616Q	MAR3616NX485Q	
		56	1115 mm	BMEL4216A	BMRL4216A	1146 mm	MAE4216Q	MAR4216NX485Q	
		64	1267 mm	BMEL4816A	BMRL4816A	1298 mm	MAE4816Q	MAR4816NX485Q	
	Interlaced Mode: 25.4 mm	72	-	-	-	1451 mm	MAE5416Q	MAR5416NX485Q	
13.5 m	Other scan modes:	80	1572 mm	BMEL6016A	BMRL6016A	1514 mm	MAE6016Q	MAR6016NX485Q	
	38.1 mm	88	-	-	-	1667 mm	MAE6616Q	MAR6616NX485Q	
		96	1877 mm	BMEL7216A	BMRL7216A	1819 mm	MAE7216Q	MAR7216NX485Q	

For more specifications see page 255.

QD models: A model with a QD requires a mating cordset (see page 254).

^{*} One controller and an emitter/receiver pair (of matching length and resolution) required per system.

MINI-ARRAY® 9.5 mm Beam Spacing

Max	Max Minimum		Total		3-Piece Models*		2-Piece Models	
Range	Object Size	Beams	Length (L)	Emitter	Receiver	Length (L)	Emitter	Receiver
		16	201 mm	BMEL632A	BMRL632A	231 mm	MAE632Q	MAR632NX485Q
		32	356 mm	BMEL1232A	BMRL1232A	384 mm	MAE1232Q	MAR1232NX485Q
	Interlaced Mode:	48	505 mm	BMEL1832A	BMRL1832A	536 mm	MAE1832Q	MAR1832NX485Q
6.1 m	12.7 mm	64	659 mm	BMEL2432A	BMRL2432A	689 mm	MAE2432Q	MAR2432NX485Q
0.1111	Other scan modes:	80	810 mm	BMEL3032A	BMRL3032A	841 mm	MAE3032Q	MAR3032NX485Q
	19.111111	96	963 mm	BMEL3632A	BMRL3632A	993 mm	MAE3632Q	MAR3632NX485Q
		112	1115 mm	BMEL4232A	BMRL4232A	1146 mm	MAE4232Q	MAR4232NX485Q
		128	1267 mm	BMEL4832A	BMRL4832A	1298 mm	MAE4832Q	MAR4832NX485Q
	Interlaced Mode:	144	-	-	-	1451 mm	MAE5432Q	MAR5432NX485Q
4.6 m	12.7 mm	160	1572 mm	BMEL6032A	BMRL6032A	1603 mm	MAE6032Q	MAR6032NX485Q
4.0 111	Other scan modes:	176	-	-	-	1755 mm	MAE6632Q	MAR6632NX485Q
	19.1 mm	192	1877 mm	BMEL7232A	BMRL7232A	1908 mm	MAE7232Q	MAR7232NX485Q

MINI-ARRAY® Controllers*, 16-30 V DC

Inputs	Solid-State Discrete Outputs	Analog Outputs	Serial Output	Controller Models
	1 Reed & 1 NPN	-		MAC-1
1 Sensor pair & Trigger (Gate)	2 NPN	-	RS-232 & RS-485	MACN-1
	2 PNP	-		MACP-1
	1 NPN	(2) 0-10 V Sourcing	D0 000	MACV-1
	1 NPN	(2) 4-20 mA Sinking	RS-232	MACI-1
1 Sensor pair &	16 NPN	_	DO 000	MAC16N-1
Trigger (Gate)	16 PNP	-	RS-232	MAC16P-1

For more specifications see page 255.

QD models: A model with a QD requires a mating cordset (see page 254).

^{*} One controller and an emitter/receiver pair (of matching length and resolution) required per 3-piece system.

Used with 2-Piece Arrays

8-Pin MAQDC-806 Euro-Style with Shield Straight connector models only 2 m (6') MAQDC-8015 4.5 m (15') MAQDC-830 9 m (30') MAQDC-850 15 m (50')

Additional cordset information is available

Used with 3-Piece Arrays

Communication MQDMC-506 Cordsets 2 m (13') Straight connector models MQDMC-515 listed; for right-angle, add **RA** to the end of the model number 4 m (13" MQDMC-530 (example, MQDMC-506RA) 9 m (30')

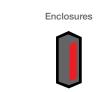


Additional bracket information is available See page 725

See page 758



Additional information is available See page 802



Additional information is available See page 808





Additional information is available See page 812



MINI-ARRAY Controller



D = 38.1 mmW = 38.1 mmL = Length (see model chart)

MINI-ARRAY® 3-Piece Set, Emitter/Receiver Specifications

Max Emitter/Receiver Range	9.5 mm beam spacing: Length 201 to 1115 mm: 6.1 m Length 1267 to 1877 mm: 4.6 m	19.1 mm beam spacing: Length 201 to 1115 mm: 16.5 m Length 1267 to 1877 mm: 13.5 m			
Minimum Object Sensitivity	9.5 mm Beam Spacing: Straight, Edge Modes: 19.1 mm Interlaced Mode: 12.7 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 12.7 mm* *Assumes sensing is in the middle 1/3 of sensing	19.1 mm Beam Spacing: Straight, Edge Modes: 38.1 mm Interlaced Mode: 25.4 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 25.4 mm*			
Sensor Scan Time	55 microseconds per beam, plus 1 millisecond po	55 microseconds per beam, plus 1 millisecond post process time per scan			
Power Requirements	9.5 mm beam spacing:	19.1 mm beam spacing:			
*Maximum current is for a 6' sensor	12 V dc ±2%, supplied by controller Emitter: 0.10 A @ 12 V dc Receiver: 0.75 A @ 12 V dc [†] 12 V dc ±2%, supplied by controller Emitter: 0.10 A @ 12 V dc Receiver: 0.50 A @ 12 V dc [†]				
Status Indicators	Emitter: Red LED lights to indicate proper emitter operation Receiver: Green indicates sensors aligned (> 3x excess gain) Amber indicates marginal alignment of one or more beams (1x -3x excess gain) Red indicates sensors misaligned or one or more beam(s) blocked				
Construction	Aluminum, with black anodized finish; acrylic lens cover				
Environmental Rating	NEMA 4, 13; IP65				
Certification	C € c 71 °us				

MINI-ARRAY® 3-Piece Set, Controller Specifications

Power Requirements	16 to 30 V dc @ 1.25 amps max. (see current requirements for sensors); controller alone, (without sensors connected) requires 0.1 amp.						
Inputs	Sensor input (5 connections): Emitter and receiver wire in parallel to five terminals Trigger (Gate) input: Optically isolated, requires 10 to 30 V dc (7.5K input impedance) for gate signal						
Discrete Outputs	MACN-1: (2) Open collector NPN transistor outputs MAC16P-1: Sixteen open collector PNP transistor outputs 30 V dc max, 150 mA max., short circuit protected OFF-state leakage current: less than 10 μA ON-state saturation voltage: less than 1 V @ 10 mA; less than 1.9 V @ 150 mA						
Serial Data Outputs	RS-232, ASCII or binary data format Baud Rate: 9600, 19.2K, or 38.4K, 8 data bits, 1 start bit, 1 stop bit, even parity Clear data may be suppressed Header string may be suppressed in binary format						
Analog Outputs	Resolution: Span/(Number of sensor channels) Linearity: 0.1% of Full Scale Temperature variation: 0.01% of Full Scale/ °C						
Controller Programming	Via RS-232 PC-compatible computer running Windows XP, 2000, Vista, Windows 7 or Windows 8 and using Banner supplied software						
Sensor Scan Time	All models: 55 microseconds per beam plus processing time Processing time is dependent on the scan analysis and the number of active outputs. This timing assumes a straight scan, continuous, and TBB mode MACN-1: 1 millisecond processing time MAC16N-1 & MAC16P-1: 2.3 to 7 milliseconds processing time						
System Response Time	Outputs are not active for 5 seconds after system power up. Maximum response time for the system is two sensor scan cycles. A scan cycle includes a sensor scan plus any serial data transmission. Serial transmission (if activated) follows every sensor scan.						
Status Indicators	The following status LEDs are located on the top surface of the module: MACN-1: OUT 1 (Red) - Indicates that output 1 is energized MAC16N-1 & MAC16P-1: OUT (Red) - Indicates that at least one output is active ALARM (Red) - Indicates that Output 2 is active/MAC16N-1 & MAC16P-1: Indicates output 16 is active GATE (Red) - Indicates voltage is applied to Trigger (Gate) input ALIGN (Green) - Indicates sensor aligned (excess gain > 1x) DIAG1 (Green) - Indicates power is applied to the module DIAG3 (Red) - Indicates receiver failure DIAG3 (Red) - Indicates mitter failure						
Construction	Polycarbonate						
Environmental Rating	NEMA 1; IP20						
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 95% (non-condensing)						
Certifications	C E UL						

MINI-ARRAY® 2-Piece Set, Emitter/Receiver Specifications

Emitter/Receiver Range	9.5 mm beam spacing: Array Length 231 to 1146 mm: 6.1 m Array Length 1298 to 1908 mm: 4.6 m	19.1 mm beam spacing: Array Length 231 to 1146 mm: 16.5 m Array Length 1298 to 1908 mm: 13.5 m			
Minimum Object Sensitivity	9.5 mm Beam Spacing: Straight, Edge Modes: 19.1 mm Interlaced Mode: 12.7 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 12.7 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 25.4 mm* *Assumes sensing is in the middle 1/3 of sensing range				
Sensor Scan Time	0.9-27.1 ms depending on scan mode, array length and beam spacing				
Supply Voltage and Power	16 V dc to 30 V dc; maximum power 12 watts				
Status Indicators	Emitter: Red LED lights to indicate proper emitter operation Receiver: Green indicates sensors aligned (> 3x excess gain) Amber indicates marginal alignment of one or more beams (1x -3x excess gain) Red indicates sensors misaligned or one or more beam(s) blocked				
Construction	Aluminum, with black anodized finish; acrylic lens cover				
Environmental Rating	NEMA 4, 13; IP65				
Certification	(€ c 71 2 us				

High Resolution MINI-ARRAY®



High-Resolution Measuring Light Screens

- Offers programmable controller with a selection of measurement modes scan modes and output configurations
- 120 sensing beams per foot provides reliable detection of objects as small as 2.5 mm
- Features a 1.8 m range and easy alignment
- Advanced software GUI
- Highly visible indicators for status monitoring

High-Resolution MINI-ARRAY®, 2.5 mm Beam Spacing

Housing Length (L)	Arroy Longth	Total Beams	Connection	Panga	Minimum Object Size	Models* Emitters	Receivers
Length (L)	Array Length	iotai beams	Connection	Range	Object Size	Emitters	Receivers
236 mm	163 mm	64		0.4 to 1.8 m	2.5 mm	MAHE6A	MAHR6A
399 mm	325 mm	128				MAHE13A	MAHR13A
561 mm	488 mm	192				MAHE19A	MAHR19A
724 mm	650 mm	256	5-pin Mini QD			MAHE26A	MAHR26A
887 mm	813 mm	320				MAHE32A	MAHR32A
1049 mm	975 mm	384				MAHE38A	MAHR38A
1215 mm	1138 mm	448				MAHE45A	MAHR45A
1377 mm	1300 mm	512				MAHE51A	MAHR51A
1540 mm	1463 mm	576				MAHE58A	MAHR58A
1703 mm	1626 mm	640				MAHE64A	MAHR64A
1865 mm	1788 mm	704				MAHE70A	MAHR70A
2028 mm	1951 mm	768				MAHE77A	MAHR77A

For more specifications see page 258.

QD models: A model with a QD requires a mating cordset.

"E" and "R" in model numbers denotes "Emitter" and "Receiver" respectively. Sold separately.

High-Resolution MINI-ARRAY® Controllers[†], 16-30 V DC

Inputs	Solid-State Discrete Outputs	Analog Outputs	Serial Output	Controller Models
1 Sensor pair & Trigger (Gate)	2 PNP	(2) 0 to 10 V Sourcing		MAHCVP-1
	2 NPN	(2) 0 to 10 V Sourcing	RS-232 & RS-485	MAHCVN-1
	2 PNP	(2) 4 to 20 mA Sinking		MAHCIP-1
	2 NPN	(2) 4 to 20 mA Sinking		MAHCIN-1





DB9 Communication Cordset MASC

9-Pin MASC 2 m (13')



Additional bracket information is available See page 725

Additional cordset information is available See page 758



Additional information is available See page 802

Enclosures



Additional information is available See page 808

Lens Shields



Additional information is available See page 812



W = 38.1 mm D = 38.1 mm L = Length (see model chart page 256)



MINI-ARRAY Controller

[†] One controller and an emitter/receiver pair (of matching length) required per system.

High-Resolution MINI-ARRAY® Emitter/Receiver Specifications

Emitter/Receiver Range	380 mm to 1.8 m					
Minimum Object Sensitivity	2.5 mm					
Sensor Scan Time	1.8 to 58.4 milliseconds, depending on scanning method and sensor length plus 1 millisecond post processing time for controller					
Power Requirements	12 V dc ±2%, supplied by controller					
Connections	Sensors connect to controller using two 5-conductor quick-disconnect cordset (one each for emitter and receiver), ordered separately. Use only Banner cordset, which incorporate a "twisted pair" for noise immunity. Cordsets measure 8.1 mm in diameter and are shielded and PVC-jacketed. Conductors are 20 gauge (0.9 mm). Emitter and receiver cordset may not exceed 75 m long, each. See page 257.					
Status Indicators	Emitter: Red LED lights to indicate proper emitter operation Receiver: Green indicates sensors aligned Yellow indicates marginal alignment of one or more beams Red indicates sensors misaligned or one or more beam(s) blocked					
Construction	Aluminum, with black anodized finish; acrylic lens cover					
Environmental Rating	NEMA 4, 13; IP65					
Operating Conditions	Temperature: 0 to +50 °C Relative humidity: 95% at 50 °C (non-condensing)					
Certifications	CE					

High-Resolution MINI-ARRAY® Controller Specifications

Dawar Dawiramanta	401 001/1 0 4 0 4 // 1 1 0 5 4 0 401/1 1
Power Requirements	16 to 30 V dc @ 1.0 A (typical: 0.5 A @ 16 V dc)
nputs	Sensor input: Emitter and receiver wire in parallel to five terminals Trigger (Gate) input: Optically isolated, requires 10 to 30 V dc (7.5 kΩ impedance) for gate signal Remote alignment input: Optically isolated, requires 10 to 30 V dc (7.5 kΩ impedance) for alignment sequence signal
Discrete (Switched) Outputs	NPN outputs: Open collector NPN transistor rated at 30 V dc max., 150 mA max. PNP outputs: Open collector PNP transistor rated at 30 V dc max., 150 mA max. All discrete outputs: OFF-state leakage current: less than 10 μA @ 30 V dc ON-state saturation voltage: less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
Serial Data Outputs	RS-232 or RS-485 interface. (Up to 15 control modules may be given unique addresses on one RS-485 party line.) ASCII or binary data format 9600, 19.2K or 38.4K baud rate 8 data bits 1 stop bit, and even, odd or no parity
Analog Outputs	Voltage-sourcing outputs: 0 to 10 V dc (25 mA current limit) Current-sinking outputs: 4 to 20 mA (16 to 30 V dc input) Resolution: Span / Number of sensing channels Linearity: 0.1% of full scale Temperature variation: 0.01% of full scale per °C
Output Configuration	MAHCVP-1: Two PNP discrete (switched), two 0-10 V voltage sourcing MAHCVN-1: Two NPN discrete (switched), two 0-10 V voltage sourcing MAHCIP-1: Two PNP discrete (switched), two 4-20 mA current sinking MAHCIN-1: Two NPN discrete (switched), two 4-20 mA current sinking
System Programming	Via RS-232 interface to PC-compatible computer running Windows® XP, Vista, Windows 7, Windows 8 and using software supplied with each control module
Status Indicators	Output 1 (Red): Lights to indicate Discrete Output #1 is active Alarm (Red): Lights to indicate Discrete Output #2 is active Gate (Red): Lights to indicate Trigger (Gate) is active Align (Green): Lights to indicate emitter and receiver are aligned Diagnostics indicator: (Key on controller side label) Identifies System errors and status
Construction	Polycarbonate housing; mounts to flat surface or directly onto 35 mm DIN rail
Environmental Rating	NEMA 1; IP20
Operating Conditions	Temperature: 0 to +50 °C Relative humidity: 95% @ 50 °C (non-condensing)
Certifications	C E c Tu



Temperature & Vibration

Temperature sensors detect small differences between the temperature of an object and the surrounding ambient temperature. Vibration and temperature sensor measures RMS velocity, in inches per second or millimeters per second, and temperature.

Series	Description	Minimum Object Detection Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	M18T Works on moving or still products by detecting infrared energy that objects emit. page 262	1 m	18 mm ø x (varies by model)	IP67 NEMA 6	Stainless Steel	12 to 30 V dc
No. of the last of	M12F Designed to work as a Modbus slave device via RS-485 or with Sure Cross® Wireless products page 264	264	12 mm ø x (varies by model)	IP67 NEMA 6	Metal	12 to 24 V dc 3.6 to 5.5 V dc
	QM42VT Provides high accuracy vibration (velocity RMS) and temperature measurements page 266		42 x 13 x 42 mm	IP67 NEMA 6	Zinc alloy	3.6 to 5.5 V dc

M18T Series





- Senses temperature differences as small as 3 °C, on moving or still products
- Senses from 0 to 300 °C
- Allows threshold adjustment and real-time information display through a PC
- Requires no emitter or controller
- Uses remote or push-button programming

M18T

Sensing Face	D:S Ratio*	Output	Connection	Models
Integrated lens	8:1	0 to 10 V dc analog,	2 m	M18TUP8
integrated lens	0.1	plus PNP Alarm	5-pin Euro QD	M18TUP8Q
Enclosed Plastic face	stic face 0 to 10 V dc ar		2 m	M18TUP6E
(for food industry use)	6:1	plus PNP Alarm	5-pin Euro QD	M18TUP6EQ
Germanium lens	14:1	0 to 10 V dc analog,	2 m	M18TUP14
Germanium iens		plus PNP Alarm	5-pin Euro QD	M18TUP14Q
Integrated lens	8:1	4 to 20 mA analog,	2 m	M18TIP8
		plus PNP Alarm	5-pin Euro QD	M18TIP8Q
Enclosed Plastic face	6:1	4 to 20 mA analog,	2 m	M18TIP6E
(for food industry use)	0.1	plus PNP Alarm	5-pin Euro QD	M18TIP6EQ
Germanium lens	14:1	4 to 20 mA analog,	2 m	M18TIP14
	14.1	plus PNP Alarm	5-pin Euro QD	M18TIP14Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18TUP8 W/30).
* For a sensor with an 8:1 D:S ratio, the sensor's spot size is a 1" diameter circle at a distance of 8"

M12/Euro-Style with Shield

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

Additional cordset information is available See page 758







SMB18UR

SMB18A

SMB18SF

Additional bracket information is available See page 723



Air Purge Collar (sensor not included)



LAT1812 Laser Alignment Tool



Cabled Models (L) M18T..Q8 M18T..6EQ M18T..14Q 81.3 mm 81.7 mm 86.5 mm



QD Models (L) ..Q8 91.3 mm ..6EQ 91.8 mm M18T..Q8 M18T..6EQ M18T..14Q 96.6 mm

M18T Specifications

ivito i specifications	
Supply Voltage and Current	12 to 30 V dc
Wavelength	8 to 14 µm
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Response Time	75 ms (for a 95% step change)
Delay at Power-up	1.5 second
Repeatability	± 1% of measurement, or ± 1 °C, whichever is greater
Construction	Threaded Barrel: Stainless steel Housing: ABS/PC
Environmental Rating	IEC IP67; NEMA 6
Sensing Field of View	See datasheet
Performance Curves	See datasheet
Operating Conditions	Temperature: -20 to +70 °C
Certifications	(6



M12F Series

Temperature and Humidity Sensors

- Manufactured with a robust metal housing
- Designed to work as a Modbus slave device via RS-485 or with Sure Cross® 1-wire serial interface -P6 nodes, -H6 MultiHop Radios, or Q45 Sensor Node DX80N2Q45TH
- Ships with aluminum grill filter cap; optional stainless steel 10 micrometer sintered filter available separately

M12FTH Temperature and Humidity

1/	O	Power	Connection	Models
R	S-485 Modbus	3.6 to 5.5 V dc low power option or 12 to 24 V dc	5-pin Euro QD	M12FTH3Q
1-	-wire serial interface	3.6 to 5.5 V dc	o piir Edio do	M12FTH4Q

M12FT Temperature

	I/O	Power	Connection	Models
	RS-485 Modbus	3.6 to 5.5 V dc low power option or 12 to 24 V dc	5-pin Euro QD	M12FT3Q
	1-wire serial interface	3.6 to 5.5 V dc	5-βiii Edio QD	M12FT4Q



Additional cordset information is available See page 758





M12F Specifications

Supply Voltage and Current	3.6 to 5.5 V dc low power option or 12 to 24 V dc		
Resolution	Humidity: 0.1% relative humidity Temperature: 0.1 °C		
Construction Housing: metal			
Environmental Rating	IEC IP67; NEMA 6		
Operating Conditions	Temperature: -40 °C to +85 °C		
Certifications	c Us CSA: Class I, Division 2, Groups A, B, C, D — Certificate 1921239		

QM42VT Series



Vibration and Humidity Sensors

- Provides high accuracy vibration (velocity RMS) and temperature measurements
- Manufactured with a robust zinc alloy housing
- Connects via a 1-wire serial interface
- Reduces labor costs by obviating manual checks and eliminating error

QM42VT

I/O	Power	Connection	Models
1-Wire Serial	3.6 to 5.5 V dc	3 m	QM42VT1
RS-485 Modbus	3.6 to 5.5 V dc low power option or 10 to 24 V dc	3 m	QM42VT2



M12/Euro-Style with Shield Straight connector 1 m (3') models only straight male to straight female DEE2R-58D 2.5 m (8')

Additional cordset information is available See page 758



BWA-HW-006

RS-485 to **USB** Adaptor



RS-485 to **USB** Adaptor

BWA-USB1WIRE-001





BWA-BK-002

BWA-BK-001



QM42VT Specifications

QIVI+2 V I Opecificat	
Supply Voltage and Current	3.6 to 5.5 V dc or 10 to 24 V dc
Vibration	Mounted base resonance: 5.5 kHz nominal Measuring range: 0-46 mm/sec or 0–1.8 in/sec RMS Frequency Range: 10 – 1000 Hz Accuracy: ± 10% @25 °C
Temperature	Measuring range: -40 to +105 °C (-40 to +221 °F) Resolution: 0.1 °C Accuracy: ±3 °C
Construction	Housing: Zinc alloy
Shock	400G
Environmental Rating	IEC IP67; NEMA 6
Operating Conditions	Temperature: -40 to +105 °C
Certifications	C€



Special Purpose

Special purpose sensors provide a variety of choices for challenging environments and applications where standard sensors don't make the cut. From hazardous areas and heavy duty washdown environments to sensing specific colors and temperatures for maximum accuracy, special purpose sensors meet specific application needs.

SPECIAL PURPOSE

BARCODE READERS

page 270

REGISTRATION, COLOR &

LUMINESCENCE page 282

STAINLESS STEEL page 296

CLEAR OBJECT page 312

TEMPERATURE page 324

HAZARDOUS AREA page 328



Barcode Readers

Able to decode over a dozen commonly used 1D and 2D barcode symbols, provides fast read rates, wide depth of field, and high resolution.

Series	Description	Max Sensing Range	Dimensions (H x W x D)	Housing Material	Power Supply
	iVu BCR Easy to set up, powerful, affordable inspection solution solves a wide variety of simple and complex applications. page 272	Varies by selected lens	95.3 x 81.2 x 53.2 mm	Black PBT	10-30 V dc
BER	P4 BCR Find and decode 2D and 1D linear bar codes. page 278	Varies by selected lens	124.5 x 66.8 x 34.3 mm	Black anodized aluminum	10-30 V dc
	Laser Barcode Scanner Can detect over a dozen of the most commonly used linear barcode symbols with a fast reading rate. page 280	600 mm	68 x 83.4 x 32.8 mm	Black anodized aluminum	10-30 V dc

iVu BCR and iVu Plus BCR



Bar Code Reader (BCR)

- Powerful, affordable inspection solution solves a wide variety of simple and complex applications
- Solve a variety of linear and 2D bar code applications
- First-time users can have it up and running in minutes
- Optional remote touch screen for programming
- Ability to change parameters on the fly
- IVu BCR Plus models have Ethernet communication available and is capable of storing and controlling up to 30 inspections for fast product change over

iVu BCR Applications

Bar Code Type



Reading a 1D barcode





Reading a 2D barcode

Screen Interface Pass





Screen Interface Fail







Conducts high-performance reading of industry standard barcodes.

Reads up to ten 1D and 2D bar codes at one time.

2D Bar Codes

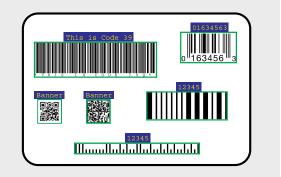
Data Matrix (ECC200) QR & Micro QR

1D Bar Codes Code 128

Interleaved 2 of 5

EAN-13 (UPC-A) EAN-8 UPC-E

Postnet Pharmacode



Installation and configuration in

• No PC required to configure, change or monitor

 Self-contained sensor with easy configuration and convenient monitoring

right on the sensor

• Built-in or remote touch screen

- four easy steps 1. Install and connect the sensor
 - 2. Select the sensor or bar code type, depending on model
 - 3. Acquire a good image
 - 4. Set inspection parameters

Intuitive operation with menu driven tools to guide you through setup

- Define region of interest
- Adjust intensity/contrast
- Define the pass criteria



iVu BCR (Barcode Reader)

Example Model Number: IVU2PRBR04



Touch Screen

IVU2P

IVU2 = Reads 1D and 2D IVU2P = Reads 1D and 2D with Ethernet and storage for 30 inspections



TB = Integrated**RB** = Remote

Ring Light



R

R = Red

B = BlueG = Green

W = White I = Infrared

6 = UV365**9** = UV395

XC = C-mount* X = No Ring Light

* Requires C-mount lens. For C-Mount lenses see page 362

Lens (mm)



04 = 4.3

06 = 6

08 = 8

12 = 12

16 = 16

25 = 25

Blank = No lens (only C-Mount)



Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC2S-1206RA)

12-Pin MQDC2S-1206 2 m (6.5") MQDC2S-1215

MQDC2S-1230 9 m (301) MQDC2S-1250 15 m (50')

5 m (15')



Straight connector models listed

MQDEC-8005-USB 0.15 m (0.5) MQDEC-801-USB 0.3 m (1') MQDEC-803-USB

0.9 m (31 MQDEC-810-USB 3 m (10')

BCR with Integrated Touch Screen

4-Pin Pico PSG-4M-4005-USB 0.15 m (0.5

PSG-4M-401-USB 0.3 m (1')

PSG-4M-403-USB 0.9 m (3')

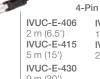
PSG-4M-410-USB

3 m (10')

Used with:

BCR with Remote Touch Screen and BCR Plus with Remote or Integrated Touch Screen





9 m (30')

Used with: BCR Plus only

Additional cordset information is available. See page 758









IVUC-E-450

IVUC-E-475

12 m (50')

23 m (75')



SMBIVURAL

SMBIVURAR

SMBIVUB

SMBIVUU

Used with: iVu BCR and iVu Plus BCR

Additional bracket information is available. See page 726

For more specifications see page 277.

Display and cordsets ordered separately.

Remote display is required for set up and viewing of sensors with a remote touch screen.

BARCODE READERS

REGISTRATION, COLOR & LUMINESCENCE

STAINLESS STEEL

Remote Display Touch Screen

Description	Model
3.5" diagonal remote touch screen — Machine-mountable	RDM35
3.5" diagonal remote touch screen — Handheld	RD35

RDM35 Accessory Kits



Machine-mountable Remote Display Used for- programming & monitoring

Description Straight Right-Angle 1 m cordset, bracket/docking station, stylus and hardware IVURDM-QDK-803 IVURDM-QDK-803RA 2 m cordset, bracket/docking station, stylus and hardware IVURDM-QDK-806 IVURDM-QDK-806RA 5 m cordset, bracket/docking station, stylus and hardware **IVURDM-QDK-815** IVURDM-QDK-815RA IVURDM-QDK-830RA IVURDM-QDK-830 9 m cordset, bracket/docking station, stylus and hardware 16 m cordset, bracket/docking station, stylus and hardware IVURDM-QDK-850 IVURDM-QDK-850RA

RD35 Accessory Kits



RD35 Handheld Remote Display Used for-programming

Description	Straight	Right-Angle
1 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-803	IVURD-MXK-803RA
2 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-806	IVURD-MXK-806RA
5 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-815	IVURD-MXK-815RA
9 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-830	IVURD-MXK-830RA
16 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-850	IVURD-MXK-850RA

Cordsets for Remote Display

Hand Held Remote Display (RD35)

Double Ended

M12/Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, IVURD-QD-803RA)

IVURD-QD-803 IVURD-QD-806 2 m (6') IVURD-QD-815 5 m (15') IVURD-QD-830 9 m (30' IVURD-QD-850 16 m (50')

8-Pin

Additional cordset information is available See page 773

Machine Mountable Remote Display (RDM35)

Euro-Style to Molex

of the model number

(example, IVURD-MX-803RA)

IVURD-MX-803 Straight connector models listed; for right-angle, add RA to the end

IVURD-MX-806 2 m (6') IVURD-MX-815 5 m (15'

8-Pin

IVURD-MX-830 9 m (30' IVURD-MX-850 16 m (50')

Brackets for Remote Display





SMBRD35

SMBKS

SMBRDM35

TEMPERATURE

HAZARDOUS AREA

Lenses Lens Model 4.3 mm LMF04 6 mm LMF06 LMF08 8 mm 12 mm LMF12 LMF16 16 mm 25 mm LMF25

Used with: iVu and iVu Plus

* 25 mm filter holder is purchased separately





Used with: iVu and iVu Plus

Red Blue Green Infrared

Filter

* Blue band-pass filters are preinstalled on ultraviolet ringlight models ** Infrared band-pass filters are preinstalled on infrared ring light models † Filter kits include 1 color and two sizes of filter holders

FLTMR2 FLTMB* FITMG FLTMI*

Model

Focusing ring with plastic window Replacement cover for touch screen

Focusing ring with optically clear glass

IVUW-G IVUW **IVUBC**

Model

Used with: iVu and iVu Plus

Replacement Windows

Sensor Interface Module



IVUSIM For simplified wiring of iVu sensors in an electrical box

2 GB USB Drive



IVU-USBFD2



STYLUS-1 (Qty 1) STYLUS-10 (Qty 10)

Model

C-Mount Lens Covers



Lens cover 50 mm -

IVUSLC50-P

Model



Description



Lens cover 75 mm plastic window

IVUSLC75-P



Additional C-mount Lens information is available See page 362

Accessories for C-Mount Lenses'

Description	
	Extension K
	Extension
	Lens Exter
8	UV Lens F

Description

Color

Infrared

Blue

Green

Red

Dark Red

	Format Size	Model	Used With
Extension Kit (0.5, 1.0 , 5.0, 10, 20 and 40 mm)		LEK	
Extension Kit (0.25 and 0.5 mm)	_	LEKS	All Lenses
Lens Extender (increases focal length 2X)		LCF2X	
UV Lens Filter, Clear Glass	2/3"	FLTUV	Tamron Megapixel Lenses

High-pass filter blocks visible light and passes infrared light. Included with all Banner Infrared light sources.

Band-pass filter improves quality by helping to reduce ambient light; it passes blue and infrared light.

Band-pass filter improves quality by helping to reduce ambient light; it passes green and infrared light.

High-pass filter improves quality by helping to reduce ambient light; it passes red and infrared light.

High-pass filter improves quality by helping to reduce ambient light; it passes red and infrared light.

Bandpass Filters

Example Model Number: FLTB470-27

Description	Model	Diameter
Blue	FLTB470-	05.5
Green	FLTG525-	25.5
Infrared	FLTI850-	27
Red	FLTR635-	30.5
Dark Red	FLTR660-	34
Polarizing Filter	FLTPR032-	43

Plastic Models **FLTI** (> 760 nm)

FLTB (400-525 nm)

FLTG (400-575 nm)

FLTR (> 600 nm)

C-Mount Color Filters*

Description





FLTR635 (600-660 nm)

FLTR660 (650-680 nm)



FLT1850 (810-990 nm)
FLTB470 (435-490 nm)
FLTG525 (495-565 nm)

^{*} For C-Mount lenses see page 362







iVu BCR & iVu Plus BCR Specifications

2			
General			
Supply Voltage	10-30 V dc		
Demo Mode	Full tool functionality on canned images		
Sensor Lock	Optional password protection		
Integrated Ring Light	Red, IR, Green, Blue, White, UV or no integrated ring light		
Imager	1/3 inch CMOS 752 x 480 pixels; adjustable Field-of-View (FOV)		
Lens Mount	M12 X 1 mm thread (c-mount lens); microvideo lens 4.3, 6, 8, 12, 16,	25 mm	
Output Rating	150 mA		
Exposure Time	0.1 milliseconds to 1.049 seconds		
Construction	Black PBT sensor housing; acrylic window iVu Plus Integrated:	Die cast zinc and Black PBT	
External Strobe Output	+ 5 V dc		
Environmental Rating	IP67		
Model Specific			
Power Connection	iVu BCR (integrated and remote touch screen):12-pin Euro-style (M12) male connector	iVu Plus BCR (integrated and remote touch screen):12-pin Euro-style (M12) male connector	
	Accessory cordset required for operation; QD cordsets are ordered se	parately.	
Supply Current	iVu BCR: 800 mA max. (exclusive of I/O load)	iVu Plus BCR: 850 mA max. (exclusive of I/O load)	
USB 2.0 Host	iVu BCR (integrated touch screen): 8-pin Euro-style (M12) female connector iVu BCR (remote touch screen): 4-pin Pico-style (M8) female connector iVu Plus BCR (integrated and remote touch screen): 4-pin Pico-style (M8) female connector Optional USB cordset required for operation of USB Thumb Drive. QD cordsets are ordered separately. See page 274.		
Ethernet Connection	iVu Plus BCR: 4-pin Pico-style (M8) male connector. Ethernet cordset	s are ordered separately. See page 274	
Output Configuration	NPN or PNP, software selectable		
Display	Integrated touch screen: 68.5 mm (2.7") LCD Color Integrated Display 320 x 240 pixels Remote touch screen: See RD35 Remote Display specifications		
Acquisition	iVu BCR (integrated touch screen): 50 fps (frames per second) max. iVu BCR (remote touch screen): 50 fps (frames per second) max.	iVu Plus BCR (integrated and remote touch screen): 100 fps (frames per second) max.	
Operating conditions	Stable Ambient Temperature:		
	BCR: 0 to + 50 °C	iVu Plus BCR (integrated touch screen): 0 to +45 °C iVu Plus BCR (remote touch screen): 0 to +40 °C	
Remote Display connection (Remote Touch Screen Models Only)	8-pin Euro-style (M12) female connector Accessory cordset required for	pr remote display; QD cordsets are ordered separately.	
Certifications	NOTE: iVu Plus remote must use Euro QD power cordset for CE compliance.		

iVu Remote Display Specifications

Screen Size	3.5" diagonal
LCD Aspect Ratio	4:3
Display Resolution	320 x 240 RGB
Viewing Angle	60 degrees left, and 60 degrees right, 50 degrees up, and 55 degrees down
Housing Material	Zinc Zamac #3
Bracket Material	Delrin
Stylus	Delrin
Display Weight	4.8 oz
Bracket & Stylus Weight	1.1 oz
Connection	Molex HandyLink connector
Operating Temperature	0 to + 50 °C



P4 BCR

Bar Code Reader

- P4 Bar Code Readers find and decode 2D and 1D linear bar codes.
- Industry-standard bar code metrics and grading
- Economical one-piece solution
- High performance vision inspections in self-contained in-line or right-angle housing styles that fit in the palm of your hand

Conducts high-performance reading of industry standard barcodes.

2D Bar Codes

Data Matrix (ECC200) QR & Micro QR

1D Bar Codes

Code 128 Code 39 Codabar Interleaved 2 of 5

EAN-13 (UPC-A) EAN-8 UPC-E IMB

Postnet Pharmacode

Choosing a P4 BCR

Example Model Number P4BCR

P4BC

P4BC = BCR - Bar Code Reader

Resolution

Blank = 640 x 480 **1.3** = 1280 x 1024 Housing

R

R = Right-Angle I = In-Line



Right-Angle Sensor Models (shown with lens—sold separately)



In-line Sensor Models (shown with lens—sold separately)

* To add the OCR/OCV premium tool add suffix -OC to the model number. (example P4BCR-OC)

Power and I/O Cable	12-	-Pin	Video (BNC to BNC)		Ethernet	Shielded	Shielded Crossover
Hirose with 12 flying leads	P4C06 2 m (6.5') P4C23 7 m (23') P4C32 10 m (32')	P4C50 15 m (49') P4C75 23 m (75') P4C110 34 m (111')	Coaxial with male BNC both ends	BNC06 2 m (6.5') BNC15 5 m (15') BNC30 9 m (30') BNC48 15 m (49')	Straight RJ45 to RJ45 Cable length: 2 m	STP07 2 m (6.5') STP25 7 m (25') STP50 9 m (30') STP75 22 m (30')	STPX07 2 m (6.5') STPX25 7 m (25') STPX50 9 m (30') STPX75 22 m (30')

Additional cordset information is available See page 758

Presence PLUS® P4 Dedicated-Function Specifications

Supply Voltage and Current	10 to 30 V dc (24 V dc ±10% if the sensor powers a light source P4BCR: Less than 650 mA (exclusive of lights and I/O load) P4BCR 1.3: Less than 550 mA (exclusive of lights and I/O load)	
Memory (Storage)	BCR-8 MB Inspection (jobs): 999 max.	BCR 1.3-32 MB Inspection (jobs): 999 max.
Input/Output Configuration	NPN (sinking) or PNP (sourcing) software selectable	
Output Rating	150 mA max. each output OFF-state leakage current: less than 100 μA ON-state saturation voltage: NPN—less than 1 V @ 150 mA	max. PNP-greater than V+ -2 V
Bicolor Status Indicators	PASS/FAIL: Green ON steady—PASS POWER/ERROR: Green ON steady—POWER READY/TRIGGER: Green ON steady—READY Yellow ON ste	dý-ERROR
Display Options	PC or NTSC video (uses 9 m max. BNC cordset)	
Discrete I/O	1 Trigger IN 1 Strobe OUT 4 Programmable I/O 1 Product Change IN 1 Remote TEACH IN	
Communications	RJ-45 10/100 Ethernet connection for running <i>Presence</i> PLUS RS-232 connection for output of inspection results	P4 software and/or output inspection results
Imager Resolution	BCR: 640 x 480 pixels	BCR 1.3: 1280 x 1024 pixels
Pixel Size	BCR: 7.4 x 7.4 µm	BCR 1.3: 6.7 x 6.7 μm
Imager Size	BCR: 4.8 x 3.6 mm, 6 mm diagonal (1/3 inch CCD)	BCR 1.3: 8.6 x 6.9 mm, 11 mm diagonal (2/3 inch CMOS)
Levels of Gray	256 Gray Scale	
Exposure Time	BCR: 0.1 to 2830 milliseconds	BCR 1.3: 0.1 to 1670 milliseconds
Full Image Acquisition	BCR: 48 frames per second max.*	BCR 1.3: 27 frames per second max.*
Lens Mount	Standard C-mount (1 inch—32 UN)	
Construction	Black anodized aluminum housing, glass lens	
Weight	In-line: 293 g Right-angle: 385 g	
Environmental Rating	IEC IP20; NEMA 1	
Operating Temperature	Stable ambient temperature: 0 to +50 °C Stable ambient lighting: No large, quick changes in light level; Relative humidity: 90% (non-condensing)	no direct or reflected sunlight
Certifications		

^{*} A reduced Field-of-View (FOV) dramatically increases acquisition rates.

Visible Red Laser





Laser Barcode Scanner

- The TCNM can detect over a dozen of the most commonly used linear barcode symbols with a fast reading rate
- Advanced algorithm and multiple scans can reconstruct damaged codes
- Has a barcode reading range of up to 600 mm
- Rugged, IP65-rated industrial housing
- SMART TEACH push button programming



Correct Label Verification Lot control and traceability for a pharmaceutical manufacturer

Barcode Scanner, 10-30 V DC

Sensing Mode	Range	Resolution	Laser Output	Models
	40-300 mm	Standard resolution: 8-20 mils		TCNM-AD-1200
Class 2 laser	50-310 mm	High performance: 6-20 mils	Cingle line seen	TCNM-AD-1204
	30-90 mm	High resolution: 6-12 mils	Single line scan	TCNM-AD-2200
	45-100 mm	High resolution, High performance 5-8 mils		TCNM-AD-2204
	40-300 mm	Standard resolution: 8-20 mils		TCNM-AD-1210
Class 2 laser	50-310 mm	High performance: 6-20 mils	Ten line raster scan	TCNM-AD-1214
Class 2 lasel	30-90 mm	High resolution: 6-12 mils	Terrille raster scarr	TCNM-AD-2210
	45-100 mm	High resolution, High performance 5-8 mils		TCNM-AD-2214
	75-340 mm	Short range: 8-14 mils		TCNM-EX-0200
Class 2 laser	100-440 mm	Medium range: 10-20 mils	Single line scan	TCNM-EX-1200
	190-600 mm	Long range: 14-20 mils		TCNM-EX-2200
	75-340 mm	Short range: 8-14 mils		TCNM-EX-0210
Class 2 laser	100-440 mm	Medium range: 10-20 mils	Ten line raster scan	TCNM-EX-1210
	190-600 mm	Long range: 14-20 mils		TCNM-EX-2210

Conducts high-performance reading of industry standard barcodes.

Code 128 Code 39 Codabar Interleaved 2 of 5 EAN-13 (UPC-A) EAN-8 UPC-E

Postnet Pharmacode GS1 DataBar GS1 DataBar Expanded GS1 DataBar Limited

Accessories



TCNM-AD-CAB Serial interface adapter (RS232 or RS-485) going from TCNM-ACBB1 to PC (DB9)



TCNM-ACBB1 Connection box



Barcode Scanner Specifications

Barcode Scanner Spec	BICATIONS
Supply Voltage and Current	10 to 30 V dc Maximum 0.5 to 0.17 A; 5 W
Input/Output Configuration	Input 1 (External Trigger), Input 2: Optocoupled, polarity insensitive
Reading Features	Scan Rate (software): (600 to 1000 scans/sec) Aperture Angle: 50°
Construction	Black anodized aluminum housing, glass lens
Weight	330 g
Environmental Rating	IP65
Operating Temperature	Operating temperature: 0 to +45 °C Storage temperature: -20 to +70 °C Relative humidity: 90% (non-condensing)
Hookup Diagrams	See data sheet for more information



Registration, Color & Luminescence

Registration mark sensors reliably detect registration marks in low contrast applications. True color sensors analyze colors and reliably detect registration marks in extremely low contrast applications. These sensors can detect changes in color and intensity of targets of the same color. Luminescence sensors detect luminescent marks even on irregular or reflective backgrounds.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	QC50/QCX50 Accurately analyze and compare colors or varying intensities of color. page 284	Diffuse: 20 mm	50 x 25 x 50 mm	IEC IP62	ABS	10 to 30 V dc
	Q26 Reliably detects luminescent plastics, coatings, lubricants, and other targets on even and uneven surfaces page 286	Diffuse: 30 mm	14 x 25 x 42 mm	IEC IP67	ABS	12 to 30 V dc
THE STATE OF THE S	QL56 Detects luminescent marks, even on luminescent backgrounds, and reflective surfaces such as ceramic, metal or mirrored glass. page 288	Diffuse: 50 mm	96.5 x 31.9 x 65.5 mm	IEC IP67	Aluminum	15 to 30 V dc
Soft of the second of the seco	R58 Registration mark sensors that detect contrasts as low as 2% over a wide range of colors. page 290	Convergent: 10 mm	62.1 x 30 x 83.3 mm	IEC IP67	Zinc alloy	10 to 30 V dc
	R55 Delivers outstanding color contrast sensitivity and features an innovative TEACH function for setting the sensing threshold. page 294	Varies depending on fiber	85.4 x 30 x 25 mm	IEC IP67; NEMA 6	ABS/polycarbonate blend	10 to 30 V dc

QC50/QCX50 Series



True Color Sensors

- The QC50 and QCX50 accurately analyze and compare colors or varying intensities of color. The QC50 will solve most color comparison applications and for challenging applications such as reading the difference between dark blue and black use the QCX50.
- Offers easy-to-set push-button programming options for up to three colors
- Compact, self-contained design
- Offers fast response time of 335 microseconds, depending on model

QC50, 10-30 V DC

Sensing Mode	Range	Connection	Response Time	Output Type	Models
	20 mm typical; varies according to	8-pin Euro QD	225 112	NPN, 3 channels	QC50A3N6XDWQ
DIFFUSE	sensor configuration	o-pii i Euro QD	335 μs	PNP, 3 channels	QC50A3P6XDWQ

QCX50, 10-30 V DC

Sensing Mode	Range	Connection	Response Time	Output Type	Models
	20 mm typical; varies according to	8-pin Euro QD	Selectable	NPN, 3 channels	QCX50A3N6XDWQ
DIFFUSE	sensor configuration	5 p 2010 Q3	5 ms or 1 ms	PNP, 3 channels	QCX50A3P6XDWQ

Connection options: A model with a QD requires a mating cordset.



MQDC2S-806 2 m (6.5') MQDC2S-815 5 m (15') MQDC2S-830 9 m (30')

Additional cordset information is available See page 758



SMBQC50

Additional bracket information is available See page 725



QC50/QCX50 Specifications

QC50/QCX50 Specif	ncations
Sensing Receiver	Solid-state photodiode device with R, G, B filters
Minimum Spot Diameter	4 mm
Supply Voltage and Current	10 to 30 V dc, 2 V pp max ripple 40 mA max @ 24 V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity, over-voltage, and transient voltage
Output Configuration	3 PNP or 3 NPN outputs, depending on model 30 V dc max. Saturation voltage: less than 2 V
Output Rating	100 mA max. load per output channel
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power-up
Output Response Time	QC50 models: 335 microseconds QCX50 models: Selectable 5 milliseconds (normal) or 1 millisecond QC50 models QCX50 models QCX50 models QCX50 models Gate ON-time: 335 microseconds 700 microseconds Gate OFF-time: 170 microseconds 400 microseconds
Delay at Power-up	500 milliseconds; outputs do not conduct during this time
Data Retention	EEPROM nonvolatile memory
Ambient Light Rejection	According to EN 609475-2
Adjustments	2 push buttons (Set and Select) Color, scanning, color modes, delay and tolerance Manual adjustment of color channels, sensing mode and tolerance level
Indicators	4-Digit LCD Display: indicates sensing mode, run status, tolerance level, output status Yellow Output LED: ON when any output is conducting 3 Green Channel Output Status LEDs: ON when its corresponding output is conducting
Construction	ABS shock-resistant housing; glass window and lens
Environmental Rating	IEC IP67
Operating Conditions	Temperature: -10 to +55 °C Relative humidity: 90% at 50 °C (non-condensing)
Shock Resistance	Approx. 30 G; 3 shocks per axis; 11 milliseconds duration
Vibration	0.5 mm amplitude; 10 to 60 Hz frequency; 30 minutes for each X, Y, Z axis
Certifications	CE

Q26 Series



Luminescence Sensor

- Reliably detects luminescent plastics, coatings, lubricants, and other targets on even and uneven surfaces
- Simple configuration with the push button on the sensor's housing or via a remote input line
- Rotary switch selects Light Operate or Dark Operate
- IP67-rated housing for use in rugged industrial environments
- Compact housing size

Q26, 12-30 V DC

Sensing	Mode	Range	Connection	Models NPN	Models PNP
DIFFUSE ULT	TRAVIOLET	10 to 30 mm	4-pin M12/Euro-style quick disconnect fitting on a 150 mm (6 in) PVC cable jacket	Q26NLUMQ5	Q26PLUMQ5

Connection options: A model with a QD requires a mating cordset.

For a 9 m cable, add suffix W/30 to the 2 m model number (example, Q26NXLPQ7 W/30)



2 m (6.5') MQDC-415 for right-angle, add RA to the end of the model number (example, 5 m (15') MQDC-406RA) **MQDC-430** 9 m (30')

4-Pin

Additional cordset information is available See page 758





SMBLSTDLQ26

SMBLSTQ26

Additional bracket information is available See page 725



Q26 Specifications

azo opcomeationo				
Supply Voltage and Current	12 to 30 V dc (2 Vpp maximum ripple) Supply current (exclusive of load current): 30 mA			
Supply Protection Circuity	Protected against reverse polarity and transient voltages			
Output Configuration	NPN or PNP			
Output Rating	100 mA max (exclusive of load) ON-state saturation voltage: less than 2 V @ 10 mA dc; less than 1.5 V @ 150 mA dc			
Output Protection Circuitry	Protected against false power-up and continuous overload or short circuit of outputs			
Output Response Time	250 μS or 1 ms (based on sensitivity)			
Indicators	Green ON: Power ON Amber ON: Output conducting			
Construction	ABS plastic housing, glass window, polycarbonate lens			
Operating Conditions	Temperature: -10 to +55 °C Relative Humidity: 90% at 50°; non-condensing			
Environmental Rating	IEC IP67			
Vibration and Shock	EN60068-2-6 and EN60068-2-27			
Certifications	C € c(V)_us			



QL56 Series

Luminescence Sensors

- The Q25 sensor is completely epoxy-encapsulated for use in harsh sensing environments, including food and beverage applications.
- Compact, self-contained design
- Includes easy-to-set programming options
- High-speed response of 250 microseconds

Connection options: A model with a QD requires a mating cordset.

QL56, 15-30	V DC		Black Ultraviolet LED	Returned Luminescence
Sensing Mode	Range	Connection	Output Type	Models
DIFFUSE	10-20 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD15BQ
DIFFUSE	20-40 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD30BQ
DIFFUSE	30-50 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD40BQ







QL56M6XD15BQ Models



QL56M6XD40BQ Models



Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC1-506RA)

Additional cordset information is available See page 758

5-Pin MQDC1-506

2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')





SMB55RA





SMB55F SMB55S

Additional bracket information is available See page 725

QL56 Specifications

QL30 Specifications	
Sensing Beam	LED UV, 375 nm; class 1
Supply Voltage and Current	15 to 30 V dc, (2 V pp max ripple); 50 mA max @ 24 V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity
Output Configuration	Bipolar (1 NPN & 1 PNP), plus 0.75 to 5.5 V dc analog output
Analog Output	0.75 to 5.5 V dc max
Analog Output Impedance	2.2 kΩ (short-circuit protection)
Output Rating	100 mA max.
Output Saturation Voltage	< 2 V
Output Protection Circuitry	Overload and short circuit protection
Output Response Time	250 microseconds
Ambient Light Rejection	According to EN 60947-5-2
Adjustments	"+" and "-" push buttons determine sensitivity "Set" push button activates delay and keylock function
Switching Frequency	2 kHz
Delay at Power-up	0 milliseconds (default) or 20 milliseconds user selectable
Indicators	Green Ready LED: ON indicates power on; Flashing indicates output overload Yellow Output LED: ON indicates output conducting Orange Delay LED: ON indicates 20 milliseconds delay activated Orange Keylock LED: ON indicates push buttons are unlocked 5-segment bar graph: Indicates sensitivity
Construction	Aluminum housing, glass lens; mass 180 g. max.
Environmental Rating	IP67
Operating Conditions	Temperature: -10 to +55 °C Storage Temperature: -20 to 70 °C
Minimum Spot Dimensions	2 x 8 mm @ 10 mm (QL56M6XD15BQ) 3 x 11 mm @ 24 mm (QL56M6XD30BQ) 4 x 15 mm @ 50 mm (QL56M6XD40BQ)
Shock Resistance	30 G; 6 shocks per axis; 11 milliseconds duration (EN60068-2-27)
Vibration	0.5 mm amplitude; 10 to 55 Hz frequency; per axis (EN60068-2-6)
Application Notes	The lens must be used in the lower position, and the cap must remain in place on the end position
Certifications	CE



R58 Expert™ Series

Registration Mark Sensors

- The R58E sensors offer maintenance-free, solid-state reliability for color contrast applications. With a fast, 50-microsecond sensing response time, the R58E provides excellent registration repeatability, even in speedy applications.
- Bipolar outputs
- 10,000 actuations per second and 15 microsecond repeatability
- Rugged mechanical housing rated to IP67

R58 Expert™, 10-30 V DC

> Visible Red, Green or Blue LED, depending on registration mark

				Mo	dels
				Parallel	Perpendicular
Sensing Mode/LED	Focus	Connection	Output Type		
		2 m	Bipolar NPN/PNP	R58ECRGB1	R58ECRGB2
		5-pin Euro Pigtail QD	Bipolar NPN/PNP	R58ECRGB1Q	R58ECRGB2Q
	10 mm	2 m	PNP	R58BPCRGB1	R58BPCRGB2
CONVERGENT	10 mm	5-pin Euro Pigtail QD	PNP	R58BPCRGB1Q	R58BPCRGB2Q
		2 m	NPN	R58BNCRGB1	R58BNCRGB2
		5-pin Euro Pigtail QD	NPN	R58BNCRGB1Q	R58BNCRGB2Q

For more specifications see page 293.

Connection options: A model with a QD requires a mating cordset (see page 292)

For 9 m cable, add suffix W/30 to the 2 m model number (example, R58ECRGB1 W/30). QD models: For integral 5-pin Euro-style QD, add suffix Q8 to the 2 m model number (example R58ECRGB1Q8).

→ Visible Red LED → Visible Green LED



R58A Series

Registration Mark Sensors

- Easy to set multi-turn poteniometer
- The R58A provides outstanding color contrast sensitivity in lowcontrast or high-gloss applications and detects contrasts as low as 2% over a wide range of colors
- Bipolar outputs
- Provides a single emitter color of red or green, depending on
- Rugged mechanical housing rated to IP67

R58A Expert™, 10-30 V DC

i ioor (Export	, 10 00	V 20				
					Мо	dels
					Parallel	Perpendicular
Sensing Mode/LED	Focus	Connection	Output Type	OFF-Delay		
	10 mm	2 m	Bipolar NPN/ PNP	•	R58ACG1	R58ACG2
		4-pin Euro Pigtail QD			R58ACG1Q	R58ACG2Q
		2 m			R58ACG1D	R58ACG2D
CONVERGENT		4-pin Euro Pigtail QD			R58ACG1DQ	R58ACG2DQ
		2 m		0 ma	R58ACR1	R58ACR2
CONVERGENT	10 mm	4-pin Euro Pigtail QD	Bipolar	0 ms	R58ACR1Q	R58ACR2Q
	10 111111	2 m	NPN/ PNP	20 mc	R58ACR1D	R58ACR2D
		4-pin Euro Pigtail QD	FINE	20 ms	R58ACR1DQ	R58ACR2DQ

For more specifications see page 293.

Connection options: A model with a QD requires a mating cordset (see page 292)

For 9 m cable, add suffix W/30 to the 2 m model number (example, R58ACG1 W/30).

QD models: For integral 4-pin Euro-style QD, add suffix Q8 to the 2 m model number (example, R58ACG1Q8).





Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

Additional cordset information is available

Used with: Expert models

MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')



Euro-Style Cordsets Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

Used with: R58A models

MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')



See page 758







SMB55A

SMB55RA

SMB55F

SMB55S

Additional bracket information is available See page 725







R58B



R58A

R58 Specifications

rioc opcomoduorio	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) R58A: 36 mA exclusive of load R58B & R58E: 75 mA @ 10 V dc 35 mA @ 30 V dc
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	R58 Expert & R58A: Bipolar: One current sourcing (PNP) and one current sinking (NPN) R58B: Single output: One current sourcing (PNP) or one current sinking (NPN)
Output Rating	R58 Expert & R58B: 100 mA max. (each output) OFF-state leakage current: NPN less than 200 μA; PNP less than 10 μA NPN saturation: less than 1.6 V @ 100 mA PNP saturation: less than 3 V @ 100 mA R58A: 150 mA max. (each output) OFF-state leakage current: less than 10 μA NPN saturation: less than 200 mV @ 10 mA and less than 1 V @ 150 mA PNP saturation: less than 1 V @ 10 mA and less than 2 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	50 microseconds
Delay at Power-up	R58A: 100 milliseconds; outputs do not conduct during this time R58B & R58E: 1 second; outputs do not conduct during this time
Repeatability	15 microseconds
Sensing Image	Rectangular: 1.2 x 3.8 mm at 10 mm from face of lens; image oriented either parallel or perpendicular to sensor length, depending on model
Adjustments	R58 Expert & R58B: 2 push buttons and remote wire for sensor TEACH programming and configuration. See datasheet for detailed information. R58A: Light/Dark Operate (LO/DO) select switch, and 15-turn switchpoint adjustment potentiometer
Indicators	R58 Expert: 8-segment Bargraph display: Green: Power ON Yellow: Outputs ON 2-position Green: LED ON next to DO for Dark Operate LED ON next to LO for Light Operate 2-position Green: LED ON next to ON for ON-delay LED ON next to OFF for OFF-delay R58B: Green: Power ON Amber: Output active R58A: Amber: Output active Green: Switchpoint threshold adjustment indicators See datasheet for detailed information.
Construction	Zinc alloy die-cast housing with black painted finish and o-ring sealed lens port cap Lens: Acrylic Lens port cap and lens holder: ABS Sensitivity and LO/DO adjusters: Acetal QD: Anodized aluminum
Environmental Rating	IEC IP67
Operating Conditions	Temperature: R58E: -10 to +50 °C R58A & R58B: -10 to +55 °C Relative humidity: 90% at 50 °C (non-condensing) Storage temperature: -20 to +80 °C
Shock and Vibration	All models meet IEC 68-2-6 and IEC 68-2-27 testing criteria
Certification	CE



Infrared LED



R55F Series

Fiber Optic Sensors

- Reliably detects 16 levels of grayscale at up to 10,000 actuations per second
- 10,000 actuations per second and 15 microsecond repeatability
- Bipolar outputs

R55F Fiber Optic, 10-30 V DC Visible Green LED Visible Blue LED Visible White LED Visible White LED Visible Red LED					
Sensing Mode	Range	Connection	Output Type	Models	
	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55F R55FQ	
GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FV R55FVQ	
GLASS FIBER GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FVG R55FVGQ	
GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FVB R55FVBQ	
GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FVWQ	
PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FP R55FPQ	
PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FPG R55FPGQ	
PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FPBQ	
PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m 5-pin Euro QD	Bipolar NPN/PNP	R55FPWQ	

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, R55F W/30).



Euro-Style

See page 758

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDC1-506RA)

Additional cordset information is available

MQDC1-506 2 m (6.5') 5 m (15') 9 m (30')

MQDC1-515 MQDC1-530







DIN-35...

SMBR55F01

SMBR55FRA

Additional bracket information is available See page 722



R55F Fiber Optic Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 70 mA, exclusive of load							
Supply Protection Circuitry	Protected against reverse polarity and transient voltages							
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor							
Output Rating	150 mA max each output @ 25 °C (derate ≈ 1 mA per °C increase) OFF-state leakage current: less than 5 µA @ 30 V dc ON-state saturation voltage: PNP: less than 1 V @ 10 mA; 1.5 V @ 150 mA NPN: less than 200 mV @ 10 mA; 1 V @ 150 mA							
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs							
Output Response Time	50 microseconds							
Delay at Power-up	100 milliseconds; outputs do not conduct during this time							
Adjustments	Using push buttons ("+" Dynamic and "-" Static): Manually adjust Switch Point using "+" or "-" buttons Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Static Single-Point TEACH Light Operate/Dark Operate OFF-Delay select: 0 milliseconds, 20 milliseconds or 40 milliseconds Using Remote TEACH input (gray wire): Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Static Single-Point TEACH Light Operate/Dark Operate OFF-Delay select: 0 milliseconds, 20 milliseconds or 40 milliseconds Push button lockout for security							
Indicators	10-segment light bar indicates signal strength Light Operate: Green Dark Operate: Green Outputs Conducting: Yellow OFF-Delay (Green): SETUP Mode: OFF-no delay Flashing-20 milliseconds delay ON-40 milliseconds delay							
Construction	Black ABS/polycarbonate blend; nylon fiber clip mounts to standard 35 mm DIN rail. 1 stainless steel right angle bracket and 1 PBT polyester bracket for mounting to flat surfaces also included with sensor.							
Environmental Rating	IEC IP67; NEMA 6							
Operating Conditions	Temperature: -10 to +55 °C Relative humidity: 90% at 50 °C (non-condensing)							
Application Notes	Do not mount the fiber tip directly perpendicular to shiny surfaces; position it at approximately a 15° angle in relation to the sensing target Minimize web or product "flutter" whenever possible to maximize sensing reliability							
Certifications	CE							



Stainless Steel

Stainless steel sensors hold up well in extremely abusive environments and can handle a wide variety of chemicals. This makes them ideal for hygienic applications, such as food and beverage applications.

Series	Description	Max Sensing Range		Dimensions H x W x D	Protection Rating	Power Supply
	QM26 The QM26 withstands high-pressure washdown environments and is easy to mount for a hassle-free setup. Page 298	Opposed: Polar Retro: Coaxial Polar Retro: Background Suppression:	8.5 m 3 m 2.6 m 200 mm	48.5 x 14 x 25 mm	IP69K	10-30 V dc
	QMH26 The QMH26 is designed with minimal grooves and crevices, making it easy to clean and ideal for clean-in-place (CIP) applications. Page 300	Polar Retro: Coaxial Polar Retro: Background Suppression: Foreground Suppression:	3 m 2.6 m 400 mm 200 mm	53.7 x 14 x 20.3 mm	IP69K	10-30 V dc
	M25U Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles. Available in eight modes with a compact housing for limited space setups. Page 302	Ultrasonic:	500 mm	103 x ø 25 mm	IP67; NEMA 6, IP69K	10-30 V dc
	SM30 Powerful sensor with a long range and the stainless steel model can be used in abusive environments. Page 304	Opposed:	150 m	30 ø x 102 mm	IEC IP67; NEMA 6	10-30 V dc, 2-240 V ac
	VSM Series Heavy-duty metal sensors that are compact and ideal for use in confined areas. Page 306	Opposed: Diffuse:	250 mm 200 mm	Varies by model	IP67; NEMA 6P	10-30 V dc
	M18-4 Heavy-duty barrel sensor protected by a 316 stainless steel housing that resists exposure to harsh chemicals and washdown conditions. Page 308	Opposed: Retro: Polarized Retro: Diffuse Fixed-Field:	7.5 m 6 m 750 mm	18 ø x 63.5 mm	IP67 IP68 IP69K	10-30 V dc

OTHER AVAILABLE MODELS





QM26 Series

Washdown Sensors

- The QM26 withstands high-pressure washdown environments and is easy to mount for a hassle-free setup
- Rugged, chemically resistant and food safe 316L stainless steel housing
- Reliably detects clear materials in harsh environments
- IP69K rated for use in harsh 1500 psi and 80 °C washdown
- Withstands environmental temperature cycling from -30 to 60 °C

Opposed QM26 Visible Red LED Sensing Mode Range Connection Models NPN Models PNP QM26EQ5 Emitter 4-pin Euro QD 8.5 m QM26VNRQ5 QM26VPRQ5 Polar Retro QM26 Visible Red LED Sensing Mode Range Connection Models NPN Models PNP 3 m 4-pin Euro QD QM26VNLPQ5 QM26VPLPQ5 → Visible Red LED Coaxial Polar Retro QM26 Sensing Mode Connection Models NPN Models PNP Range 4-pin Euro QD 2.6 m QM26ENXLPCQ5 QM26EPXLPCQ5 POLAR RETRO Background Suppression QM26 Visible Red LED Models PNP Sensing Mode Connection Models NPN Range 5-400 mm Cutoff 4-pin Euro QD QM26VNAF400Q5 QM26VPAF400Q5 5-200 mm Cutoff 4-pin Euro QD QM26VNAF200Q5 QM26VPAF200Q5 (small light spot)

Connection options: A model with a QD requires a mating cordset.

For a 5 m cable, replace Q5 with -5M to the 2 m model number (example, QM26E-5M)

CLEAR OBJECT | TEMPERATURE | HAZARDOUS AREA



Euro-Style Straight connector models listed; for right-angle, add RA to the end of the model number (example,

MQDC-406RA)

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (151) MQDC-430 9 m (30')

5-Pin MQDC1-506 2 m (6.5') MQDC1-515 5 m (151) MQDC1-530 9 m (30')





SMBLSTDLQ26

SMBLSTQ26

Additional bracket information is available See page 725

Additional cordset information is available See page 758



Additional information is available See page 790



Additional information is available See page 816



QM26 Specifications

QIVIZO Specification								
Supply Voltage and Current	10 to 30 V dc (10% maximum ripple within specified limits); supply current (exclusive of load current) less than 20mA							
Supply Protection Circuity	Protected against reverse polarity and transient voltages							
Output Configuration	Most Models: Complementary PNP or NPN by model number							
Output Rating	100 mA max OFF-state leakage current for load: NPN less than 200 μA; PNP less than 500 μA ON-state saturation voltage: less than 2 V @ 100 mA							
Output Protection Circuitry	Protected against false pulse at power-up and continuous overload or short circuit of outputs							
Output Response Time	500 microseconds ON and OFF							
Repeatability	Opposed mode: 110 microseconds All other mode: 150 microseconds							
Indicators	Green steady: Power ON Yellow steady: Light sensed Yellow flashing: Light sensed but marginal signal							
Construction	316L stainless steel housing; acrylic window							
Operating Conditions	Temperature: -30 to +70 °C Relative Humidity: Periodic exposure to 100% humidity and washdown cleaning							
Environmental Rating	IP67 & IP69K, Ecolab® compatible							
Vibration and Shock	IEC60947-5-2							
Certifications	C C c(VI) _{us}							

With Class 2 power ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details



QMH26 Series

Hygienic Sensors

- The QMH26 is designed with minimal grooves and crevices, making it easy to clean and ideal for clean-in-place (CIP) applications
- Rugged, chemically resistant and food safe 316L stainless steel housing
- Reliably detects clear materials in harsh environments
- IP69K rated for use in harsh 1500 psi and 80° C washdown
- High chemical resistance for the most demanding photoelectric sensing environments

Polar Retro QMH26 → Visible Red LED								
Sensing Mode	Range	Connection	Models NPN	Models PNP				
POLAR RETRO	3 m	4-pin Pico QD	QMH26VNLPQ7	QMH26VPLPQ7				
Coaxial Polar F	Retro QMH26			→ Visible Red LED				
Sensing Mode	Range	Connection	Models NPN	Models PNP				
POLAR RETRO	2.6 m	4-pin Pico QD	QMH26ENXLPCQ7	QMH26EPXLPCQ7				
Background S	uppression QMH26			Visible Red LED				
Sensing Mode	Range	Connection	Models NPN	Models PNP				
BACKGROUND SUPPRESSION	Adjustable between 5-400 mm	4-pin Pico QD	QMH26VNAF400Q7	QMH26VPAF400Q7				
Foreground Supression QMH26 → Visible Red LED								
Sensing Mode	Range	Connection	Models NPN	Models PNP				

4-pin Pico QD

QMH26VNAF200Q7 QMH26VPAF200Q7

Connection options: A model with a QD requires a mating cordset.

5-200 mm

For a 5 m cable, replace Q7 with -5M in the model number (example, QMH26VNLP-5M)

Adjustable between

SUPPRESSION



Pico QD (for Q models) Straight connector models listed; for right-angle, **W** replaces **G** in the model number. (example, PKW3M-2)

See page 758

Additional cordset information is available

PKG4M-2 PKG4M-5 PKG4M-9 9 m (30')







SMBLSTDLQ26

SMBLSTQ26

SMBQMH26-SS-150

Additional bracket information is available See page 725

Reflectors



Additional information is available See page 790

Apertures



Additional information is available See page 816



QMH26 Specifications

Supply Voltage and Current	10 to 30 V dc (10% maximum ripple within specified limits); supply current (exclusive of load current) less than 20mA							
Supply Protection Circuity	Protected against reverse polarity and transient voltages							
Output Configuration	Most Models: Complementary PNP or NPN by model number QMH26EXLPC models: Single PNP or NPN on pin 4 (black wire) with remote teach input on pin 2 (white wire)							
Output Rating	100 mA max OFF-state leakage current for load: NPN less than 200 μA; PNP less than 500 μA ON-state saturation voltage: less than 2 V @ 100 mA							
Output Protection Circuitry	Protected against false pulse at power-up and continuous overload or short circuit of outputs							
Output Response Time	500 microseconds ON and OFF							
Repeatability	Opposed mode: 110 microseconds All other mode: 150 microseconds							
Indicators	Green steady: Power ON Yellow steady: Light sensed Yellow flashing: Light sense but marginal signal							
Construction	316L stainless steel housing; acrylic window							
Operating Conditions	Temperature: -30 to +70 °C Relative Humidity: Periodic exposure to 100% humidity and washdown cleaning							
Environmental Rating	IP67 & IP69K, ECOLAB® compatible							
Vibration and Shock	IEC60947-5-2							
Certifications	C C Wyus With Class 2 power ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details							

M25U



Stainless Steel Ultrasonic Sensors

- Cleans easily with no thread, gaps or seams to trap debris
- The M25U Ultrasonic Sensor features a smooth 316 series stainless steel construction to withstand the toughest sanitary challenges
- Constructed with FDA approved materials and rated to IP69K, IEC IP67 (NEMA 6) with fully encapsulated electronics

M25U

Range*	Frequency	Connection	Output	Response Time	Models
Normal Speed:500 mm High Speed:250 mm	140 kHz	4-pin Euro QD	_	-	M25UEQ8 Emitter
Normal Speed:500 mm High Speed:250 mm	140 kHz	5-pin Euro QD	Bipolar NPN/PNP	Normal Speed: 4.0 ms High Speed: 3.0 ms	M25URBQ8 Receiver

Connection options: A model with a QD requires a mating cordset

M25U receivers may be wired for either of two speed modes: Normal or High, depending on hookup. The Normal-Speed mode offers a sensing range of 500 mm. The Normal-Speed mode maximizes sensing energy, as is required in demanding environments. The High-Speed mode offers a sensing range of 250 mm. The High-Speed mode maximizes sensing response, as is needed in high-speed counting applications.



5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

5-Pin MQDCWD-506 2 m (6.5') Washdown **Euro-Style** Straight connector models listed MQDCWD-530 9 m (30')

Additional cordset information is available See page 758





SMBM25A

SMBM25B

Additional bracket information is available See page 725



M25U Specifications

Sensing Range	Normal Speed: 500 mm High Speed: 250 mm 140KHz					
Supply Voltage and Current	Emitter: 10 to 30 V dc (10% max. ripple) at less than 85 mA Receiver: 10 to 30 V dc (10% max. ripple) at less than 38 mA (exclusive of load)					
Supply Protection Circuitry	Protected against reverse polarity and transient voltages					
Receiver Output Configuration	Bipolar (1 NPN & 1 PNP) solid-state output; Normally Open (output is activated when an object blocks the sensing beam)					
Output Rating	100 mA (each output) with short circuit protection; see Note 1 OFF-state leakage current: NPN: < 200 μA sinking ON-state saturation voltage: NPN: < 1.6 V @ 100 mA PNP: < 10 μA sourcing PNP: < 3.0 V @ 100 mA					
Output Protection Circuitry	Protected against short circuit conditions					
Output Response Time	Normal Speed: 4.0 milliseconds High Speed: 3.0 milliseconds					
Repeatability	1 millisecond					
Delay at Power-up	< 250 milliseconds					
Delay for Switching Between Normal and High Speed	20 milliseconds					
Indicators	Green Power LED: indicates Power ON Amber Output LED: indicates output activated					
Construction	Housing: 316 Stainless Steel LED window: Polysulfone					
Environmental Rating	Leakproof design, rated IEC IP67 (NEMA 6), IP69K					
Operating Conditions	Temperature: -20 to +70 °C Max. Relative Humidity: 95% at 50 °C non-condensing					
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max. amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration.					
Certifications	CE					
Notes	1. NPN < 200 μA for load impedance > 3 KΩ; for load current of 100 mA, leakage < 1% of load current 2. When mounting the M25U, care should be taken to acoustically isolate the emitter and receiver to eliminate sound energy coupling between the					

sensor pair. This is best accomplished with elastomeric materials between the sensor and rigid mounting brackets.

SM30



High-Power, Long-Range, Opposed-Mode **Barrel Sensors**

- The SM30 is a powerful sensor with a long range for different frequencies and the stainless steel model can be used in abusive environments
- Available with ac or dc supply voltages
- Ideal in equipment washdown environments

SM30 Emitters, 10-30 V DC or 12-240 V AC, Frequency At



Sensing Mode	Housing	Range	Connection	Output Type	Models
OPPOSED	Plastic	150 m	2 m	N/A	SMA30PEL
			3-Pin Mini QD		SMA30PELQD
OPPOSED	Stainless Steel	150 m	2 m	N/A	SMA30SEL
			3-Pin Mini QD		SMA30SELQD

SM30 Receivers, 10-30 V DC Frequency A[†]



Sensing Mode	Housing	Range	Connection	Output Type	Models
OPPOSED	Plastic	150 m	2 m	Bi-Modal™ NPN or PNP	SM30PRL
			4-Pin Mini QD		SM30PRLQD
OPPOSED	Stainless Steel	150 m	2 m	Bi-Modal™ NPN or PNP	SM30SRL
			4-Pin Mini QD		SM30SRLQD

SM30 Receivers, 24-240 V AC, Frequency At



Sensing Mode	Housing	Range	Connection	Output Type	Models
	Plastic	150 m	2 m	LO	SM2A30PRL
	1 lastic		3-Pin Mini QD	LO	SM2A30PRLQD
	Stainless Steel	150 m	2 m	LO	SM2A30SRL
			3-Pin Mini QD		SM2A30SRLQD
OPPOSED	Plastic	150 m	2 m	DO	SM2A30PRLNC
			3-Pin Mini QD		SM2A30PRLNCQD
	Stainless Steel	150 m	2 m	DO	SM2A30SRLNC
	Starriess Steel		3-Pin Mini QD		SM2A30SRLNCQD

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, SM30PR W/30).

† Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" at the end of the standard model number (example, SM30PRLB or SM30PRLC).

TEMPERATURE HAZARDOUS AREA



4-Pin MBCC-406 2 m (6.5') MBCC-412 3 m (12')

Additional cordset information is available See page 758



SMB30A







SMB30SC

SMBAMS30P

Additional bracket information is available See page 724

SMB30FA..





Additional information is available See page 816



Opposed Models—All Frequencies Suffix E and R

SM30 Specifications

Supply Voltage and Current	Emitters: 12 to 240 V ac (50/60 Hz) or 10 to 30 V dc (10% max. ripple) at 20 mA DC Receivers: 10 to 30 V dc (10% max. ripple) at 10 mA max, exclusive of load AC Receivers: 24 to 240 V ac (50/60 Hz)								
Supply Protection Circuitry	Protected against reverse polarity and transient voltages								
Output Configuration	DC Receivers: Bi-Modal™ output (PNP sourcing or NPN sinking). Selection of sourcing or sinking configuration depends upon receiver's power supply hookup polarity. Once wired, the unit performs as a solid-state switch. AC Receivers: Solid-state switch offer Light Operate (LO) or Dark Operate (DO) by model								
Output Rating	DC Receivers: 250 mA continuous Output saturation voltage: (PNP & NPN configuration) less than 1 volt at 10 mA; less than 2 volts at 250 mA OFF-state leakage current: less than 10 µA AC Receivers: Max. steady-state load capability is 500 mA Inrush capability: 10 amps for 1 second (non-repeating) OFF-state leakage: current less than 1.7 mA rms ON-state voltage drop: less than 3.5 volts rms across a 500 mA load; less than 5 volts rms across a 15 mA load								
Output Protection Circuitry	Outputs of dc receivers are short circuit protected								
Output Response Time	10 milliseconds ON/OFF								
Repeatability	"A" frequency units: 1 millisecond "B" frequency units: 1.5 milliseconds "C" frequency units: 2.3 milliseconds								
Indicators	Internal Red LED, visible through the lens or from side of the sensor. Emitters: Red "Power ON" indicator LED DC Receivers: Lights whenever receiver sees its modulated light source AC Receivers: Lights whenever receiver's output is conducting								
Construction	Fully epoxy-encapsulated tubular threaded housing, positive sealed at both ends, quad-ring sealed acrylic lens 30 mm diameter 303 stainless steel housing and jam nuts								
Environmental Rating	Exceeds NEMA 6P; IEC IP67 standards								
Operating Conditions	Temperature: –40 to +70 °C Relative humidity: 90% at 50 °C (non-condensing)								
Certifications	CE ® c Sus ECOLAB® Chemical Compatibility Certified								



VSM Series

Self-Contained Metal Sensors

- Heavy-duty, compact, metal sensors that are ideal for use in confined areas.
- Sapphire lens
- Tough 300 series stainless steel body withstands a wide variety of chemicals and cutting fluids
- Smooth barrel models are ideal for hygienic applications that require frequent cleaning
- Advanced optical design provides high performance with repeatable sensing

VSMQ (Flat-Pack, Side-Looker)





					,
Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
DIFFUSE	20-50 mm	2 m	LO	VSMQAN6CV20	VSMQAP6CV20
DIFFUSE	50-140 mm	2 m	LO	VSMQAN6CV50	VSMQAP6CV50
DIFFUSE	90-200 mm	2 m	LO	VSMQAN6CV90	VSMQAP6CV90

VSM4 (4 mm Smooth Barrel)





_ (- /			
Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
OPPOSED	250 mm	2 m	_	VSM46E Emitter	
		3-Pin Pico QD		VSM46EQ7	'Emitter
	250 mm	2 m	DO	VSM4RN6R	VSM4RP6R
		3-Pin Pico QD		VSM4RN6RQ7	VSM4RP6RQ7
DIFFUSE	10-30 mm	2 m	LO	VSM4AN6CV10	VSM4AP6CV10
		3-Pin Pico QD		VSM4AN6CV10Q7	VSM4AP6CV10Q7
DIFFUSE	20-50 mm	2 m	LO	VSM4AN6CV20	VSM4AP6CV20
		3-Pin Pico QD		VSM4AN6CV20Q7	VSM4AP6CV20Q7
DIFFUSE	50-140 mm	2 m	LO	VSM4AN6CV50	VSM4AP6CV50
		3-Pin Pico QD		VSM4AN6CV50Q7	VSM4AP6CV50Q7

Connection options: A model with a QD requires a mating cordset.

VSM5 (5 mm Threaded Barrel)



Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
OPPOSED	250 mm	2 m	-	VSM56E Emitter	
		3-Pin Pico QD		VSM56EQ7 Emitter	
OPPOSED	250 mm	2 m	DO	VSM5RN6R	VSM5RP6R
		3-Pin Pico QD		VSM5RN6RQ7	VSM5RP6RQ7
DIFFUSE	10-30 mm	2 m	LO	VSM5AN6CV10	VSM5AP6CV10
		3-Pin Pico QD		VSM5AN6CV10Q7	VSM5AP6CV10Q7
DIFFUSE	20-50 mm	2 m	LO	VSM5AN6CV20	VSM5AP6CV20
		3-Pin Pico QD		VSM5AN6CV20Q7	VSM5AP6CV20Q7
DIFFUSE	50-140 mm	2 m	LO	VSM5AN6CV50	VSM5AP6CV50
		3-Pin Pico QD		VSM5AN6CV50Q7	VSM5AP6CV50Q7





Connection options: A model with a QD requires a mating cordset.





SMBVSM4

Additional cordsett information is available See page 758

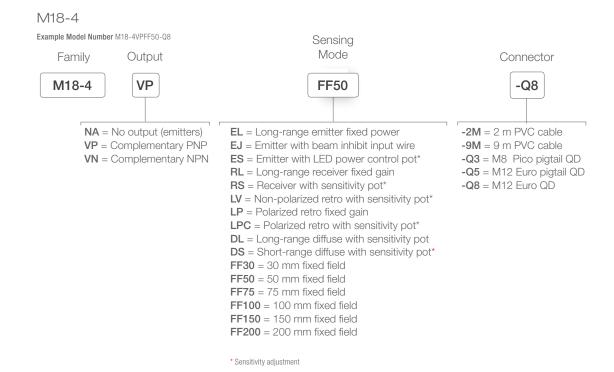
VSM Specifications

VOIVI Opeomodiono			
Supply Voltage and Current	10 to 30 V dc (10% max. ripple)		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Single-output: 1 NPN or 1 PNP, Light Operate (LO) or Dark Operate (DO), depending on model		
Output Rating	100 mA max. OFF-state leakage current: less than 1 μA ON-state saturation voltage: less than 2 V @ 100 mA		
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA		
Response Time	2.5 milliseconds		
Delay at Power-up	20 milliseconds		
Repeatability	1 millisecond		
Indicators	Yellow LED: light sensed		
Construction	300 series stainless steel with PVC cable CV10 & CV20: sapphire lens CV50 & Opposed: Glass lens		
Environmental Rating	IP67		
Connections	2 m PVC-jacketed cable or 3-pin Pico-style integral QD (Q7), depending on model. QD cordsets ordered separately.		
Operating Conditions	Operating temperature: 0° to +55 °C		
Certification	(((h)		

M18-4

Heavy-Duty 18 mm Metal Barrel-Mount

- Chemically robust stainless steel sensors for washdown applications
- Robust housing is sealed against fluid ingress and exposure to harsh chemicals
- Powerful and bright visible red emitter beam for easy alignment and setup
- Highly visible output and dual-function power and stability indicators
- Advanced ASIC technology is resistant to fluorescent light and offers exceptional cross talk immunity
- Robust 250° adjustment potentiometer on select models
- Available in Emitter/Receiver, Polarized Retroreflective, Retroreflective, Diffuse, and Fixed Field models



Connection options: A model with a QD requires a mating cordset.

[†] Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.



Euro-Style Cordsets Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (15') MQDC-430 9 m (30')

M12/Euro-Style Washdown (IP69K) Straight connector models only

4-Pin MQDC-WDSS-0406 2 m (6.5') MQDC-WDSS-0415 MQDC-WDSS-0430 9 m (30')

Additional cordset information is available See page 758







SMB18FA..

See page 790

SMB18A

SMB18SF

Additional bracket information is available See page 725



Additional information is available





Additional information is available See page 816



M18-4 Specifications

Supply Voltage and Current	10 V to 30 V dc for ambient temperature ≤ 55 °C 10 V to 24 V dc for ambient temperature > 55 °C				
Supply Protection Circuitry	Protected against reverse polarity and transient voltages				
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply				
Output Rating	≤ 50 mA total current for ambient temperatures > 55 °C OFF-State Leakage Current: < 50 µA at 30 V dc ≤ 100 mA total current through both outputs ≤ 55 °C ON-State Saturation Voltage: < 1.5 V at 10 mA; < 3.0 V at 100 mA				
Output Protection Circuitry	Protected against false pulse on power-up and continuous short circuit of outputs. Short circuit protection at elevated temperature may require a power cycle to reset.				
Output Response Time	Opposed, Fixed Field: 1.5 milliseconds ON, 1.5 milliseconds OFF Polarized Retroreflective, Retroreflective, Fixed-field and Diffuse: 1.5 milliseconds ON, 0.75 milliseconds OFF Delay on Power-up: 100 milliseconds; outputs do not conduct during this time				
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time				
Repeatability	Opposed: 170 microseconds Polarized Retroreflective, Retroreflective, Diffuse, Fixed Field: 100 microseconds Repeatability and response are independent of signal strength				
Indicators	Three LEDs (1 green, 2 amber) Green solid: indicates power applied and sensor ready Amber solid: indicates Pin 4 (black wire) output conducting Green flashing: indicates marginal sensing signal				
Emitter LED	Visible red				
Construction	Housing: 316L stainless steel Front window: PMMA Indicator windows: Clear polysulfone (PSU) Indicator cover and gain pot driver: Black PSU				
Environmental Rating	IEC 60529 IP67, IP68, and IP69K				
Operating Conditions	Temperature: -40° to +70 °C Relative humidity: 95% at 50 °C (non-condensing)				
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06 in acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)				
Certifications	C E UL				

SPECIAL PURPOSE



Clear Object

Clear object detection sensors reliably and quickly detect clear, transparent and mirror-like surfaces with various visible red laser or ultrasonic sensor models for high precision detection.

Series	Description	Max Sensing Range		Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
STORY	QS18 The QS18E features a polarized coaxial optical design to ensure reliable detection of clear targets and has a fast 400 microsecond response time. page 312		3 m	34.5 x 15 x 31 mm	IP67	ABS	10 to 30 V dc
	Q4X COD The Q4X sensor solves many challenging applications and comes in a rugged IP69K rating with FDA food grade stainless steel casing. page 314		300 mm	44 x 22 x 33 mm	IP67 IP68 IP69K	Stainless Steel	12 to 30 V dc
	QS30 The QS30 reliably detects clear, translucent and opaque objects faster than other clear object detection sensor options. page 316	Retro:	2 m	44 x 22 x 33 mm	IP67	ABS	10 to 30 V dc
	Q26 Coaxial optics enable reliable detection of clear, translucent or opaque objects including mirror-like surfaces. page 318	Coaxial Polar Retro:	800 mm	52.3 x 45 x 25 mm	IP67	ABS	12 to 30 V dc
	OMNI-BEAM Modular self-contained photoelectric sensors can be customized for specific applications and offer reliable clear object detection. page 320	Polar Retro:	4 m	H (varies by model) 44.5 x 54.6 mm	IP66	Thermoplastic polyester	10 to 30 V dc
	MINI-BEAM Universal housing design with 18 mm threaded lens; an ideal replacement for other sensor styles. page 322	Polar Retro:	1 m	33.3 x 12 53.1 mm	IP67	Thermoplastic polyester	10 to 30 V dc

OTHER AVAILABLE MODELS



QS18U page 236



Q4X

page 34



T18U page 226







QM26 page 298



QS18



Clear Object Detection Sensor

- Polarized coaxial optical design ensures reliable detection of transparent, translucent, and opaque targets at any distance between sensor and reflector
- Suitable for low contrast sening application: PET bottles, glass containers, shrink wrap
- Detect surfaces such as: LCD panels with built in polarizing films, solar panels, and semiconductor wafers
- IO-Link option available

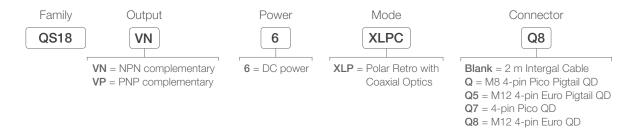
QS18 COD Expert

Example Model Number: QS18EN6XLPCQ8

Family Output Power Mode Connector QS18E **XLPC** Ν 6 Q8 N = NPN6 = DC power XLPC = Polar Retro Blank = 2 m Intergal Cable P = PNPwith Coaxial Q = M8 4-pin Pico Pigtail QD K = IO-LinkQ5 = M12 4-pin Euro Pigtail QD Optics Q7 = 4-pin Pico QD

QS18 COD with Potentiometer

Example Model Number: QS18VN6XLPCQ8



Q8 = M12 4-pin Euro QD

Connection options: A model with a QD requires a mating cordset.

CLEAR OBJECT | TEMPERATURE | HAZARDOUS AREA



Additional cordset information is available See page 758









SMBQ4XFA Includes 3/8" bolt for mounting

SMBQ4XFAM10 Includes 10 mm bolt for mounting

SMBQ4XFAM12 Clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods



Additional information is available See page 790

Additional bracket information is available See page 722

QS18 Clear Object Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24 V dc @ greater than 55° C		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Solid-state NPN (current sinking) or PNP (current sourcing), depending on model Light (LO) or Dark Operate (DO) selectable Selectable 30 millisecond output OFF-delay Rating: 100 mA max. OFF-state leakage current: less than 50 µA @ 30 V dc ON-state saturation voltage: less than 1.5 V (2 m cable); 1.7 V (9 m cable) Protected against false pulse on power-up and continuous overload or short circuit of output		
Output Response Time	400 microseconds ON/OFF		
Delay at Power-up	Momentary delay on power-up; outputs do not conduct during this time		
Repeatability	100 microseconds		
Adjustments	Thresholds: Push-button/remote-wire configurable Expert™-style TEACH and SET options: Light/Dark Operate: selectable by programming order (load output follows the first taught target condition) Push-button enable/disable: remote wire only See datasheet for detailed information		
Indicators	2 LED indicators: Green: RUN mode, output short-circuit Yellow: Output ON/marginal, TEACH mode		
Construction	ABS housing		
Environmental Rating	Meets NEMA 6; IEC IP67; UL Type 1		
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 90% @ 50 °C (non-condensing)		
Certifications	C € c¶us © IO -Link®		



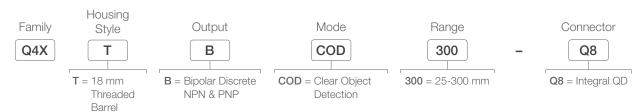


Clear Object Detection Sensor

- A simple user experience from installation to setup
 - Bright spot alignment
 - Three push buttons simplify setup
 - Intuitive menus
- Four-digit display shows percent match
- FDA-grade stainless steel is suitable for IP69K washdown environments

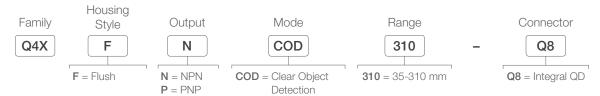
Q4X COD Threaded Barrel

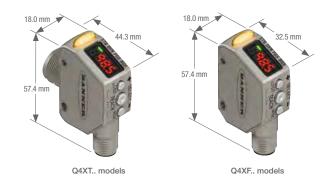
Example Model Number: Q4XTBC0D300-Q8



Q4X COD Flush Mount

Example Model Number: Q4XFNC0D310-Q8





Co

Connection options: A model with a QD requires a mating cordset.

CLEAR OBJECT | TEMPERATURE | HAZARDOUS AREA

MQDC1-506 M12/Euro-Style Straight connector models 2 m (6.5') listed; for right-angle, add RA MQDC1-515 to the end of the model number 5 m (15') (example, MQDC1-506RA) MQDC1-530 9 m (30')

M12/Euro-Style Washdown (IP69K) Straight connector models only

5-Pin MQDC-WDSS-0506 2 m (6.5') MQDC-WDSS-0515 5 m (15') MQDC-WDSS-0530 9 m (30')

Additional cordset information is available See page 758







SMBAMS18P





SMBAMS18RA

SMB46L2



includes 3/8" bolt for mounting

SMBQ4XFAM10 includes 10 mm bolt for mounting

SMBQ4XFAM12

clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

Additional bracket information is available See page 722

Q4X Specifications

Supply Voltage and Current 10 to 30 V dc Laser Characteristics Wavelength: Class 1 Laser: 655 nm visible red Beam Spot Size Distance (mm) Size (Horizontal x Vertical) 25/35 2.4 mm x 1.0 mm 50/60 2.32mm x 0.9 mm 100/110 1.8 mm x 0.7 mm Output Response Time User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 msw Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card) Response Speed (ms) 25/35 mm 300/310 mm
Distance (mm) Size (Horizontal x Vertical) 25/35 2.4 mm x 1.0 mm 50/60 2.32mm x 0.9 mm 100/110 1.8 mm x 0.7 mm Output Response Time User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 msw Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card)
25/35 2.4 mm x 1.0 mm 50/60 2.32mm x 0.9 mm 100/110 1.8 mm x 0.7 mm
25/35 2.4 mm x 1.0 mm 50/60 2.32mm x 0.9 mm 100/110 1.8 mm x 0.7 mm Output Response Time User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 msw Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card)
50/60 2.32mm x 0.9 mm 100/110 1.8 mm x 0.7 mm
Output Response Time User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 msw Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card)
Output Response Time User selectable: 50 ms, 25 ms, 10 ms, 3 ms and 1.5 msw Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card)
Excess Gain HIGH Excess Gain (STANDARD Excess Gain) Excess Gain (90% white card)
Excess Gain (90% white card)
Pagagaga Spaced (mg) 25/35 mm 300/310 mm
nesponse speed (ilis) 25/55 filli 500/516 filli
1.5 200 20
3 200 20
10 1000 (500) 100 (50*)
25 2500 (1000) 250 (100*)
50 5000 (2500) 500 (250*)
Construction Housing 316 L stainless steel; PMMA acrylic lens cover, Polysulfone lightpipe and display window
Ambient Light Immunity Greater than 5000 lux
Environmental Rating IP67 per IEC60529; IP68 per IEC60529; IP69K per DIN40050-9
Operating Conditions Temperature: -10 to +55 °C Humidity: 35% to 95% relative humidity
Certifications
C E CYLAB





Right-Angle Clear Object Detection Sensors

- The QS30 reliably detects clear, translucent and opaque objects faster than other clear object detection sensor options
- Three selectable thresholds based on type of target being detected
- Easy configuration of sensor via push buttons or remote wire
- Rugged housing rated to IP67 NEMA 6

QS30 Expert™, 10-30 V DC



Sensing Mode	Laser Class	Range	Connection	Model Bipolar NPN/PNP
CLEAR OBJECT		100 mm to 0 mt	2 m	QS30ELVC
RETRO	_	100 mm to 2 m†	5-pin Euro QD	QS30ELVCQ

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30ELVC W/30). † BRT-2X2LVC and BRT40X19A retroreflectors are included with sensor.

CLEAR OBJECT | TEMPERATURE | HAZARDOUS AREA



Euro-Style Cordsets Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC1-506RA)

5-Pin MQDC1-506 2 m (6.5') MQDC1-515 5 m (15') MQDC1-530 9 m (30')

Additional cordset information is available See page 758



SMB30A







SMBQS30L

SMBQS30YL

SMBQS30Y

Additional bracket information is available See page 722



Additional information is available See page 790





Additional information is available See page 816



Retroreflective Expert Models Suffix ELVC

OS30 Expert™ Specifications

Application Note Certification	If supply voltage is > 24 V dc, derate maximum output current 1 mA/°C above 25° C	
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz max., double amplitude 0.06-inch acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half-sine wave.	
Operating Conditions	Temperature: -10 to +55 °C Relative humidity: 95% @ 55 °C (non-condensing)	
Environmental Rating	IEC IP67 (NEMA 6); PW12 1200 PSI washdown	
Construction	PC/ABS housing with acrylic lens cover	
	See data sheet for more detailed information	
Indicators	2 LEDs: Green: Power ON Yellow: Output conducting	
Adjustments	2 push buttons and remote wire for TEACH programming and configuration See data sheet for detailed information	
Repeatability	150 microseconds	
Delay at Power-up	250 milliseconds; outputs do not conduct during this time	
Output Response Time	500 microseconds	
Output Configuration	Bipolar: One NPN (current sinking) and one PNP (current sourcing); Light Operate (LO) or Dark Operate (DO) configurable	
Supply Protection Circuitry	Protected against reverse polarity; over voltage and transient voltages	
Sensing Beam	660 nm visible Red	
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages and false pulse on power-up	
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load	

Q26



Clear Object Sensors

- Coaxial optics enable reliable detection of clear, translucent or opaque objects including mirror-like surfaces
- Simple setup with a single turn sensitivity adjustment potentiometer
- Compact design ideal when space is limited
- Rugged ABS housing with glass window

Q26

	Sensing Mode	Range	Connection	Models NPN	Models PNP
COAXIAL	5-800 mm sensor to	4-pin Pico QD	Q26NXLPQ7	Q26PXLPQ7	
	POLAR RETRO	reflector distance with no detection	4-pin Euro Pigtail QD	Q26NXLPQ5	Q26PXLPQ5

Connection options: A model with a QD requires a mating cordset.

For a 9 m cable, add suffix W/30 to the 2 m model number (example, Q26NXLPQ7 W/30)

CLEAR OBJECT

TEMPERATURE

HAZARDOUS AREA



Euro-Style Cordsets

Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (151) MQDC-430 9 m (30')

Used with: Q models

Pico-Style Cordsets Straight connector models listed; for right-angle, replace the G with a W in the model number (example, PKW4M-2)

4-Pin PKG4M-2 2 m (6.5') PKG4M-5 5 m (15') PKG4M-9 9 m (30')

Used with: Q7 models

Additional cordset information is available See page 758





SMBLSTDLQ26

SMBLSTQ26

Additional bracket information is available See page 725





Additional information is available See page 790

Apertures



Additional information is available See page 816



Q26 Specifications

Supply Voltage and Current	12 to 30 V dc (10% maximum ripple within specified limits); supply current (exclusive of load current): 15mA		
Supply Protection Circuity	Protected against reverse polarity and transient voltages		
Output Configuration	Primary output (pin 2) NPN or PNP (current sinking or sourcing), depending on model; second output (pin 4) is a Health mode output		
Output Rating	100 mA max OFF-state leakage current: less than 1 microamp @ 30 V dc ON-state saturation voltage: less than 1 V @ 10 mA dc; less than 1.5 V @ 150 mA dc		
Output Protection Circuitry	Protected against false power-up and continuous overload or short circuit of outputs		
Output Response Time	250 μS ON and OFF		
Repeatability	50 microseconds		
Indicators	Green steady: Power ON Yellow steady: Output conducting		
Construction	ABS plastic housing; glass window		
Operating Conditions	Temperature: −10 ° to +55 °C Relative Humidity: 90% at 50 °C; non-condensing		
Environmental Rating	Leakproof design rated IP67		
Vibration and Shock	EN60068-2-6 and EN60068-2-27		
Certifications	C € c∰us		

Visible Red LED





Rectangular Modular Sensors

- Modular self-contained photoelectric sensors can be customized for specific applications and offer reliable clear object detection
- Includes a sensor head and power block with optional timing logic module
- Offers interchangeable AC or DC power blocks
- Features exclusive multiple-LED system that display received signal strength, sensing contrast and seven different warnings

Sensor Head Sensor Head Timing/Logic Module Power Block

STEP 1: Choose a power block for the required sensor power (ac or dc) and interface.

STEP 2: Choose an timing logic module (Optional)

STEP 3: Plug and bolt components together without interwiring.

OMNI-BEAM modular components are sold separately. The three modular components, and the lenses, can be replaced in the field.

OMNI-BEAM™ Sensor Heads

				,
Sensing Mode	Range	Supply Voltage	Response & Repeatability	Models
POLAR RETRO	4 m [†]	Provided by Power Block	Response: 4 ms Repeatability: 0.2 ms	OSBLVAGC

OMNI-BEAM™ Power Blocks

Connection	Supply Voltage	Output Type	Models
2 m		Bi-Modal™	OPBT2
4-Pin Mini QD	10-30 V dc	NPN or PNP	OPBT2QD
4-Pin Euro QD		Two outputs: Load and Alarm	OPBT2QDH
2 m			OPBTE
4-Pin Mini QD	10-30 V dc	No output: for powering emitter-only sensor heads	OPBTEQD
4-Pin Euro QD		possessing essential conference control of the c	OPBTEQDH
2 m	105-130 V ac		OPBA2
5-Pin Mini QD	100 100 v 40	SPST solid-state ac relay	OPBA2QD
2 m	210-250 V ac	Two outputs: Load and Alarm	OPBB2
5-Pin Mini QD	210-230 V ac		OPBB2QD
2 m	105-130 V ac		OPBAE
5-Pin Mini QD	100-130 v ac	No output: for powering emitter only sensor heads	OPBAEQD
2 m	210-250 V ac		OPBBE
5-Pin Mini QD	210-200 V ac		OPBBEQD

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

NOTE: Sensor heads require a power block.

OMNI-BEAM™ Timing Logic Modules

Туре	Logic Function	Timing Ranges	Models
Delay Timer Logic Module	ON-DELAY or OFF-DELAY or ON/OFF DELAY	ON-Delay: 0.01-1 sec., 0.15-15 sec., or none OFF-Delay: 0.01-1 sec., 0.15-15 sec., or none	OLM5
Pulse Timer Logic Module	ONE-SHOT pulse timer or DELAYED ONE-SHOT logic timer	Delay: 0.01-1 sec., 0.15-15 sec., or none Pulse: 0.01-1 sec., 0.15-15 sec.	OLM8
For information on Timing Diagrams, see data sheet			



Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, OPBT2 W/30).

Euro-Style Cordsets Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDC-406RA)

4-Pin MQDC-406 2 m (6.5') MQDC-415 5 m (151) MQDC-430 9 m (30')



4-Pin MBCC-406 2 m (6.5') MBCC-415 5 m (15') MBCC-430 9 m (30')

5-Pin MBCC-506 2 m (6.5') MBCC-515 5 m (15') MBCC-530 9 m (30')

Additional cordset information is available See page 758



SMB30A



SMB30FA..



SMB30SC

Reflectors



Additional information is available See page 790

Additional bracket information is available See page 737

OMNI-BEAM™ Specifications

See website for more details www.bannerengineering.com

BARCODE READERS

REGISTRATION, COLOR & LUMINESCENCE

STAINLESS STEEL



MINI-BEAM®

Clear Object Sensor with Mounting Versatility

- Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles. Available in eight modes with a compact housing for limited space setups
- Versatile sensor with several mounting options
- Meets IP67 and NEMA 6 standards for harsh environment
- Universal housing design

MINI-BEAM® Expert, 10-30 V DC



Sensing Mode	Range	Connection	Output	Models
CLEAR OBJECT POLAR RETRO	1 m	2 m	SME Bipolar NPN/PNP	SME312LPC*
	1 111	5-Pin Euro QD		SME312LPCQD*

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, SME312D W/30).

* NOTE: For clear object detection, sensing range varies, according to the efficiency and reflective area of the retroreflector(s) used.

For these low-contrast applications, the model BRT-2X2 reflector is recommended and is included with each SME312LPC(QD) sensor.

- For applications with high vibration, the model BRT-51X51BM, with its micro-prism geometry, is recommended.
- For long-range applications, the BRT-77X77C reflector provides a range up to 2 m.
- $\bullet \ \ \text{SME312LPC} (\text{QD}) \ \text{are for use with corner cube type reflectors only; reflective tape is not recommended.} \\$



Euro-Style Cordsets Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDC-406RA)

MQDC1-506 MQDC1-515 MQDC1-530 9 m (30')

Additional cordset information is available See page 758



SMB18A



SMB18FA..



SMB18SF





SMB312B SMB3018SC

Additional bracket information is available See page 722



MINI-BEAM dc Suffix EPD and RPD

Reflectors



Additional information is available See page 790

MINI-BEAM® Expert™ Specifications

= = =			
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 45 mA, exclusive of load		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor Configuration in TEACH sequence for Light Operate (LO) or Dark Operate (DO)		
Output Rating	150 mA max. each output at 25 °C, derated to 100 mA at 70 °C (derate \approx 1 mA per °C) OFF-state leakage current: less than 5 μ A @ 30 V dc Output saturation voltage (PNP output): less than 1 V at 10 mA and less than 2 V at 150 mA Output saturation voltage (NPN output): less than 200 mV at 10 mA and less than 1 V at 150 mA		
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs		
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 500 microseconds or longer duration, 1 kHz max.		
Delay at Power-up	1 second; outputs do not conduct during this time		
Repeatability	100 microseconds (all models)		
Adjustments	Push-button TEACH mode sensitivity setting; remote TEACH mode input is provided (gray wire)		
Indicators	Two LEDs: Yellow and Bicolor Green/Red Green: power ON Red: OFF when no signal is received Yellow (TEACH Mode): ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition Yellow (RUN Mode): ON when outputs are conducting See data sheet for more detailed information		
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring seal, acrylic lenses, and stainless steel screws		
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67		
Operating Conditions	Temperature: -20 to +70 °C Relative humidity: 90% at 50 °C (non-condensing)		
Application Notes	The first condition presented during TEACH mode becomes the output ON condition		
Certifications	C E c Tus		



Temperature

Temperature sensors are passive, non-contact sensors that are able to detect a change as small as 3 $^{\circ}\mathrm{C}.$

Series	Description	Temperature Measurement Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	M18T A small, self-contained design with easy to use TEACH mode programming. page 326	0 to 300 °C	H (varies by model) ø18 mm	IP67	304 Stainless Steel	10 to 30 V dc

OTHER AVAILABLE MODELS



M18T



Rugged Temperature Sensors

- The M18T has a small, self-contained design and has easy-to-use TEACH mode programming
- Rugged, encapsulated design for harsh environments
- Remote Teach available in both Static and Dynamic modes

Discrete M18T, 10-30 V DC

Sensing Mode	D:S Ratio*	Sensing Face	Connection	Output	Models
	8:1 Integrated lens	Integrated lane	2 m	Bipolar	M18TB8
		5-Pin Euro QD	(NPN and PNP)	M18TB8Q	
	C-1	Enclosed plastic face	2 m	Bipolar	M18TB6E
TEMPERATURE	6:1	(for food industry use)	5-Pin Euro QD	(NPN and PNP)	M18TB6EQ
TEMPERATURE	14:1	Camaanium lana	2 m	Bipolar	M18TB14
	14:1 Germanium lens	5-Pin Euro QD	(NPN and PNP)	M18TB14Q	

Analog M18T, 12-30 V DC

Sensing Mode	D:S Ratio*	Sensing Face	Connection	Output	Models
	8:1	Integrated lens	2 m 5-Pin Euro QD	0 to 10 V dc analog, plus PNP Alarm	M18TUP8
		Enclosed plastic face	2 m	0 to 10 V dc	M18TUP6E
	6:1	(for food industry use)	5-Pin Euro QD	analog, plus PNP Alarm	M18TUP6EQ
	14.1	Germanium lens	2 m	0 to 10 V dc	M18TUP14
	14:1	Germanium iens	5-Pin Euro QD	analog, plus PNP Alarm	M18TUP14Q
TEMPERATURE	8:1	late meta di laca	2 m	4 to 20 mA analog,	M18TIP8
TEMPERATURE	0.1	Integrated lens	5-Pin Euro QD	plus PNP Alarm	M18TIP8Q
	6:1	Enclosed plastic face (for food industry	2 m	4 to 20 mA analog,	M18TIP6E
	0.1	use)	5-Pin Euro QD	plus PNP Alarm	M18TIP6EQ
	14:1	Germanium lens	2 m	4 to 20 mA analog,	M18TIP14
	17.1	Gormaniani IGIIS	5-Pin Euro QD	plus PNP Alarm	M18TIP14Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18TB8 W/30). * For D:S ratio information see page 327



5-Pin MQDEC2-506 2 m (6.5') MQDEC2-515 5 m (15') MQDEC2-530 9 m (30')

Additional cordset information is available See page 758





SMB18A

SMB18SF

Additional bracket information is available See page 723



M18T Specifications

Supply Voltage and Current	Discrete models: 10 to 30 V dc (10% max. ripple) Analog models: 12 to 30 V dc (10% max. ripple)											
Supply Protection Circuitry	Protected	Protected against short circuit conditions										
Output Rating	Analog Voltage: 2.5 kΩ minimum load resistance Analog Current: 1 kΩ max. @ 24 V input; max. load resistance = [(Vcc -4)/0.02]Ω For current output (4-20mA models): Ideal results are achieved when the total load resistance R = [(Vin - 4)/0.02] Ω Example, at Vin = 24 V dc, R ~= 1kΩ (1 watt) Alarm: Off-state leakage: < 10 microamps; Saturation: < 1.2 V @ 10 mA and < 1.6 V @ 100 mA											
Output Protection Circuitry	Protected	against f	alse pulse	e on powe	er-up and	continuo	us overloa	d or short	-circuit of	outputs		
Sensing Field of View	Distance from Sensor Face Versus Sport Size											
	D:S ratio	100	200	300	400	500	600	700	800	900	1000	Distance (mm)
	6:1	17	33	50	67	83	100	117	133	150	167	
	8:1	13	25	38	50	63	75	88	100	113	125	Spot size (mm)
	14:1	7	14	21	39	36	43	50	57	64	71	
Construction	Threaded Push Butt Push Butt	on Hous	sing: ABS									
Environmental Rating	IEC IP67; I	NEMA 6										
Operating Conditions	Temperati	ure: -20	to +70 °C									
Certification	CE	(ne model		Certification C F							



Hazardous Area

Sensors for hazardous areas are ideal for environments or locations with possibility of fire or explosion. Extensive approvals ensure sensors are safe to use in classified areas or zones.

Series	Description	Max Sensing Range		Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	MINI-BEAM® NAMUR Ideal for hazardous environments with approved switching amplifiers that have intrinsically safe input circuits. page 330	Opposed: Retro: Retro Polarized: Convergent: Diffuse: Glass/Plastic Fiber:	6 m 5 m 2 m 43 mm 380 mm Varies	30.7 x 12.2 x 66 mm	IP67	Thermoplastic Polyester	5 to 15 V dc
	Q45 NAMUR A specialized sensor for explosive environments meeting intrinsically safe standards to ensure it is safe for use in hazardous areas. page 336	Opposed: Retro: Retro Polarized: Convergent: Diffuse: Glass/Plastic Fiber:	6 m 9 m 6 m 100 mm 1 m Varies	87.6 x 44.5 (D varies by model)	IP67	Thermoplastic Polyester	5 to 15 V dc
	SMI30 An extremely rugged and powerful intrinsically safe barrel sensor designed for the most demanding hazardous area sensing applications. page 338	Opposed:	140 m	ø30 x 102 mm	IP67	Thermoplastic Polyester	10 to 30 V dc



MINI-BEAM® NAMUR

Compact Sensors for Hazardous Areas

- The MIAD9 series NAMUR models are ideal for hazardous environments with approved switching amplifiers that have intrinsically safe input circuits
- Available in opposed, retroreflective, convergent, diffuse and fiber optic modes
- Infrared or visible red sensing beam
- Industry standard mounting holes

Opposed MINI-BEAM®

Infrared LED

Sensing Mode	Range	Connection	Output	Models
	6 m	2 m	_	MI9E Emitter
OPPOSED	OIII	4-Pin Euro QD		MI9EQ Emitter
	6 m	2 m	Constant Current: ≤1.2 mA dark	MIAD9R
OPPOSED	0111	4-Pin Euro QD	≥2.1 mA light	MIAD9RQ

Retro & Polar Retro MINI-BEAM®

→ Visible Red LED

Sensing Mode	Range	Connection	Output	Models
$\longrightarrow \{$	5 m	2 m	Constant Current: ≤1.2 mA dark	MIAD9LV
RETRO	5111	4-Pin Euro QD	≥2.1 mA light	MIAD9LVQ
P	E0 mm 0 m	2 m	Constant Current: ≤1.2 mA dark	MIAD9LVAG
POLAR RETRO	50 mm - 2 m	4-Pin Euro QD	≥2.1 mA light	MIAD9LVAGQ

For more specifications see page 333

Connection options: A model with a QD requires a mating cordset (see page 332).

For 9 m cable, add suffix W/30 to the 2 m model number (example, MIAD9LV W/30).

Convergent MINI-BEAM®



Sensing Mode	Range	Connection	Output	Models
		2 m	Constant Current: ≤1.2 mA dark	MIAD9CV
CONVERGENT	16 mm	4-Pin Euro QD	≥2.1 mA light	MIAD9CVQ
	40	2 m	Constant Current: ≤1.2 mA dark	MIAD9CV2
CONVERGENT	43 mm	4-Pin Euro QD	≥2.1 mA light	MIAD9CV2Q

Diffuse MINI-BEAM®



Sensing Mode	Range	Connection	Output	Models
	000	2 m	Constant Current: ≤1.2 mA dark	MIAD9D
DIFFUSE	380 mm	≤1.2 mA dark 4-Pin Euro QD ≥2.1 mA light		MIAD9DQ
	75	2 m	Constant Current: ≤1.2 mA dark	MIAD9W
DIVERGENT DIFFUSE	75 mm	4-Pin Euro QD	≥2.1 mA light	MIAD9WQ

MINI-BEAM® NAMUR



Sensing Mode	Range	Connection	Output	Models
	Range varies by sensing mode and fiber	2 m	Constant Current: ≤1.2 mA dark	MIAD9F
GLASS FIBER	optics used	4-Pin Euro QD	≥2.1 mA light	MIAD9FQ

For more specifications see page 333.

Connection options: A model with a QD requires a mating cordset (see page 332). For 9 m cable, add suffix W/30 to the 2 m model number (example, MIAD9LV W/30).

REGISTRATION, COLOR & LUMINESCENCE



for right-angle, add RA to the end of the model number (example, MQD9-406RA)

4-Pin MQD9-406 2 m (6.5') MQD9-415 5 m (15')

Additional cordset information is available See page 758







SMB312B

SMB312PD SMB18FA

Additional bracket information is available See page 722





Additional information is available See page 821

Apertures



Additional information is available See page 816



MINI-BEAM® NAMUR Retroreflective, Diffuse and Convergent Models Suffix E, R, LV, D and CV

MINI-BEAM® NAMUR Specifications

Supply Voltage	5 to 15 V dc (provided by the amplifier to which the sensor is connected)				
Output	Constant current output: ≤ 1.2 mA in the "dark" condition and ≥ 2.1 mA in the "light" condition				
Output Response Time	Opposed receiver: 2 milliseconds ON/400 microseconds OFF All others: 5 milliseconds ON/OFF (does not include amplifier response)				
Adjustments	GAIN (sensitivity) adjustment potentiometer				
Indicators	Red LED Alignment Indicator Device (AID) located on rear panel lights when the sensor sees a "light" condition; pulse rate is proportional to signal strength (the stronger the signal, the faster the pulse rate).				
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses and stainless steel screws				
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12 and 13; IEC IP67				
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 90% at 50 °C (non-condensing)				
Design Standards	MIAD9 Series sensors comply with the following standards: DIN 19 234, EN 50 014 Part 1. 1977, EN50 020 Part 7. 1977, Factory Mutual #3610 and 3611, CSA 22.2 #157-92 and 22.2 #213-M1987				
Certifications	CE KEMA FM B B				

APPROVALS

CSA: #LR 41887 Instrinsically Safe, with Entity for:

Class I, Groups A-D Class I, Div. 2, Groups A-D **FM:** #J.I. 5Y3A4.AX

Intrinsically Safe, with Entity for: Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G

KEMA: #03ATEX1441X II IG EEx ia IIC T6 ETL: #553868



Q45 NAMUR

Rectangular Sensors for Hazardous Areas

- The Q45 NAMUR is a specialized sensor for explosive environments meeting intrinsically safe standards to ensure it is safe for use in hazardous areas
- Intrinsically safe dc models for potentially explosive environments
- For use with approved DIN 19 234 switching amplifiers

Opposed Q45, 5-15 V DC



Sensing Mode	Range	Connection	Output Type	Models
OPPOSED	6 m	2 m		Q459E Emitter
		4-Pin Euro QD	Constant Current ≤1.2 mA dark	Q459EQ Emitter
		2 m	≥2.1 mA light	Q45AD9R
		4-Pin Euro QD		Q45AD9RQ

Retro & Polar Retro Q45, 5-15 V DC



Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models
RETRO	9 m†	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9LV Q45AD9LVQ
	6 mt	2 m	Constant Current	Q45AD9LP
POLAR RETRO	6 m ^t	4-Pin Euro QD	≤1.2 mA dark ≥2.1 mA light	Q45AD9LPQ

For more specifications see page 337.

Connection options: A model with a QD requires a mating cordset (see page 336).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q459E W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

Diffuse Q45, 5-15 V DC



Sensing Mode	Range	Connection	Output Type	Models
DIFFUSE	300 mm	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9DQ
LONG-RANGE	1 m	2 m	Constant Current ≤1.2 mA dark	Q45AD9DL
DIFFUSE		4-Pin Euro QD	≥2.1 mA light	Q45AD9DLQ

Convergent Q45, 5-15 V DC



Sensing Mode	Range	Connection	Output Type	Models
CONVERGENT	38 mm	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9CVQ
	100 mm	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9CV4 Q45AD9CV4Q

Glass & Plastic Fiber Q45, 5-15 V DC



Sensing Mode	Range	Connection	Output Type	Models
GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9F Q45AD9FQ
GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9FV Q45AD9FVQ
PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9FP Q45AD9FPQ

Connection options: A model with a QD requires a mating cordset (see page 336).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q459E W/30).



4-Pin

Euro-Style NAMUR
Straight connector models listed;
for right-angle, add RA to the end
of the model number (example,
MQD9-406RA)

MQD9-406 2 m (6.5') MQD9-415 5 m (15')





SMB30MM

SMB30SC

Additional cordset information is available See page 758 Additional bracket information is available See page 722







Opposed, Retroreflective and Diffuse Models Suffix E, R, D, DL, LV and LP



Convergent Models Suffix CV and CV4



Plastic Fiber Model Suffix FP



Glass Fiber Models Suffix F and FV

Q45 NAMUR Specifications

Supply Voltage and Current	5 to 15 V dc. Supply voltage is provided by the amplifier to which the sensor is connected.		
Output	Constant current output: ≤ 1.2 mA in the dark condition and ≥ 2.1 mA in the light condition		
Output Response Time	Opposed receiver: 2 milliseconds ON/0.4 milliseconds OFF All others: 5 milliseconds ON/OFF (does not include amplifier response)		
Adjustments	Multi-turn sensitivity control on top of sensor		
Indicators	Power (Red): LED (emitters only) lights whenever 5 - 15 V dc power is applied Signal (Red): LED lights whenever the sensor sees its modulated light source		
Construction	Molded thermoplastic polyester housing, o-ring sealed transparent Lexan® top cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.		
Environmental Rating	IP67; NEMA 6P		
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 90% at 50 °C (non-condensing)		
Design Standards	Q45AD9 Series sensors comply with the following standards: DIN 19234, EN 50 014: 1977, EN 50 020: 2002		
Certifications	CE BEXIA KEMA PPROVED		

Lexan® is a registered trademark of General Electric Co.

APPROVALS

CSA: #LR 41887 Intrinsically Safe, with Entity for Class I, Groups A-D

Class I, Div. 2, Groups A-D

FM: #J.I. 5Y3A4.AX Intrinsically Safe, with Entity for

Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G **KEMA**: #03 ATEX 1441x

II IG EEx ia IICTC

ETL: #558044 Tested per FM and CSA as shown above

SMI30



Long-Range Barrel Sensors for Hazardous Areas

- The SMI30 is an extremely rugged and powerful intrinsically safe barrel sensor designed for the most demanding hazardous area sensing applications
- Certified as intrinsically safe for use in hazardous atmospheres as defined by Article 500 of the National Electrical Code, when used with approved "positive input" intrinsic safety barriers
- Certified by Factory Mutual and CSA as non-incendive devices when used in Division 2 locations (except Groups E and F) without intrinsic safety barriers

SMI30 Frequency A[†]



Sensing Mode	Range	Connection	Output Type	Response Time	Models
			_		SMI306EQ
	140 m	3-Pin Mini QD	NPN/LO	10 ms	SMI30AN6RQ
OPPOSED			NPN/DO		SMI30RN6RQ
			_		SMI306EYQ
	60 m	3-Pin Mini QD	NPN/LO	1 ms	SMI30AN6RYQ
OPPOSED			NPN/DO		SMI30RN6RYQ

Intrinsic Safety Kits for Use with SMI30 Intrinsically Safe Sensors

Model	Description
CI2BK-1	Includes a CI3RC2 current amplifier, one RS-11 socket, one DIN-rail mount and one single-channel intrinsically safe barrier
CI2BK-2	Includes a Cl3RC2 current amplifier, one RS-11 socket, one DIN-rail mount and one dual-channel intrinsically safe barrier
CI3RC2	Current trip point amplifier
CIB-1	Single channel intrinsic safety barrier
Cl2B-1	Dual channel intrinsic safety barrier

Connection options: A model with a QD requires a special Mini-style mating cordset.

† Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" at the end of the standard model number (example, SMI306EBQ or SMI306ECQ).

TEMPERATURE HAZARDOUS AREA



Mini-Style Straight connector models listed

3-Pin SMICC-306 2 m (6.5') SMICC-312 4 m (12') SMICC-330 9 m (30')

4-Pin MBCC-406 2 m (6.5') MBCC-412 4 m (12') MBCC-430 9 m (30')

Additional cordset information is available See page 758







SMB30A

SMB30FA..

SMBAMS30P

Additional bracket information is available See page 724



Additional information is available See page 790





Additional information is available See page 816



SMI30 Specifications

Siviloo opecilication			
Supply Voltage and Current	Emitters: 10 to 30 V dc at 25 mA Receivers: 10 to 30 V dc at 15 mA max. Division 1 use, with barriers, requires minimum system supply voltage of 10 V.		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	Receivers: Current sinking NPN open-collector transistor		
Output Rating	Three-wire hookup sinks 15 mA max. continuous, 10 to 30 V dc. Two-wire hookup sinks ≤10 mA		
Output Protection Circuitry	Outputs are short circuit protected		
Output Response Time	10 milliseconds or 1 millisecond ON/OFF, depending on models; independent of signal strength		
Repeatability	"A" frequency units: 10 millisecond receiver is 1 milliseconds and 1 millisecond receiver is 360 microseconds "B" frequency units: 1.6 milliseconds "C" frequency units: 10 millisecond receiver is 2.3 milliseconds and 1 millisecond receiver is 210 microseconds Repeatability is independent of signal strength		
Indicators	Internal Red LED lights whenever the receiver sees the emitter's modulated light source. Emitters have Red "power on" indicator LED. All indicator are visible through the lens or from side of the sensor.		
Construction	30 mm diameter tubular threaded thermoplastic polyester housing, fully epoxy-encapsulated, positive sealing at both ends, quad-ring sealed acrylic lens. Two thermoplastic polyester jam nuts provided.		
Environmental Rating	IP67; NEMA 6P		
Operating Conditions	Temperature: -40 to +70 °C Relative humidity: 90% at 50° C (non-condensing)		
Certifications	CE ® Exia KEMA FM		
Hookup Diagrams	See data sheet for detailed Hookup Diagrams.		