COMPACT SENSORS

WORLD-BEAM® QS18 page 88

- Universal photoelectric family with 18 mm threaded lens or side mounts
- Ideal replacement for hundreds of other sensor styles
- All sensing modes available, including laser, fiber optic and ultrasonic
- *Expert*™ push-button teachable models
- Models for ac or dc power

WORLD-BEAM® Q20 page 103

- High power in a small package
- Rugged overmolded design for enhanced durability
- Ranges to 20 m
- Four sensing modes
- Universal threaded inserts with 25.4 mm hole spacing

MINI-BEAM® page 108

- Extensive family in all sensing modes and ranges to 30 m
- *Expert*™ push-button teachable models
- Models for special needs—clear plastic detection, NAMUR outputs
- World's most popular photoelectric

S18 page 127

- Completely epoxy-encapsulated 18 mm threaded plastic barrels
- Specialized laser diode emitter models
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power

M18 page 127

- Rugged 18 mm stainless steel threaded barrels
- Opposed, polarized and non-polarized retroreflective, diffuse and fixed-field modes
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

T18 page 134

- Completely epoxy-encapsulated right-angle, T-shaped package
- Specialized fixed-field and polarized retroreflective models
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power

TM18 page 140

- Rugged, metal right-angle, T-shaped package
- Opposed, polarized retroreflective and fixed-field models
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

Q25 page 144

- Compact, rectangular 25 mm right-angle housing with 18 mm threaded mounting base
- Completely epoxy-encapsulated
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power

SENSORS

WORLD-BEAM®
QS18 Right-Angle Barrel- & Side-Mount Sensors

- Replaces hundreds of other sensors with a compact housing
- Meets IP67 and NEMA 6 standards for harsh environments
- Available in opposed, polarized and non-polarized retroreflective, convergent, regular and wide-angle diffuse, laser, ultrasonic (see page 321), plastic or glass fiber optic, fixed-field and adjustable-field sensing modes
- Models for dc or ac/dc universal voltage operation
- Offers easy push-button TEACH-mode setup in *Expert*™ QS18E and ultrasonic models
- Ranges up to 20 m
- Features bright LED operating status indicators visible from 360°

ACCESSORIES page 96
LASER EMITTER
OPPOSED
RETRO
RETRO LASER
POLAR RETRO
DIFFUSE
DIFFUSE LASER
CONVERGENT
ADJUSTABLE-FIELD
LASER ADJUSTABLE-FIELD
FIXED-FIELD
ULTRASONIC
GLASS FIBER
PLASTIC FIBER

page 89

QS18

- Eight sensing modes for solving most applications: opposed, retroreflective, convergent, diffuse, plastic and glass fiber optic, and adjustable field and fixed field
- High-power infared or visible red sensing beam
- Models for dc or ac/dc operation

page 89

QS18 Laser

- Opposed, diffuse, retroreflective and adjustable-field models
- High-performance sensing with visible Class 1 and 2 lasers
- Long sensing ranges
- Ideal for confined areas
- Narrow effective beam for small object detection and precise position control
- Emitter models available with five beam shapes

page 90

QS18 Adjustable-Field

- Background suppression models for detection of objects when the background condition is not fixed
- Foreground suppression models for detection when background is fixed and object varies in color or shape
- Visible red LED or laser sensing beam
- Long-range models for reliable sensing up to 300 mm
- Models with crosstalk avoidance circuity for reliable sensing

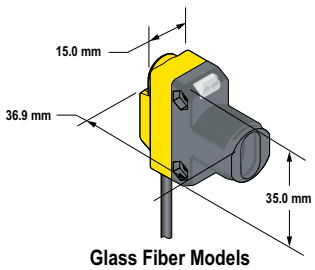
page 93

QS18 *Expert*™

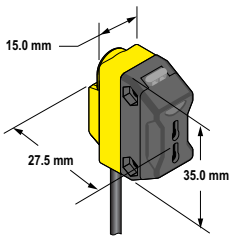
- Single push-button programing of advanced sensing options
- Five sensor configuration options
- Diffuse, convergent, retroreflective and plastic fiber optic modes
- Reliable detection of reflective objects

WORLD-BEAM® QS18 DC Series

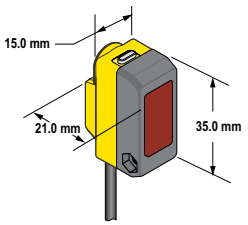
Opposed, Retroreflective, Laser Retroreflective, Convergent, Diffuse, Laser Diffuse and Fixed-field Models Suffix E, R, LV, LP, LLP, CV15, CV45, D, LD, LE and FF



Glass Fiber Models Suffix F



Plastic Fiber Models Suffix FP



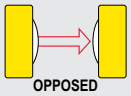
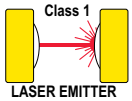
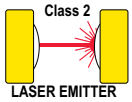
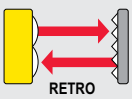
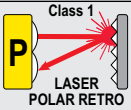
Opposed, Diffuse and Adjustable-field Models Suffix EB, RB, DB, W and AF

ONLINE
AUTOCAD, STEP, IGES & PDF

QPMA

WORLD-BEAM® QS18, 10-30V dc

Infrared LED | Visible Red LED | Visible Red Laser

Sensing Mode/LED	Range	Connection	Models* NPN	Models* PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	QS186E Emitter		EGC-1 (p. 97)	BP-1 (p. 99)
		4-pin Euro QD	QS186EQ8 Emitter			
		2 m	QS18VN6R	QS18VP6R		
		4-pin Euro QD	QS18VN6RQ8	QS18VP6RQ8		
	3 m	2 m	QS186EB Emitter		EGC-2 (p. 97)	BP-2 (p. 99)
		4-pin Euro QD	QS186EBQ8 Emitter			
		2 m	QS18VN6RB	QS18VP6RB		
		4-pin Euro QD	QS18VN6RBQ8	QS18VP6RBQ8		
 Class 1 LASER EMITTER	15 m (4500 X excess gain)	2 m	QS186LE**		See Data sheet for more information.	
		4-pin Euro QD	QS186LEQ8**			
Class 1 LASER SPOT	See Data sheet for more information.	2 m	QS186LE10			
		4-pin Euro QD	QS186LE10Q8			
Class 1 LASER SPOT		2 m	QS186LE11			
		4-pin Euro QD	QS186LE11Q8			
Class 1 LASER SPOT		2 m	QS186LE12			
		4-pin Euro QD	QS186LE12Q8			
Class 1 LASER SPOT		2 m	QS186LE14			
		4-pin Euro QD	QS186LE14Q8			
 Class 2 LASER EMITTER	15 m (7000 X excess gain)	2 m	QS186LE2**		See Data sheet for more information.	
		4-pin Euro QD	QS186LE2Q8**			
Class 2 LASER SPOT	See Data sheet for more information.	2 m	QS186LE210			
		4-pin Euro QD	QS186LE210Q8			
Class 2 LASER SPOT		2 m	QS186LE211			
		4-pin Euro QD	QS186LE211Q8			
Class 2 LASER SPOT		2 m	QS186LE212			
		4-pin Euro QD	QS186LE212Q8			
Class 2 LASER SPOT		2 m	QS186LE214			
		4-pin Euro QD	QS186LE214Q8			
 RETRO	6.5 m†	2 m	QS18VN6LV	QS18VP6LV	EGC-3 (p. 97)	BP-3 (p. 99)
		4-pin Euro QD	QS18VN6LVQ8	QS18VP6LVQ8		
 POLAR RETRO	3.5 m†	2 m	QS18VN6LP	QS18VP6LP	EGC-4 (p. 97)	BP-4 (p. 99)
		4-pin Euro QD	QS18VN6LPQ8	QS18VP6LPQ8		
 Class 1 LASER POLAR RETRO	0.1-10 m††	2 m	QS18VN6LLP	QS18VP6LLP	EGC-5 (p. 97)	—
		4-pin Euro QD	QS18VN6LLPQ8	QS18VP6LLPQ8		

More on next page

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

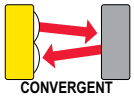
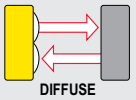
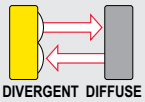
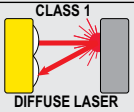
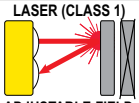
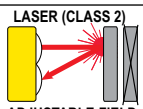
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6LV W/30**).
QD models (except Laser Emitters): A model with a QD requires a mating cable (see page 96).
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6LVQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6LVQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6LVQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6LVQ**).

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
† Retroreflective range is specified using one model BRT-84 retroreflector.
†† Retroreflective range is specified using one model BRT-51X51BM or BRT-TVHG-2X2 retroreflector.
* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
** Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty environments; the scattered light would greatly reduce excess gain.

ACCESSORIES page 96

WORLD-BEAM® QS18, 10-30V dc (cont'd)

Infrared LED | Visible Red LED | Visible Red Laser

Sensing Mode/LED	Range	Connection	Models* NPN	Models* PNP	Excess Gain	Beam Pattern
 CONVERGENT	16 mm	2 m	QS18VN6CV15	QS18VP6CV15	EGC-17 (p. 98)	BP-16 (p. 100)
		4-pin Euro QD	QS18VN6CV15Q8	QS18VP6CV15Q8		
	43 mm	2 m	QS18VN6CV45	QS18VP6CV45	EGC-18 (p. 98)	BP-17 (p. 100)
		4-pin Euro QD	QS18VN6CV45Q8	QS18VP6CV45Q8		
 DIFFUSE	450 mm	2 m	QS18VN6D	QS18VP6D	EGC-7 (p. 97)	BP-6 (p. 99)
		4-pin Euro QD	QS18VN6DQ8	QS18VP6DQ8		
		2 m	QS18VN6DB	QS18VP6DB	EGC-8 (p. 97)	BP-7 (p. 99)
		4-pin Euro QD	QS18VN6DBQ8	QS18VP6DBQ8		
 DIVERGENT DIFFUSE	100 mm	2 m	QS18VN6W	QS18VP6W	EGC-9 (p. 97)	BP-8 (p. 99)
		4-pin Euro QD	QS18VN6WQ8	QS18VP6WQ8		
CLASS 1  DIFFUSE LASER	300 mm	2 m	QS18VN6LD	QS18VP6LD	EGC-10 (p. 97)	BP-9 (p. 100)
		4-pin Euro QD	QS18VN6LDQ8	QS18VP6LDQ8		
 ADJUSTABLE-FIELD FOREGROUND	Adjustable between 30-200 mm	2 m	QS18VN6AFF200	QS18VP6AFF200	EGC-24 (p. 98) Min Separation Distance MSD-2 (p. 101)	—
			QS18AB6AFF200 (Bipolar NPN/PNP)			
		4-pin Euro Pigtail QD	QS18VN6AFF200Q5	QS18VP6AFF200Q5		
			QS18AB6AFF200Q5 (Bipolar NPN/PNP)			
	Adjustable between 15-40 mm	2 m	QS18VN6AFF40	QS18VP6AFF40	EGC-22 (p. 98) Min Separation Distance MSD-4 (p. 101)	—
			QS18AB6AFF40 (Bipolar NPN/PNP)			
		4-pin Euro Pigtail QD	QS18VN6AFF40Q5	QS18VP6AFF40Q5		
			QS18AB6AFF40Q5 (Bipolar NPN/PNP)			
 ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	Adjustable between 30-300 mm	2 m	QS18VN6AF300	QS18VP6AF300	EGC-23 (p. 98) Min Separation Distance MSD-1 (p. 101)	—
			QS18AB6AF300 (Bipolar NPN/PNP)			
		4-pin Euro Pigtail QD	QS18VN6AF300Q5	QS18VP6AF300Q5		
			QS18AB6AF300Q5 (Bipolar NPN/PNP)			
	Adjustable between 15-40 mm	2 m	QS18VN6AF40	QS18VP6AF40	EGC-21 (p. 98) Min Separation Distance MSD-3 (p. 101)	—
			QS18AB6AF40 (Bipolar NPN/PNP)			
		4-pin Euro Pigtail QD	QS18VN6AF40Q5	QS18VP6AF40Q5		
			QS18AB6AF40Q5 (Bipolar NPN/PNP)			
	1 mm to cutoff point (adjustable between 20-100 mm)	2 m	QS18VN6AF100	QS18VP6AF100	EGC-25 (p. 98) Cutoff Point Deviation Curve CPDC-1 (p. 102)	—
		4-pin Euro Pigtail QD	QS18VN6AF100Q5	QS18VP6AF100Q5		
LASER (CLASS 1)  ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	1 mm to cutoff point (adjustable between 30-150 mm)	2 m	QS18VN6LAF	QS18VP6LAF	EGC-26 (p. 98) Cutoff Point Deviation Curve CPDC-2 (p. 102)	—
		4-pin Euro Pigtail QD	QS18VN6LAFQ5	QS18VP6LAFQ5		
LASER (CLASS 2)  ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	20 mm to cutoff point (adjustable between 50-250 mm)	2 m	QS18VN6LAF250	QS18VP6LAF250	EGC-27 (p. 98) Cutoff Point Deviation Curve CPDC-3 (p. 102)	—
		4-pin Euro Pigtail QD	QS18VN6LAF250Q5	QS18VP6LAF250Q5		

More on next page

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

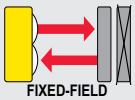
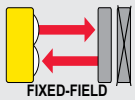
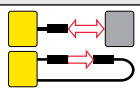
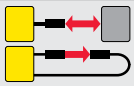
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6D W/30**).
QD models (except Adjustable-Field):
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6LVQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6LVQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6LVQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6LVQ**).

QD models (Adjustable-Field only):
- For 4-pin 150 mm Pico-style QD, add suffix **Q** (example, **QS18VP6AF100Q**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VP6AF100Q5**).

* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

WORLD-BEAM® QS18, 10-30V dc (cont'd)

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models* NPN	Models* PNP	Excess Gain	Beam Pattern
 FIXED-FIELD	0-50 mm Cutoff	2 m	**QS18VN6FF50**	**QS18VP6FF50**	EGC-28 (p. 98)	—
		4-pin Euro QD	**QS18VN6FF50Q8**	**QS18VP6FF50Q8**		
 FIXED-FIELD	0-100 mm Cutoff	2 m	**QS18VN6FF100**	**QS18VP6FF100**	EGC-29 (p. 98)	—
		4-pin Euro QD	**QS18VN6FF100Q8**	**QS18VP6FF100Q8**		
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	**QS18VN6F**	**QS18VP6F**	EGC-30 & EGC-31 (p. 98)	BP-20 & BP-21 (p. 100)
		4-pin Euro QD	**QS18VN6FQ8**	**QS18VP6FQ8**		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	**QS18VN6FP**	**QS18VP6FP**	EGC-32 & EGC-33 (p. 98)	BP-22 & BP-23 (p. 100)
		4-pin Euro QD	**QS18VN6FPQ8**	**QS18VP6FPQ8**		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6LV W/30**).
QD models:
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6LVQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6LVQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6LVQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6LVQ**).

* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

WORLD-BEAM® QS18 DC Specifications

Supply Voltage and Current	**Retroreflective, Diffuse and Adjustable-field Laser:** 10 to 30V dc (10% max. ripple) at less than 15 mA, exclusive of load **Laser Emitters:** 10 to 30V dc (10% max. ripple) at less than 35 mA **Adjustable-field (40, 200 & 300 mm):** 10 to 30V dc (10% max. ripple) at less than 27 mA **All others:** 10 to 30V dc (10% max. ripple) at less than 25 mA, exclusive of load
Laser Characteristics (Laser models only)	**Wavelength: Class 1:** 650 nm visible red **Class 2:** Adjustable-field—658 nm visible red Laser Emitter—650 nm visible red
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Laser Control (Emitters only)	Apply 0V dc to white wire to enable beam Apply +10 to 30V dc to white wire to inhibit beam **Enable Time: Class 1**—240 ms **Class 2**—8 ms **Disable time: Class 1**—100 ms **Class 2**—1 ms
Output Configuration*	**Solid-state complementary;** NPN (current sinking), PNP (current sourcing), or bipolar (both sinking and sourcing depending on model) **Rating:** 100 mA max. each output at 25° C **OFF-state leakage current:** **Adjustable-field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-field Laser:** **NPN:** less than 200 µA @ 30V dc (see Application Note 1) **PNP:** less than 10 µA @ 30V dc **Fixed-field:** less than 200 µA @ 30V dc **All others:** less than 50 µA @ 30V dc **ON-state saturation voltage:** **Adjustable-field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-field Laser:** **NPN:** less than 1.6V @ 100 mA **PNP:** less than 3.0V @ 100 mA **All others:** less than 1V @ 10 mA; less than 1.5V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time*	**Opposed:** 750 microseconds ON; 375 microseconds OFF **Retroreflective Laser, Diffuse Laser and Adjustable-field (100, 150 & 250 mm):** 700 microseconds ON/OFF **Adjustable-field:(40, 200 & 300 mm):** 2.5 milliseconds ON/OFF **Fixed-field:** 850 microseconds ON/OFF **All others:** 600 microseconds ON/OFF
Delay at Power-up	**Laser Emitters: Class 1**—250 milliseconds **Class 2**—10 milliseconds **Adjustable-field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-field Laser:** 200 milliseconds; outputs do not conduct during this time. **All others:** 100 milliseconds; outputs do not conduct during this time.

More on next page

* Does not apply to laser emitter models.

WORLD-BEAM® QS18 DC Specifications (cont'd)

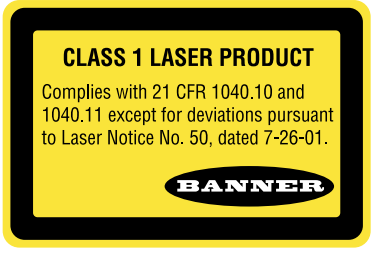
Repeatability*	**Opposed:** 100 microseconds **Retroreflective Laser, Diffuse Laser and Adjustable-field Laser:** 130 microseconds **Adjustable-field LED (100 mm):** 175 microseconds **Adjustable-field LED (40, 200 & 300 mm)**: 250 microseconds **Fixed-field:** 160 microseconds **All others:** 150 microseconds
Sensing Hysteresis*	**Retroreflective Laser:** 12% of range typical **Diffuse Laser:** 15% of range typical **Adjustable-field (100 mm):** 0.5% of range typical at 20 mm cutoff, 1% of range typical at 50 mm cutoff, 3% of range typical at 100 mm cutoff **Adjustable-field Laser (Class 1):** 1% range typical at 30 mm cutoff, 2% range typical at 75 mm cutoff, 5% range typical at 150 mm cutoff **Adjustable-field Laser (Class 2):** 1% range typical at 50 mm cutoff, 2% range typical at 150 mm cutoff, 5% range typical at 250 mm cutoff
Adjustments*	**Retroreflective, Retroreflective Laser, Convergent, Diffuse, Diffuse Laser and Glass & Plastic Fiber Optic:** Single-turn sensitivity (Gain) adjustment potentiometer **Adjustable-field:** Five-turn adjustment screw sets cutoff distance between min. and max. position
Indicators	**Laser Emitters: Green LED:** Power applied **All others, 2 LED indicators:** **Green:** Power ON **Yellow:** Light sensed See data sheet for detailed information.
Construction	ABS housing; acrylic lens cover (Laser Emitter models have PMMA window) 2.5 mm (adjustable-field only) and 3 mm mounting hardware included
Environmental Rating	Rated IEC IP67; NEMA 6; UL Type 1
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin Integral Pico-style QD (**Q7**), or 4-pin Integral Euro-style QD (**Q8**), depending on model. QD cordsets are ordered separately. See page 96.
Operating Conditions	**Lasers** **Adjustable-field LED (100 mm)** **Adjustable-field LED (40, 200 & 300 mm)** **All others** **Temperature:** -10° to +50° C 0° to +55° C -20° to +55° C -20° to +70° C **Relative humidity:** 95% @ 50° C (non-condensing)
Laser Classification (Laser models only)	Class 1 and Class 2 laser product; complies with IEC 60825-1: 2001 and 21 CFR 1040.10, except deviations pursuant to Laser Notice 50, dated 7-26-01.
Certifications	CE cULus
Application Notes	1. NPN off-state leakage current is < 200 µA for load resistances > 3 kΩ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current
Hookup Diagrams	**LED Emitters:** DC02 (p. 744) **Single output:** DC03 (p. 744) **Bipolar:** DC04 (p. 744) **Laser Emitters:** DC22 (p. 749)

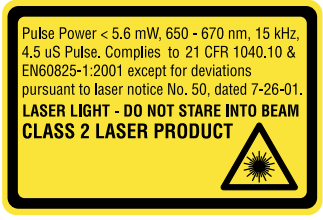
* Does not apply to laser emitter models.

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

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

For safe laser use (Class 1 or Class 2):
- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path.
- Locate open laser beam paths either above or below eye level, where practical.

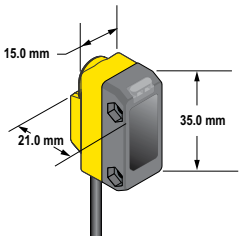




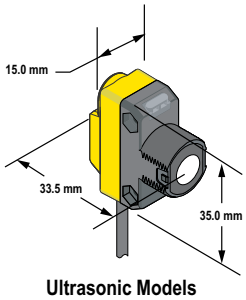
WORLD-BEAM® QS18 *Expert*™ and Ultrasonic Sensors

Retroreflective, Convergent and Diffuse Models
Suffix LP, CV15, CV45, D and DV

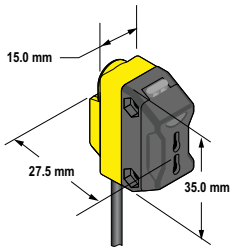
ONLINE
AUTOCAD, STEP, IGES & PDF



Diffuse Models
Suffix DB and W



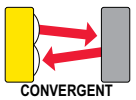
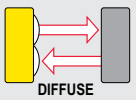
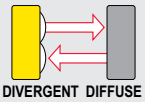
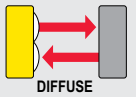
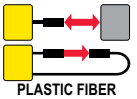
Ultrasonic Models
Suffix NA and PA



Plastic Fiber Models
Suffix FP

WORLD-BEAM® QS18, 10-30V dc

Infrared LED Visible Red LED

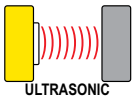
Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 POLAR RETRO	3.5 m†	2 m	QS18EN6LP	QS18EP6LP	EGC-6 (p. 97)	BP-5 (p. 99)
		4-pin Euro QD	QS18EN6LPQ8	QS18EP6LPQ8		
 CONVERGENT	16 mm	2 m	QS18EN6CV15	QS18EP6CV15	EGC-19 (p. 98)	BP-18 (p. 100)
		4-pin Euro QD	QS18EN6CV15Q8	QS18EP6CV15Q8		
	43 mm	2 m	QS18EN6CV45	QS18EP6CV45	EGC-20 (p. 98)	BP-19 (p. 100)
		4-pin Euro QD	QS18EN6CV45Q8	QS18EP6CV45Q8		
 DIFFUSE	800 mm	2 m	QS18EN6D	QS18EP6D	EGC-13 (p. 97)	BP-12 (p. 100)
		4-pin Euro QD	QS18EN6DQ8	QS18EP6DQ8		
	500 mm	2 m	QS18EN6DB	QS18EP6DB	EGC-14 (p. 97)	BP-13 (p. 100)
		4-pin Euro QD	QS18EN6DBQ8	QS18EP6DBQ8		
 DIVERGENT DIFFUSE	300 mm	2 m	QS18EN6W	QS18EP6W	EGC-15 (p. 97)	BP-14 (p. 100)
		4-pin Euro QD	QS18EN6WQ8	QS18EP6WQ8		
 DIFFUSE	600 mm	2 m	QS18EN6DV	QS18EP6DV	EGC-16 (p. 97)	BP-15 (p. 100)
		4-pin Euro QD	QS18EN6DVQ8	QS18EP6DVQ8		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	QS18EN6FP	QS18EP6FP	EGC-34 & EGC-35 (p. 99)	BP-24 & BP-25 (p. 100)
		4-pin Euro QD	QS18EN6FPQ8	QS18EP6FPQ8		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18EN6LP W/30**).
QD models
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18EN6LPQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18EN6LPQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18EN6LPQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18EN6LPQ**).

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

WORLD-BEAM® QS18 Ultrasonic, 12-30V dc

Sensing Mode/LED	Range	Connection	Models† NPN	Models† PNP	Excess Gain	Beam Pattern
 ULTRASONIC	50 - 500 mm	2 m	**QS18UNA**	**QS18UPA**	—	—
		4-pin Euro QD	**QS18UNAQ8**	**QS18UPAQ8**		
		2 m	**QS18UNAE††**	**QS18UPAE††**		
		4-pin Euro QD	**QS18UNAEQ8††**	**QS18UPAEQ8††**		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18UNA W/30**).
QD models:
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18UNAQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18UNAQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18UNAQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18UNAQ**).

† For complete information see QS18U Ultrasonic Sensors on page 317.
†† Models are epoxy-encapsulated, IP68; NEMA 6P with remote TEACH programming.

ACCESSORIES page 96

WORLD-BEAM® QS18 *Expert*™ Specifications

Supply Voltage	10 to 30V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24V dc @ greater than 55° C
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state NPN (current sinking) or PNP (current sourcing), depending on model. Light- (LO) or dark-operate (DO) selectable. Selectable 30 millisecond output OFF-delay **Rating:** 100 mA max. **OFF-state leakage current:** less than 50 µA @ 30V dc **ON-state saturation voltage:** less than 1.5V (2 m cable); 1.7V (9 m cable) Protected against false pulse on power-up and continuous overload or short circuit of output
Output Response Time	600 microseconds ON/OFF
Delay at Power-up	Momentary delay on power-up; outputs do not conduct during this time
Repeatability	75 microseconds
Adjustments	• **Thresholds:** Push-button/remote-wire configurable • **Five *Expert*™-style TEACH and SET options** **Light/dark operate:** selectable by programming order (load output follows the first taught target condition) • **Push-button enable/disable:** (remote wire only) See data sheet for detailed information.
Indicators	**2 LED indicators:** **Green:** RUN mode, output short-circuit **Yellow:** Output ON/marginal, TEACH mode
Construction	ABS housing, PMMA lens rated IEC IP67; NEMA 6 3 mm mounting hardware included
Environmental Rating	Meets NEMA 6; IEC IP67; UL Type 1
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin Integral Pico-style QD (**Q7**), or 4-pin Integral Euro-style QD (**Q8**). QD cordsets are ordered separately. See page 96.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 95% @ 50° C (non-condensing)
Certifications	CE c UL US
Hookup Diagrams	DC07 (p. 745)

WORLD-BEAM® QS18 Ultrasonic Specifications

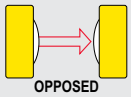
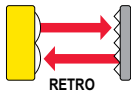
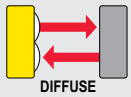
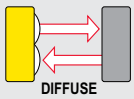
See page 317

WORLD-BEAM® QS18 Universal Voltage Sensors

ACCESSORIES page 96

WORLD-BEAM® QS18 Universal Voltage, 20-140V ac/dc or 20-270V ac/dc

⇨ Infrared LED ➡ Visible Red LED

Sensing Mode/LED	Range	Output††	Models LO	Models DO	Excess Gain	Beam Pattern
 OPPOSED	20 m	—	QS18WE Emitter		EGC-1 (p. 97)	BP-1 (p. 99)
		N-MOSFET (Sinking)	QS18ANWR	QS18RNWR		
		P-MOSFET (Sourcing)	QS18APWR	QS18RPWR		
 POLAR RETRO	3.5 m†	N-MOSFET (Sinking)	QS18ANWLP	QS18RNWLP	EGC-4 (p. 97)	BP-4 (p. 99)
		P-MOSFET (Sourcing)	QS18APWLP	QS18RPWLP		
 RETRO	6.5 m†	N-MOSFET (Sinking)	QS18ANWLV	QS18RNWLV	EGC-3 (p. 97)	BP-3 (p. 99)
		P-MOSFET (Sourcing)	QS18APWLV	QS18RPWLV		
 DIFFUSE	450 mm	N-MOSFET (Sinking)	QS18ANWDL	QS18RNWDL	EGC-11 (p. 97)	BP-10 (p. 100)
		P-MOSFET (Sourcing)	QS18APWDL	QS18RPWDL		
 DIFFUSE	1 m	N-MOSFET (Sinking)	QS18ANWDXL	QS18RNWDXL	EGC-12 (p. 97)	BP-11 (p. 100)
		P-MOSFET (Sourcing)	QS18APWDXL	QS18RPWDXL		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18WE W/30**).
QD models
• For 4-pin 150 mm Micro-style pigtail QD, add suffix **Q2** to the model number (example, **QS18WEQ2**).
600V cable models: Standard models are supplied with 300V cable. For a 600V cable, add suffix **C1** to the 2 m model number (example, **QS18WEC1**).

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

WORLD-BEAM® QS18 Universal Voltage Specifications

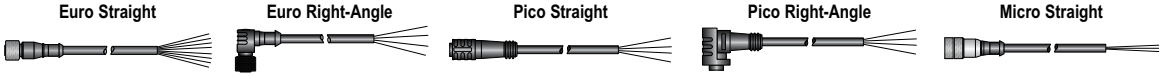
Supply Voltage	**P-MOSFET Models:** 20 to 140V ac/dc @ < 10 mA, exclusive of load **N-MOSFET Models:** 20 to 270V ac/dc @ < 10 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient over-voltages

More on next page

WORLD-BEAM® QS18 Universal Voltage Specifications (cont'd)

Output Configuration	Single Discrete Output, 100 mA load rating N-MOSFET or P-MOSFET, depending on model number Light Operate or Dark Operate, depending on model number	
Output Rating	**P-MOSFET models** 100 mA with short circuit protection **OFF-state leakage current:** < 400 µA **ON-state saturation voltage:** 2.75V	**N-MOSFET models** 100 mA with short circuit protection **OFF-state leakage current:** < 400 µA **ON-state saturation voltage:** 2.5V
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up. Latching short-circuit protection; reset by cycling power.	
Delay at Power-up	100 milliseconds max. dc, 300 milliseconds max. ac; outputs do not conduct during this time	
Repeatability	1.5 milliseconds	
Output Response Time	**Opposed mode:** 16.6 milliseconds (1 cycle at 60 Hz) **All other modes:** 8.3 milliseconds (½ cycle at 60 Hz)	
Adjustments	**Diffuse, Retroreflective and Polarized Retroreflective models only:** 1-turn potentiometer Sensitivity (Gain) adjustment	
Indicators	**Green:** Power ON **Yellow:** Light Sensed	
Construction	**Housing:** ABS **Lenses:** PMMA **Gain Adjuster:** acetal	
Environmental Rating	IEC IP67 (NEMA 6); 1200 PSI washdown NEMA ICS5, Annex F-2002 (PW12); UL Type 1	
Connections	2 m 3-conductor, 22 AWG PVC cable (300V ac), or 150 mm pigtail PVC cable with 4-pin threaded Micro-style connector; **C1 suffix models:** 2 m 3-conductor, 22 AWG PVC cable (600V ac).	
Operating Conditions	**Temperature:** **Less than 140V ac/dc:** −25° to +70° C (N-MOSFET and P-MOSFET models) **140V ac/dc or greater:** −25° to +55° C (N-MOSFET models only) **Max. Relative Humidity:** 95% @ 55° C (non-condensing)	
Certifications	CE c UL us LISTED 8N35 IND. CONT. EQ.	
Hookup Diagrams	**Cabled Emitters:** UN03 (p. 753) **QD Emitters**: UN04 (p. 753)	**Other cable models:** UN05 (p. 754) **Other QD models**: UN06 (p. 754)

Cordsets



Euro QD

See page 682

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

Euro QD (with Shield)

See page 683

	Threaded 4-Pin	
Length	Straight	Right-Angle
1.83 m	MQDEC2-406	MQDEC2-406RA
4.57 m	MQDEC2-415	MQDEC2-415RA
9.14 m	MQDEC2-430	MQDEC2-430RA

Pico QD

See page 680

	Snap-on 4-Pin	
Length	Straight	Right-Angle
2.00 m	PKG4-2	PKW4Z-2

Pico QD (with Shield)

See page 681

	Snap-on 4-Pin	
Length	Straight	Right-Angle
2.00 m	PKG4S-2	PKW4ZS-2

Micro QD

See page 698

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

Additional cordset information available. See page 679.

Brackets

QS18

pg. 637	pg. 638	pg. 669	pg. 670	pg. 638
SMB18A	SMB18FA..	SMBQS18A	SMBQS18AF	SMB18SF

Additional brackets and information available. See page 620.

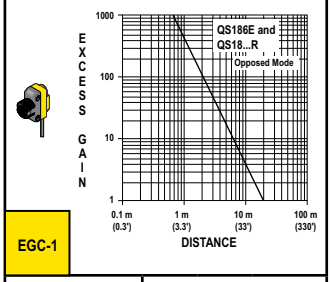
REFLECTORS PAGE 710

APERTURES PAGE 736

Excess Gain Curves (Diffuse 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

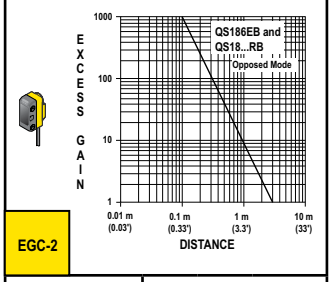
Opposed Mode WORLD-BEAM® QS18



EGC-1

Range: 20 m **LED:** ○

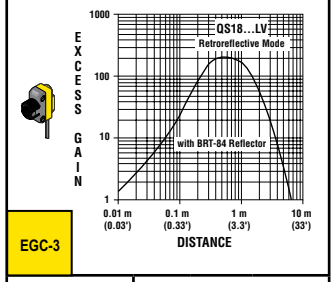
Opposed Mode WORLD-BEAM® QS18



EGC-2

Range: 3 m **LED:** ○

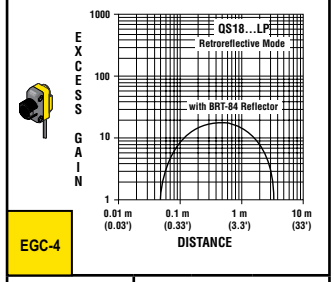
Retroreflective Mode WORLD-BEAM® QS18



EGC-3

Range: 6.5 m **LED:** ●

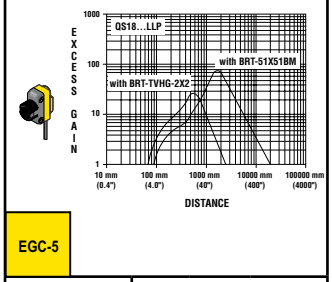
Polarized Retroreflective Mode WORLD-BEAM® QS18



EGC-4

Range: 3.5 m **LED:** P

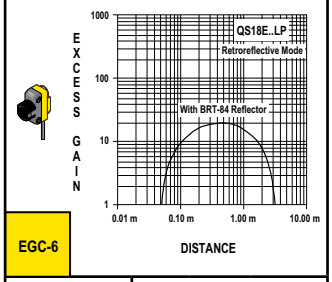
Retroreflective Mode WORLD-BEAM® QS18 Class 1 Laser



EGC-5

Range: 10 m **LED:** LP

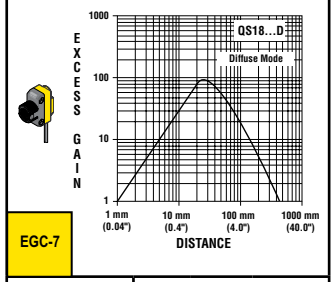
Polarized Retroreflective Mode WORLD-BEAM® QS18 *Expert*™



EGC-6

Range: 3.5 m **LED:** P

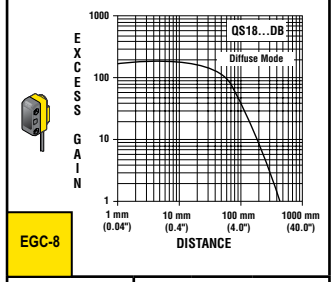
Diffuse Mode WORLD-BEAM® QS18



EGC-7

Range: 450 m **LED:** ○

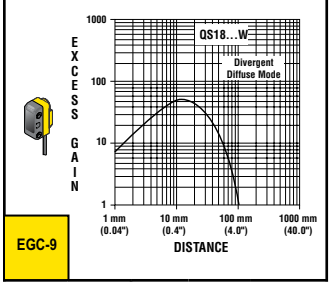
Diffuse Mode WORLD-BEAM® QS18



EGC-8

Range: 450 mm **LED:** ○

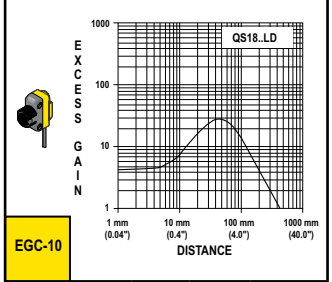
Divergent Diffuse Mode WORLD-BEAM® QS18



EGC-9

Range: 100 mm **LED:** ○

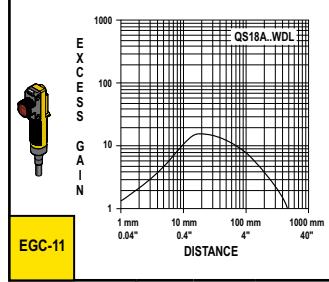
Diffuse Mode WORLD-BEAM® QS18 Class 1 Laser



EGC-10

Range: 300 mm **LED:** ✸

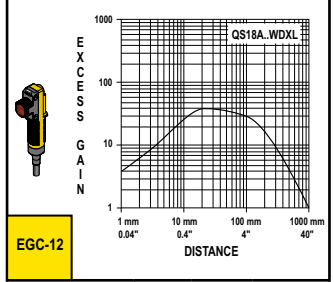
Diffuse Mode WORLD-BEAM® QS18



EGC-11

Range: 450 mm **LED:** ●

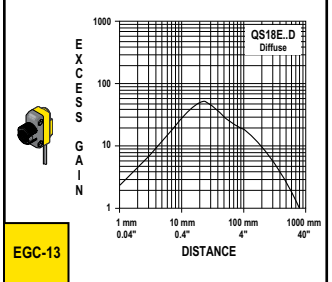
Diffuse Mode WORLD-BEAM® QS18



EGC-12

Range: 1 m **LED:** ○

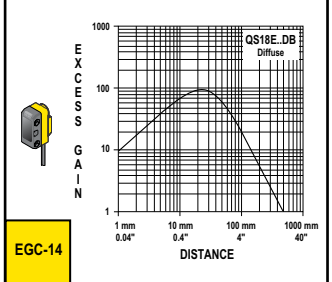
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



EGC-13

Range: 800 mm **LED:** ○

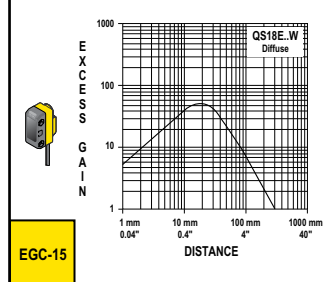
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



EGC-14

Range: 500 mm **LED:** ○

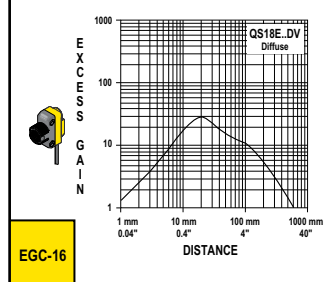
Divergent Diffuse Mode WORLD-BEAM® QS18 *Expert*™



EGC-15

Range: 300 mm **LED:** ○

Diffuse Mode WORLD-BEAM® QS18 *Expert*™



EGC-16

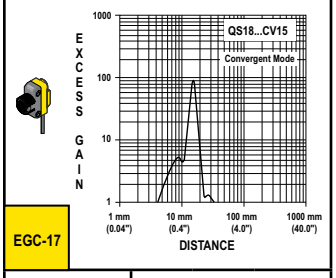
Range: 600 mm **LED:** ●

More on next page

Excess Gain Curves (Convergent, Diffuse, Adjustable-Field and Fixed-Field mode performance based on 90% reflectance white test card)

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

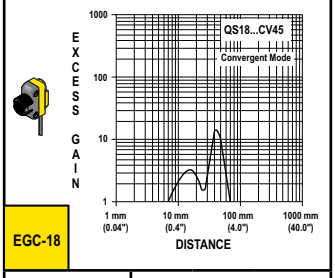
Convergent Mode WORLD-BEAM® QS18



EGC-17

Range: 16 mm **LED:** ●

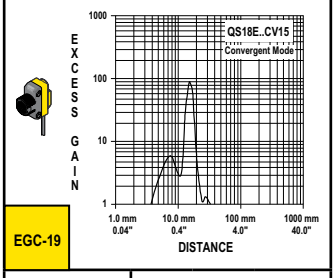
Convergent Mode WORLD-BEAM® QS18



EGC-18

Range: 43 mm **LED:** ●

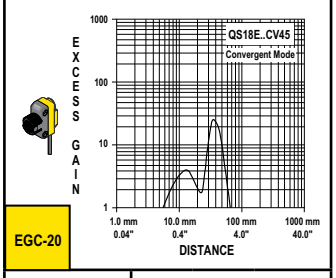
Convergent Mode WORLD-BEAM® QS18 *Expert*™



EGC-19

Range: 16 mm **LED:** ●

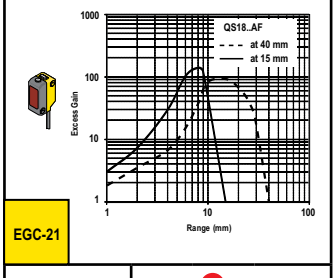
Convergent Mode WORLD-BEAM® QS18 *Expert*™



EGC-20

Range: 43 mm **LED:** ●

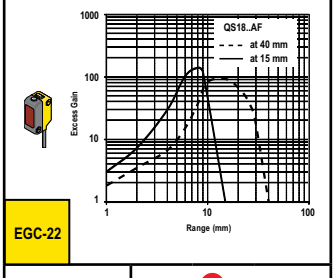
Adjustable-Field Mode WORLD-BEAM® QS18 Background Suppression



EGC-21

Cutoff: 15-40 mm **LED:** ●

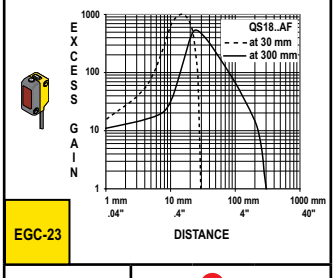
Adjustable-Field Mode WORLD-BEAM® QS18 Foreground Suppression



EGC-22

Cutoff: 15-40 mm **LED:** ●

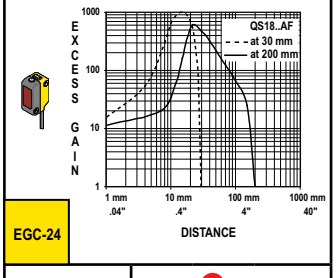
Adjustable-Field Mode WORLD-BEAM® QS18 Background Suppression



EGC-23

Cutoff: 30-300mm **LED:** ●

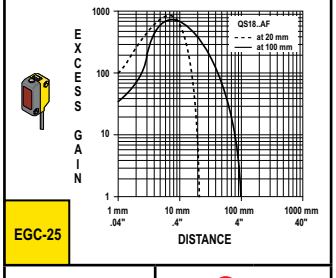
Adjustable-Field Mode WORLD-BEAM® QS18 Foreground Suppression



EGC-24

Cutoff: 30-200mm **LED:** ●

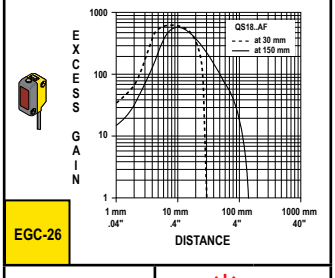
Adjustable-Field Mode WORLD-BEAM® QS18



EGC-25

Cutoff: 20 -100 mm **LED:** ●

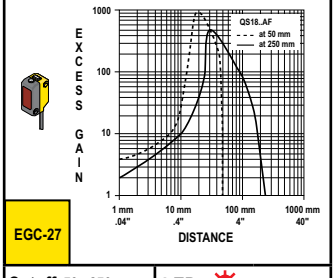
Adjustable-Field Mode WORLD-BEAM® QS18 Class 1 Laser



EGC-26

Cutoff: 30 -150 mm **LED:** ✸

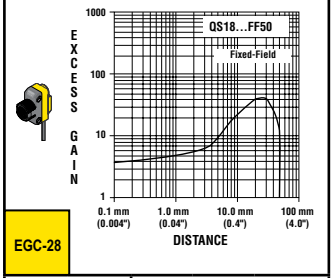
Adjustable-Field Mode WORLD-BEAM® QS18 Class 2 Laser



EGC-27

Cutoff: 50 - 250 mm **LED:** ✸

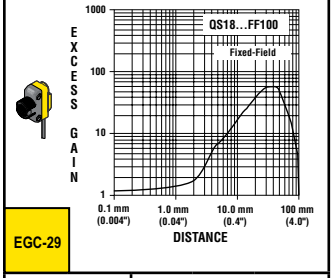
Fixed-Field Mode WORLD-BEAM® QS18



EGC-28

Cutoff: 50 mm **LED:** ●

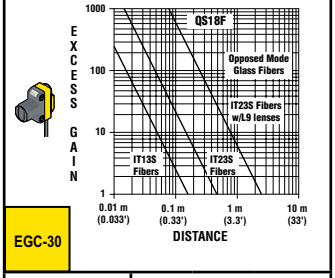
Fixed-Field Mode WORLD-BEAM® QS18



EGC-29

Cutoff: 100 mm **LED:** ●

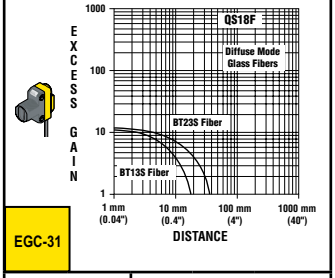
Opposed Mode—Glass Fiber WORLD-BEAM® QS18



EGC-30

Range: Varies **LED:** ○

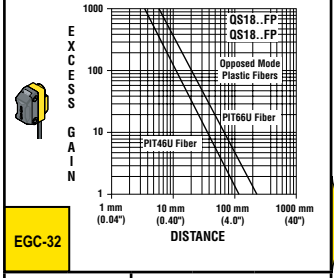
Diffuse Mode—Glass Fiber WORLD-BEAM® QS18



EGC-31

Range: Varies **LED:** ○

Opposed Mode—Plastic Fiber WORLD-BEAM® QS18



EGC-32

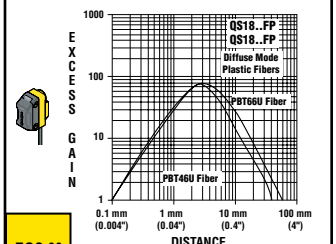
Range: Varies **LED:** ●

More on next page

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

● = Visible Red LED

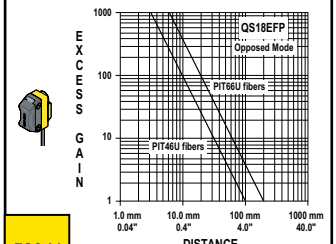
Diffuse Mode—Plastic Fiber WORLD-BEAM® QS18



EGC-33

Range: Varies | **LED:** ●

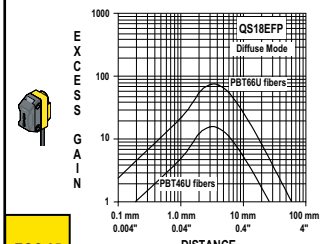
Opposed Mode—Plastic Fiber WORLD-BEAM® QS18 *Expert*™



EGC-34

Range: Varies | **LED:** ●

Diffuse Mode—Plastic Fiber WORLD-BEAM® QS18 *Expert*™



EGC-35

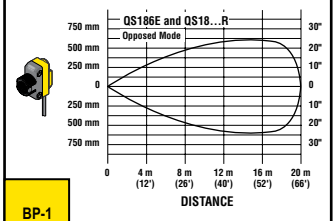
Range: Varies | **LED:** ●

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

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

Opposed Mode WORLD-BEAM® QS18

Effective Beam: 13 mm

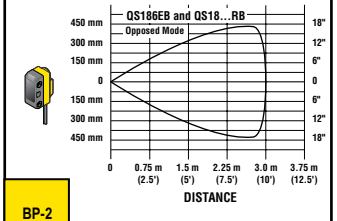


BP-1

Range: 20 m | **LED:** ○

Opposed Mode WORLD-BEAM® QS18

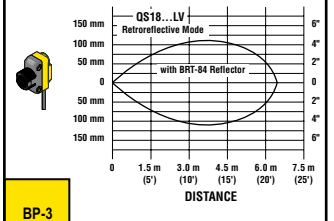
Effective Beam: 13 mm



BP-2

Range: 3 m | **LED:** ○

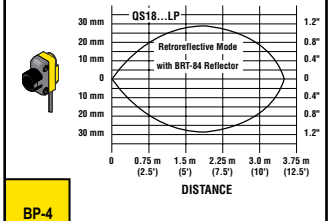
Retroreflective Mode WORLD-BEAM® QS18



BP-3

Range: 6.5 m | **LED:** ●

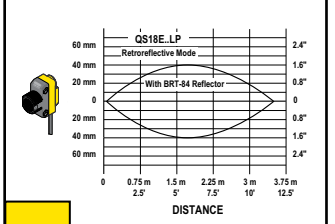
Polarized Retroreflective Mode WORLD-BEAM® QS18



BP-4

Range: 3.5 m | **LED:** P

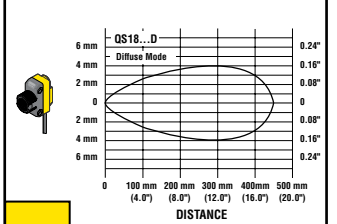
Polarized Retroreflective Mode WORLD-BEAM® QS18 *Expert*™



BP-5

Range: 3.5 m | **LED:** P

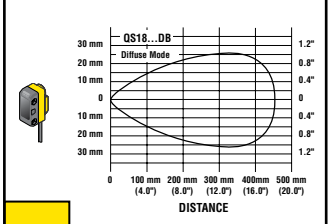
Diffuse Mode WORLD-BEAM® QS18



BP-6

Range: 450 mm | **LED:** ○

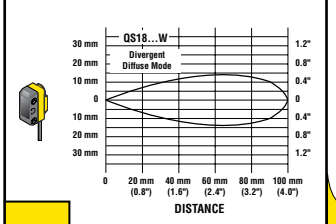
Diffuse Mode WORLD-BEAM® QS18



BP-7

Range: 450 mm | **LED:** ○

Divergent Diffuse Mode WORLD-BEAM® QS18



BP-8

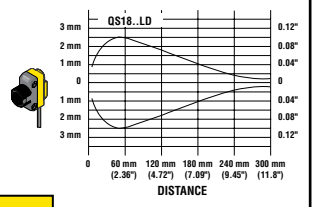
Range: 100 mm | **LED:** ○

More on next page

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

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

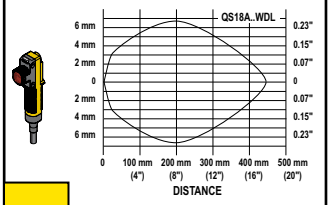
Diffuse Mode WORLD-BEAM® QS18 Class 1 Laser



BP-9

Range: 300 mm **LED:** ✸

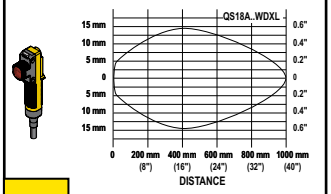
Diffuse Mode WORLD-BEAM® QS18



BP-10

Range: 450mm **LED:** ●

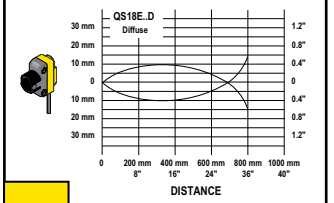
Diffuse Mode WORLD-BEAM® QS18



BP-11

Range: 1 m **LED:** ○

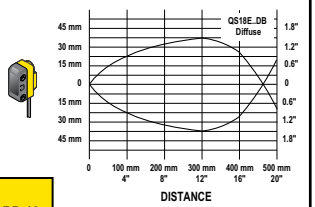
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



BP-12

Range: 800 mm **LED:** ○

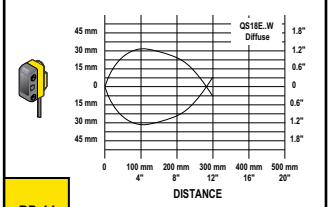
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



BP-13

Range: 500 mm **LED:** ○

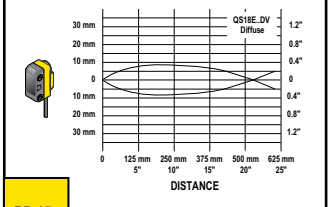
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



BP-14

Range: 300 mm **LED:** ○

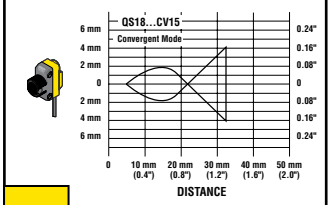
Diffuse Mode WORLD-BEAM® QS18 *Expert*™



BP-15

Range: 600 mm **LED:** ●

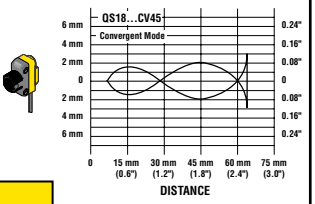
Convergent Mode WORLD-BEAM® QS18



BP-16

Range: 16 mm **LED:** ●

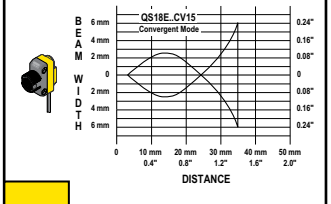
Convergent Mode WORLD-BEAM® QS18



BP-17

Range: 43 mm **LED:** ●

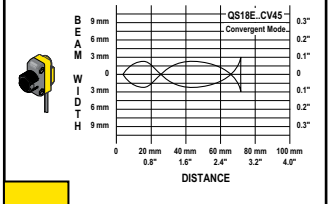
Convergent Mode WORLD-BEAM® QS18 *Expert*™



BP-18

Range: 16 mm **LED:** ●

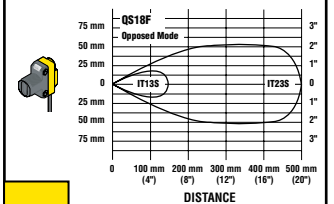
Convergent Mode WORLD-BEAM® QS18 *Expert*™



BP-19

Range: 43 mm **LED:** ●

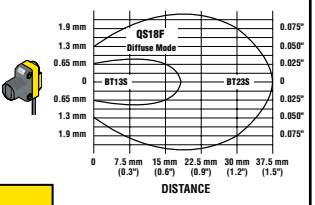
Opposed Mode—Glass Fiber WORLD-BEAM® QS18



BP-20

Range: Varies **LED:** ○

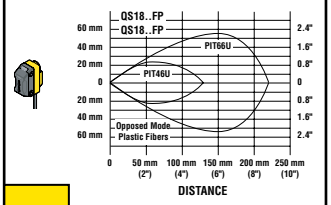
Diffuse Mode—Glass Fiber WORLD-BEAM® QS18



BP-21

Range: Varies **LED:** ○

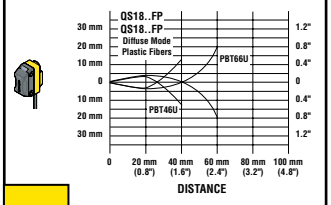
Opposed Mode—Plastic Fiber WORLD-BEAM® QS18



BP-22

Range: Varies **LED:** ●

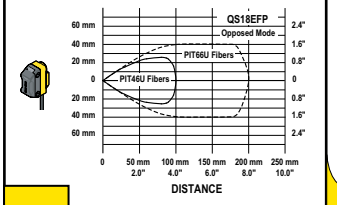
Diffuse Mode—Plastic Fiber WORLD-BEAM® QS18



BP-23

Range: Varies **LED:** ●

Opposed Mode—Plastic Fiber WORLD-BEAM® QS18 *Expert*™



BP-24

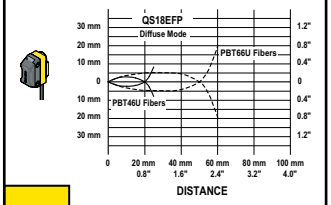
Range: Varies **LED:** ●

More on next page

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

● = Visible Red LED

Diffuse Mode— Plastic Fiber WORLD-BEAM® QS18 *Expert*™

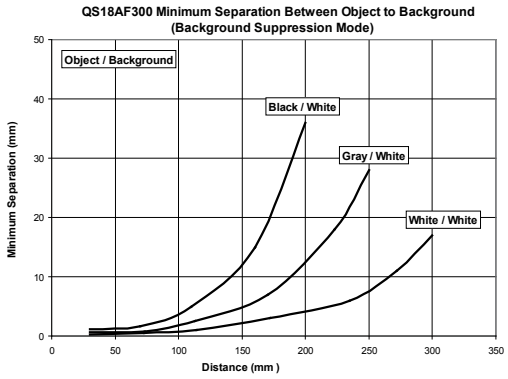


BP-25

Range: Varies | **LED:** ●

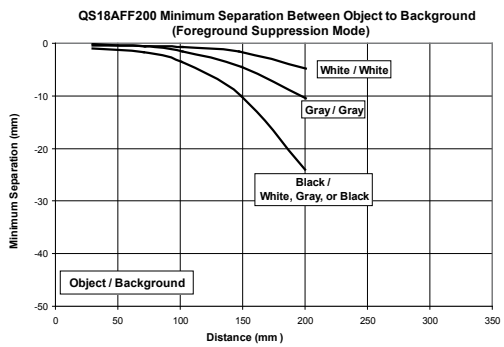
Minimum Separation Distance

WORLD-BEAM® QS18 Adjustable-Field Background Suppression LED (30-300 mm)



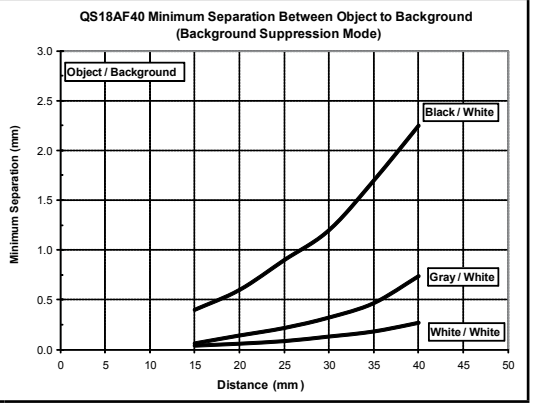
MSD-1

WORLD-BEAM® QS18 Adjustable-Field Foreground Suppression LED (30-200 mm)



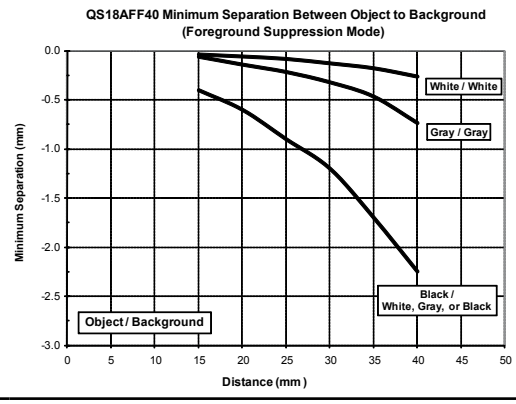
MSD-2

WORLD-BEAM® QS18 Adjustable-Field Background Suppression LED (15-40 mm)



MSD-3

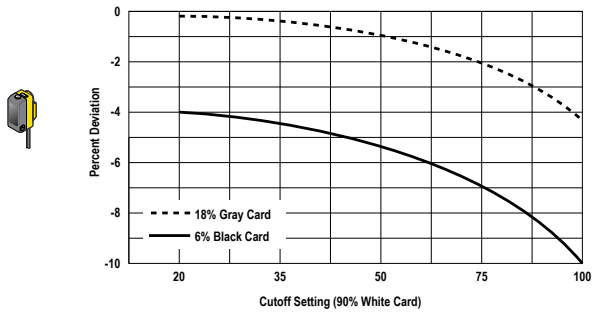
WORLD-BEAM® QS18 Adjustable-Field Foreground Suppression LED (15-40 mm)



MSD-4

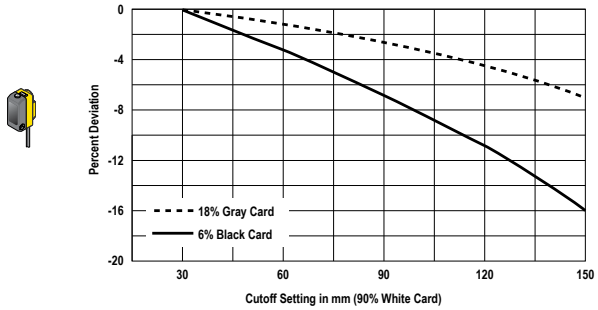
Cutoff Point Deviation

WORLD-BEAM® QS18 Adjustable-Field Background Suppression LED (20-100 mm)



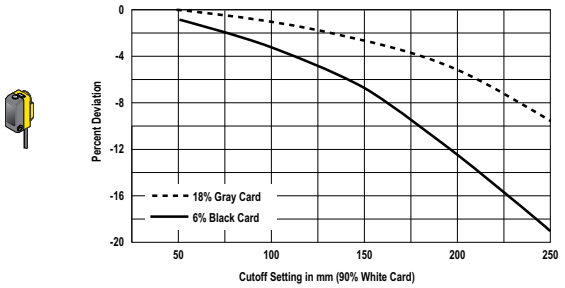
CPDC-1

WORLD-BEAM® QS18 Adjustable-Field Background Suppression Class 1 Laser (30-150 mm)



CPDC-2

WORLD-BEAM® QS18 Adjustable-Field Background Suppression Class 2 Laser (50-250 mm)



CPDC-3

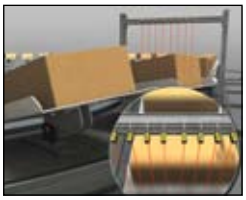
WORLD-BEAM®
Q20 Side-Mount Rectangular Sensor

- Features compact, rectangular housing with industry-standard mounting configuration
- Available in opposed, polarized and non-polarized retroreflective, diffuse and fixed-field models
- Offers visible red beam for easy alignment on most models
- Features bright LED status indicators visible from 360°
- Provides water-tight, IP67 and NEMA 6 rated enclosure for rugged, reliable sensing
- Rated to 1200 psi for washdown environments
- Features an advanced electronic design for excellent noise immunity and crosstalk avoidance
- Provides versatile mounting options, including M3 (3 mm) inserts and 25.4 mm hole spacing
- Includes single-turn gain potentiometer for easy configuration, depending on model
- Background suppression models provide reliable detection up to 150 mm while ignoring objects in the background

ACCESSORIES page 105

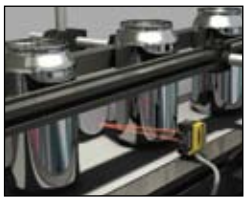
Opposed, Retroreflective, Fixed-field and Diffuse Models
Suffix E, EL, R, RL, LP, LV,
D, DL, DXL and FF

ONLINE
AUTOCAD, STEP, IGES & PDF



Tilt Tray Inspection

Outsert Detection



Highly Reflective Container Detection

WORLD-BEAM® Q20, 10-30V dc

Sensing Mode/LED	Range	Connection	Models* NPN	Models* PNP	Excess Gain	Beam Pattern
OPPOSED	12 m	2 m	Q20E Emitter		EGC-1 (p. 106)	BP-1 (p. 107)
		4-pin Euro Pigtail QD	Q20EQ5 Emitter			
		2 m	Q20NR	Q20PR		
		4-pin Euro Pigtail QD	Q20NRQ5	Q20PRQ5		

More on next page

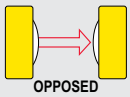
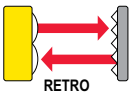
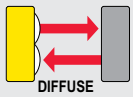
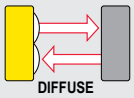
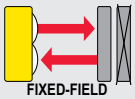
Connection options: A model with a QD requires a mating cordset (see page 105).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q20ND W/30**).
QD models:
- For a 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **Q20NDQ5**).
- For a 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **Q20NDQ**).
- For a 4-pin integral Pico-style QD, add suffix **Q7** (example, **Q20NDQ7**).

* Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.

WORLD-BEAM® Q20, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models* NPN	Models* PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	Q20EL Emitter		EGC-1 (p. 106)	BP-1 (p. 107)
		4-pin Euro Pigtail QD	Q20ELQ5 Emitter			
		2 m	**Q20NRL**	**Q20PRL**		
		4-pin Euro Pigtail QD	**Q20NRLQ5**	**Q20PRLQ5**		
 RETRO	6 m†	2 m	**Q20NLV**	**Q20PLV**	EGC-2 (p. 106)	BP-2 (p. 107)
		4-pin Euro Pigtail QD	**Q20NLVQ5**	**Q20PLVQ5**		
 POLAR RETRO	4 m†	2 m	**Q20NLP**	**Q20PLP**	EGC-3 (p. 106)	BP-3 (p. 107)
		4-pin Euro Pigtail QD	**Q20NLPQ5**	**Q20PLPQ5**		
 DIFFUSE	250 mm	2 m	**Q20ND**	**Q20PD**	EGC-4 (p. 106)	BP-4 (p. 107)
		4-pin Euro Pigtail QD	**Q20NDQ5**	**Q20PDQ5**		
	800 mm	2 m	**Q20NDL**	**Q20PDL**	EGC-5 (p. 106)	BP-5 (p. 107)
		4-pin Euro Pigtail QD	**Q20NDLQ5**	**Q20PDLQ5**		
 DIFFUSE	1500 mm	2 m	**Q20NDXL**	**Q20PDXL**	EGC-6 (p. 106)	BP-6 (p. 107)
		4-pin Euro Pigtail QD	**Q20NDXLQ5**	**Q20PDXLQ5**		
 FIXED-FIELD	0-50 mm Cutoff	2 m	**Q20NFF50**	**Q20PFF50**	EGC-7 (p. 104)	—
		4-pin Euro Pigtail QD	**Q20NFF50Q5**	**Q20PFF50Q5**		
	0-100 mm Cutoff	2 m	**Q20NFF100**	**Q20PFF100**	EGC-8 (p. 104)	—
		4-pin Euro Pigtail QD	**Q20NFF100Q5**	**Q20PFF100Q5**		
	0-150 mm Cutoff	2 m	**Q20NFF150**	**Q20PFF150**	EGC-9 (p. 104)	—
		4-pin Euro Pigtail QD	**Q20NFF150Q5**	**Q20PFF150Q5**		

ACCESSORIES page 105

Connection options: A model with a QD requires a mating cordset (see page 105).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q20ND W/30**).
QD models:
- For a 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **Q20NDQ5**).
- For a 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **Q20NDQ**).
- For a 4-pin integral Pico-style QD, add suffix **Q7** (example, **Q20NDQ7**).

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

* Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.

WORLD-BEAM® Q20 Specifications

Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 18 mA, exclusive of load
Supply Protection Circuity	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; PNP (sourcing) or NPN (sinking), depending on model
Output Rating	100 mA with short circuit protection **OFF-state leakage current:** **NPN:** less than 200 µA sinking **PNP:** less than 20 µA sourcing **ON-state saturation voltage:** **NPN:** less than 1.6V @ 100 mA **PNP:** less than 3.0V @ 100 mA
Output Response Time	**Opposed:** 1 millisecond/600 microseconds OFF **All others:** 800 microseconds ON/OFF
Delay a Power-up	100 milliseconds; outputs do not conduct during this time
Repeatability	**Opposed:** 140 microseconds **All others:** 155 microseconds
Adjustments	**Diffuse, Retroreflective and Polarized Retroreflective:** single-turn sensitivity (Gain) adjustment potentiometer
Indicators	**Emitters:** Green power ON only **All others: Two LED Indicators: Green:** Power ON **Yellow:** Black (LO) wire conducting

More on next page

WORLD-BEAM® Q20 Specifications (cont'd)

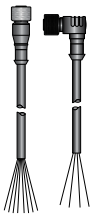
Construction	**Housing:** ABS **Lenses:** PPMA **Gain Adjuster:** PBT
Connections	2 m or 9 m 4-wire PVC cable, 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin integral Pico-style QD (**Q7**), depending on model. QD cordsets are ordered separately. See pages 105.
Operating Conditions	**Temperature:** –20° to +60° C **Relative humidity:** 95% @ 50° C (non-condensing)
Enviromental Rating	IEC IP67; NEMA 6 and 1200 psi washdown NEMA ICS 5, Annex F-2002
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2: 30G 11 ms duration, half sine wave
Application Note	1. Opposed mode sensor spacing can be reduced by alternating emitters and receivers or by applying crosstalk filters (visible red models only). 2. NPN OFF-state leakage current is < 200 µA for load resistances > 3 kΩ or optically isolated loads. For load currents of 100 mA, leakage is < 1% of load current.
Certification	CE
Hookup Diagram	**Emitters:** DC02 (p. 744) **All others:** DC03 (p. 744)

Cordsets

Euro QD

See page 682

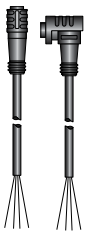
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Pico QD

See page 680

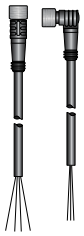
Length	Snap-on 4-Pin Straight	Snap-on 4-Pin Right-Angle
2.00 m	PKG4-2	PKW4Z-2



Pico QD

See page 681

Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
2.00 m	PKG4M-2	PKW4M-2
5.00 m	PKG4M-5	PKW4M-5
9.00 m	PKG4M-9	PKW4M-9



Additional cordset information available. See page 679.

Brackets

Q20

			
pg. 668	pg. 668	pg. 668	pg. 668
SMBQ20H	SMBQ20L	SMBQ20LV	SMBQ20U

Additional bracket information available. See page 620.

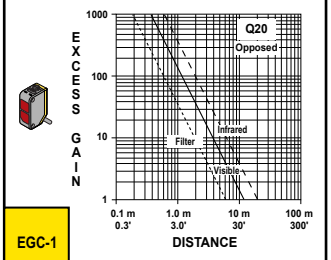
REFLECTORS PAGE 710

APERTURES PAGE 736

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

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

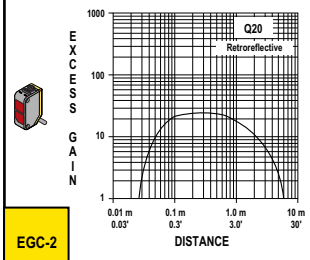
Opposed Mode WORLD-BEAM® Q20



EGC-1

Range: 20 m **LED:** ● ○

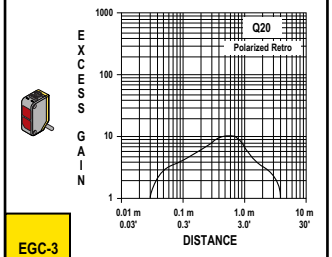
Retroreflective Mode WORLD-BEAM® Q20



EGC-2

Range: 6 m **LED:** ●

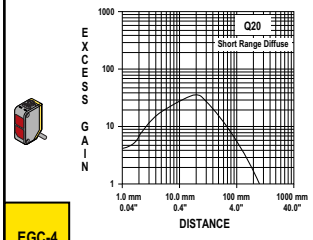
Polarized Retroreflective Mode WORLD-BEAM® Q20



EGC-3

Range: 4 m **LED:** P

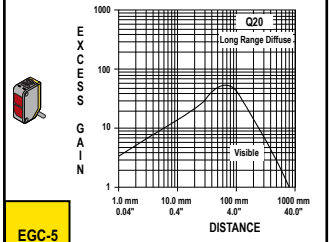
Diffuse Mode WORLD-BEAM® Q20



EGC-4

Range: 250 mm **LED:** ●

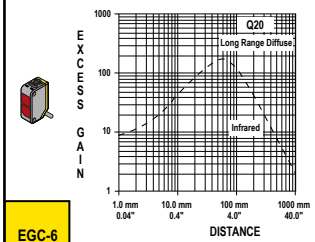
Diffuse Mode WORLD-BEAM® Q20



EGC-5

Range: 800 mm **LED:** ●

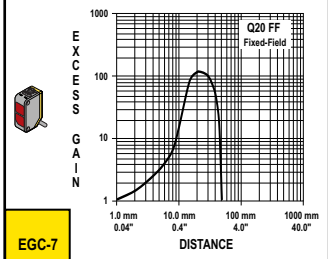
Diffuse Mode WORLD-BEAM® Q20



EGC-6

Range: 1500 mm **LED:** ○

Fixed-Field Mode Q20



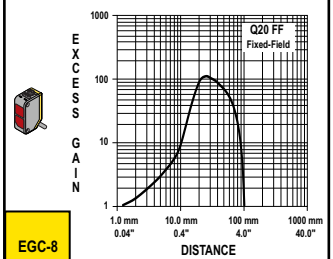
EGC-7

Cutoff: 50 mm **LED:** ●

Ø 6 mm spot size @ 25 mm focus
Ø 6 mm spot size @ 50 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 Q20



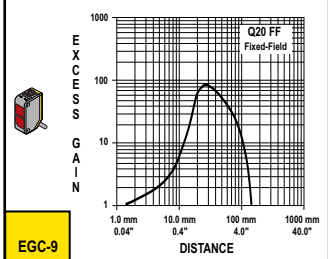
EGC-8

Cutoff: 100 mm **LED:** ●

Ø 6 mm spot size @ 50 mm focus
Ø 6 mm spot size @ 100 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 Q20



EGC-9

Cutoff: 150 mm **LED:** ●

Ø 6 mm spot size @ 75 mm focus
Ø 9 mm spot size @ 150 mm cutoff

† Using 18% gray test card:
Cutoff distance will be 80% of value shown.
† Using 6% black test card:
Cutoff distance will be 70% of value shown.

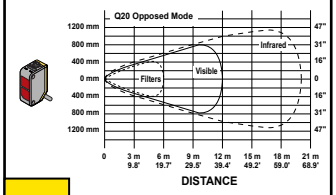
More on next page

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

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

Opposed Mode WORLD-BEAM® Q20

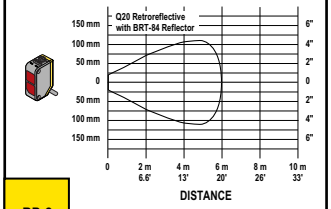
Effective Beam: 10 mm



BP-1

Range: 20 m **LED:** ● ○

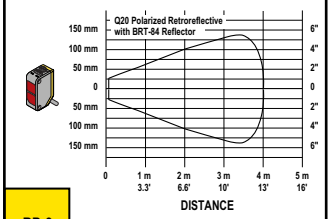
Retroreflective Mode WORLD-BEAM® Q20



BP-2

Range: 6 m **LED:** ●

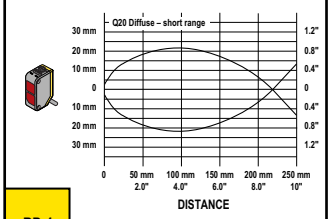
Polarized Retroreflective Mode WORLD-BEAM® Q20



BP-3

Range: 4 m **LED:** P

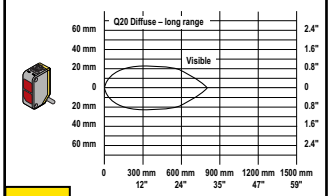
Diffuse Mode WORLD-BEAM® Q20



BP-4

Range: 250 mm **LED:** ●

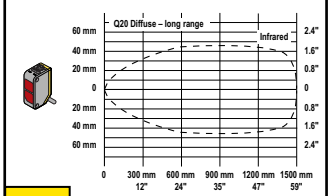
Diffuse Mode WORLD-BEAM® Q20



BP-5

Range: 800 mm **LED:** ●

Diffuse Mode WORLD-BEAM® Q20



BP-6

Range: 1500 mm **LED:** ○