MIDSIZE SENSORS

WORLD-BEAM® QS30

S30

SM30/SMI30

T30

Q40

PicoDot®

QM42/QMT42

WORLD-BEAM® QS30 page 150

- Universal housing with 30 mm threaded lens or side mount
- High-power opposed sensing available with some models
- Popular dc or ac/dc universal power supply options
- *Expert*™ models with push-button TEACH-mode setup
- Models to detect water, or liquids that contain water
- New models for reliable clear object detection

S30 page 161

- EZ-BEAM® technology for reliable sensing without adjustments
- 30 mm plastic threaded barrel sensor in opposed, retroreflective and fixed-field modes
- Completely epoxy encapsulated
- Models for ac or dc power

SM30/SMI30 page 166

- Economical, easy-to-use opposed-mode barrel sensors
- Models certified as intrinsically safe for use in hazardous atmospheres
- Quad-ring sealed lens to eliminate capillary leakage
- Very high excess gain; 200 m sensing range

T30 page 170

- Right-angle T-style housing with 30 mm threaded lens
- Completely epoxy encapsulated
- Models for ac or dc power and bus network compatible connection
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

Q40 page 175

- Rectangular 40 mm plastic housing with 30 mm threaded mounting base in opposed, retroreflective and fixed-field modes
- Models for ac or dc power
- Completely epoxy encapsulated
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

PicoDot® Lasers page 179

- Convergent and retroreflective mode laser sensors for accurate position detection, inspection or counting
- Convergent models with precise 0.25 mm focus point beam width and background suppression
- Retroreflective models for sensing small objects at close range or larger objects to 10.6 m

QM42/QMT42 page 183

- Rugged low-cost dc sensor in die-cast housing
- Outstanding immunity to noise
- Opposed, retroreflective, diffuse, fixed-field, adjustable-field and plastic fiber models

SENSORS

WORLD-BEAM®
QS30 Right-Angle Barrel- & Side-Mount Sensors

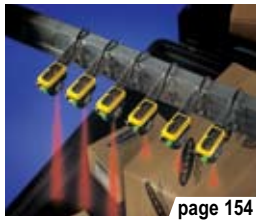
- Innovative housing design with 30 mm threaded lens or side mounts to suit almost any mounting requirement
- Available in opposed, high-power opposed, polarized and non-polarized retroreflective, diffuse, laser, and fixed-field and adjustable-field sensing modes
- High-power sensing with ranges up to 213 m
- Class 1 visible laser in diffuse and retroreflective models and Class 2 in diffuse models for small object detection and precise position control
- Specialized models for reliable detection of water or liquids containing water, and for clear object detection
- Easy push-button *Expert*™ configuration in laser, clear object detection and visible red diffuse models
- Models with dc supply or ac/dc supply voltage
- Light- or dark-operate selectable or configurable, depending on model
- IP67 or IP69K environmental rating, depending on model

ACCESSORIES page 157
OPPOSED WATER DETECTION
OPPOSED
RETRO
POLAR RETRO
LASER POLAR RETRO
CLEAR OBJECT POLAR RETRO
DIFFUSE
DIFFUSE LASER
FIXED-FIELD
ADJUSTABLE-FIELD

page 151

QS30

- Available in opposed, polarized and non-polarized retroreflective, and diffuse sensing modes
- Precise background and foreground suppression models
- Ranges up to 213 m
- High-power opposed and water detecting models
- Large bright output state indicator



page 154

QS30 *Expert*™

- Visible red LED or laser for easy alignment
- Models for reliable clear object detection
- Push-button configuration
- 8-segment LED bargraph for easy setup

page 154

QS30 Lasers

- High-performance sensing with visible Class 1 and Class 2 lasers
- Available in diffuse or retroreflective sensing modes
- Visible beam for easy alignment and long-range sensing
- Convenient push-button TEACH or SET programming
- 8-segment LED bargraph for easy setup

page 152

QS30 Adjustable-Field

- Background suppression models for detection of objects when background condition is not fixed
- Foreground suppression models for detection when background is fixed and object varies in color or shape
- Fluorescent light and crosstalk immunity for reliable sensing
- Long range for reliable sensing up to 600 mm
- Accurate and reliable even with low-reflectivity targets

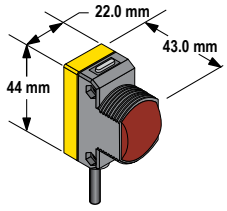
page 156

QS30 Universal Voltage

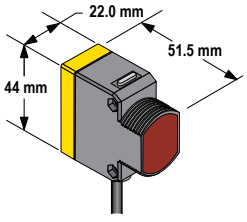
- Universal voltage for use anywhere regardless of supply voltage
- Available in opposed, retroreflective and fixed-field sensing modes
- Operation from 12 to 250V dc or 24 to 250V ac
- Convenient SPDT electromechanical relay to switch up to 5 A

WORLD-BEAM® QS30 DC Sensors

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



Opposed High-Power Models
Suffix EX and RX

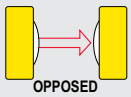
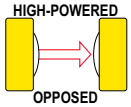
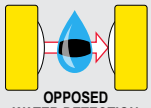
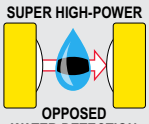
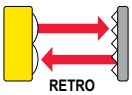
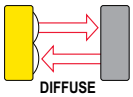


Opposed Water Detector and Adjustable-field Models
Suffix H2O and AFF

ONLINE
AUTOCAD, STEP, IGES & PDF

WORLD-BEAM® QS30, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Model	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	—	QS30E Emitter	EGC-1 (p.158)	BP-1 (p. 159)
		5-pin Euro QD		QS30EQ Emitter		
		2 m	Bipolar NPN/PNP	QS30R		
		5-pin Euro QD		QS30RQ		
 HIGH-POWERED OPPOSED	213 m	2 m	—	QS30EX Emitter	EGC-2 (p. 158)	BP-2 (p. 159)
		5-pin Euro QD		QS30EXQ Emitter		
		2 m	Bipolar NPN/PNP LO	QS30ARX		
		5-pin Euro QD		QS30ARXQ		
		2 m	Bipolar NPN/PNP DO	QS30RRX		
		5-pin Euro QD		QS30RRXQ		
 OPPOSED WATER DETECTION	4 m††	2 m	—	QS30EXH2O Emitter*	EGC-3 (p. 158)	BP-3 (p. 159)
		5-pin Euro Pigtail QD		QS30EXH2OQ5 Emitter*		
		2 m	Bipolar NPN/PNP LO	QS30ARXH2O		
		5-pin Euro Pigtail QD		QS30ARXH2OQ5		
		2 m	Bipolar NPN/PNP DO	QS30RRXH2O		
		5-pin Euro Pigtail QD		QS30RRXH2OQ5		
	2 m††	2 m	Bipolar NPN/PNP LO	QS30ARH2O		
		5-pin Euro Pigtail QD		QS30ARH2OQ5		
		2 m	Bipolar NPN/PNP DO	QS30RRH2O		
		5-pin Euro Pigtail QD		QS30RRH2OQ5		
 SUPER HIGH-POWER OPPOSED WATER DETECTION	8 m††	2 m	—	QS30EXSH2O Emitter*	EGC-3 (p. 158)	BP-3 (p. 159)
		5-pin Euro Pigtail QD		QS30EXSH2OQ5 Emitter*		
		2 m	Bipolar NPN/PNP LO	QS30ARXSH2O		
		5-pin Euro Pigtail QD		QS30ARXSH2OQ5		
		2 m	Bipolar NPN/PNP DO	QS30RRXSH2O		
		5-pin Euro Pigtail QD		QS30RRXSH2OQ5		
 RETRO	12 m†	2 m	Bipolar NPN/PNP	QS30LV	EGC-4 (p. 158)	BP-4 (p. 159)
		5-pin Euro QD		QS30LVQ		
 POLAR RETRO	8 m†	2 m	Bipolar NPN/PNP	QS30LP	EGC-5 (p. 158)	BP-5 (p. 159)
		5-pin Euro QD		QS30LPQ		
 DIFFUSE	1 m	2 m	Bipolar NPN/PNP	QS30D	EGC-8 (p. 159)	BP-6 (p. 159)
		5-pin Euro QD		QS30DQ		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 157).

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

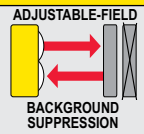
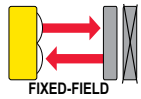
* Standard emitters will only work with standard receivers. Super High-Power emitters will only work with Super High-Power receivers.

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

†† 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.

WORLD-BEAM® QS30, 10-30V dc (cont'd)

Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Model	Excess Gain	Beam Pattern
	Adjustable between 50-600 mm	2 m	Bipolar NPN/PNP	**QS30AF600**	EGC-13 (p. 158) Min separation distance MSD-1 (p. 160)	—
		5-pin Euro QD		**QS30AF600Q**		—
	Adjustable between 50-400 mm	2 m	Bipolar NPN/PNP	**QS30AFF400**	EGC-12 (p. 158) Min separation distance MSD-2 (p. 160)	—
		5-pin Euro QD		**QS30AFF400Q**		—
	200 mm Cutoff	2 m	Bipolar NPN/PNP	**QS30FF200**	EGC-14 (p. 158)	—
		5-pin Euro QD		**QS30FF200Q**		
	400 mm Cutoff	2 m		**QS30FF400**	EGC-15 (p. 159)	—
		5-pin Euro QD		**QS30FF400Q**		
	600 mm Cutoff	2 m		**QS30FF600**	EGC-16 (p. 159)	—
		5-pin Euro QD		**QS30FF600Q**		

ACCESSORIES page 157

Connection options: A model with a QD requires a mating cordset (see page 157).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS30FF200 W/30**).

WORLD-BEAM® QS30 DC Specifications

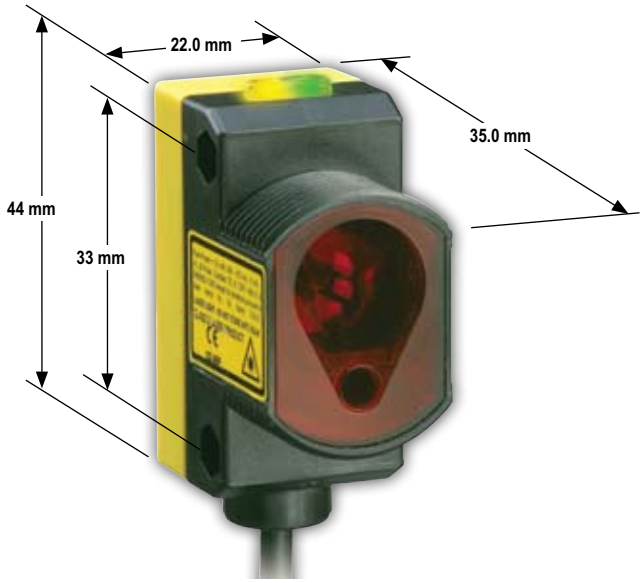
Supply Voltage	**Emitters (High-Powered):** 10 to 30V dc (10% max. ripple) at less than 70 mA **Receivers (High-Powered):** 10 to 30V dc (10% max. ripple) at less than 22 mA **Emitters (Water):** 10 to 30V dc (10% max. ripple) at less than 80 mA **Receivers (Water):** 10 to 30V dc (10% max. ripple) at less than 65 mA (exclusive of load) **Adjustable-field:** 10 to 30V dc (10% max. ripple); current consumption: less than 80 mA at 10V dc, less than 40 mA at 30V dc **All others:** 10 to 30V dc (10% max. ripple) at 40 mA, (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Delay at Power-Up	**Adjustable-field:** 200 milliseconds; outputs do not conduct during this time **All others:** 100 milliseconds; outputs do not conduct during this time (except Opposed High-Powered and Water)
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 Rating	**Opposed (High-Power):** 100 mA max. load **OFF-state leakage current:** less than 200 µA **ON-state saturation voltage:** less than 1.5V at 100 mA; less than 900 mV at 10 mA **Opposed (Water):** 100 mA max. load at 25° C **OFF-state leakage current:** less than 10 µA **ON-state saturation voltage: NPN:** less than 200 mV at 10 mA; less than 1V at 100 mA **PNP:** less than 1.2V at 10 mA; less than 2.5V at 100 mA **Adjustable-field:** 100 mA total output current (derate 1 mA per ˚C above 30˚C) **Off-state leakage current:** less than 5 µA @ 30V dc **ON-state saturation voltage: NPN:** less than 1.5V @ 100 mA **PNP:** less than 2.0V @ 100 mA **All others:** 100 mA max. each output at 25° C **OFF-state leakage current: NPN:** less than 200 µA @ 30V dc **PNP:** less than 10 µA **ON-state saturation voltage: NPN:** less than 1.6V @ 100 mA **PNP:** less than 2.0V @ 100 mA
Output Protection	Protected against false pulse on power-up and continuous overload or short circuit of outputs
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 **Super High-Power:** 10 milliseconds ON/OFF **2x to 10x excess gain– Standard:** 3 milliseconds ON/OFF **Super High-Power:** 30 milliseconds ON/OFF **Adjustable-field:** 5 milliseconds ON/OFF **All others:** 2 milliseconds ON/OFF

More on next page

WORLD-BEAM® QS30 DC Specifications (cont'd)

Repeatability	**Opposed:** not applicable **Opposed (High-Power)**: 5 milliseconds **Opposed (Water)**: **10 x excess gain or more– Standard:** 500 microseconds **Super High-Power:** 5 milliseconds **2x to 10x excess gain– Standard:** 2.5 milliseconds **Super High-Power:** 25 milliseconds **Adjustable-field:** 750 microseconds **All others:** 500 microseconds
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 3V)* **Dark Operate** - High (open or 5 to 30V)* **Diffuse and Fixed-field:** Selectable Light/Dark Operate is achieved via the gray wire. **Light Operate** - High (open or 5 to 30V)* **Dark Operate** - Low (0 to 3V)* **Diffuse, Retroreflective, and Polarized Retroreflective (only):** Single-turn sensitivity (Gain) adjustment potentiometer **Adjustable-field:** Four-turn adjustment screw sets cutoff distance between min and max. positions, clutched at both ends of travel LO/DO adjustment * Input impedance 10 kΩ See data sheets 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
Environmental Rating	**Opposed (High-Power): Cabled:** IP67; NEMA 6P **QD:** IP69K per DIN 40050-9 **Opposed (Water):** IEC IP67 (NEMA 6); PW12 1200 PSI washdown per NEMA PW12 **Adjustable-field:** IEC IP67; NEMA 6 **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 157.
Operating Conditions	**Opposed (Water), Opposed (High-Power) and Adjustable-field:** -20° to +60° C **Relative humidity:** 95% (non-condensing) **All others:** -20° to +70° C **Relative humidity:** 95% (non-condensing)
Vibration and Mechanical Shock	All models (except Opposed High-Power) meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max. double amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.
Certifications	**Adjustable-field:** CE (pending) **All others:** CE
Hookup Diagrams	**High-Powered and Water models: Emitters:** DC10 (p. 746) **Receivers:** DC11 (p. 746) **All other models:** **Emitters:** DC02 (p. 744) **Bipolar NPN/PNP:** DC08 (p. 745)

WORLD-BEAM® QS30 *Expert*™ Sensors



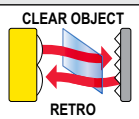
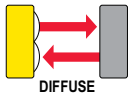
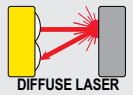
ONLINE
AUTOCAD, STEP, IGES & PDF

ACCESSORIES
page 157

Laser Retroreflective, LED Diffuse, Laser Diffuse and LED Retroreflective Models Suffix LLP, LLPC, LVC, EDV, LD and LDL

WORLD-BEAM® QS30 *Expert*™, 10-30V dc

Visible Red LED Visible Red Laser

Sensing Mode/LED	Laser Class	Range	Connection	Model Bipolar NPN/PNP	Excess Gain	Beam Pattern
	Class 1	0.2-18 m†	2 m	**QS30LLP**	EGC-6 & EGC-7 (p. 158)	—
			5-pin Euro QD	**QS30LLPQ**		
			2 m	**QS30LLPC**		
			5-pin Euro QD	**QS30LLPCQ**		
	—	100 mm to 2 m††	2 m	**QS30ELVC**	—	—
			5-pin Euro QD	**QS30ELVCQ**		
	—	**High-Speed:** 1100 mm **Normal:** 1400 mm	2 m	**QS30EDV**	EGC-11 (p. 158)	BP-9 (p. 160)
			5-pin Euro QD	**QS30EDVQ**		
	Class 1	400 mm	2 m	**QS30LD**	EGC-9 (p. 158)	BP-7 (p. 159)
			5-pin Euro QD	**QS30LDQ**		
	Class 2	800 mm	2 m	**QS30LDL**	EGC-10 (p. 158)	BP-8 (p. 159)
			5-pin Euro QD	**QS30LDLQ**		

Connection options: A model with a QD requires a mating cordset (see page 157).

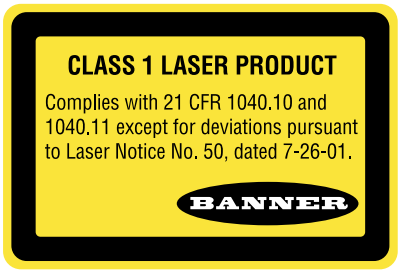
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS30LLP W/30**).

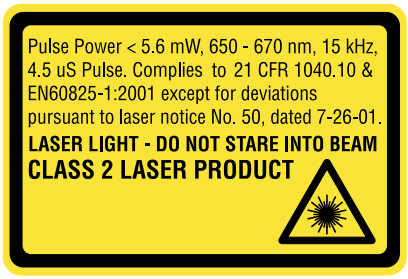
† Retroreflective range is specified using one model BRT-36X40BM retroreflector. BRT-TVHG-2X2 and BRT-36X40BM are included. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

†† BRT-2X2LVC and BRT40X19A retroreflectors are included with sensor.

WORLD-BEAM® QS30 *Expert*™ Specifications

Supply Voltage and Current	**Diffuse LED and Retroreflective LED:** 10 to 30V dc (10% max. ripple) at less than 25 mA, exclusive of load **Diffuse Laser and Retroreflective Laser:** 10 to 30V dc (10% max. ripple @ 10% duty cycle) @ 35 mA max current, exclusive of load
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
Supply Protection Circuitry	Protected against reverse polarity; over voltage and transient voltages
Output Configuration	**Bipolar:** One NPN (current sinking) and one PNP (current sourcing); light operate (LO) or dark operate (DO) configurable
Output Rating	**Retroreflective LED (see Application Note 1) and Diffuse LED:** 150 mA max. load (derate ~ 1 mA/° C above 25° C) **OFF-state leakage current:** less than 50 µA @ 30V dc **ON-state saturation voltage:** **NPN:** less than 200 mV @ 10 mA; less than 1V @ 150 mA **PNP:** less than 1.25V @ 10 mA; less than 2V @ 150 mA **Diffuse Laser and Retroreflective Laser:** 150 mA max. load **OFF-state leakage current:** less than 10 µA at 30V dc **ON-state saturation voltage:** **NPN:** less than 1.0V @ 150 mA load **PNP:** less than 2.0V @ 150 mA load
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages and false pulse on power-up
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 data sheet for detailed information
Indicators	**2 LEDs:** **Green:** Power ON **Yellow:** Output conducting See data sheets 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 157.
Operating Conditions	**Diffuse LED and Retroreflective LED:** **Temperature:** -10° to +55° C **Relative humidity:** 95% @ 55° C (non-condensing) **Diffuse Laser and Retroreflective Laser:** **Temperature:** -10° to +50° C **Relative humidity:** 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). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half-sine wave.
Application Note	1. If supply voltage is > 24V dc, derate maximum output current 1 mA/°C above 25°C
Certification	CE
Hookup Diagrams	DC08: (p. 745)





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

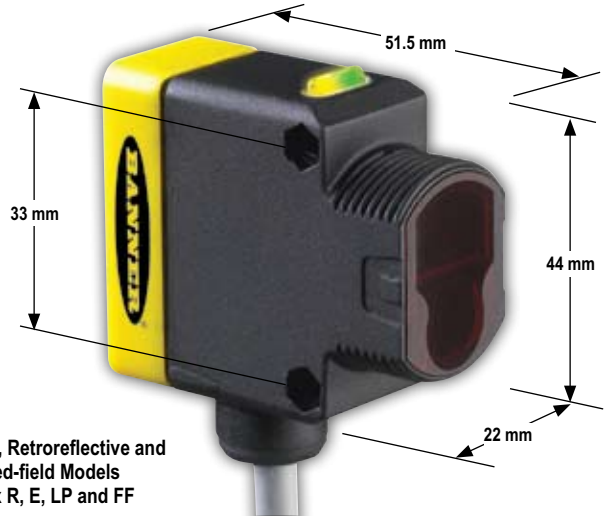
Lasers that emit visible radiation in the wavelength range from 400 to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use 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.

ACCESSORIES page 157

WORLD-BEAM® QS30 Universal Voltage Sensors



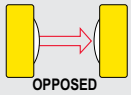
Opposed, Retroreflective and Fixed-field Models
Suffix R, E, LP and FF

ONLINE
AUTOCAD, STEP, IGES & PDF

QPMA

WORLD-BEAM® QS30 Universal Voltage, 12-250V dc or 24-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Model	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	—	**QS303E Emitter**	EGC-1 (p. 158)	BP-1 (p. 159)
		2 m	SPDT e/m Relay	**QS30VR3R**		
 POLAR RETRO	8 m†	2 m	SPDT e/m Relay	**QS30VR3LP**	EGC-5 (p. 158)	BP-5 (p. 159)

More on next page

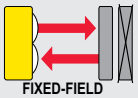
Connection options:

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.

† 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.

WORLD-BEAM® QS30 Universal Voltage, 12-250V dc or 24-250V ac (cont'd)

Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Model	Excess Gain	Beam Pattern
 FIXED-FIELD	200 mm Cutoff	2 m	SPDT e/m Relay	**QS30VR3FF200**	EGC-14 (p. 158)	—
	400 mm Cutoff	2 m		**QS30VR3FF400**	EGC-15 (p. 159)	—
	600 mm Cutoff	2 m		**QS30VR3FF600**	EGC-16 (p. 159)	—

Connection options:

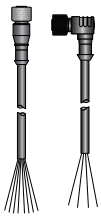
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS303E W/30**).
QD models: Available with modified specification, contact factory at 1-888-373-6767.

WORLD-BEAM® QS30 Universal Voltage Specifications

Supply Voltage	24 to 250V ac, 50/60 Hz or 12 to 250V 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 Rating	**Max. Switching Power (resistive load):** 150 W, 1250 VA **Max. Switching Voltage (resistive load):** 250V ac; 125V dc **Max. Switching Current (resistive load):** 5 A @ 250V ac; 5 A @ 30V dc derated to 200 mA @ 125V dc **Min. Voltage and Current:** 5V dc, 10 mA **Mechanical life of relay:** 50 million operations **Electrical life of relay at full resistive load:** 100,000 operations
Output Response	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 data sheet 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	CE c UL us LISTED
Hookup Diagrams	**Emitters:** UN02 (p. 753) **All other models:** UN01 (p. 753)

Cordsets

Euro QD		
See page 685		
	Threaded 5-Pin	
Length	Straight	Right-Angle
1.83 m	MQDC1-506	MQDC1-506RA
4.57 m	MQDC1-515	MQDC1-515RA
9.14 m	MQDC1-530	MQDC1-530RA



Additional cordset information available. See page 679.

Brackets

QS30			
 pg. 639	 pg. 671	 pg. 672	 pg. 671
SMB30A	SMBQS30L	SMBQS30YL	SMBQS30Y

Additional brackets and more information available. See page 620.

REFLECTORS PAGE 710

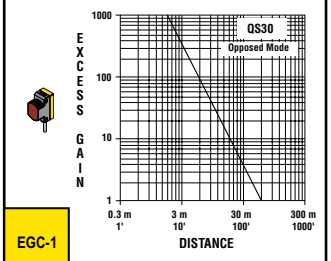
APERTURES PAGE 737

Excess Gain Curves

(Diffuse, Adjustable-Field and Fixed-field mode performance based on 90% reflectance white test card)

○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized LP = Visible Red Laser Polarized ✸ = Visible Red Laser

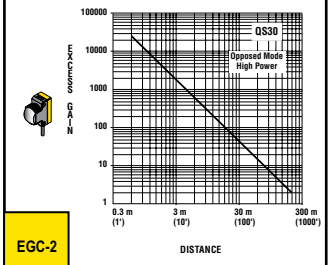
Opposed Mode WORLD-BEAM® QS30



EGC-1

Range: 60 m **LED:** ○

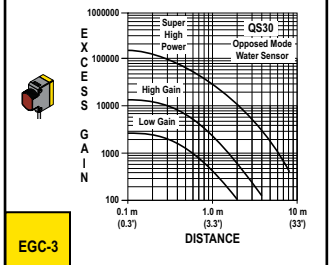
Opposed Mode WORLD-BEAM® QS30 High Power



EGC-2

Range: 213 m **LED:** ○

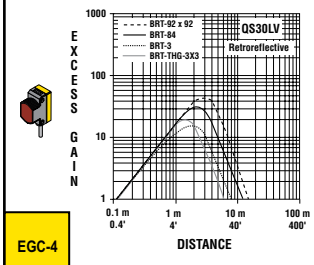
Opposed Mode WORLD-BEAM® QS30 High-Power Water



EGC-3

Range: 8 m **LED:** ○

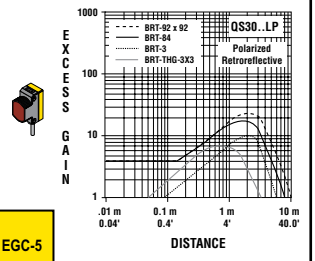
Retroreflective Mode WORLD-BEAM® QS30



EGC-4

Range: 12 m **LED:** ●

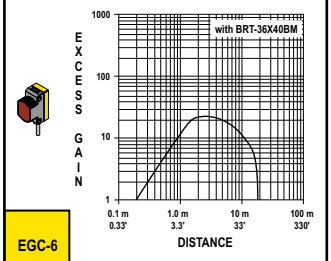
Polarized Retroreflective Mode WORLD-BEAM® QS30



EGC-5

Range: 8 m **LED:** P

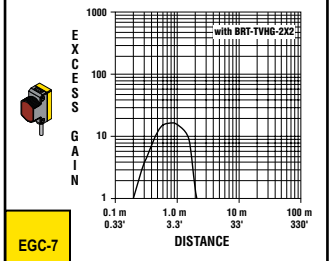
Retroreflective Mode WORLD-BEAM® QS30 *Expert*™ Class 1 Laser



EGC-6

Range: 18 m **LED:** LP

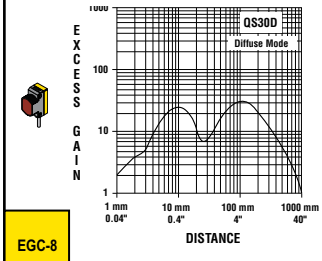
Retroreflective Mode WORLD-BEAM® QS30 *Expert*™ Class 1 Laser



EGC-7

Range: 2 m **LED:** LP

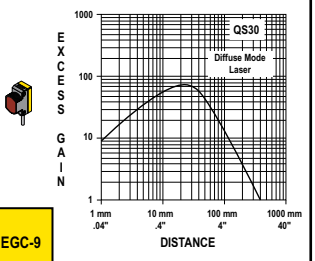
Diffuse Mode WORLD-BEAM® QS30



EGC-8

Range: 1 m **LED:** ○

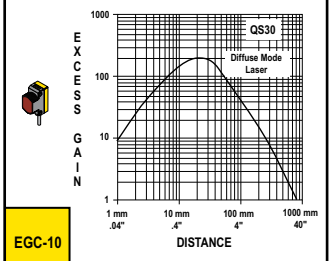
Diffuse Mode WORLD-BEAM® QS30 *Expert*™ Class 1 Laser



EGC-9

Range: 400 mm **LED:** ✸

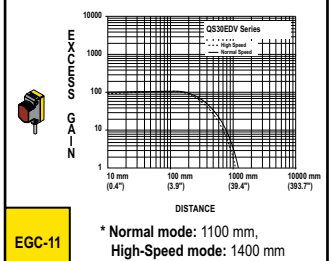
Diffuse Mode WORLD-BEAM® QS30 *Expert*™ Class 2 Laser



EGC-10

Range: 800 mm **LED:** ✸

Diffuse Mode WORLD-BEAM® QS30 *Expert*™ Visible Red LED

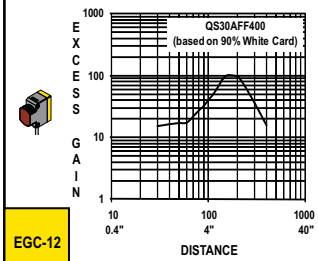


EGC-11

* **Normal mode:** 1100 mm,
High-Speed mode: 1400 mm

Range: 1400 mm* **LED:** ●

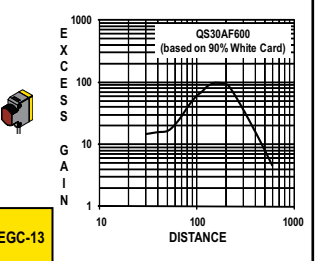
Adjustable-Field Mode WORLD-BEAM® QS30 Foreground Suppression



EGC-12

Cutoff: 50-400 mm **LED:** ●

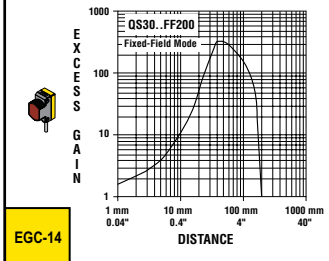
Adjustable-Field Mode WORLD-BEAM® QS30 Background Suppression



EGC-13

Cutoff: 50-600 mm **LED:** ●

Fixed-Field Mode WORLD-BEAM® QS30



EGC-14

Cutoff: 200 mm **LED:** ●

ø 10 mm spot size @ 160 mm focus
ø 7 mm spot size @ 200 mm cutoff

Using 18% gray test card: performance will be 95% of values shown.
Using 6% black test card: performance will be 90% of values shown.

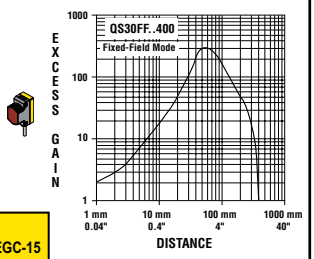
More on next page

Excess Gain Curves

(Fixed-field mode performance based on 90% reflectance white test card)

● = Visible Red LED

Fixed-Field Mode WORLD-BEAM® QS30



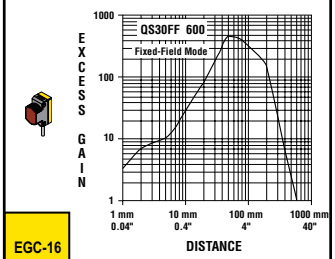
EGC-15

ø 10 mm spot size @ 160 mm focus
ø 10 mm spot size @ 400 mm cutoff

Using 18% gray test card: performance will be 90% of values shown.
Using 6% black test card: performance will be 85% of values shown.

Cutoff: 400 mm | **LED:** ●

Fixed-Field Mode WORLD-BEAM® QS30



EGC-16

ø 10 mm spot size @ 160 mm focus
ø 15 mm spot size @ 600 mm cutoff

† **Using 18% gray test card:** performance will be 85% of values shown.
† **Using 6% black test card:** performance will be 75% of values shown.

Cutoff: 600 mm | **LED:** ●

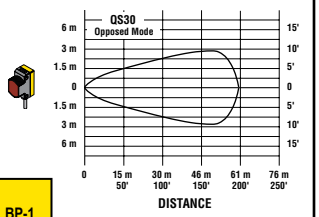
Beam Patterns

(Diffuse mode performance based on 90% reflectance white test card)

○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized ✸ = Visible Red Laser

Opposed Mode WORLD-BEAM® QS30

Effective Beam: 18 mm

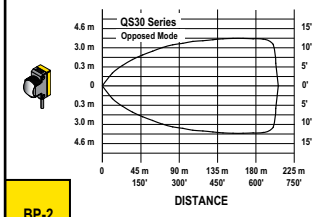


BP-1

Range: 60 m | **LED:** ○

Opposed Mode WORLD-BEAM® QS30 High Power

Effective Beam: 18 mm

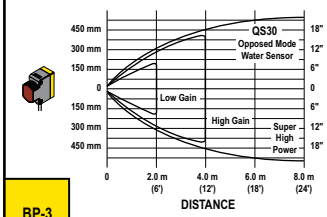


BP-2

Range: 213 m | **LED:** ○

Opposed Mode WORLD-BEAM® QS30 Water

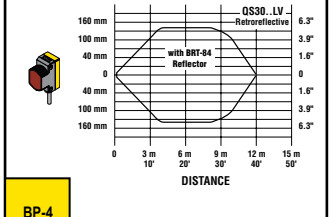
Effective Beam: 13 mm



BP-3

Range: 8 m | **LED:** ○

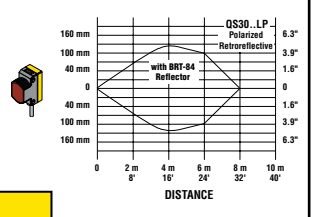
Retroreflective Mode WORLD-BEAM® QS30



BP-4

Range: 12 m | **LED:** ●

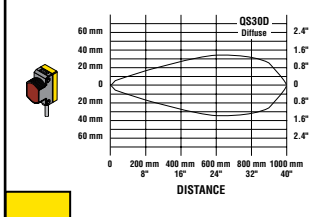
Polarized Retroreflective Mode WORLD-BEAM® QS30



BP-5

Range: 8 m | **LED:** P

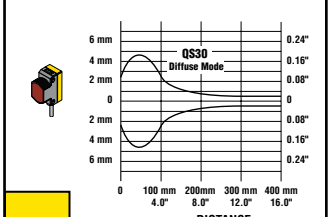
Diffuse Mode WORLD-BEAM® QS30



BP-6

Range: 1 m | **LED:** ○

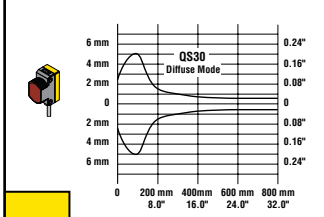
Diffuse Mode WORLD-BEAM® QS30 *Expert*™ Class 1 Laser



BP-7

Range: 400 mm | **LED:** ✸

Diffuse Mode WORLD-BEAM® QS30 *Expert*™ Class 2 Laser



BP-8

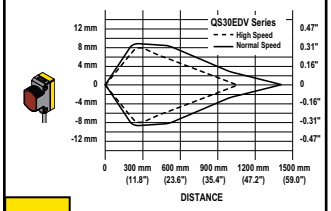
Range: 800 mm | **LED:** ✸

More on next page

Beam Patterns (Diffuse mode performance based on 90% reflectance white test card)

● = Visible Red LED

Diffuse Mode
WORLD-BEAM® *Expert*™
Visible Red LED

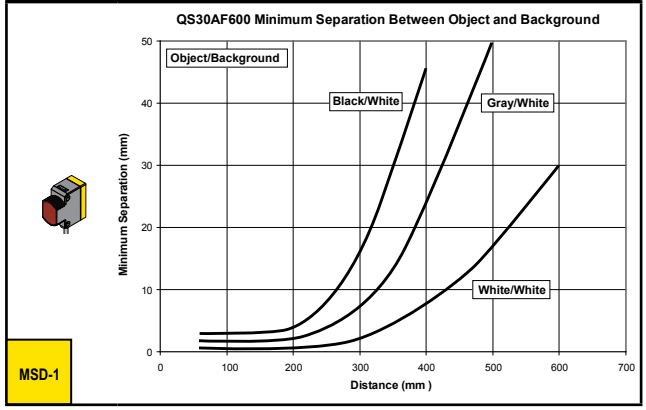


BP-9

Range: 1400 mm **LED:** ●

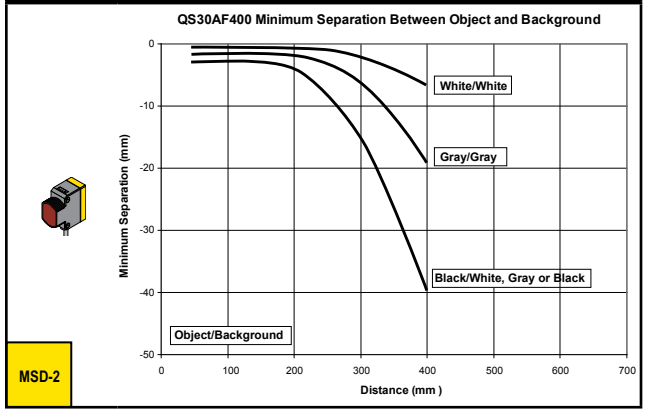
Minimum Separation Distance

WORLD-BEAM® QS30 Adjustable-Field Background Suppression (50-600 mm)



MSD-1

WORLD-BEAM® QS30 Adjustable-Field Foreground Suppression (50-400 mm)



MSD-2

S30
Barrel-Mount Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in 30 mm plastic threaded barrel sensor in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

DC Models page 161
AC Models 163

ACCESSORIES page 164

S30 DC Sensors

ONLINE
AUTOCAD, STEP, IGES & PDF

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

OPPOSED
POLAR RETRO
FIXED-FIELD

S30, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
OPPOSED	60 m	2 m	S306E Emitter		EGC-1 (p. 165)	BP-1 (p. 165)
		4-Pin Euro QD	S306EQ Emitter			
		2 m	S30SN6R	S30SP6R		
		4-Pin Euro QD	S30SN6RQ	S30SP6RQ		
P POLAR RETRO	6 m†	2 m	S30SN6LP	S30SP6LP	EGC-2 (p. 165)	BP-2 (p. 165)
		4-Pin Euro QD	S30SN6LPQ	S30SP6LPQ		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 164).

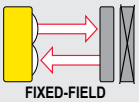
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S30SP6LP W/30**).

† 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.

ACCESSORIES page 164

S30, 10-30V dc (cont'd)

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	**S30SN6FF200**	**S30SP6FF200**	EGC-3 (p. 165)	—
		4-Pin Euro QD	**S30SN6FF200Q**	**S30SP6FF200Q**		
	0 - 400 mm Cutoff	2 m	**S30SN6FF400**	**S30SP6FF400**	EGC-4 (p. 165)	—
		4-Pin Euro QD	**S30SN6FF400Q**	**S30SP6FF400Q**		
	0 - 600 mm Cutoff	2 m	**S30SN6FF600**	**S30SP6FF600**	EGC-5 (p. 165)	—
		4-Pin Euro QD	**S30SN6FF600Q**	**S30SP6FF600Q**		

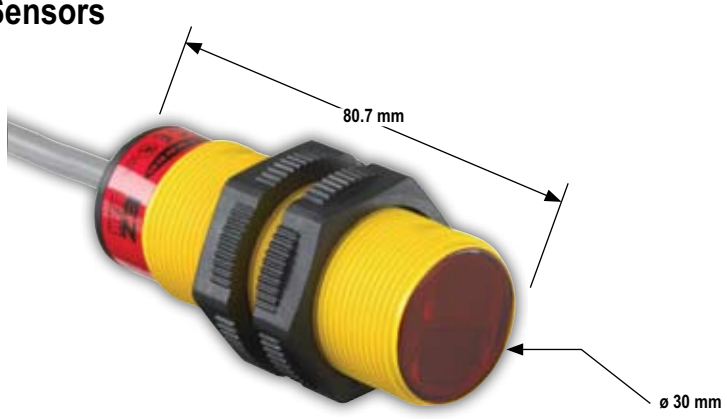
Connection options: A model with a QD requires a mating cordset (see page 164).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S30SP6FF W/30**).

S30 DC Specifications

Supply Voltage and Current	10 to 30V 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 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V 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:** Power ON **Yellow:** Light Operate (LO) energized See data sheet for detailed information
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. See page 164.
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 UL LISTED CSA®
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 745) **PNP Models:** DC06 (p. 745)

S30 AC Sensors

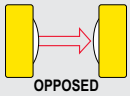
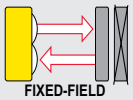


ONLINE
AUTOCAD, STEP, IGES & PDF

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

S30, 20-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	S303E Emitter		EGC-1 (p. 165)	BP-1 (p. 165)
		4-Pin Micro QD	S303EQ1 Emitter			
		2 m	S30AW3R	S30RW3R		
		4-Pin Micro QD	S30AW3RQ1	S30RW3RQ1		
 POLAR RETRO	6 m†	2 m	S30AW3LP	S30RW3LP	EGC-2 (p. 165)	BP-2 (p. 165)
		4-Pin Micro QD	S30AW3LPQ1	S30RW3LPQ1		
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	S30AW3FF200	S30RW3FF200	EGC-3 (p. 165)	—
		4-Pin Micro QD	S30AW3FF200Q1	S30RW3FF200Q1		
	0 - 400 mm Cutoff	2 m	S30AW3FF400	S30RW3FF400	EGC-4 (p. 165)	—
		4-Pin Micro QD	S30AW3FF400Q1	S30RW3FF400Q1		
	0 - 600 mm Cutoff	2 m	S30AW3FF600	S30RW3FF600	EGC-5 (p. 165)	—
		4-Pin Micro QD	S30AW3FF600Q1	S30RW3FF600Q1		

Connection options: A model with a QD requires a mating cordset (see page 164).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S30AW3FF200 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.

S30 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V 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:** 3V at 300 mA ac; 2V at 15 mA ac

More on next page

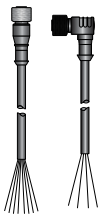
S30 AC Specifications (cont'd)	
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON; 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective and Fixed-field**: 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** **Green:** Power ON **Yellow:** Light sensed See data sheet for detailed information
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. See page 164.
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	
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **QD Models:** AC06 (p. 751)

Cordsets

Euro QD

See page 682

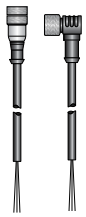
Length	4-Pin	
	Straight	Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Micro QD

See page 698

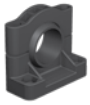
Length	Threaded 4-Pin	
	Straight	Right-Angle
1.83 m	MQAC-406	MQAC-406RA
4.57 m	MQAC-415	MQAC-415RA
9.14 m	MQAC-430	MQAC-430RA



Additional cordset information available. See page 679.

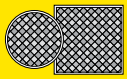
Brackets

S30

			
pg. 639	pg. 640	pg. 641	pg. 648
SMB30A	SMB30FA..	SMB30SC	SMBAMS30P

Additional brackets and information available. See page 620.

REFLECTORS



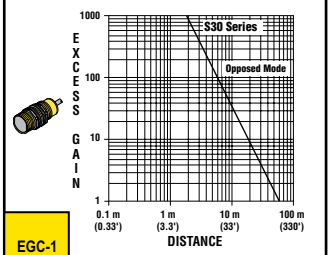
PAGE 710

Excess Gain Curves

(Fixed-field mode performance based on 90% reflectance white test card)

○ = Infrared LED P = Visible Red LED Polarized

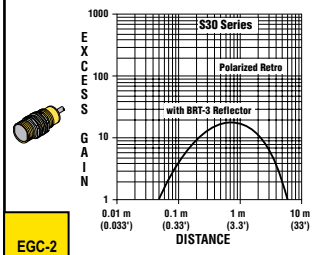
Opposed Mode S30



EGC-1

Range: 60 m | **LED:** ○

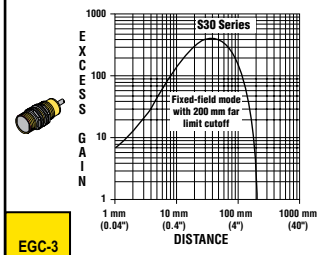
Polarized Retroreflective Mode S30



EGC-2

Range: 6 m | **LED:** P

Fixed-Field Mode S30



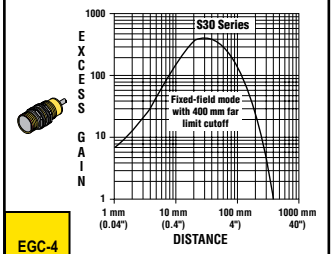
EGC-3

Cutoff: 200 mm | **LED:** ○

Ø 16 mm spot size @ 35 mm focus
Ø 20 mm spot size @ 200 mm cutoff

Using 18% gray test card: Cutoff distance will be 95% of value shown.
Using 6% black test card: Cutoff distance will be 90% of value shown.

Fixed-Field Mode S30



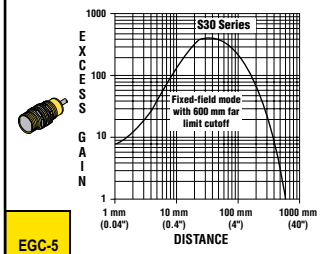
EGC-4

Cutoff: 400 mm | **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 25 mm spot size @ 400 mm cutoff

Using 18% gray test card: Cutoff distance will be 90% of value shown.
Using 6% black test card: Cutoff distance will be 85% of value shown.

Fixed-Field Mode S30



EGC-5

Cutoff: 600 mm | **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 30 mm spot size @ 600 mm cutoff

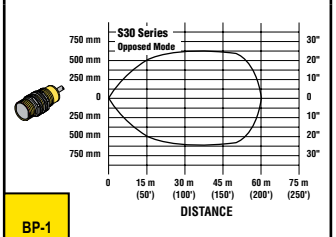
Using 18% gray test card: Cutoff distance will be 85% of value shown.
Using 6% black test card: Cutoff distance will be 75% of value shown.

Beam Patterns

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode S30

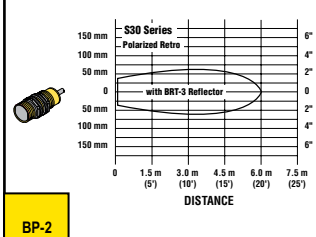
Effective Beam: 23 mm



BP-1

Range: 60 m | **LED:** ○

Polarized Retroreflective Mode S30



BP-2

Range: 6 m | **LED:** P

SM30 and SMI30

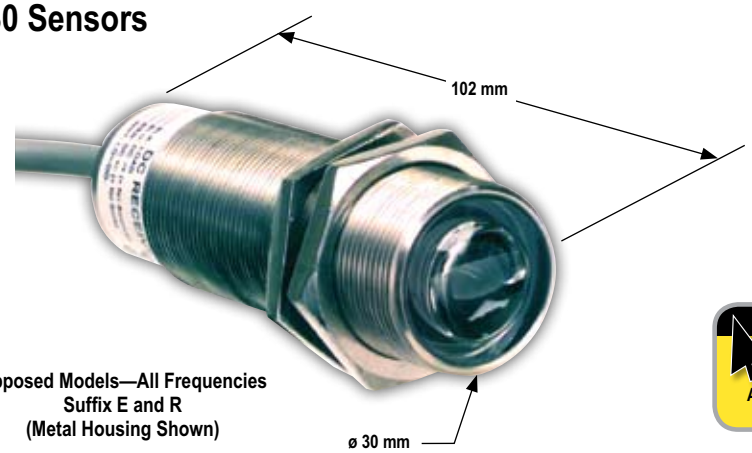
High-Power, Opposed-Mode Barrel Sensors

- Features reliable sensing without the need for adjustments
- Operates in opposed mode with very high excess gain
- Available in models for either ac or dc operation (standard SM30 Series)
- Certified as intrinsically safe for use in hazardous atmospheres (SMI30 Series)
- Uses positive sealing to eliminate even capillary leakage, with quad-ring-sealed lens
- Exceeds IEC IP67 (NEMA 6P) ratings; ideal in equipment washdown environments

ACCESSORIES page 169

OPPOSED

SM30 Sensors



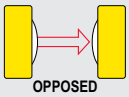
Opposed Models—All Frequencies
Suffix E and R
(Metal Housing Shown)

SM30 page 166
SMI30 Intrinsically Safe 168

ONLINE
AUTOCAD, STEP, IGES & PDF

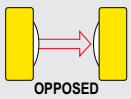
SM30 Emitters, 10-30V dc or 12-240V ac, Frequency A†

Infrared LED

Sensing Mode/LED	Housing	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 OPPOSED	Plastic	150 m	2 m	N/A	**SMA30PEL**	EGC-1 (p. 169)	BP-1 (p. 169)
			3-Pin Mini QD		**SMA30PELQD**		
	Stainless Steel		2 m		**SMA30SEL**		
			3-Pin Mini QD		**SMA30SELQD**		

SM30 Receivers, 10-30V dc Frequency A†

Infrared LED

Sensing Mode/LED	Housing	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 OPPOSED	Plastic	150 m	2 m	Bi-Modal™ NPN or PNP	**SM30PRL**	EGC-1 (p. 169)	BP-1 (p. 169)
			4-Pin Mini QD		**SM30PRLQD**		
	Stainless Steel		2 m		**SM30SRL**		
			4-Pin Mini QD		**SM30SRLQD**		

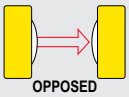
Connection options: A model with a QD requires a mating cordset (see page 169).

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**).

SM30 Receivers, 24-240V ac, Frequency A†

Infrared LED

Sensing Mode/LED	Housing	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 OPPOSED	Plastic	150 m	2 m	LO	**SM2A30PRL**	EGC-1 (p. 169)	BP-1 (p. 169)
			3-Pin Mini QD		**SM2A30PRLQD**		
	Stainless Steel		2 m		**SM2A30SRL**		
			3-Pin Mini QD		**SM2A30SRLQD**		
	Plastic		2 m	DO	**SM2A30PRLNC**		
			3-Pin Mini QD		**SM2A30PRLNCQD**		
	Stainless Steel		2 m		**SM2A30SRLNC**		
			3-Pin Mini QD		**SM2A30SRLNCQD**		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM2A30PRL 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**).

SM30 Specifications

Supply Voltage and Current	**Emitters:** 12 to 240V ac (50/60 Hz) or 10 to 30V dc (10% max. ripple) at 20 mA **DC Receivers:** 10 to 30V dc (10% max. ripple) at 10 mA max, exclusive of load **AC Receivers:** 24 to 240V 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. See page 169.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	
Hookup Diagrams	**Cabled Emitters:** UN10 (p. 755) **AC Cabled Receivers:** AC10 (p. 752) **DC Receivers:** DC20 & DC21 (pp. 748 & 749) **QD Emitters:** AC04 (p. 750) **AC QD Receivers:** AC11 (p. 752)

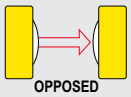
SMI30
Intrinsically Safe DC Sensors

- Extremely rugged and powerful opposed-mode intrinsically safe barrel sensors are designed for the most demanding hazardous area sensing applications.
- Sensor is certified as intrinsically safe for use in all hazardous atmospheres as defined by Article 500 of the National Electrical Code, when used with approved "positive input" intrinsic safety barriers.
- Sensor is 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.
- Use each sensor pair with model CI3RC2 current trip point amplifier and dual-channel intrinsic safety barrier for a complete intrinsically safe sensing system (components available as a kit).

ACCESSORIES page 169

SMI30, 10-30V dc, Frequency A†

Infrared LED

Sensing Mode/LED	Range	Connection	Output Type	Response Time	Models	Excess Gain	Beam Pattern
 OPPOSED	105 m	3-Pin Mini QD	—	10 ms	**SMI306EQ**	Frequency: A: EGC-2 B: EGC-3 C: EGC-4 (p. 169)	BP-2 (p. 169)
			NPN/LO		**SMI30AN6RQ**		
			NPN/DO		**SMI30RN6RQ**		
	45 m		—	1 ms	**SMI306EYQ**		BP-3 (p. 169)
			NPN/LO		**SMI30AN6RYQ**		
			NPN/DO		**SMI30RN6RYQ**		

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

† 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**).

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 CI3RC2 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
CI2B-1	Dual channel intrinsic safety barrier

SMI30 Specifications

Supply Voltage and Current	**Emitters:** 10 to 30V dc at 25 mA **Receivers:** 10 to 30V dc at 15 mA max. Division 1 use, with barriers, requires minimum system supply voltage of 10V.
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 30V 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

More on next page

SMI30 Specifications (cont'd)

Indicators	Internal Red LED lights whenever the receiver sees the emitter's modulated light source. Emitters have Red "power on" indicator LED. All indicators 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
Connections	3-wire Mini-style quick-disconnect (QD) fitting. Use cordset models SMICC-3xx (p. 169). Cable electric properties: 40 pf/ft; 20 µH/ft. Order cable separately from sensor.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE, CSA Exia NRTL/C, KEMA, FM APPROVED
Hookup Diagrams	See data sheet for detailed Hookup Diagrams.

Cordsets

Mini QD

See page 700

Length	3-Pin	3-Pin*	4-Pin
	Threaded Straight		
1.83 m	SM30CC-306	SMICC-306	MBCC-406
3.66 m	SM30CC-312	SMICC-312	MBCC-412
9.14 m	–	SMICC-330	MBCC-430

* Required for Intrinsically safe

Additional cordset information available. See page 679.

Brackets

SM30 & SMI30

pg. 639	pg. 640	pg. 641	pg. 648
SMB30A	SMB30FA..	SMB30SC	SMBAMS30P

Additional brackets and information available. See page 620.

APERTURES

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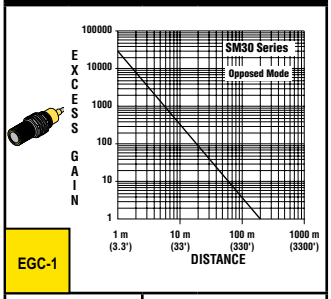
Excess Gain Curves

○ = Infrared LED

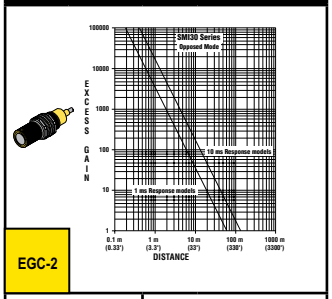
Opposed Mode SM30



EGC-1

Range: 200 m **LED:** ○

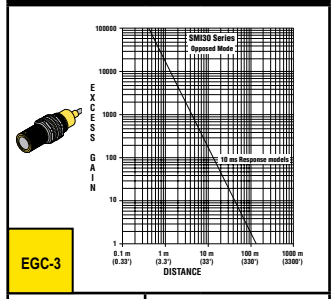
Opposed Mode SMI30 - Frequency A



EGC-2

Range: 140 m **LED:** ○

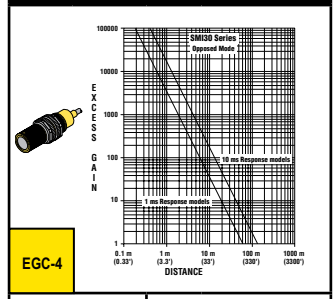
Opposed Mode SMI30 - Frequency B



EGC-3

Range: 140 m **LED:** ○

Opposed Mode SMI30 - Frequency C



EGC-4

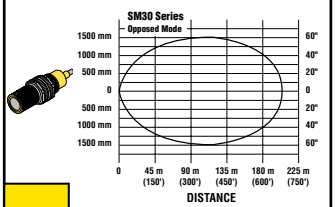
Range: 140 m **LED:** ○

Beam Patterns

○ = Infrared LED

Opposed Mode SM30

Effective Beam: 19 mm

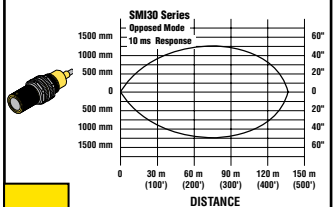


BP-1

Range: 200 m **LED:** ○

Opposed Mode SMI30

Effective Beam: 19 mm

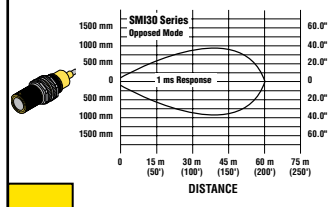


BP-2

Range: 140 m **LED:** ○

Opposed Mode SMI30

Effective Beam: 22 mm



EGC-3

Range: 60 m **LED:** ○

T30

Right-Angle Barrel-Mount Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Features T-style plastic housing with 30 mm threaded lens in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

ACCESSORIES page 173

OPPOSED

POLAR RETRO

FIXED-FIELD

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

ONLINE
AUTOCAD, STEP, IGES & PDF

T30, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
OPPOSED	60 m	2 m	T306E Emitter		EGC-1 (p. 174)	BP-1 (p. 174)
		4-Pin Euro QD	T306EQ Emitter			
		2 m	T30SN6R	T30SP6R		
		4-Pin Euro QD	T30SN6RQ	T30SP6RQ		
P POLAR RETRO	6 m†	2 m	T30SN6LP	T30SP6LP	EGC-2 (p. 174)	BP-2 (p. 174)
		4-Pin Euro QD	T30SN6LPQ	T30SP6LPQ		

More on next page

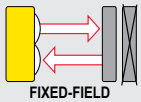
Connection options: A model with a QD requires a mating cordset (see page 173).

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.

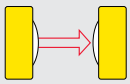
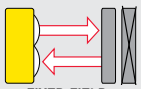
T30, 10-30V dc (cont'd)

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	T30SN6FF200	T30SP6FF200	EGC-3 (p. 174)	—
		4-Pin Euro QD	T30SN6FF200Q	T30SP6FF200Q		
	0 - 400 mm Cutoff	2 m	T30SN6FF400	T30SP6FF400	EGC-4 (p. 174)	—
		4-Pin Euro QD	T30SN6FF400Q	T30SP6FF400Q		
	0 - 600 mm Cutoff	2 m	T30SN6FF600	T30SP6FF600	EGC-5 (p. 174)	—
		4-Pin Euro QD	T30SN6FF600Q	T30SP6FF600Q		

T30, 20-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	T303E Emitter		EGC-1 (p. 174)	BP-1 (p. 174)
		4-Pin Micro QD	T303EQ1 Emitter			
		2 m	T30AW3R	T30RW3R		
		4-Pin Micro QD	T30AW3RQ1	T30RW3RQ1		
 POLAR RETRO	6 m†	2 m	T30AW3LP	T30RW3LP	EGC-2 (p. 174)	BP-2 (p. 174)
		4-Pin Micro QD	T30AW3LPQ1	T30RW3LPQ1		
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	T30AW3FF200	T30RW3FF200	EGC-3 (p. 174)	—
		4-Pin Micro QD	T30AW3FF200Q1	T30RW3FF200Q1		
	0 - 400 mm Cutoff	2 m	T30AW3FF400	T30RW3FF400	EGC-4 (p. 174)	—
		4-Pin Micro QD	T30AW3FF400Q1	T30RW3FF400Q1		
	0 - 600 mm Cutoff	2 m	T30AW3FF600	T30RW3FF600	EGC-5 (p. 174)	—
		4-Pin Micro QD	T30AW3FF600Q1	T30RW3FF600Q1		

Connection options: A model with a QD requires a mating cordset (see page 173).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T30AW3FF200 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.

T30 DC Specifications

Supply Voltage and Current	10 to 30V 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 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs

More on next page

T30 DC Specifications (cont'd)

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:** Power ON **Yellow:** Light operate (LO) output energized
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 173.
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 UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 745) **PNP Models:** DC06 (p. 745)

T30 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V 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:** 3V at 300 mA ac; 2V 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**: Power ON **Yellow:** Light sensed
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 173.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)

More on next page

T30 AC Specifications (cont'd)

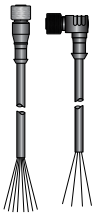
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE, UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **QD Models:** AC06 (p. 751)

Cordsets

Euro QD

See page 682

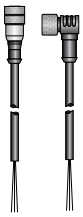
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Micro QD

See page 698

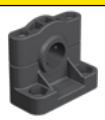
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQAC-406	MQAC-406RA
4.57 m	MQAC-415	MQAC-415RA
9.14 m	MQAC-430	MQAC-430RA



Additional cordset information available. See page 679.

Brackets

T30



pg. 637

SMB1815SF

pg. 639

SMB30A

pg. 640

SMB30FA..

pg. 648

SMBAMS30P

Additional brackets and information available. See page 620.

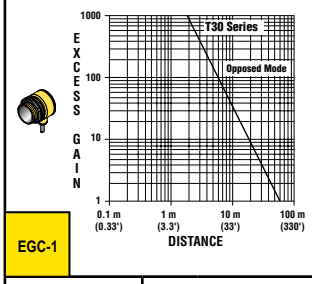
REFLECTORS
PAGE 710

Excess Gain Curves

(Fixed-field mode performance based on 90% reflectance white test card)

○ = Infrared LED P = Visible Red LED Polarized

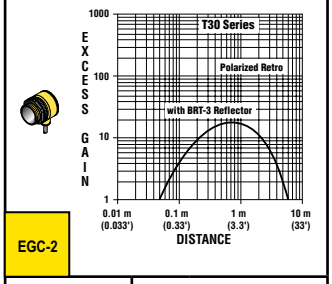
Opposed Mode T30



EGC-1

Range: 60 m **LED:** ○

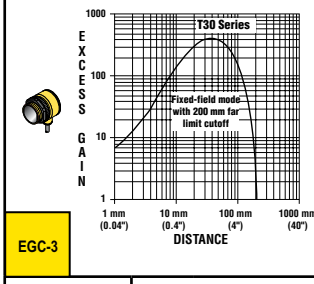
Polarized Retroreflective Mode T30



EGC-2

Range: 6 m **LED:** P

Fixed-Field Mode T30



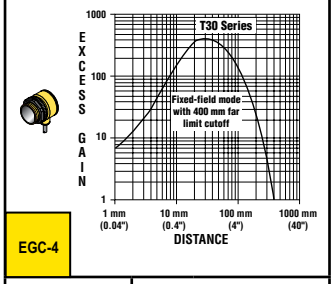
EGC-3

Cutoff: 200 mm **LED:** ○

Ø 16 mm spot size @ 35 mm focus
Ø 20 mm spot size @ 200 mm cutoff

Using 18% gray test card: cutoff distance will be 95% of value shown.
Using 6% black test card: cutoff distance will be 90% of value shown.

Fixed-Field Mode T30



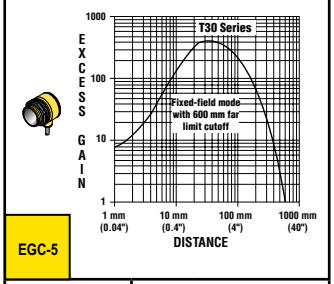
EGC-4

Cutoff: 400 mm **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 25 mm spot size @ 400 mm cutoff

Using 18% gray test card: cutoff distance will be 90% of value shown.
Using 6% black test card: cutoff distance will be 85% of value shown.

Fixed-Field Mode T30



EGC-5

Cutoff: 600 mm **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 30 mm spot size @ 600 mm cutoff

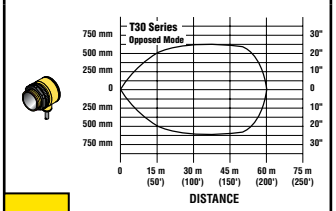
Using 18% gray test card: cutoff distance will be 85% of value shown.
Using 6% black test card: cutoff distance will be 75% of value shown.

Beam Patterns

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode T30

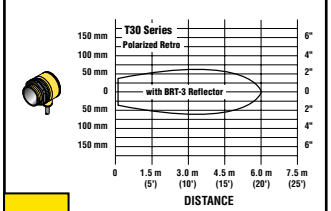
Effective Beam: 23 mm



BP-1

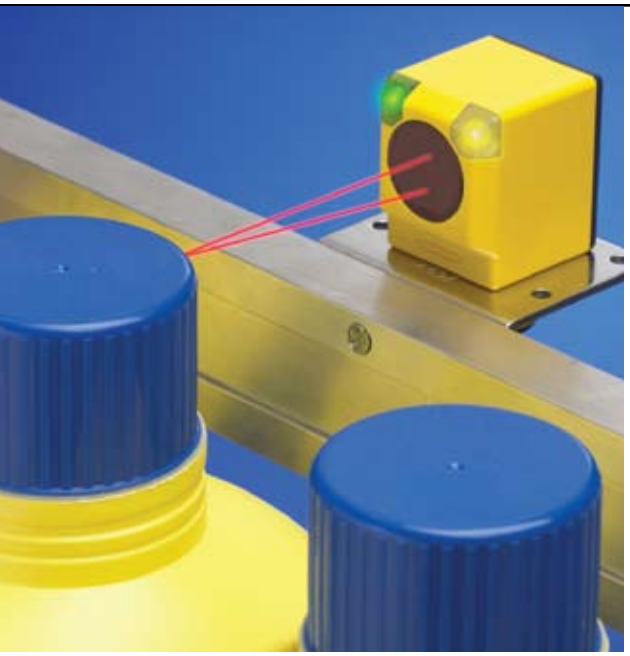
Range: 60 m **LED:** ○

Polarized Retroreflective Mode T30



BP-2

Range: 6 m **LED:** P



Q40
Right-Angle Base-Mount Rectangular Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Features rectangular 40 mm plastic housing with 30 mm threaded mounting base in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments; rated to IP69K
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Uses advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

ACCESSORIES page 177

ONLINE
AUTOCAD, STEP, IGES & PDF

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

Q40, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
OPPOSED	60 m	2 m	Q406E Emitter		EGC-1 (p. 178)	BP-1 (p. 178)
		4-Pin Euro QD	Q406EQ Emitter			
		2 m	Q40SN6R	Q40SP6R		
		4-Pin Euro QD	Q40SN6RQ	Q40SP6RQ		
P POLAR RETRO	6 m†	2 m	Q40SN6LP	Q40SP6LP	EGC-2 (p. 178)	BP-2 (p. 178)
		4-Pin Euro QD	Q40SN6LPQ	Q40SP6LPQ		
FIXED-FIELD	0 - 200 mm Cutoff	2 m	Q40SN6FF200	Q40SP6FF200	EGC-3 (p. 178)	—
		4-Pin Euro QD	Q40SN6FF200Q	Q40SP6FF200Q		
	0 - 400 mm Cutoff	2 m	Q40SN6FF400	Q40SP6FF400	EGC-4 (p. 178)	—
		4-Pin Euro QD	Q40SN6FF400Q	Q40SP6FF400Q		
	0 - 600 mm Cutoff	2 m	Q40SN6FF600	Q40SP6FF600	EGC-5 (p. 178)	—
		4-Pin Euro QD	Q40SN6FF600Q	Q40SP6FF600Q		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 177).

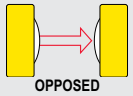
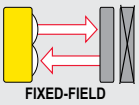
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q40SN6R W/30**).

† 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.

ACCESSORIES page 177

Q40, 20-250V ac (cont'd)

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	Q403E Emitter		EGC-1 (p. 178)	BP-1 (p. 178)
		4-Pin Micro QD	Q403EQ1 Emitter			
		2 m	Q40AW3R	Q40RW3R		
		4-Pin Micro QD	Q40AW3RQ1	Q40RW3RQ1		
 POLAR RETRO	6 m†	2 m	Q40AW3LP	Q40RW3LP	EGC-2 (p. 178)	BP-2 (p. 178)
		4-Pin Micro QD	Q40AW3LPQ1	Q40RW3LPQ1		
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	Q40AW3FF200	Q40RW3FF200	EGC-3 (p. 178)	—
		4-Pin Micro QD	Q40AW3FF200Q1	Q40RW3FF200Q1		
	0 - 400 mm Cutoff	2 m	Q40AW3FF400	Q40RW3FF400	EGC-4 (p. 178)	—
		4-Pin Micro QD	Q40AW3FF400Q1	Q40RW3FF400Q1		
	0 - 600 mm Cutoff	2 m	Q40AW3FF600	Q40RW3FF600	EGC-5 (p. 178)	—
		4-Pin Micro QD	Q40AW3FF600Q1	Q40RW3FF600Q1		

Connection options: A model with a QD requires a mating cordset (see page 177).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q40AW3FF200 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.

Q40 DC Specifications

Supply Voltage and Current	10 to 30V 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 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V 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 **Green:** Power ON **Yellow:** Light Operate (LO) output energized See data sheet 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 Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 177.
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 UL LISTED CSA®
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 751) **PNP Models:** DC06 (p. 751)

Q40 AC Specifications

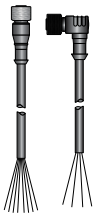
Supply Voltage and Current	20 to 250V ac (50/60 Hz) **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose light operate (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:** 3V at 300 mA ac; 2V 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**: Power ON **Yellow:** Light sensed See data sheet 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 177.
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, UL LISTED, CSA®
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **QD Models:** AC06 (p. 751)

Cordsets

Euro QD to Flying Leads

See page 682

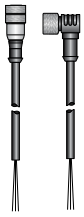
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Micro QD

See page 698

Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQAC-406	MQAC-406RA
4.57 m	MQAC-415	MQAC-415RA
9.14 m	MQAC-430	MQAC-430RA



Additional cordset information available. See page 679.

REFLECTORS
PAGE 710

Brackets

Q40

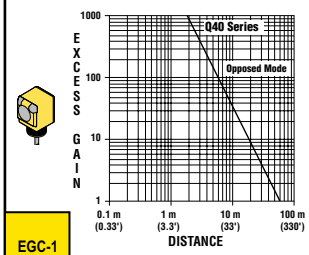
pg. 639	pg. 640	pg. 641	pg. 648
SMB30A	SMB30FA..	SMB30SC	SMBAMS30P

Additional brackets and information available. See page 620.

Excess Gain Curves (Fixed-field mode performance based on 90% reflectance white test card)

○ = Infrared LED P = Visible Red LED Polarized

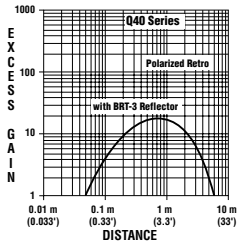
Opposed Mode Q40



EGC-1

Range: 60 m **LED:** ○

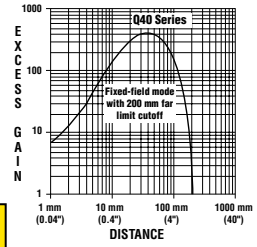
Polarized Retroreflective Q40



EGC-2

Range: 6 m **LED:** P

Fixed-Field Mode Q40



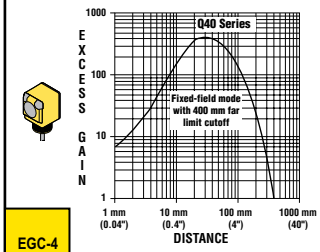
EGC-3

Cutoff: 200 mm **LED:** ○

Ø 16 mm spot size @ 35 mm focus
Ø 20 mm spot size @ 200 mm cutoff

Using 18% gray test card: Cutoff distance will be 95% of value shown.
Using 6% black test card: Cutoff distance will be 90% of value shown.

Fixed-Field Mode Q40



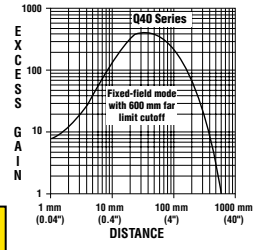
EGC-4

Cutoff: 400 mm **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 25 mm spot size @ 400 mm cutoff

Using 18% gray test card: Cutoff distance will be 90% of value shown.
Using 6% black test card: Cutoff distance will be 85% of value shown.

Fixed-Field Mode Q40



EGC-5

Cutoff: 600 mm **LED:** ○

Ø 17 mm spot size @ 35 mm focus
Ø 30 mm spot size @ 600 mm cutoff

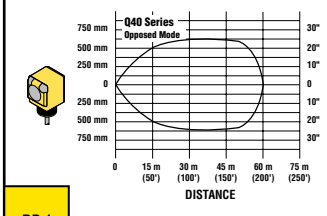
Using 18% gray test card: Cutoff distance will be 85% of value shown.
Using 6% black test card: Cutoff distance will be 75% of value shown.

Beam Patterns

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode Q40

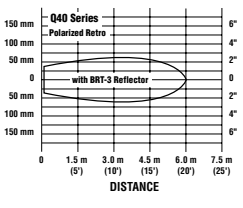
Effective Beam: 23 mm



BP-1

Range: 60 mm **LED:** ○

Polarized Retroreflective Mode Q40



BP-2

Range: 6 m **LED:** P

PicoDot®
Laser Precision Sensors

- Convergent-mode laser sensor delivers precise position detection, inspection and counting.
- Powerful retroreflective models offer long-range retroreflective sensing.
- Fixed-field technology in the convergent-mode models ignores objects beyond the maximum sensing distance.
- Convergent models have precise 0.25 mm beam width at the convergent focus point.
- Retroreflective models have a precise, narrow beam to sense small objects at close range or larger objects to 10.6 m.
- All models have a gain sensitivity potentiometer for fine tuning sensor performance.
- Models are available with compact light-weight housing (PD45) or with environmentally sealed housing (PD49).

ACCESSORIES page 181

PD45 Models

ONLINE
AUTOCAD, STEP, IGES & PDF

QPMA

PD49 Models

PicoDot®, 10-30V dc

Sensing Mode/LED	Range or Focus	Connection	Housing Rating	NPN Models	PNP Models	Excess Gain	Beam Pattern
CLASS 2 P LASER POLAR RETRO	0.2 m - 10.6 m†	2 m	IP54, NEMA 3	**PD45VN6LLP**	**PD45VP6LLP**	EGC-1, EGC-2 & EGC-3 (p. 182)	—
		5-pin Euro Pigtail QD		**PD45VN6LLPQ**	**PD45VP6LLPQ**		
		2 m	IP67, NEMA 6	**PD49VN6LLP**	**PD49VP6LLP**		
		5-pin Euro Pigtail QD		**PD49VN6LLPQ**	**PD49VP6LLPQ**		
CLASS 2 LASER CONVERGENT	50 mm	2 m	IP54, NEMA 3	**PD45VN6C50**	**PD45VP6C50**	EGC-4 (p. 182)	BP-1 (p. 182)
		5-pin Euro Pigtail QD		**PD45VN6C50Q**	**PD45VP6C50Q**		
		2 m	IP67, NEMA 6	**PD49VN6C50**	**PD49VP6C50**		
		5-pin Euro Pigtail QD		**PD49VN6C50Q**	**PD49VP6C50Q**		
	102 mm	2 m	IP54, NEMA 3	**PD45VN6C100**	**PD45VP6C100**	EGC-5 (p. 182)	BP-2 (p. 182)
		5-pin Euro Pigtail QD		**PD45VN6C100Q**	**PD45VP6C100Q**		
		2 m	IP67, NEMA 6	**PD49VN6C100**	**PD49VP6C100**		
		5-pin Euro Pigtail QD		**PD49VN6C100Q**	**PD49VP6C100Q**		

More on next page

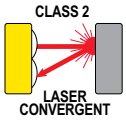
Connection options: A model with a QD requires a mating cordset (see page 181).

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

† Tested using a BRT-36X40BM 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.

ACCESSORIES page 181

PicoDot®, 10-30V dc (cont'd)

Sensing Mode/LED	Range or Focus	Connection	Housing Rating	NPN Models	PNP Models	Excess Gain	Beam Pattern
	203 mm	2 m	IP54, NEMA 3	**PD45VN6C200**	**PD45VP6C200**	EGC-6 (p. 182)	BP-3 (p. 182)
		5-pin Euro Pigtail QD		**PD45VN6C200Q**	**PD45VP6C200Q**		
		2 m	IP67, NEMA 6	**PD49VN6C200**	**PD49VP6C200**		
		5-pin Euro Pigtail QD		**PD49VN6C200Q**	**PD49VP6C200Q**		
	305 mm	2 m	IP54, NEMA 3	**PD45VN6C300**	**PD45VP6C300**	EGC-7 (p. 181)	BP-4 (p. 182)
		5-pin Euro Pigtail QD		**PD45VN6C300Q**	**PD45VP6C300Q**		
		2 m	IP67, NEMA 6	**PD49VN6C300**	**PD49VP6C300**		
		5-pin Euro Pigtail QD		**PD49VN6C300Q**	**PD49VP6C300Q**		

Connection options: A model with a QD requires a mating cordset (see page 181).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **PD45VN6C100 W/30**).

PicoDot® Specifications

Supply Voltage and Current	10 to 30V 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 µA at 30V dc **ON-state saturation voltage:** less than 0.3V at 10 mA dc; less than 0.8V 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 **C300 models:** 25 to 317 mm; focus at 305 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 ≤ 1.0V dc; High ≥ Vsupply -4.0V dc (< 30V dc) or disconnect wire; 100 milliseconds delay upon enable
Indicators	**Two LEDs:** **Green:** Power ON **Yellow:** Light sensed; light operate (LO) output conducting See data sheet for detailed information
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

More on next page

PicoDot® Specifications (cont'd)

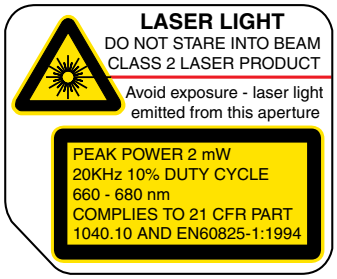
Connections	2 m or 9 m attached cable, or 5-pin Euro-style 150 mm pigtail quick-disconnect fitting; mating cordsets for QD models are ordered separately. See page 181.
Operating Conditions	**Temperature:** -10° to +45° C **Relative humidity:** 90% at 50° C (non-condensing)
Weight	**PD45: Sensor only:** 22 g **Sensor plus 2 m cable:** 62 g **PD49: Sensor only:** 28 g **Sensor plus 2 m cable:** 68 g
Application Notes	False pulse may occur less than 1 second after power-up
Certifications	CE
Hookup Diagrams	DC12 (p. 747)

Class 2 Laser Safety Notes

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.

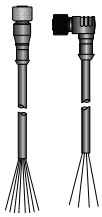


Cordsets

Euro QD

See page 685

Length	Threaded 5-Pin Straight	Threaded 5-Pin Right-Angle
0.5 m	MQDC1-501.5	–
1.83 m	MQDC1-506	MQDC1-506RA
4.57 m	MQDC1-515	MQDC1-515RA
9.14 m	MQDC1-530	MQDC1-530RA



Additional cordset information available. See page 679.

Brackets

PicoDot

pg. 644	pg. 644	pg. 644	pg. 644
SMB46A	SMB46S	SMB46L	SMB46U

Additional bracket information available. See page 620.

REFLECTORS

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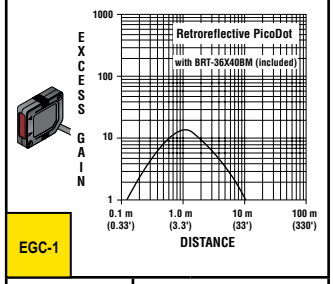
Excess Gain Curves

(Convergent mode performance based on 90% reflectance white test card)

LP = Visible Red Laser LED Polarized

= Visible Red Laser LED

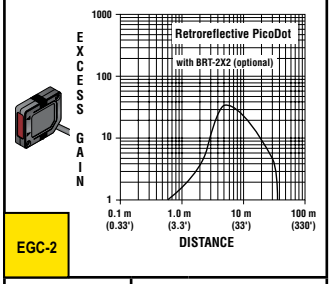
Retroreflective Mode PicoDot® Class 2 Laser



EGC-1

Range: 10.6 m **LED:** LP

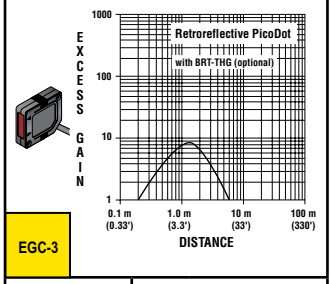
Retroreflective Mode PicoDot® Class 2 Laser



EGC-2

Range: 39.6 m **LED:** LP

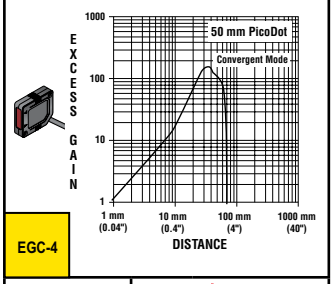
Retroreflective Mode PicoDot® Class 2 Laser



EGC-3

Range: 6 m **LED:** LP

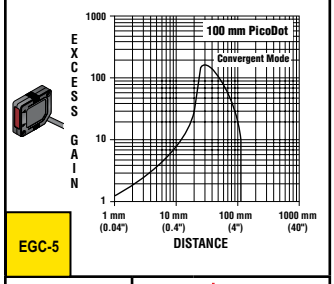
Convergent Mode PicoDot® Class 2 Laser



EGC-4

Range: 50 mm **LED:**

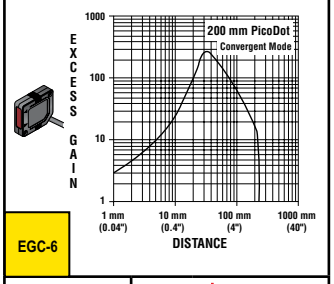
Convergent Mode PicoDot® Class 2 Laser



EGC-5

Range: 102 mm **LED:**

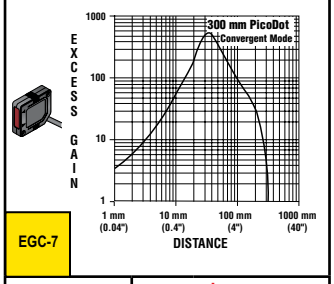
Convergent Mode PicoDot® Class 2 Laser



EGC-6

Range: 203 mm **LED:**

Convergent Mode PicoDot® Class 2 Laser



EGC-7

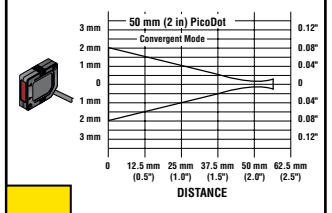
Range: 305 mm **LED:**

Beam Patterns

(Convergent mode performance based on 90% reflectance white test card)

= Visible Red Laser LED

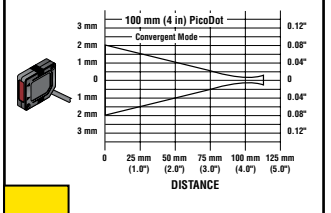
Convergent Mode PicoDot® Class 2 Laser



BP-1

Range: 50 mm **LED:**

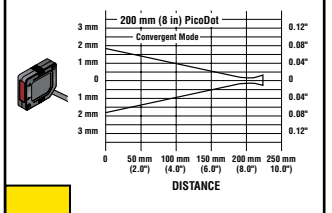
Convergent Mode PicoDot® Class 2 Laser



BP-2

Range: 102 mm **LED:**

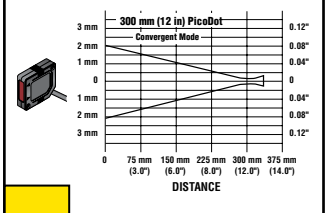
Convergent Mode PicoDot® Class 2 Laser



BP-3

Range: 203 mm **LED:**

Convergent Mode PicoDot® Class 2 Laser



BP-4

Range: 305 mm **LED:**

QM42 and QMT42

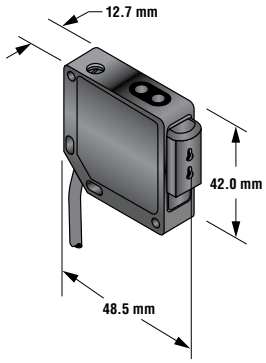
Rugged Die-Cast Family of Sensors

- Features compact, low-cost dc sensors in NEMA 6 (IEC IP67) die-cast housings
- Delivers outstanding immunity to electrical noise
- Includes marginal and Power ON gain indicator
- QM42 series: Available in opposed, polarized retroreflective, diffuse, short-range adjustable-field and plastic fiber optic modes
- QMT42 series (slightly larger): Available in fixed-field, diffuse and long-range adjustable-field modes

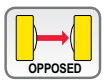
ACCESSORIES
page 185

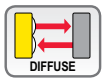
QMT42 Long-range Diffuse, Fixed-field and Adjustable-field Model Suffix DX, FF and AFV400

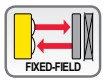
QM42 Opposed, Retroreflective, Short-range Diffuse, and Short-range Adjustable-field Model Suffix E, R, LP, D, AFV150 and FP

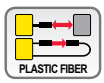


QM42 Plastic Fiber Optic Models Suffix FP



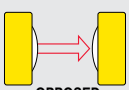






QM42 and QMT42, 10-30V dc

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	10 m	2 m	QM426E Emitter		EGC-1 (p. 186)	BP-1 (p. 187)
		4-Pin Euro QD	QM426EQ Emitter			
		2 m	QM42VN6R	QM42VP6R		
		4-Pin Euro QD	QM42VN6RQ	QM42VP6RQ		

More on next page

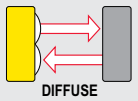
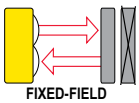
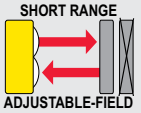
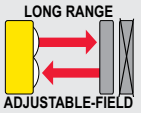
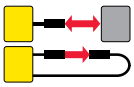
Connection options: A model with a QD requires a mating cordset (see page 185).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QM42VN6R W/30**).

ACCESSORIES page 185

QM42 and QMT42, 10-30V dc (cont'd)

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 POLAR RETRO	3 m†	2 m	QM42VN6LP	QM42VP6LP	EGC-2 (p. 186)	BP-2 (p. 187)
		4-Pin Euro QD	QM42VN6LPQ	QM42VP6LPQ		
 DIFFUSE	Short-Range 400 mm	2 m	QM42VN6D	QM42VP6D	EGC-3 (p. 186)	BP-3 (p. 187)
		4-Pin Euro QD	QM42VN6DQ	QM42VP6DQ		
	Long-Range 10 mm- 6 m	2 m	QMT42VN6DX	QMT42VP6DX	EGC-4 (p. 186)	BP-4 (p. 187)
		4-Pin Euro QD	QMT42VN6DXQ	QMT42VP6DXQ		
 FIXED-FIELD	50 - 500 mm Cutoff	2 m	QMT42VN6FF500	QMT42VP6FF500	EGC-7 (p. 186)	—
		4-Pin Euro QD	QMT42VN6FF500Q	QMT42VP6FF500Q		
	50 - 750 mm Cutoff	2 m	QMT42VN6FF750	QMT42VP6FF750	EGC-8 (p. 186)	—
		4-Pin Euro QD	QMT42VN6FF750Q	QMT42VP6FF750Q		
	50 - 1000 mm Cutoff	2 m	QMT42VN6FF1000	QMT42VP6FF1000	EGC-9 (p. 186)	—
		4-Pin Euro QD	QMT42VN6FF1000Q	QMT42VP6FF1000Q		
	50 - 1500 mm Cutoff	2 m	QMT42VN6FF1500	QMT42VP6FF1500	EGC-10 (p. 186)	—
		4-Pin Euro QD	QMT42VN6FF1500Q	QMT42VP6FF1500Q		
	50 - 2000 mm Cutoff	2 m	QMT42VN6FF2000	QMT42VP6FF2000	EGC-11 (p. 186)	—
		4-Pin Euro QD	QMT42VN6FF2000Q	QMT42VP6FF2000Q		
 SHORT RANGE ADJUSTABLE-FIELD	5 mm to Cutoff point (adjustable from 50 to 150 mm)	2 m	QM42VN6AFV150	QM42VP6AFV150	EGC-5 (p. 186) Cutoff Point Deviation Curve CPDC-1 (p. 187)	—
		4-Pin Euro QD	QM42VN6AFV150Q	QM42VP6AFV150Q		
 LONG RANGE ADJUSTABLE-FIELD	25 mm to Cutoff point (adjustable from 125 to 400 mm)	2 m	QMT42VN6AFV400	QMT42VP6AFV400	EGC-6 (p. 186) Cutoff Point Deviation Curve CPDC-2 (p. 187)	—
		4-Pin Euro QD	QMT42VN6AFV400Q	QMT42VP6AFV400Q		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	QM42VN6FP	QM42VP6FP	EGC-12 (p. 186) & EGC-13 (p. 186)	BP-5 (p. 187) & BP-6 (p. 187)
		4-Pin Euro QD	QM42VN6FPQ	QM42VP6FPQ		

Connection options: A model with a QD requires a mating cordset (see page 185).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QM42VN6LP 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.

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 30V 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

More on next page

QM42 and QMT42 Specifications (cont'd)

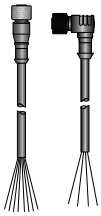
Output Rating	100 mA max. (each output) **OFF-state leakage current:** less than µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 100 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 150 mA, typical at 20º 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 data sheet for detailed information
Indicators	**Two LEDs:** Green and Yellow **Green:** Power ON; Opposed emitters: Green power ON **Yellow:** Light sensed; light operate (LO) See data sheet 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 185.
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	CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 744) **All others:** DC03 (p. 744)

Cordsets

Euro QD

See page 682

Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Additional options: Additional cordset information available. See page 679.

Brackets

QM42/QMT42

pg. 641 SMB30SK

pg. 644 SMB46S

pg. 644 SMB46L

Additional options: Additional brackets and information available. See page 620.

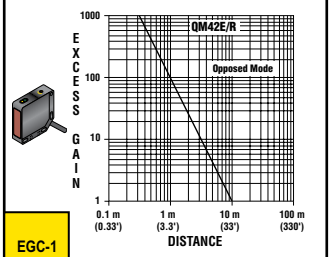
REFLECTORS
PAGE 710

Excess Gain Curves

(Diffuse, Adjustable-field and Fixed-field mode performance based on 90% reflectance white test card)

○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized

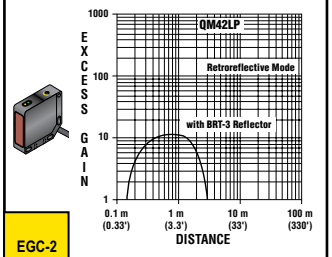
Opposed Mode QM42



EGC-1

Range: 10 m **LED:** ○

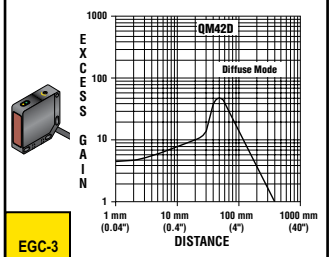
Polarized Retroreflective Mode QM42



EGC-2

Range: 3 m **LED:** P

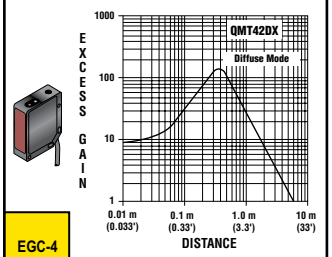
Diffuse Mode QM42



EGC-3

Range: 400 mm **LED:** ○

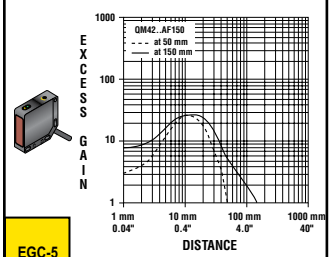
Diffuse Mode QMT42



EGC-4

Range: 6 m **LED:** ○

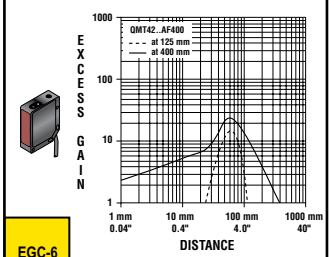
Adjustable-Field Mode QM42



EGC-5

Cutoff: 50- 150 mm **LED:** ●

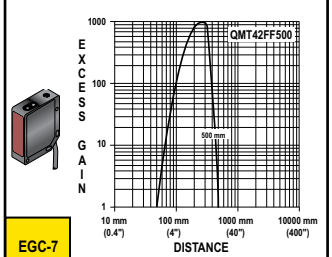
Adjustable-Field Mode QMT42



EGC-6

Cutoff: 125- 400 mm **LED:** ●

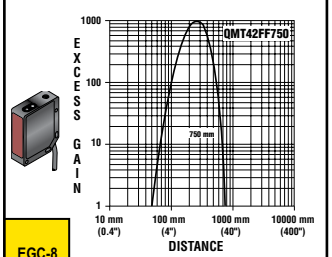
Fixed-Field Mode QMT42



EGC-7

Cutoff: 500 mm **LED:** ○

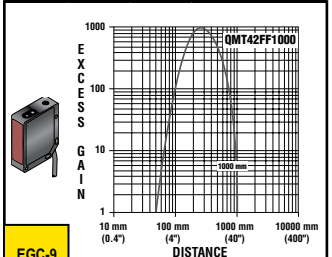
Fixed-Field Mode QMT42



EGC-8

Cutoff: 750 mm **LED:** ○

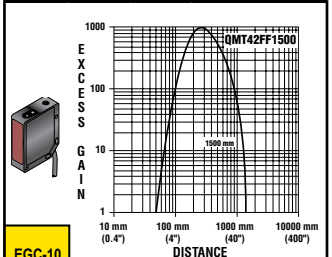
Fixed-Field Mode QMT42



EGC-9

Cutoff: 1000 mm **LED:** ○

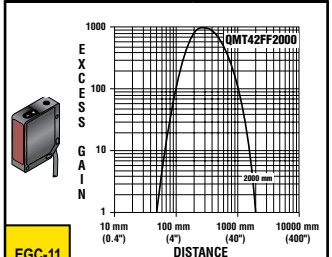
Fixed-Field Mode QMT42



EGC-10

Cutoff: 1500 mm **LED:** ○

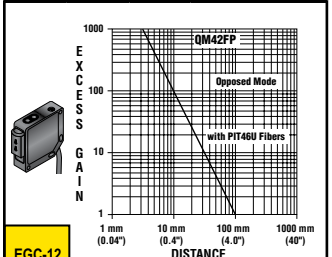
Fixed-Field Mode QMT42



EGC-11

Cutoff: 2000 mm **LED:** ○

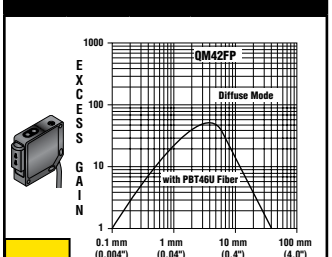
Opposed Mode—Plastic Fiber QM42



EGC-12

Range: Varies **LED:** ●

Diffuse Mode—Plastic Fiber QM42



EGC-13

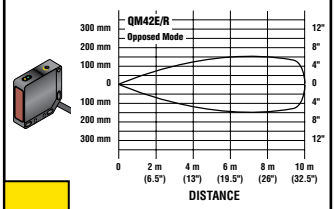
Range: Varies **LED:** ●

Beam Patterns (Diffuse mode performance based on 90% reflectance white test card)

○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized

Opposed Mode QM42

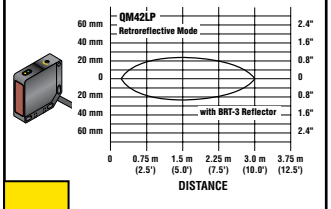
Effective Beam: 8 mm



BP-1

Range: 10 m **LED:** ○

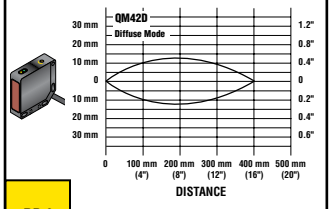
Polarized Retroreflective Mode QM42



BP-2

Range: 3 m **LED:** P

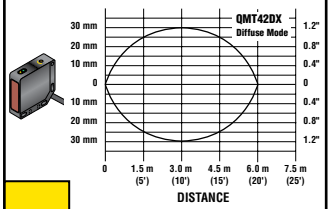
Diffuse Mode QM42



BP-3

Range: 400 mm **LED:** ○

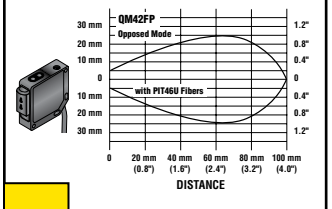
Diffuse Mode QMT42



BP-4

Range: 6 m **LED:** ○

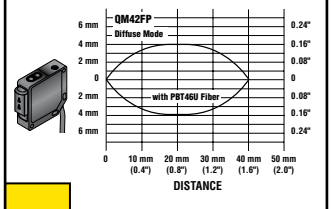
Opposed Mode—Plastic Fiber QM42



BP-5

Range: Varies **LED:** ●

Diffuse Mode—Plastic Fiber QM42

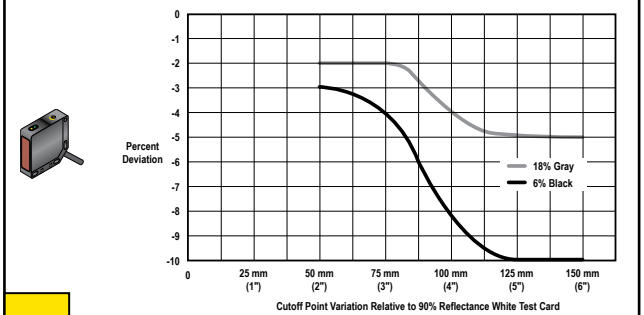


BP-6

Range: Varies **LED:** ●

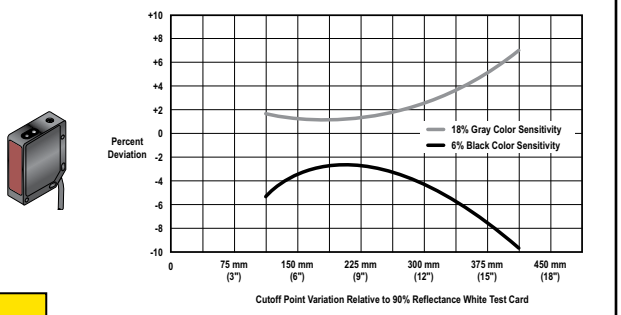
Cutoff Point Deviations

QM42 Adjustable-Field – 150 mm



CPDC-1

QMT42 Adjustable-Field – 400 mm



CPDC-2

WORLD-BEAM® QS30H2O
Opposed-Mode Water Sensors

High-power, infrared sensor for reliable detection of water and water-based liquids

The WORLD-BEAM® QS30H2O Sensor uses a 1450 nm sensing beam to burn through many types of thin-walled glass and plastic containers, creating contrast for reliable liquid detection. The QS30H2O Sensor is an innovative addition to Banner's complete line of cost-effective, rugged and powerful WORLD-BEAM photoelectric sensors.

Liquid detection for challenging clear or translucent plastic or glass containers

- Emits light that water-based liquids will attenuate, enhancing contrast in challenging low-contrast applications
- Burns through many plastic and glass containers
- Detects water-based liquids including liquor, beer, shampoos, conditioners, lotions and sauces
- Penetrates many labels (material thickness and type dependent)
- Features WORLD-BEAM QS30 housing with popular 30 mm threaded lens and side mount
- Specified ranges of up to 4 m (longer range possible)
- Offers built-in electronic crosstalk avoidance
- Resists harsh environments with rugged IP67 (NEMA 6) housing and encapsulated electronics
- Rated PW12 (1200 psi washdown)
- Offers choice of 10 to 30V dc operation with bipolar, NPN (sinking) and PNP (sourcing) output or 15 to 30V dc with analog (0-10V) output
- Delivers highly visible power and output status indicators
- Includes accessory apertures to attenuate or shape the beam

bannerengineering.com

Reliable liquid detection in WORLD-BEAM® housing

Detect water and water-based liquids inside containers

- Fluid filled IV bags
- HDPE milk containers
- Clear glass test tubes
- Colored PET beverage bottles
- Etched or frosted glass containers
- Liquid point level in sight glass
- Thin walled PFA/FEP tubes
- Nozzle spray verification

Versatile models to meet demanding requirements

- Robust housing with 30 mm threaded barrel and integrated side mount
- Receivers with a choice of outputs and range
  - Models with bipolar NPN/PNP output and 2 m range
  - High-gain models with bipolar NPN/PNP output and 4 m range
  - Analog (0-10V) output with 4 m range
- Light operate (LO) or dark operate (DO), depending on model (discrete only)
- Operating temperature from -20° to 60° C
- Large output status indicator on back of receiver
- Bright LED status indicators on sensor top
- 2 m or 9 m attached cable or 5-pin Euro-style pigtail quick-disconnect

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