

FULLSIZE SENSORS

Q45



OMNI-BEAM™



Q60



- Photoelectrics Sensors**
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Vision
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control



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- Extremely rugged design that exceeds NEMA 6P and IEC IP67 standards, and withstands 1200 psi washdown
- Standard models accommodate output timing logic or expansion for a 7-segment LED display of signal strength
- Available in opposed, polarized and non-polarized retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- Available in models for dc, ac or ac/dc universal voltage power
- A laser retroreflective version for extended 70 m sensing range



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- Advanced modular design for customized configuration at user level
- Sensor heads in opposed, retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- For use with analog ac or dc power blocks



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- Available in both Class 1 or extended-range Class 2 laser and visible red or infrared LED formats
- Adjustable-field setpoints from 200 to 2000 mm
- Advanced background suppression technology to ignore objects beyond the setpoint

- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE**

Q45 Advanced One-Piece Sensors

- Uses extremely rugged design that exceeds NEMA 6P and IEC IP67 standards and withstands 1200 psi washdown
- Features highly visible Power, Signal and Output indicator LEDs
- Accommodates output timing logic or 7-segment LED signal strength display on standard models
- Available in opposed, polarized and non-polarized retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- Available in models for dc, ac or ac/dc universal voltage power
- Available in laser diode retroreflective and NAMUR models
- Features triple LED multi-function indicators under gasketed transparent cover



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Q45 DC or AC

- Models for dc or ac power
- Opposed, retroreflective, diffuse, convergent, laser, and glass and plastic fiber optic modes
- Electromechanical or solid-state outputs



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Q45 Retroreflective Laser

- Extended 70 m sensing range
- Visible laser beam for easy target alignment
- Precision small object or edge detection



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Q45 Universal Voltage

- Models for ac/dc power
- Opposed, retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- A variety of cable and connector options



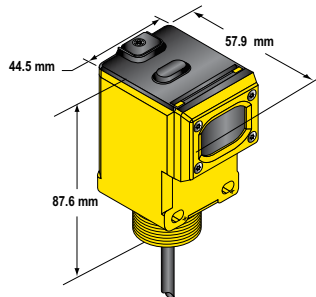
page 200

Q45 NAMUR

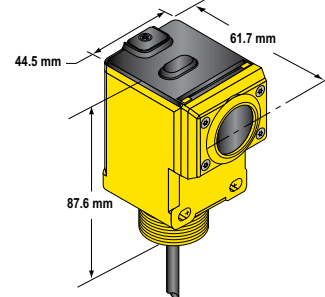
- Intrinsically safe dc models for potentially explosive environments
- 1.2 mA output or less in dark condition and 2.1 mA or more in light condition
- For use with approved DIN 19 234 switching amplifiers



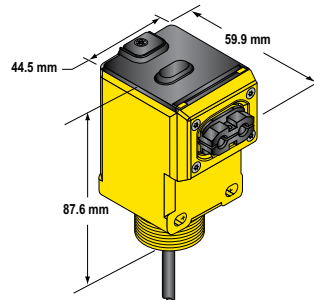
Opposed, Retroreflective and Diffuse Models
Suffix E, R, D, DL, DX, LV and LP



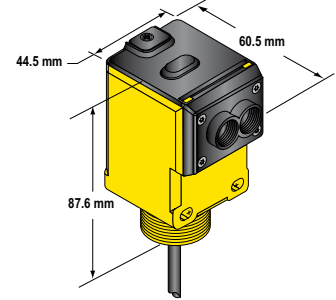
Retroreflective Laser Models
Suffix LL and LLP



Convergent Models
Suffix CV and CV4



Plastic Fiber Model
Suffix FP



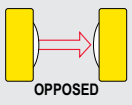
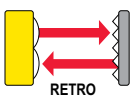
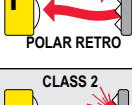

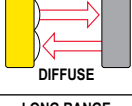
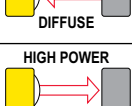

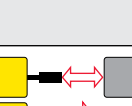
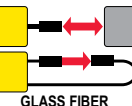
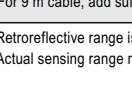
Glass Fiber Models
Suffix F and FV

ONLINE
AUTOCAD, STEP,
IGES & PDF



Q45, 10-30V dc

→ Infrared LED → Visible Red LED → Visible Red Laser

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern	
 OPPOSED	60 m	2 m	—	Q456E Emitter	EGC-1 (p. 202)	BP-1 (p. 204)	
		4-Pin Mini QD		Q456EQ Emitter			
		4-Pin Euro QD		Q456EQ5 Emitter			
 RETRO	0.08 - 9 m†	2 m	Bipolar NPN/PNP	Q45BB6R	EGC-3 (p. 202)	BP-3 (p. 204)	
		4-Pin Mini QD		Q45BB6RQ			
		4-Pin Euro QD		Q45BB6RQ5			
 POLAR RETRO	0.15 - 6 m†	2 m	Bipolar NPN/PNP	Q45BB6LV	EGC-4 (p. 202)	BP-4 (p. 204)	
		4-Pin Mini QD		Q45BB6LVQ			
		4-Pin Euro QD		Q45BB6LVQ5			
 CLASS 2 RETRO LASER	0.3 - 70 m†	2 m	Bipolar NPN/PNP	Q45BB6LP	EGC-5 (p. 202)	BP-5 (p. 205)	
		4-Pin Mini QD		Q45BB6LPQ			
		4-Pin Euro QD		Q45BB6LPQ5			
 CLASS 2 LASER POLAR RETRO	0.6 - 40 m†	2 m	Bipolar NPN/PNP	Q45BB6LL	EGC-6 (p. 202)	BP-5 (p. 205)	
		4-Pin Mini QD		Q45BB6LLQ			
		4-Pin Euro QD		Q45BB6LLQ6			
 SHORT RANGE DIFFUSE	450 mm	2 m	Bipolar NPN/PNP	Q45BB6LLP	EGC-9 (p. 203)	BP-8 (p. 205)	
		4-Pin Mini QD		Q45BB6LLPQ			
		4-Pin Euro QD		Q45BB6LLPQ6			
 LONG RANGE DIFFUSE	1.8 m	2 m	Bipolar NPN/PNP	Q45BB6D	EGC-10 (p. 203)	BP-9 (p. 205)	
		4-Pin Mini QD		Q45BB6DQ			
		4-Pin Euro QD		Q45BB6DQ5			
 HIGH POWER DIFFUSE	3 m	2 m	Bipolar NPN/PNP	Q45BB6DL	EGC-11 (p. 203)	BP-10 (p. 205)	
		4-Pin Mini QD		Q45BB6DLQ			
		4-Pin Euro QD		Q45BB6DLQ5			
 CONVERGENT	38 mm	2 m	Bipolar NPN/PNP	Q45BB6DX	EGC-14 (p. 203)	BP-13 (p. 205)	
		100 mm		4-Pin Mini QD			Q45BB6DXQ
				4-Pin Euro QD			Q45BB6DXQ5
	2 m			Q45BB6CV	EGC-15 (p. 203)	BP-14 (p. 205)	
	4-Pin Mini QD	Q45BB6CVQ					
	4-Pin Euro QD	Q45BB6CVQ5					
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	Q45BB6DLX	EGC-18 & EGC-19 (p. 203)	BP-17 & BP-18 (p. 205)	
		4-Pin Mini QD		Q45BB6DLXQ			
		4-Pin Euro QD		Q45BB6DLXQ5			
		2 m		Q45BB6CV4	EGC-20 & EGC-21 (p. 203)	BP-19 & BP-20 (p. 205)	
		4-Pin Mini QD		Q45BB6CV4Q			
		4-Pin Euro QD		Q45BB6CV4Q5			

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ACCESSORIES
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- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE**
- Q45
- OMNI-BEAM
- Q60

More on next page

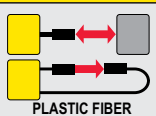
Connection options: A model with a QD requires a mating cordset (see page 202).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45BB6LV W/30**).

† Retroreflective range is specified using one model BRT-3 retroreflector (BRT-2X2 for Q45BB6LL models). Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Q45, 10-30V dc (cont'd)

→ Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 <p>PLASTIC FIBER</p>	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	Q45BB6FP	EGC-26 & EGC-27 (p. 204)	BP-25 & BP-26 (p. 206)
		4-Pin Mini QD		Q45BB6FPQ		
		4-Pin Euro QD		Q45BB6FPQ5		

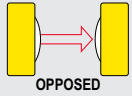
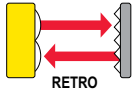

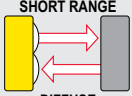
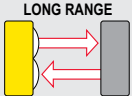
Connection options: A model with a QD requires a mating cordset (see page 202).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45BB6FP W/30).

Q45, 90-250V ac

→ Infrared LED → Visible Red LED

ACCESSORIES
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Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 <p>OPPOSED</p>	60 m	2 m	—	Q452E Emitter	EGC-1 (p. 202)	BP-1 (p. 204)
		3-Pin Mini QD		Q452EQ Emitter		
		4-Pin Micro QD		Q452EQ1 Emitter		
		2 m	SPDT e/m Relay	Q45VR2R		
		5-Pin Mini QD		Q45VR2RQ		
		2 m		SPST Solid-state Relay		
		3-Pin Mini QD	Q45BW22RQ			
4-Pin Micro QD	Q45BW22RQ1					
 <p>RETRO</p>	0.08 - 9 m [†]	2 m	SPDT e/m Relay	Q45VR2LV	EGC-3 (p. 202)	BP-3 (p. 204)
		5-Pin Mini QD		Q45VR2LVQ		
		2 m	SPST Solid-state Relay	Q45BW22LV		
		3-Pin Mini QD		Q45BW22LVQ		
		4-Pin Micro QD		Q45BW22LVQ1		
 <p>POLAR RETRO</p>	0.15 - 6 m [†]	2 m	SPDT e/m Relay	Q45VR2LP	EGC-4 (p. 202)	BP-4 (p. 204)
		5-Pin Mini QD		Q45VR2LPQ		
		2 m	SPST Solid-state Relay	Q45BW22LP		
		3-Pin Mini QD		Q45BW22LPQ		
		4-Pin Micro QD		Q45BW22LPQ1		
 <p>SHORT RANGE DIFFUSE</p>	450 mm	2 m	SPDT e/m Relay	Q45VR2D	EGC-9 (p. 203)	BP-8 (p. 205)
		5-Pin Mini QD		Q45VR2DQ		
		2 m	SPST Solid-state Relay	Q45BW22D		
		3-Pin Mini QD		Q45BW22DQ		
		4-Pin Micro QD		Q45BW22DQ1		
 <p>LONG RANGE DIFFUSE</p>	1.8 m	2 m	SPDT e/m Relay	Q45VR2DL	EGC-10 (p. 203)	BP-9 (p. 205)
		5-Pin Mini QD		Q45VR2DLQ		
		2 m	SPST Solid-state Relay	Q45BW22DL		
		3-Pin Mini QD		Q45BW22DLQ		
		4-Pin Micro QD		Q45BW22DLQ1		

Connection options: A model with a QD requires a mating cordset (see page 202).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45VR2LV 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.

More on next page

Q45, 90-250V ac (cont'd)

⇨ Infrared LED → Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
<p>HIGH POWER DIFFUSE</p>	3 m	2 m	SPDT e/m Relay	Q45VR2DX	EGC-11 (p. 203)	BP-10 (p. 205)
		5-Pin Mini QD		Q45VR2DXQ		
		2 m	SPST Solid-state Relay	Q45BW22DX		
		3-Pin Mini QD		Q45BW22DXQ		
4-Pin Micro QD	Q45BW22DXQ1					
<p>CONVERGENT</p>	38 mm	2 m	SPDT e/m Relay	Q45VR2CV	EGC-14 (p. 203)	BP-13 (p. 205)
		5-Pin Mini QD		Q45VR2CVQ		
		2 m	SPST Solid-state Relay	Q45BW22CV		
		3-Pin Mini QD		Q45BW22CVQ		
	4-Pin Micro QD	Q45BW22CVQ1				
	100 mm	2 m	SPDT e/m Relay	Q45VR2CV4	EGC-15 (p. 203)	BP-14 (p. 205)
		5-Pin Mini QD		Q45VR2CV4Q		
		2 m	SPST Solid-state Relay	Q45BW22CV4		
3-Pin Mini QD		Q45BW22CV4Q				
4-Pin Micro QD	Q45BW22CV4Q1					
<p>GLASS FIBER</p>	Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	Q45VR2F	EGC-18 & EGC-19 (p. 203)	BP-17 & BP-18 (p. 205)
		5-Pin Mini QD		Q45VR2FQ		
		2 m	SPST Solid-state Relay	Q45BW22F		
		3-Pin Mini QD		Q45BW22FQ		
4-Pin Micro QD		Q45BW22FQ1				
<p>GLASS FIBER</p>		2 m	SPDT e/m Relay	Q45VR2FV	EGC-20 & EGC-21 (p. 203)	BP-19 & BP-20 (p. 205)
		5-Pin Mini QD		Q45VR2FVQ		
		2 m	SPST Solid-state Relay	Q45BW22FV		
	3-Pin Mini QD	Q45BW22FVQ				
4-Pin Micro QD	Q45BW22FVQ1					
<p>PLASTIC FIBER</p>	Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	Q45VR2FP	EGC-26 & EGC-27 (p. 204)	BP-25 & BP-26 (p. 206)
		5-Pin Mini QD		Q45VR2FPQ		
		2 m	SPST Solid-state Relay	Q45BW22FP		
		3-Pin Mini QD		Q45BW22FPQ		
4-Pin Micro QD	Q45BW22FPQ1					

Connection options: A model with a QD requires a mating cordset (see page 202).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45VR2DX W/30**).

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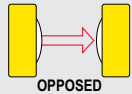
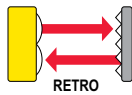

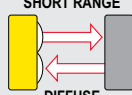
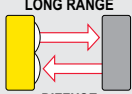
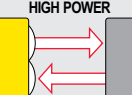
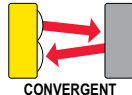
- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE**
- Q45
- OMNI-BEAM
- Q60

Q45 Universal Voltage, 12-250V dc or 24-250V ac


 Infrared LED  Visible Red LED

SENSORS

ACCESSORIES
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Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 OPPOSED	60 m	2 m	—	Q453E Emitter	EGC-1 (p. 202)	BP-1 (p. 204)
		3-Pin Mini QD		Q453EQ Emitter		
		2 m	SPDT e/m Relay	Q45VR3R		
		5-Pin Mini QD		Q45VR3RQ		
		2 m		SPST Solid-state Relay		
4-Pin Mini QD	Q45BW13RQ					
 RETRO	0.08 - 9 m†	2 m	SPDT e/m Relay	Q45VR3LV	EGC-3 (p. 202)	BP-3 (p. 204)
		5-Pin Mini QD		Q45VR3LVQ		
		2 m	SPST Solid-state Relay	Q45BW13LV		
		4-Pin Mini QD		Q45BW13LVQ		
 POLAR RETRO	0.15 - 6 m†	2 m	SPDT e/m Relay	Q45VR3LP	EGC-4 (p. 202)	BP-4 (p. 204)
		5-Pin Mini QD		Q45VR3LPQ		
		2 m	SPST Solid-state Relay	Q45BW13LP		
		4-Pin Mini QD		Q45BW13LPQ		
 SHORT RANGE DIFFUSE	450 mm	2 m	SPDT e/m Relay	Q45VR3D	EGC-9 (p. 203)	BP-8 (p. 205)
		5-Pin Mini QD		Q45VR3DQ		
		2 m	SPST Solid-state Relay	Q45BW13D		
		4-Pin Mini QD		Q45BW13DQ		
 LONG RANGE DIFFUSE	1.8 m	2 m	SPDT e/m Relay	Q45VR3DL	EGC-10 (p. 203)	BP-9 (p. 205)
		5-Pin Mini QD		Q45VR3DLQ		
		2 m	SPST Solid-state Relay	Q45BW13DL		
		4-Pin Mini QD		Q45BW13DLQ		
 HIGH POWER DIFFUSE	3 m	2 m	SPDT e/m Relay	Q45VR3DX	EGC-11 (p. 203)	BP-10 (p. 205)
		5-Pin Mini QD		Q45VR3DXQ		
		2 m	SPST Solid-state Relay	Q45BW13DX		
		4-Pin Mini QD		Q45BW13DXQ		
 CONVERGENT	38 mm	2 m	SPDT e/m Relay	Q45VR3CV	EGC-14 (p. 202)	BP-13 (p. 205)
		5-Pin Mini QD		Q45VR3CVQ		
		2 m	SPST Solid-state Relay	Q45BW13CV		
		4-Pin Mini QD		Q45BW13CVQ		
	100 mm	2 m	SPDT e/m Relay	Q45VR3CV4	EGC-15 (p. 203)	BP-14 (p. 205)
		5-Pin Mini QD		Q45VR3CV4Q		
		2 m	SPST Solid-state Relay	Q45BW13CV4		
		4-Pin Mini QD		Q45BW13CV4Q		

 More on next page

 **Connection options:** A model with a QD requires a mating cordset (see page 202).

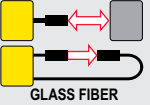
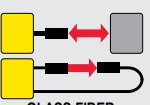
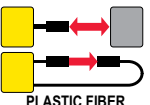
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45VR3R W/30**).


† 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.

Q45 Universal Voltage, 12-250V dc or 24-250V ac (cont'd)

⇨ Infrared LED ⇨ Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	Q45VR3F	EGC-18 & EGC-19 (p. 203)	BP-17 & BP-18 (p. 205)
		5-Pin Mini QD		Q45VR3FQ		
		2 m	SPST Solid-state Relay	Q45BW13F		
		4-Pin Mini QD		Q45BW13FQ		
 GLASS FIBER		2 m	SPDT e/m Relay	Q45VR3FV	EGC-20 & EGC-21 (p. 203)	BP-19 & BP-20 (p. 205)
		5-Pin Mini QD		Q45VR3FVQ		
		2 m	SPST Solid-state Relay	Q45BW13FV		
		4-Pin Mini QD		Q45BW13FVQ		
 PLASTIC FIBER	2 m	SPDT e/m Relay	Q45VR3FP	EGC-26 & EGC-27 (p. 204)	BP-25 & BP-26 (p. 206)	
	5-Pin Mini QD		Q45VR3FPQ			
	2 m	SPST Solid-state Relay	Q45BW13FP			
	4-Pin Mini QD		Q45BW13FPQ			

 Connection options: A model with a QD requires a mating cordset (see page 202).

For 9 m cable, add suffix **W30** to the 2 m model number (example, **Q45VR3F W30**).

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- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control



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page 202

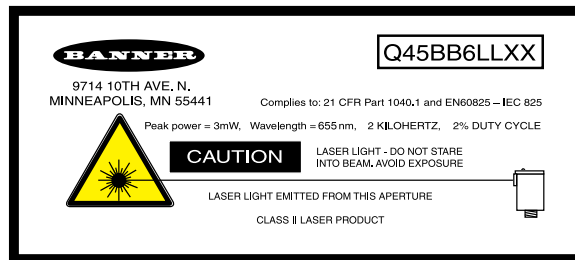
- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE**
- Q45
- OMNI-BEAM
- Q60

Q45 DC Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple), at less than 50 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: one current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	250 mA max. each output up to 50° C, derated to 150 mA at 70° C (derate 5 mA/° C) OFF-state leakage current: less than 1 µA Output saturation voltage (both outputs): less than 1 volt at 10 mA and less than 2 volts at 250 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	Opposed: 2 milliseconds ON and 1 millisecond OFF Laser Retroreflective: less than 2 milliseconds All others: 2 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; output does not conduct during this time.
Repeatability	Opposed: 0.25 milliseconds All others: 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	Light Operate (LO), Dark Operate (DO) select switch and multi-turn sensitivity control. Optional logic and logic/display modules have adjustable timing functions. See data sheet for detailed information.
Indicators	Power (Green): LED lights whenever 10 to 30V dc power is applied, and flashes to indicate output overload or output short circuit Signal (Red): LED lights whenever the sensor sees its modulated light source, and pulses at a rate proportional to the strength of the received light signal Load (Yellow): LED lights whenever an output is conducting Optional 7-element: LED signal strength display module

 More on next page

Q45 DC Specifications (cont'd)

Construction	Molded reinforced thermoplastic polyester housing, o-ring sealed transparent polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a 1/2" NPS integral internal conduit thread.	
Environmental Rating	IP67; NEMA 6P	
Laser Classification (Laser Retroreflective models only)	Class II laser product. US Safety Standards 21 CFR 1040.10 and 1040.11; European Standards EN 60825 and IEC 60825	
Connections	PVC-jacketed 4-wire (5-wire for Laser Retroreflective) 2 m or 9 m cables. For 4-pin Mini-style QD use "Q" suffix, (5-pin Mini-style QD for Laser Retroreflective use "Q" suffix) or for 4-pin Euro-style use "Q5" suffix (5-pin Euro-style QD for Laser Retroreflective use "Q6" suffix). QD cordsets are ordered separately. See page 202.	
Operating Conditions	Temperature: -40° to +70° C (-10° to +40° C for Retroreflective Laser models) Relative humidity: 90% at 50° C (non-condensing)	
Application Notes	Optional logic timing modules are available. See page 199 for more information.	
Certifications	Retroreflective Laser: 	All others: 
Hookup Diagrams	Emitters: DC02 (p. 744) Other DC Models: DC04 (p. 744)	Laser Retroreflective Models: DC13 (p. 747)









Q45 AC Specifications

Supply Voltage and Current	90 to 250V ac (50 - 60 Hz) Average current: 20 mA. Peak current: 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Q45VR2 models: SPDT (single-pole double-throw) electromechanical relay output (except emitters) Q45BW22 models: Short circuit/overload protected FET solid-state relay
Output Rating	Q45VR2 models: Max. switching power (resistive load): 150W, 600 VA Max. switching voltage (resistive load): 250V ac or 30V dc Max. switching current (resistive load): 5A @ 250V ac Min. voltage and current: 5V dc, 0.1 mA Mechanical life of relay: 10,000,000 operations Electrical life of relay at full resistive load: 100,000 operations Q45BW22 models: Continuous current: 300 mA max. to 50° C (derate to 200 mA at 70° C, 5 mA/° C) Inrush current: 3A max. for 100 milliseconds, 5A max. for 1 millisecond OFF-state leakage current: less than 100 µA Saturation voltage: less than 3V at 200 mA



Q45 AC Specifications (cont'd)

Output Protection Circuitry	Q45VR2 models: Protected against false pulse on power-up Q45BW22 models: Manually-resettable output latch-out trips in the event of an output overload or short circuit condition. The green Power LED flashes to indicate the latch-out. To reset the output, remove power to the sensor and load for 5 seconds, then restore power.		
Output Response Time	Q45VR2 models: 15 milliseconds ON/OFF Q45BW22 models: Opposed: 2 milliseconds ON, 1 millisecond OFF All others: 2 milliseconds ON/OFF		
Delay at Power-up	100 milliseconds; output does not conduct during this time.		
Repeatability	Opposed: 0.25 milliseconds; All others: 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.		
Adjustments	Light Operate (LO), Dark Operate (DO) select switch and multi-turn sensitivity control, optional logic and logic/display modules have adjustable timing functions. See data sheet for detailed information.		
Indicators	Power (Green): LED lights whenever 90-250V ac power is applied, and flashes to indicate output overload or output short circuit. Signal (Red): LED lights whenever the sensor sees its modulated light source, and pulses at a rate proportional to the strength of the received light signal Load (Yellow): LED lights whenever an output relay is energized Optional 7-element: LED signal strength display module		
Construction	Molded reinforced thermoplastic polyester housing, o-ring sealed transparent polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a 1/2" NPS integral internal conduit thread.		
Environmental Rating	NEMA 6P; IEC IP67		
Connections	Q45VR2 models: PVC-jacketed 2-wire emitters or 5-wire (all others) 2 m or 9 m unterminated cables, or 3-pin (emitters) or 5-pin (all others) Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cordsets are ordered separately. See page 202. Q45BW22 models: PVC-jacketed 2 m or 9 m cables, or 3-pin Mini-style ("Q" suffix models) or 4-pin Micro-style ("Q1" suffix models) quick-disconnect (QD) fittings are available. QD cordsets are ordered separately. See page 202.		
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)		
Application Notes	Transient suppression is recommended for contacts switching inductive loads. Optional logic timing modules are available. See page 199 for more information.		
Certifications	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> Q45VR2 models:  </td> <td style="width: 50%; vertical-align: top;"> Q45BW22 models:  </td> </tr> </table>	Q45VR2 models: 	Q45BW22 models: 
Q45VR2 models: 	Q45BW22 models: 		
Hookup Diagrams	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> VR2 Models: Emitters: AC03 (p. 750) BW22 Models: Cabled & Mini QD: AC05 (p. 751) Cabled & Mini QD Emitters: AC03 (p. 750) </td> <td style="width: 50%; vertical-align: top;"> Other VR2 Models: AC08 (p. 751) Micro QD: AC06 (p. 751) Micro QD Emitters: AC07 (p. 751) </td> </tr> </table>	VR2 Models: Emitters: AC03 (p. 750) BW22 Models: Cabled & Mini QD: AC05 (p. 751) Cabled & Mini QD Emitters: AC03 (p. 750)	Other VR2 Models: AC08 (p. 751) Micro QD: AC06 (p. 751) Micro QD Emitters: AC07 (p. 751)
VR2 Models: Emitters: AC03 (p. 750) BW22 Models: Cabled & Mini QD: AC05 (p. 751) Cabled & Mini QD Emitters: AC03 (p. 750)	Other VR2 Models: AC08 (p. 751) Micro QD: AC06 (p. 751) Micro QD Emitters: AC07 (p. 751)		

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- MINIATURE
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- OMNI-BEAM
- Q60

Q45 Universal Voltage Specifications

Supply Voltage and Current	24 to 250V ac, 50/60 Hz or 12 to 250V dc (1.5 watts max.)
Supply Protection Circuitry	Protected against transient voltages. DC hookup is without regard to polarity.
Output Configuration	Q45VR3 models: SPDT (Single-Pole, Double-Throw) electromechanical relay output. All models except emitters. Q45BW13 models: Optically isolated SPST solid-state switch. All models except emitters.



Q45 Universal Voltage Specifications (cont'd)

Output Rating	<p>Q45VR3 models: Max. switching power (resistive load): 1250VA, 150W Max. switching voltage (resistive load): 250V ac, 125V dc Max. switching current (resistive load): 5A @ 250V ac, 5A @ 30V dc derated to 200 mA @ 125V dc Min. voltage and current: 5V dc, 10 mA Mechanical life of relay: 50,000,000 operations Electrical life of relay at full resistive load: 100,000 operations</p> <p>Q45BW13 models: 250V ac, 250V dc, 300 mA Output saturation voltage: 3V at 300 mA, 2V at 15 mA OFF-state leakage current: less than 50 µA Inrush current: 1 amp for 20 milliseconds, non-repetitive</p>
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	<p>Q45VR3 models: 15 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up. Relay is de-energized during this time. Q45BW13 models: Opposed: 2 milliseconds ON, 1 millisecond OFF All others: 2 milliseconds ON/OFF</p>
Delay at Power-up	100 milliseconds; output does not conduct during this time.
Repeatability	<p>Opposed: 0.25 milliseconds All others: 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.</p>
Adjustments	Light Operate (LO), Dark Operate (DO) select switch and multi-turn sensitivity control on top of sensor, optional logic and logic/display modules have adjustable timing functions. See data sheet for detailed information.
Indicators	<p>Power (Green) LED lights whenever 24 to 250V ac, or 12 to 250V dc power is applied Signal (Red) LED lights whenever the sensor sees its modulated light source, and pulses at a rate proportional to the strength of the received light signal Load (Yellow) LED lights whenever the output relay is energized Optional 7-element LED signal strength display module</p>
Construction	Molded reinforced thermoplastic polyester housing, o-ring-sealed transparent polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.
Environmental Rating	IP67; NEMA 6P
Connections	<p>Q45VR3 models: PVC-jacketed 2 m or 9 m unterminated cables, or 5-pin Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cordsets are ordered separately. See page 202.</p> <p>Q45BW13 models: PVC-jacketed 2 m or 9 m unterminated cables, or 4-pin Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cordsets are ordered separately. See page 202.</p>
Operating Conditions	Temperature: -25° to +55° C Relative humidity: 90% at 50° C (non-condensing)
Application Notes	Transient suppression is recommended for contacts switching inductive loads. Optional output timing modules are available. See page 199 for more information.
Certifications	<p>Q45VR3 models:  Q45BW13 models: </p>
Hookup Diagrams	<p>VR3 Models: Emitters: UN02 (p. 753) Other VR3 Models: UN01 (p. 753) BW13 Models: Emitters: UN02 (p. 753) Other AC/DC Models: UN07 (p. 754)</p>

45LM Series Modules

Q45 sensors easily accept the addition of output timing logic and signal strength display functions. Display models have a 7-element display which gives a "finer" indication of excess gain than does the LED that is standard on most Q45 sensors. The modules listed below may be used with all Q45 sensors except NAMUR models.

Function	Model	Timing Logic Functions			
Programmable output timing logic	45LM58	<ul style="list-style-type: none"> Models with programmable output timing provide the following timing logic functions: <ul style="list-style-type: none"> - ON delay - OFF delay - ON/OFF delay - Retriggerable one-shot - Non-retriggerable one-shot - Delayed one-shot - ON delayed one-shot - Repeat cycle timer - Limit timer - Rate sensor - Flip-flop (alternate action) 			
Programmable output timing, plus signal strength display	45LM58D	<ul style="list-style-type: none"> Selectable timing ranges: <table border="0"> <tr> <td>0.01 to 0.15 seconds</td> <td>0.1 to 1.5 seconds</td> <td>1 to 15 seconds</td> </tr> </table> Delay and hold time ranges may be individually selected and times precisely set using 15-turn adjustment potentiometers. Delay or hold time may also be displayed (zero seconds). 	0.01 to 0.15 seconds	0.1 to 1.5 seconds	1 to 15 seconds
0.01 to 0.15 seconds	0.1 to 1.5 seconds	1 to 15 seconds			
Signal strength display, only (no programmable functions)	45LMD	<ul style="list-style-type: none"> Module allows sensor output to be programmed for normally-open or normally-closed operation. Models with signal strength display gives precise indication of excess gain; see page 195 for more information. Valuable for sensor setup and alignment, critical evaluation of alternative sensing schemes and close monitoring of sensing performance over time (example, dirt build-up on lenses or progressive misalignment). 			

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- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control

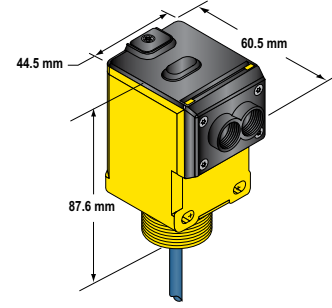
45LM Series Module Specifications	
Operating Temperature	-40° to +70° C
Timing Adjustments	Two 15-turn clutched potentiometers with brass elements, accessible from outside at the top of the sensor, beneath an o-ring sealed polycarbonate cover.
Timing Repeatability	Plus or minus 2% of the timing range (max.); assumes conditions of constant temperature and power supply.
Useful Time Range	Useful time range is from maximum time down to 5% of maximum. When the timing potentiometer is set fully counterclockwise, time will be approximately 5% of maximum.
Response Time	When the delay time is switched OFF, the card adds no measurable sensing response time.
LED Display	7-element LED display, visible through transparent top sensor cover. The more LEDs that are lit, the stronger is the received light signal; three LEDs lit is equivalent to an excess gain of about 1x.

- MINIATURE
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- FULLSIZE**
- Q45
- OMNI-BEAM
- Q60

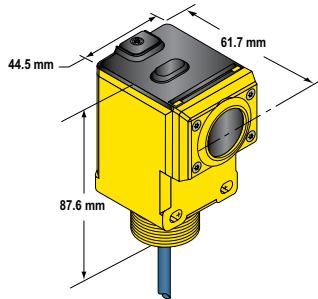
Signal Strength Display

LED Number	Approximate Gain	Display
#1	0.25x	
#2	0.5x	
#3	1.0x	
#4	2.0x	
#5	4.0x	
#6	6.0x	
#7	8.0x	

Q45 NAMUR Sensors

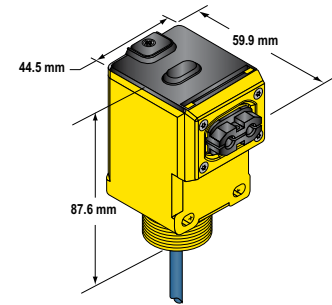


Glass Fiber Models
Suffix F and FV



Convergent Models
Suffix CV and CV4

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



Plastic Fiber Model
Suffix FP

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Q45 NAMUR, 5-15V dc

⇨ Infrared LED ⇨ Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
<p>OPPOSED</p>	6 m	2 m	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q459E Emitter	EGC-2 (p. 202)	BP-2 (p. 204)
		4-Pin Euro QD		Q459EQ Emitter		
		2 m		Q45AD9R		
		4-Pin Euro QD		Q45AD9RQ		
<p>RETRO</p>	9 m†	2 m		Q45AD9LV	EGC-7 (p. 202)	BP-6 (p. 205)
		4-Pin Euro QD		Q45AD9LVQ		
<p>P</p> <p>POLAR RETRO</p>	6 m†	2 m		Q45AD9LP	EGC-8 (p. 202)	BP-7 (p. 205)
		4-Pin Euro QD		Q45AD9LPQ		
<p>DIFFUSE</p>	300 mm	2 m		Q45AD9D	EGC-12 (p. 203)	BP-11 (p. 205)
		4-Pin Euro QD		Q45AD9DQ		
<p>LONG-RANGE DIFFUSE</p>	1 m	2 m		Q45AD9DL	EGC-13 (p. 203)	BP-12 (p. 205)
		4-Pin Euro QD		Q45AD9DLQ		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 202).

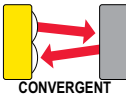
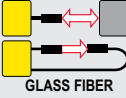
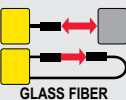
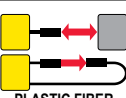
For 9 m cable, add suffix **W30** to the 2 m model number (example, **Q45AD9LV W30**).

† Retroreflective range is specified using one model BRT-3 retroreflector.

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

Q45 NAMUR, 5-15V dc (cont'd)

⇨ Infrared LED → Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 CONVERGENT	38 mm	2 m 4-Pin Euro QD	Constant Current ≤1.2 mA dark ≥2.1 mA light	Q45AD9CV Q45AD9CVQ	EGC-16 (p. 203)	BP-15 (p. 205)
	100 mm	2 m 4-Pin Euro QD		Q45AD9CV4 Q45AD9CV4Q	EGC-17 (p. 203)	BP-16 (p. 205)
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m		Q45AD9F	EGC-22 & EGC-23 (p. 203)	BP-21 & BP-22 (p. 206)
		4-Pin Euro QD		Q45AD9FQ		
 GLASS FIBER		2 m		Q45AD9FV	EGC-24 & EGC-25 (p. 203)	BP-23 & BP-24 (p. 206)
		4-Pin Euro QD		Q45AD9FVQ		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m		Q45AD9FP	EGC-28 &	BP-27 &
		4-Pin Euro QD		Q45AD9FPQ	EGC-29 (p. 204)	BP-28 (p. 206)

 **Connection options:** A model with a QD requires a mating cordset (see page 202).






For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45AD9LV W/30**).

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Q45 NAMUR Specifications

Supply Voltage and Current	5 to 15V dc. Supply voltage is provided by the amplifier to which the sensor is connected.
Output	Constant current output: ≤ 1.2 mA in the dark condition and ≥ 2.1 mA in the light condition
Output Response Time	Opposed receiver: 2 milliseconds ON/0.4 milliseconds OFF All others: 5 milliseconds ON/OFF (does not include amplifier response)
Adjustments	Multi-turn sensitivity control on top of sensor
Indicators	Power (Red): LED (emitters only) lights whenever 5 - 15V dc power is applied Signal (Red): LED lights whenever the sensor sees its modulated light source
Construction	Molded thermoplastic polyester housing, o-ring sealed transparent Lexan® top cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a 1/2" NPS integral internal conduit thread.
Environmental Rating	IP67; NEMA 6P
Connections	PVC-jacketed 2 m or 9 m cables, or 4-pin Euro-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately. See page 202.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Design Standards	Q45AD9 Series sensors comply with the following standards: DIN 19234, EN 50 014: 1977, EN 50 020: 2002
Certifications	    
Hookup Diagrams	SP01 (p. 756)

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- MINIATURE
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APPROVALS

CSA: #LR 41887	Intrinsically Safe, with Entity for Class I, Groups A-D Class I, Div. 2, Groups A-D	KEMA: #03 ATEX 1441x	II IG EEx ia IICTC
FM: #J.I. 5Y3A4.AX	Intrinsically Safe, with Entity for Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G	ETL: #558044	Tested per FM and CSA as shown above

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
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



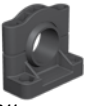
NAMUR Euro QD		
See page 683		
Threaded 4-Pin		
Length	Straight	Right-Angle
1.83 m	MQD9-406	MQD9-406RA
4.57 m	MQD9-415	MQD9-415RA

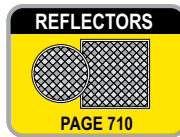
Micro QD		
See page 698		
Threaded 4-Pin		
Length	Straight	Right-Angle
1.83 m	MQAC-406	MQAC-406RA
4.57 m	MQAC-415	MQAC-415RA
9.14 m	MQAC-430	MQAC-430RA

Mini QD	
See page 700	
3-Pin	
Length	Threaded Straight
1.83 m	MBCC-306
3.66 m	MBCC-312
9.14 m	MBCC-330
4-Pin	
Length	Threaded Straight
1.83 m	MBCC-406
3.66 m	MBCC-412
9.14 m	MBCC-430
5-Pin	
Length	Threaded Straight
1.83 m	MBCC-506
3.66 m	MBCC-512
9.14 m	MBCC-530

Additional cordset information available. See page 679.

Brackets

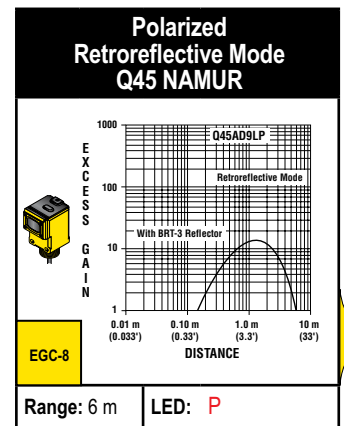
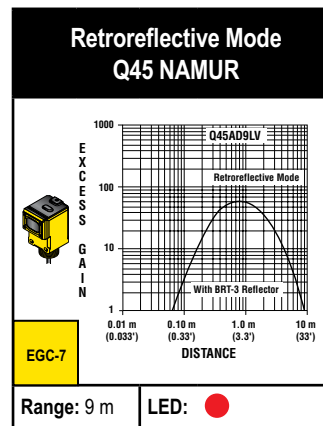
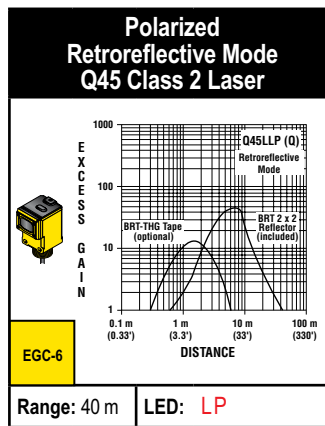
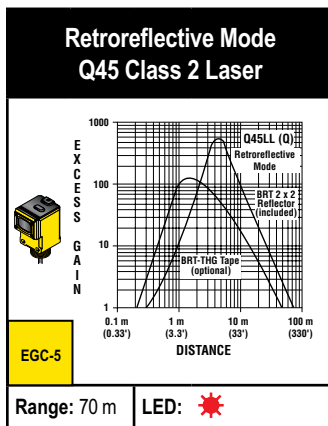
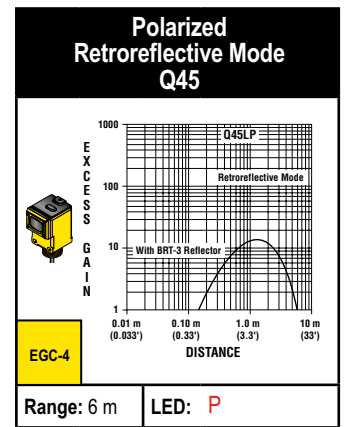
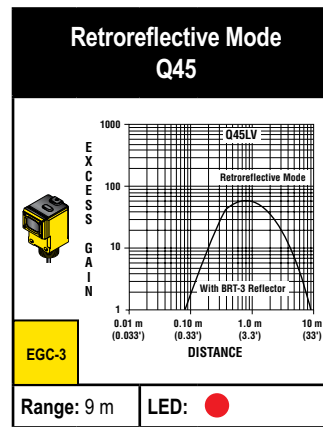
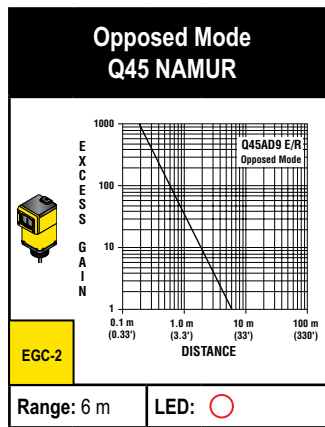
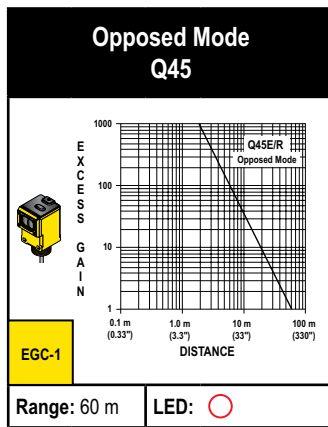
Q45		
		
pg. 639	pg. 640	pg. 641
SMB30A	SMB30FA..	SMB30SC



Additional brackets and information available. See page 620.

Excess Gain Curves

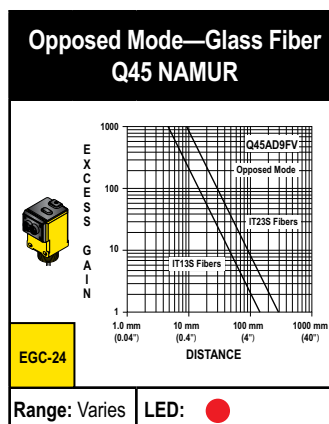
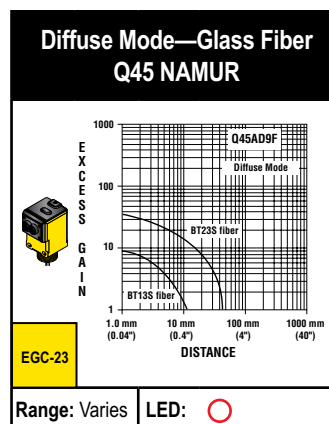
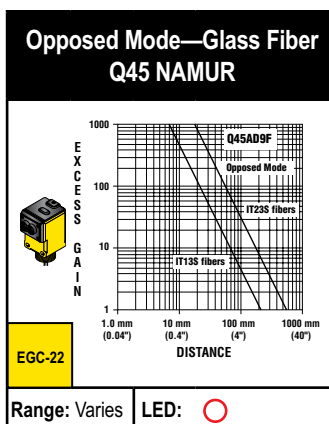
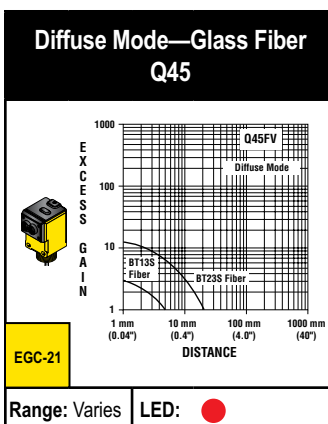
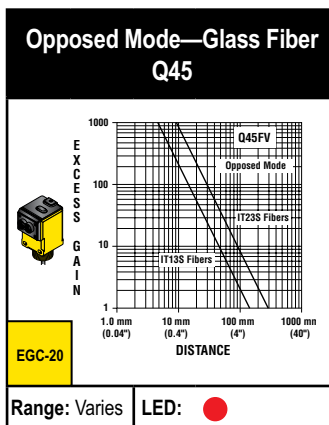
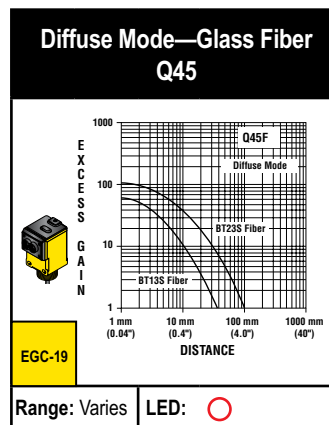
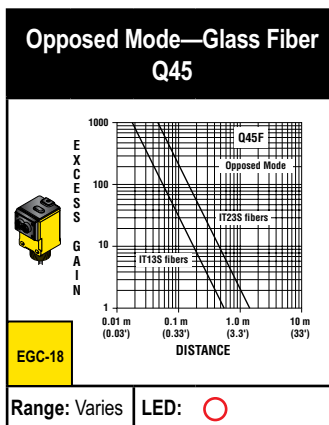
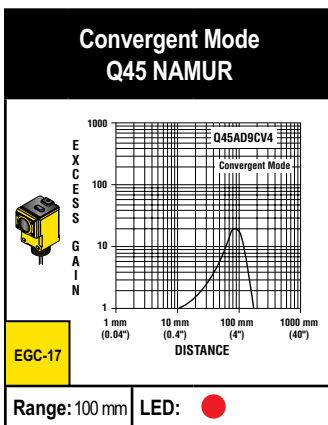
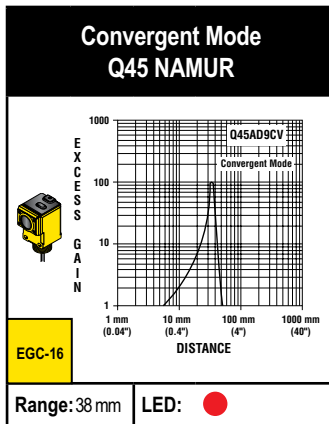
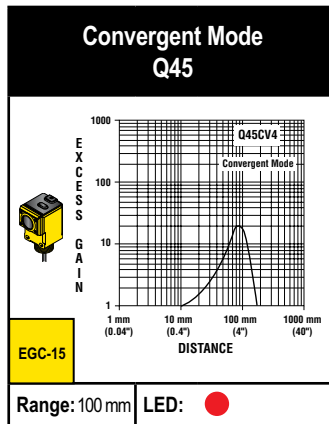
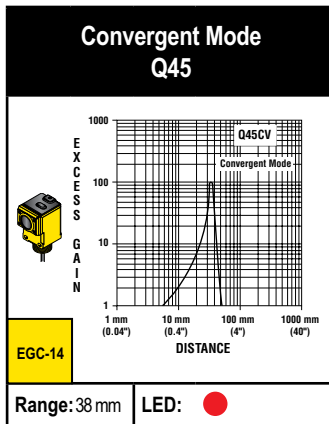
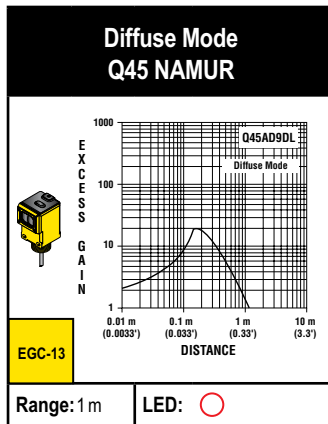
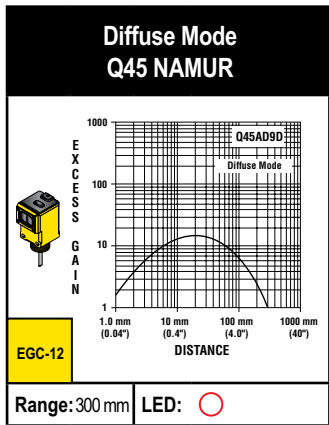
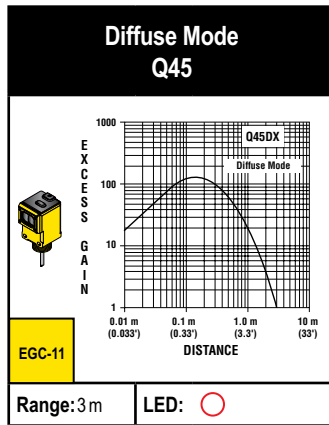
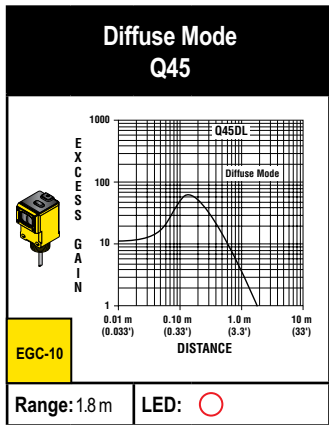
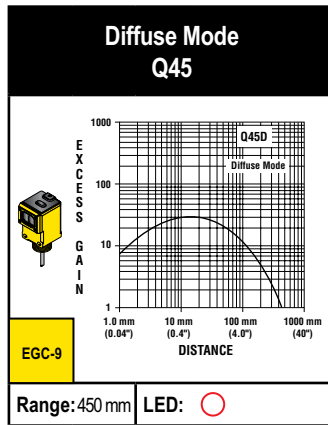
○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized LP = Visible Red Laser Polarized ★ = Visible Red Laser



More on next page

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

○ = Infrared LED ● = Visible Red LED

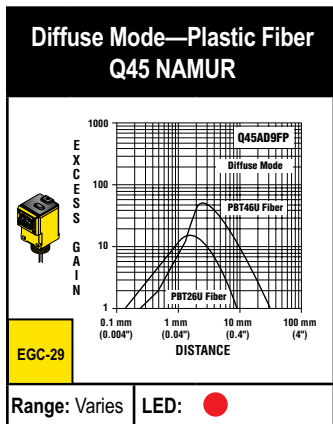
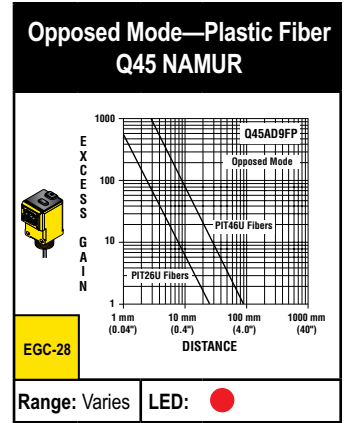
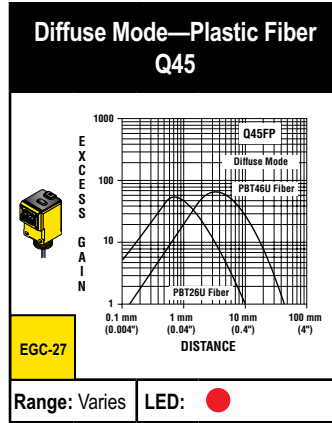
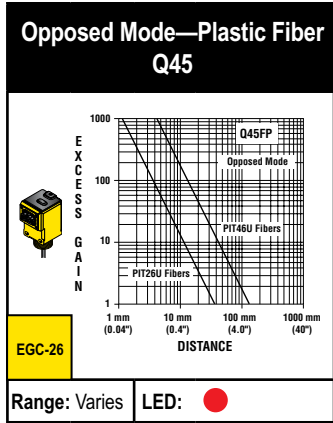
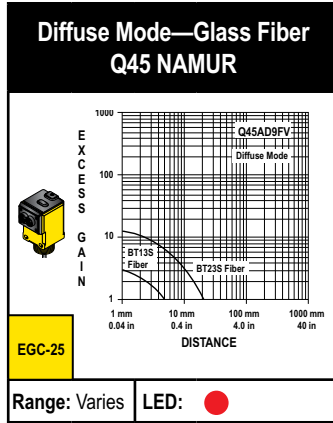


- Photoelectrics Sensors
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control
- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60

More on next page

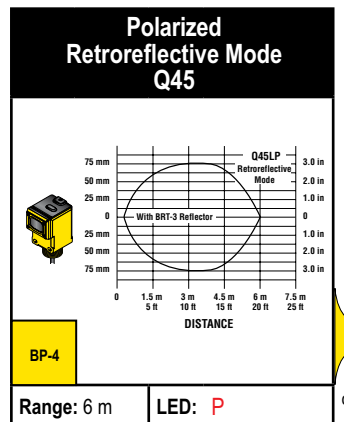
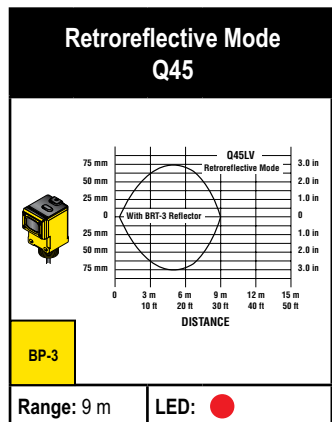
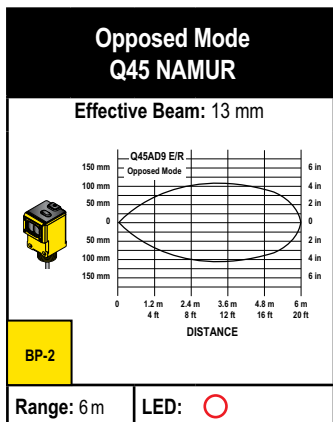
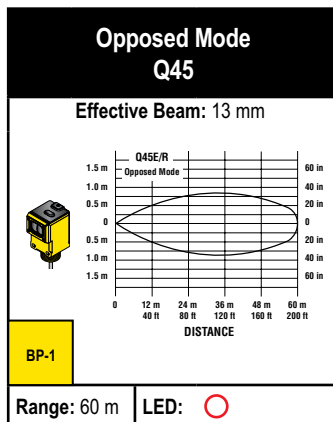
Excess Gain Curves (Diffuse mode performance based on 90% reflectance white card)

● = Visible Red LED



Beam Patterns

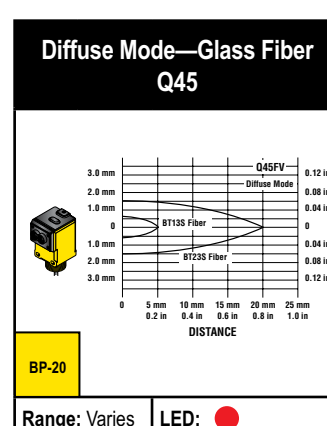
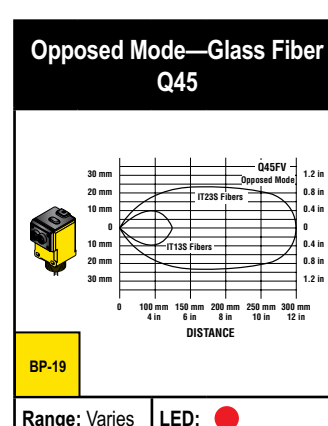
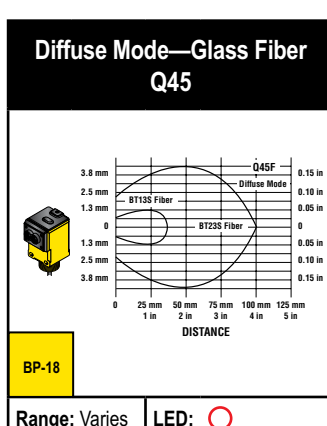
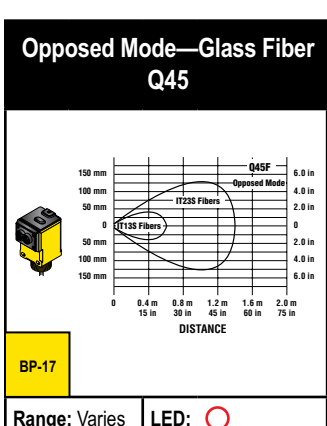
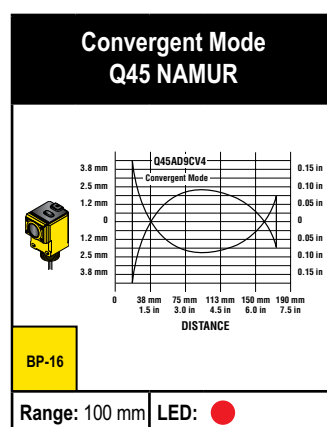
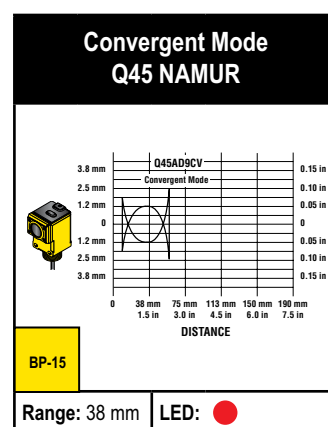
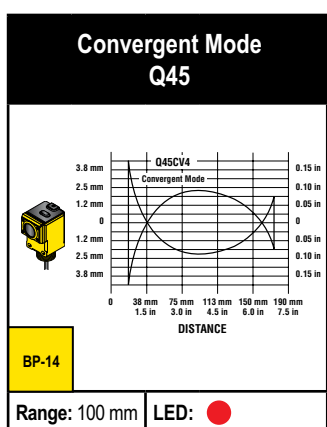
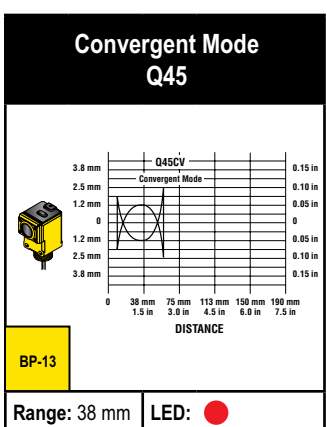
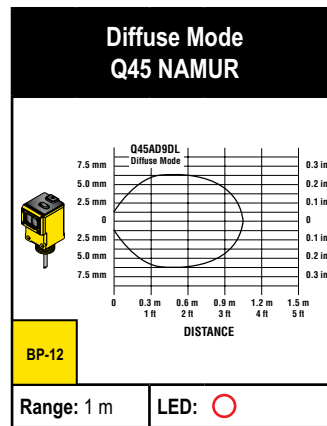
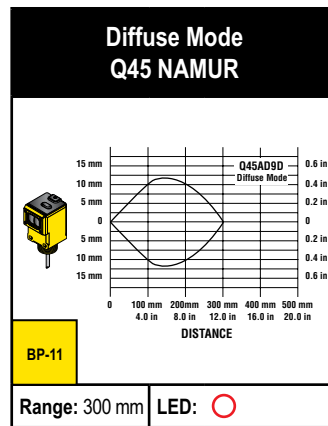
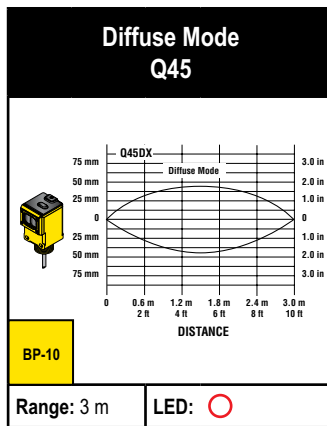
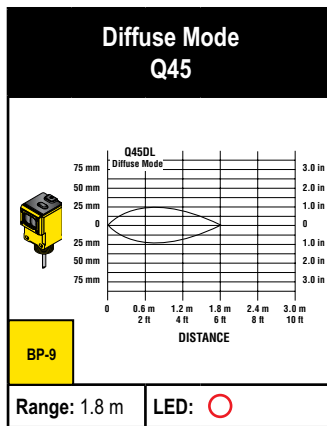
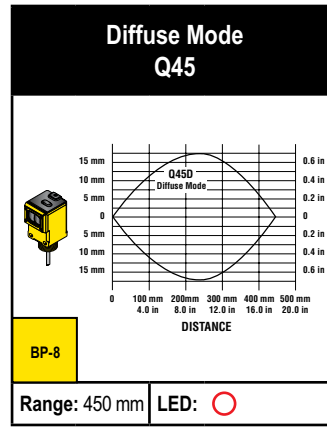
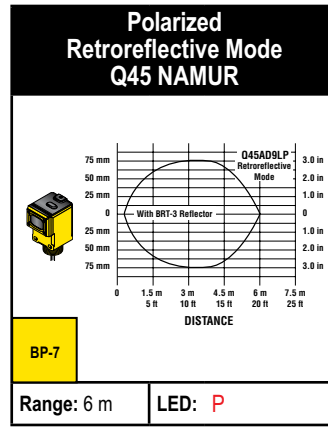
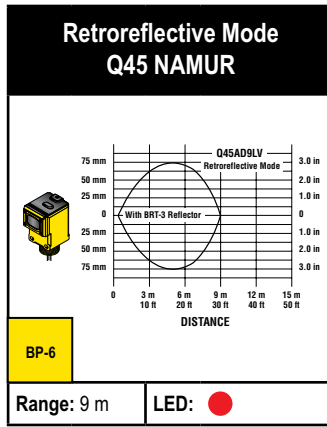
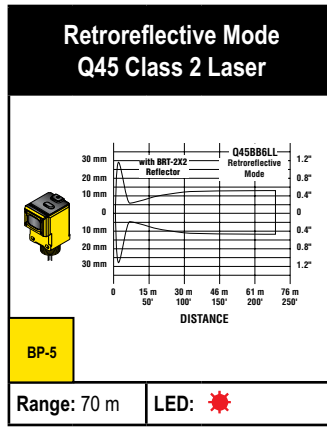
○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized



More on next page

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

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



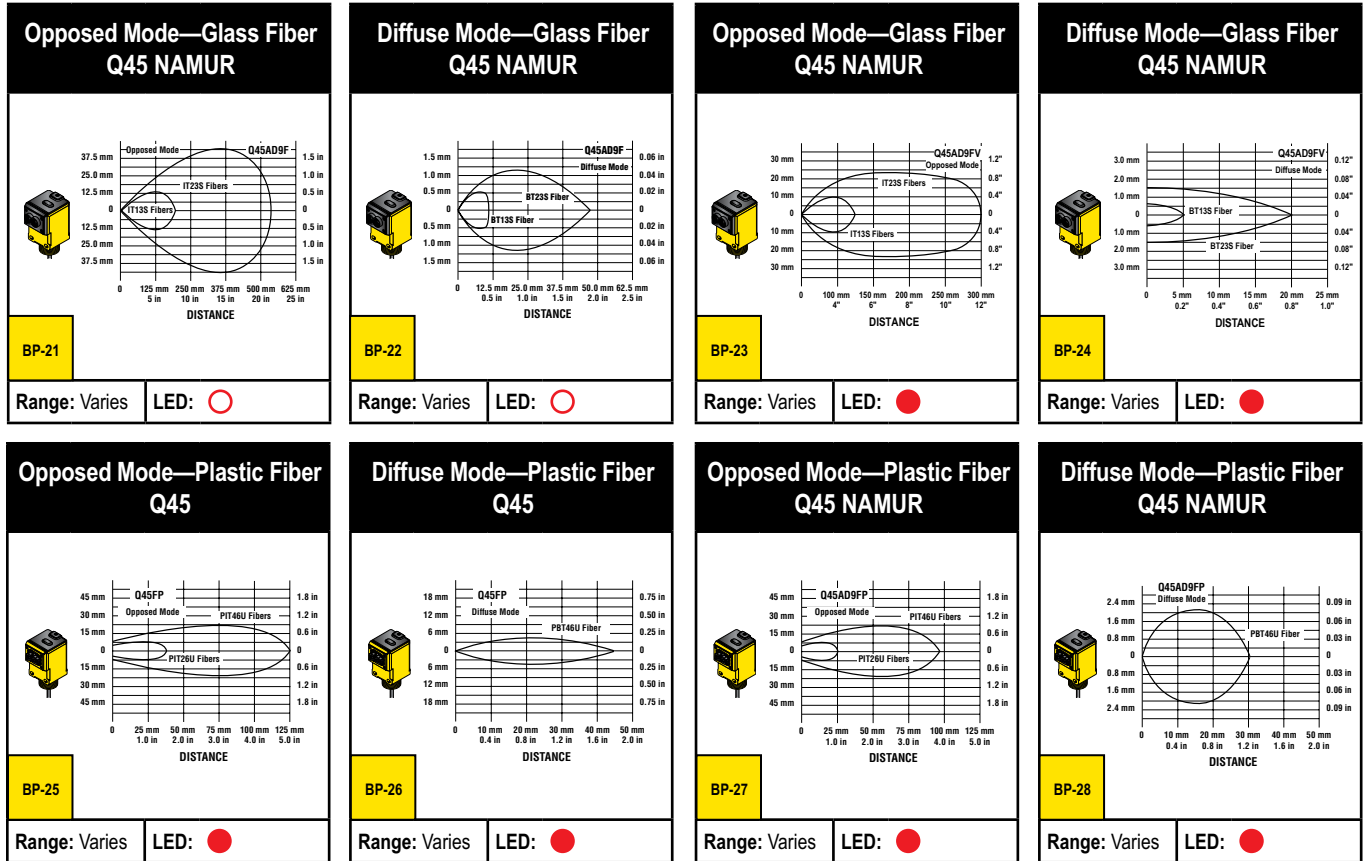
- Photoelectrics Sensors
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control

- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60



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

○ = Infrared LED ● = Visible Red LED





OMNI-BEAM™ Modular Limit-Switch Style Sensors

- Modular self-contained photoelectric sensors that you can customize for a specific application.
- Includes a sensor head and a power block; timing logic module is optional
- Offers interchangeable ac or dc power blocks
- Features exclusive multiple-LED system that displays received signal strength, sensing contrast and seven different warnings
- Easily field-programmable for sensing hysteresis, signal strength display scale factor and light/dark operate
- Available in opposed, retroreflective, diffuse, convergent and fiber optic modes
- Available in convergent and fiber optic models with choice of red, blue or green LED for color-differentiation applications

Sensor Heads	page 208
Timing Logic Modules	210
Power Blocks	210

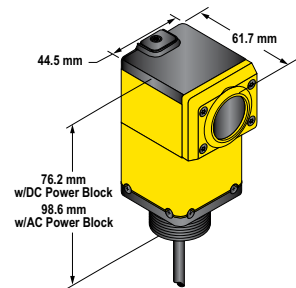
- Photoelectronics Sensors
 - Fiber Optic Sensors
 - Special Purpose Sensors
 - Measurement & Inspection Sensors
 - Vision
 - Wireless
 - Lighting & Indicators
 - Safety Light Screens
 - Safety Laser Scanners
 - Fiber Optic Safety Systems
 - Safety Controllers & Modules
 - Safety Two-Hand Control Modules
 - Safety Interlock Switches
 - Emergency Stop & Stop Control

ACCESSORIES
page 213

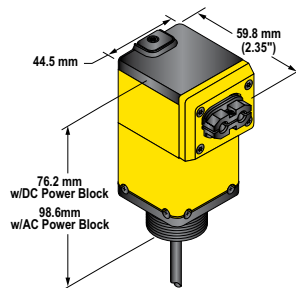


AC Model (shown)
Opposed, Retroreflective and Diffuse Models
Suffix E, R, D, DX, LV, LVAG and LVAGC

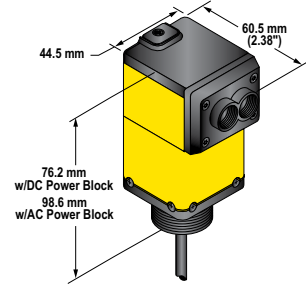
ONLINE
AUTOCAD, STEP, IGES & PDF



Convergent Models
Suffix CV, CVB and CVG



Plastic Fiber Models
Suffix FP, FPB and FPG



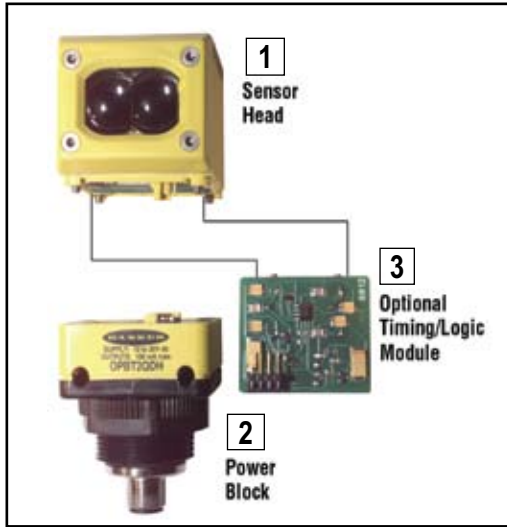
Glass Fiber Models
Suffix F, FAC, FX, FV, FVB, FVG, EF and RF

- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60



Selecting Components for OMNI-BEAM™ Sensors

OMNI-BEAM™ sensors are modular self-contained photoelectric sensors that you can customize for a specific application.



STEP 1:

Choose a sensor head with the required sensing mode.

STEP 2:

Choose a power block for the required sensor power (ac or dc) and interface.

STEP 3:

Choose an optional timing logic module.

STEP 4:

Plug and bolt components together without interwiring.

OMNI-BEAM modular components are sold separately. The three modular components, and the lenses, can be replaced in the field.

ACCESSORIES
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OMNI-BEAM™ Sensor Heads

⇨ Infrared LED → Visible Red LED

Sensing Mode/LED	Range	Supply Voltage	Response & Repeatability	Models	Excess Gain	Beam Pattern
OPPOSED	45 m	Provided by Power Block (see page 210)	Response: 2 ms Repeatability: 0.01 ms	OSBE Emitter OSBR	EGC-1 (p. 213)	BP-1 (p. 215)
RETRO	0.15-9 m†		Response: 4 ms Repeatability: 0.2 ms	OSBLV	EGC-2 (p. 213)	BP-2 (p. 215)
POLAR RETRO	0.3-4.5 m†			OSBLVAG	EGC-3 (p. 213)	BP-3 (p. 215)
CLEAR-OBJECT POLAR RETRO	4 m†			OSBLVAGC	EGC-4 (p. 213)	—
HIGH-SPEED DIFFUSE	300 mm		Response: 2 ms Repeatability: 0.1 ms	OSBD	EGC-5 (p. 214)	BP-4 (p. 215)
HIGH-POWER DIFFUSE	2 m		Response: 15 ms Repeatability: 1 ms	OSBDX	EGC-6 (p. 214)	BP-5 (p. 215)

More on next page

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.
NOTE: Sensor heads require a power block. See page 210.

OMNI-BEAM™ Sensor Heads (cont'd)

Infrared LED
 Visible Red LED
 Visible Green LED
 Visible Blue LED

Sensing Mode/LED	Range	Supply Voltage	Response & Repeatability	Models	Excess Gain	Beam Pattern	
 CONVERGENT	38 mm	Provided by Power Block (see page 210)	Response: 4 ms Repeatability: 0.2 ms	OSBCV	EGC-7 (p. 214)	BP-6 (p. 215)	
 CONVERGENT				OSBCVB	EGC-8 (p. 214)	BP-7 (p. 215)	
 CONVERGENT				OSBCVG	EGC-9 (p. 214)	BP-8 (p. 215)	
 HIGH-SPEED GLASS FIBER	Range varies by sensing mode and fiber optics used		Response: 2 ms Repeatability: 0.1 ms	OSBF	EGC-10 & EGC-11 (p. 214)	BP-9 & BP-10 (p. 216)	
 HIGH-SPEED GLASS FIBER				OSBFV	EGC-12 & EGC-13 (p. 214)	BP-11 & BP-12 (p. 216)	
 HIGH-SPEED GLASS FIBER				OSBFVB	EGC-14 (p. 214)	BP-13 (p. 216)	
 HIGH-SPEED GLASS FIBER				OSBFVG	EGC-15 (p. 214)	BP-14 (p. 216)	
 HIGH-POWER GLASS FIBER				OSBFX	Response: 15 ms Repeatability: 1 ms	EGC-16 & EGC-17 (p. 214)	BP-15 & BP-16 (p. 216)
 AC-COUPLED GLASS FIBER				OSBFAC	Response: 1 ms Repeatability: 0.01 ms	Maximum Range: IT23S fibers, opposed mode: 180 mm	
 GLASS FIBER				OSBEF	Response: 2 ms Repeatability: 0.01 ms	EGC-18 & EGC-19 (p. 214)	BP-17 & BP-18 (p. 216)
		OSBRF					
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	Response: 2 ms Repeatability: 0.1 ms	OSBFP	EGC-20 & EGC-21 (p. 214)	BP-19 & BP-20 (p. 216)		
 PLASTIC FIBER			OSBFPB	EGC-22 (p. 215)	BP-21 (p. 216)		
 PLASTIC FIBER			OSBFPG	EGC-23 (p. 215)	BP-22 (p. 216)		

NOTE: Sensor heads require a power block. See page 210.

Photoelectronics Sensors

Fiber Optic Sensors

Special Purpose Sensors

Measurement & Inspection Sensors

Vision

Wireless

Lighting & Indicators

Safety Light Screens

Safety Laser Scanners

Fiber Optic Safety Systems

Safety Controllers & Modules

Safety Two-Hand Control Modules

Safety Interlock Switches

Emergency Stop & Stop Control

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MINIATURE

COMPACT

MIDSIZE

FULLSIZE

Q45

OMNI-BEAM

Q60


OMNI-BEAM™ Timing Logic Modules

Type	Logic Function	Timing Ranges	Models	Timing Diagrams
Delay Timer Logic Module	ON-DELAY or OFF-DELAY or ON/OFF DELAY	ON-Delay: 0.01-1 sec., 0.15-15 sec., or none OFF-Delay: 0.01-1 sec., 0.15-15 sec., or none	OLM5	For information on Timing Diagrams, see data sheets
Pulse Timer Logic Module	ONE-SHOT pulse timer or DELAYED ONE-SHOT logic timer	Delay: 0.01-1 sec., 0.15-15 sec., or none Pulse: 0.01-1 sec., 0.15-15 sec.	OLM8	
Pulse Timer Logic Module	ONE-SHOT pulse timer or DELAYED ONE-SHOT logic timer	Delay: 0.002-0.1 sec., 0.03-1.5 sec., or none Pulse: 0.002-0.1 sec., 0.03-1.5 sec.	OLM8M1	

OMNI-BEAM™ Power Blocks, DC Voltage

ACCESSORIES
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Connection	Supply Voltage	Models	Output Type
2 m	10-30V dc	OPBT2	Bi-Modal™ NPN or PNP Two outputs: Load and Alarm
4-Pin Mini QD		OPBT2QD	
4-Pin Euro QD		OPBT2QDH	
2 m		OPBTE	No output: for powering emitter-only sensor heads
4-Pin Mini QD		OPBTEQD	
4-Pin Euro QD		OPBTEQDH	

 **Connection options:** A model with a QD requires a mating cordset (see page 213).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **OPBT2 W/30**).

OMNI-BEAM™ Power Blocks, AC Voltage

Connection	Supply Voltage	Models	Output Type
2 m	105-130V ac	OPBA2	SPST solid-state ac relay Two outputs: Load and Alarm
5-Pin Mini QD		OPBA2QD	
2 m	210-250V ac	OPBB2	
5-Pin Mini QD		OPBB2QD	
2 m	105-130V ac	OPBAE	No output: for powering emitter only sensor heads
5-Pin Mini QD		OPBAEQD	
2 m	210-250V ac	OPBBE	
5-Pin Mini QD		OPBBEQD	

 **Connection options:** A model with a QD requires a mating cordset (see page 213).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **OPBA2 W/30**).


OMNI-BEAM™ Sensor Head Specifications	
Supply Voltage and Current	Supplied by OMNI-BEAM power block. See page 210.
Output Response Time	See individual sensing heads for response times. See page 208.
Delay at Power-up	200 milliseconds; outputs are non-conducting during this time
Adjustments	<p>Four programming DIP switches</p> <p>SWITCH #1 selects the amount of sensing hysteresis</p> <p>SWITCH #2 selects the alarm output configuration</p> <p>SWITCH #3 selects Light Operate (switch #3 OFF) or Dark Operate (switch #3 ON)</p> <p>SWITCH #4 selects the STANDARD (switch #4 OFF) or Fine (switch #4 ON) scale factor for the D.A.T.A. light signal strength indicator array</p> <p>Sensitivity: 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer</p>
Indicators	<p>Sense and Load indicator LEDs are located on the top of the sensor head on either side of the D.A.T.A. array.</p> <p>Sense LED indicates when a target has been sensed</p> <p>Load LED lights whenever the load (sensor output) is energized</p> <p>Also, Banner's exclusive, D.A.T.A. sensor self-diagnostic system located on the top of the sensor head warns of marginal sensing conditions usually before a sensing failure occurs (except on model OSBFAC)</p>
Construction	Sensor heads are molded of rugged thermoplastic polyester; top view window is polycarbonate; acrylic lenses; stainless steel hardware.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled to power block.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Certifications	

- Photoelectrics Sensors
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Vision
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
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- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control


OMNI-BEAM™ Timing Logic Module Specifications	
Response Time	A disabled timing function adds no measurable sensing response time
Timing Adjustments	All logic modules feature 15-turn clutched potentiometers for accurate timing adjustments. The logic module slides into the sensor head housing and interconnects without wires. Timing adjustments are easily accessible at the top of the sensor head and are protected by the sensor's transparent cover.
Timing Repeatability	± 2% of timing range (max.); assumes conditions of constant temperature and power supply
Time Range	Useful range is from maximum time down to 10% of maximum (all models); when timing potentiometer is set fully counterclockwise, time will be approximately 1% of maximum for models OLM5 and OLM8, and 2% of maximum for model OLM8M1
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Certifications	

- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60

OMNI-BEAM™ DC Power Block Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 80 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	OPBT2, OPBT2QD, OPBT2QDH: Bi-Modal™ NPN or PNP, depending upon hookup to power supply (see hookup diagrams) OPBTE, OPBTEQD, OPBTEQDH: No output - for use with emitters only
Output Rating	100 mA max. OFF-state leakage current: less than 100 μ A Output saturation voltage (NPN or PNP outputs): less than 1 volt at 10 mA and less than 1.5 volts at 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Construction	Reinforced thermoplastic polyester housing with totally epoxy-encapsulated circuitry, and 30 mm threaded hub for swivel bracket or through-hole mounting
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled to sensor head
Connections	PVC-jacketed 2 m or 9 m cables, or 4-pin Mini- or Euro-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately. See page 213.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Application Notes	Interface to TTL logic is not direct (contact factory). When the load and the OMNI-BEAM do not share a common power supply, load voltage must be \leq the sensor supply voltage
Certifications	
Hookup Diagrams	Emitters: DC02 (p. 744) Other DC Models: DC14 (p. 747)

OMNI-BEAM™ AC Power Block Specifications

Supply Voltage and Current	120V models: 105 to 130V ac, 50/60 Hz, 4 watts (excluding load) 220/240V models: 210 to 250V ac, 50/60 Hz, 4 watts (excluding load)
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	OPBA2, OPBA2QD, OPBB2 and OPBB2QD: Isolated SPST solid-state ac relay OPBAE, OPBAEQD, OPBBE and OPBBEQD: No output - for use with emitter only
Load Output Rating	500 mA max to 25° C, derated 1% per ° C to 70° C; 7 amps max inrush for 1 second or 20 amps max for one cycle (non-repeating) OFF-state leakage current: less than 100 μ A max. ON-state voltage drop: less than 3V ac at full load
Alarm Output Rating	200 mA max to 25° C, derated 2% per ° C to 70° C; 2 amps max inrush for 1 second or 3 amps max for 1 cycle (non-repeating) OFF-state leakage current: less than 100 μ A max. ON-state voltage drop: less than 2.5V ac at full load
Output Protection Circuitry	Protected against false pulse on power-up
Construction	Reinforced thermoplastic polyester housing with totally epoxy-encapsulated circuitry, and 30 mm threaded hub for swivel bracket or through-hole mounting
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled with sensor head
Connections	PVC-jacketed 2 m or 9 m cables, or 5-pin Mini-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately. See page 213.
Operating Conditions	Temperature: -40° to +70° C Relative humidity: 90% at 50° C (non-condensing)
Certifications	
Hookup Diagrams	Emitters: AC03 (p. 750) Other AC Models: AC09 (p. 752)



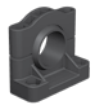
Cordsets

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

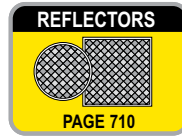
Mini QD		
See page 700		
Length	Threaded 4-Pin	Threaded 5-Pin
	Straight	
1.83 m	MBCC-406	MBCC-506
3.66 m	MBCC-412	MBCC-512
9.14 m	MBCC-430	MBCC-530

Additional cordset information available. See page 679.

Brackets

OMNI-BEAM		
		
pg. 639	pg. 640	pg. 641
SMB30A	SMB30FA..	SMB30SC

Additional brackets and information available. See page 620.

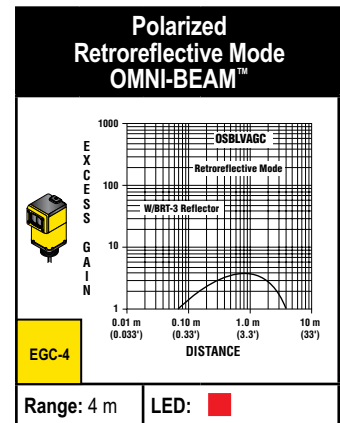
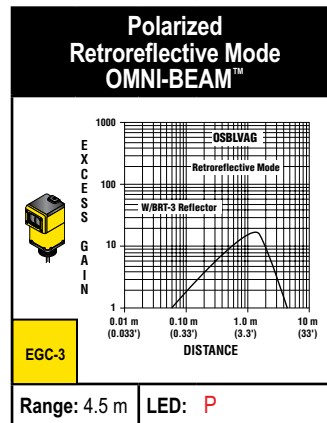
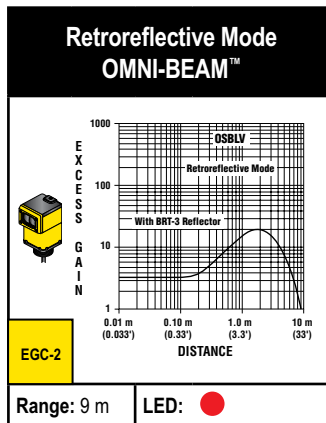
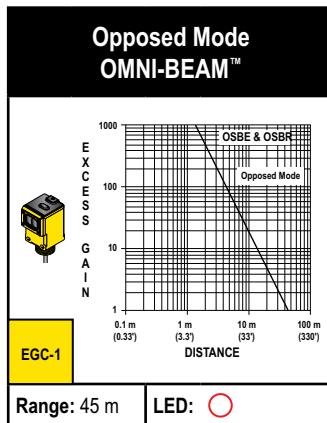


- Photoelectronics Sensors
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Vision
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control

- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60

Excess Gain Curves

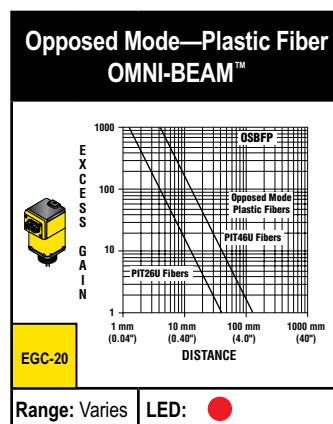
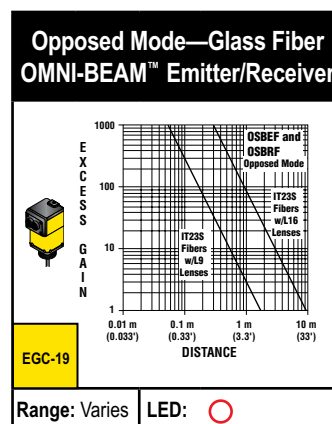
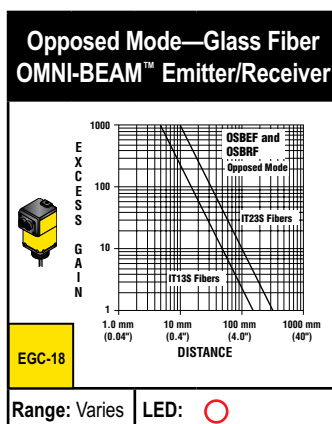
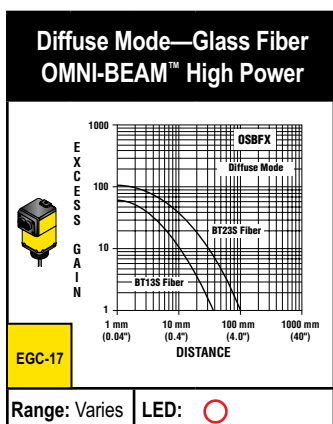
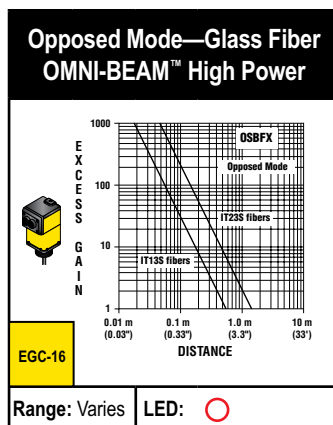
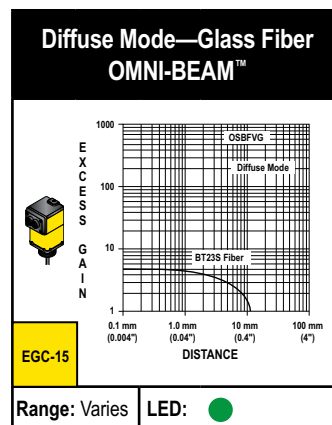
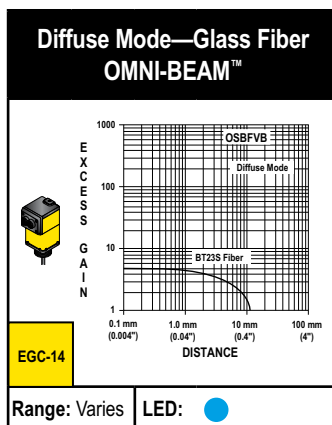
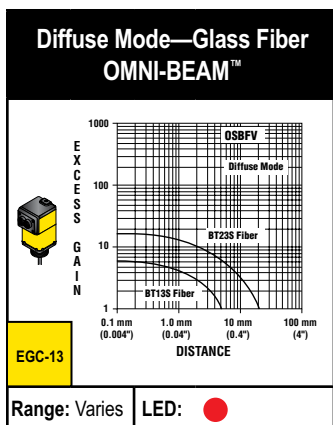
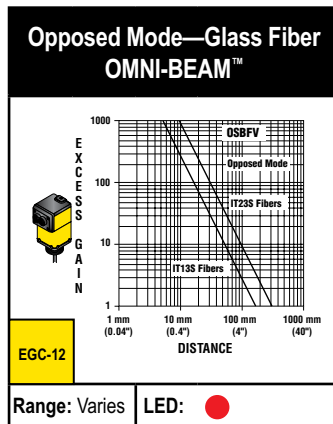
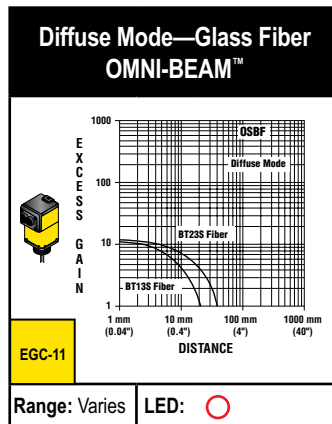
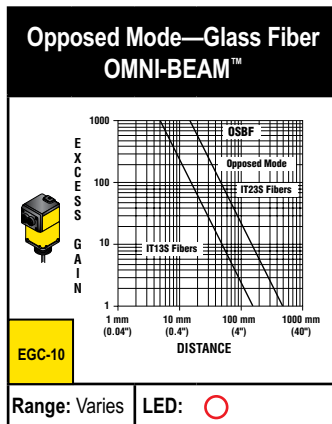
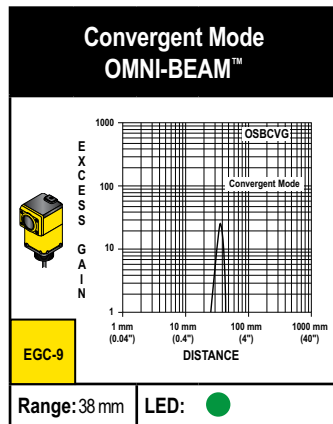
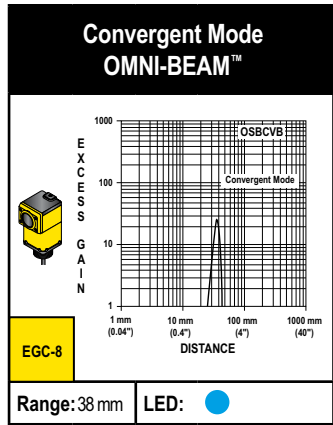
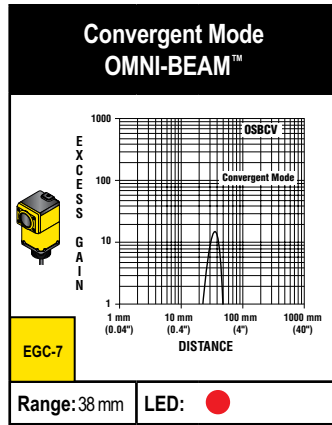
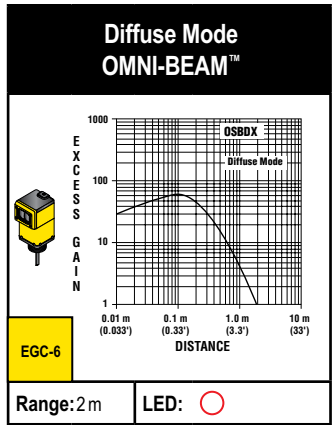
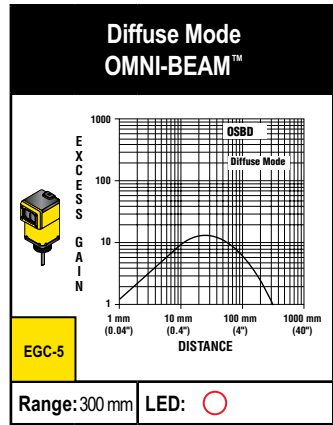
○ = Infrared LED ● = Visible Red LED P = Visible Red LED Polarized ■ = Visible Red Clear Object Detection Polarized



More on next page

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

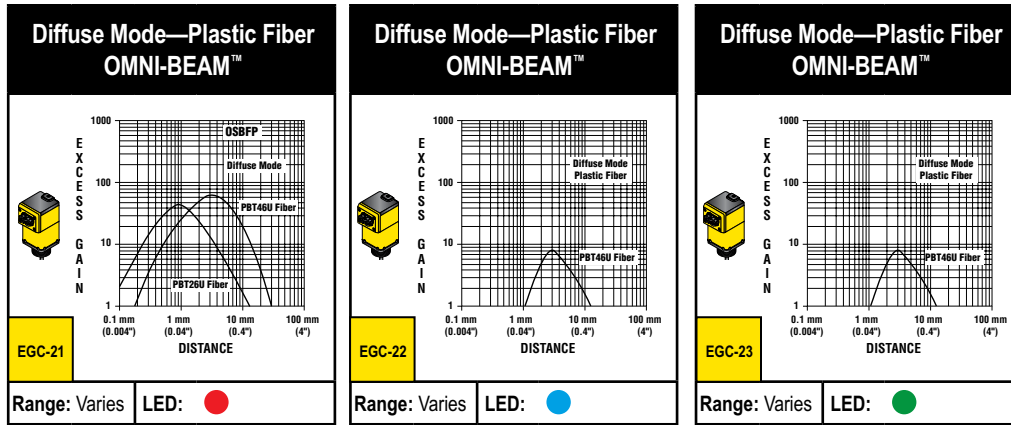
○ = Infrared LED ● = Visible Red LED ● = Visible Blue LED ● = Visible Green LED



More on next page

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

● = Visible Red LED ● = Visible Blue LED ● = Visible Green LED



Photoelectrics Sensors

- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors

Vision

Wireless

Lighting & Indicators

Safety Light Screens

Safety Laser Scanners

Fiber Optic Safety Systems

Safety Controllers & Modules

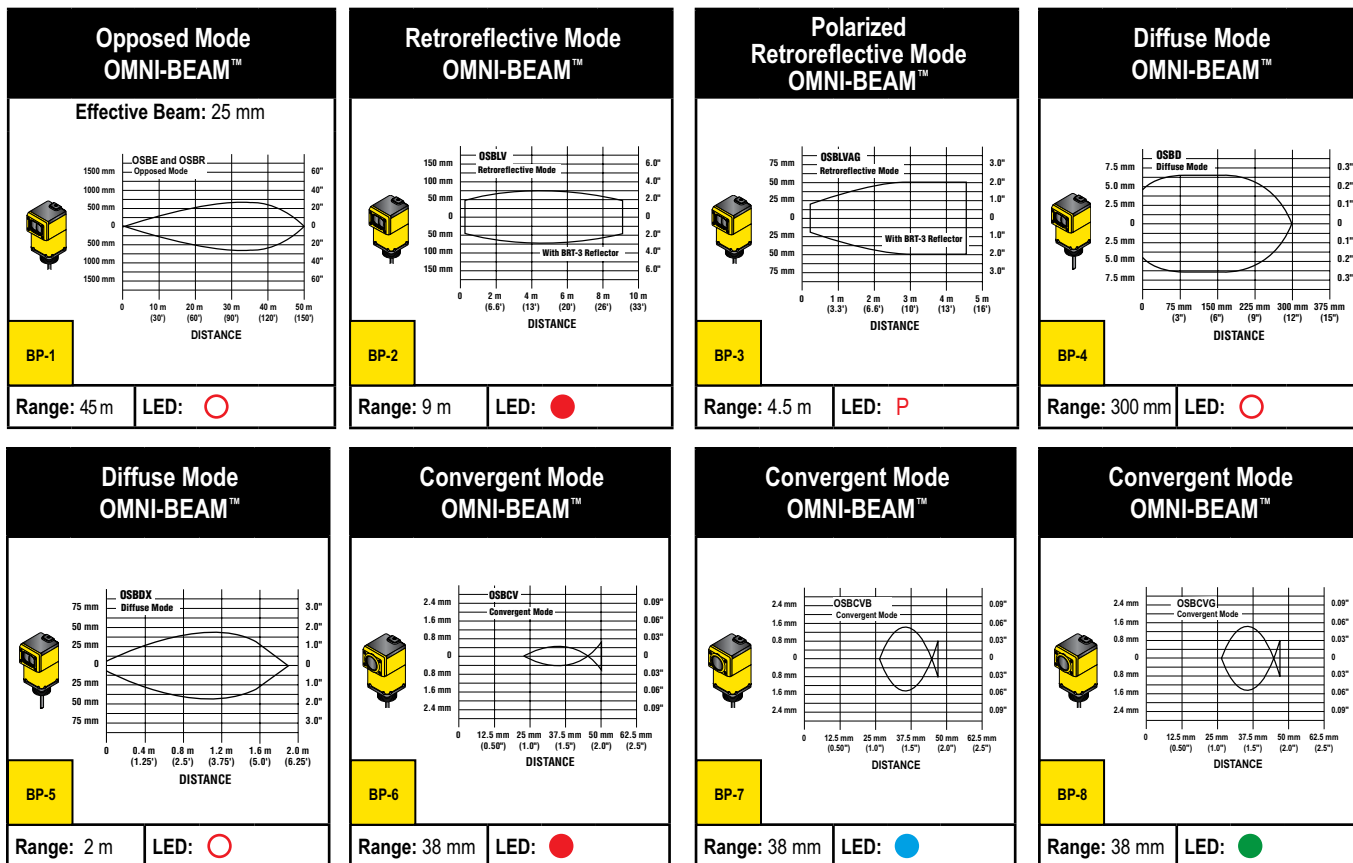
Safety Two-Hand Control Modules

Safety Interlock Switches

Emergency Stop & Stop Control

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

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



MINIATURE

COMPACT

MIDSIZE

FULLSIZE

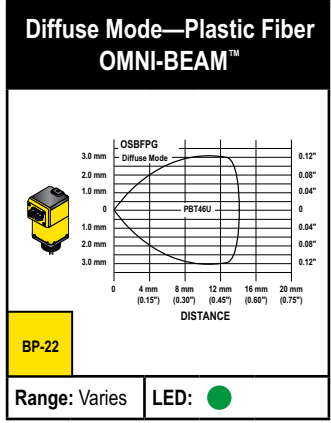
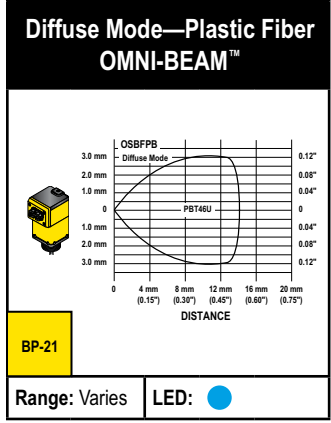
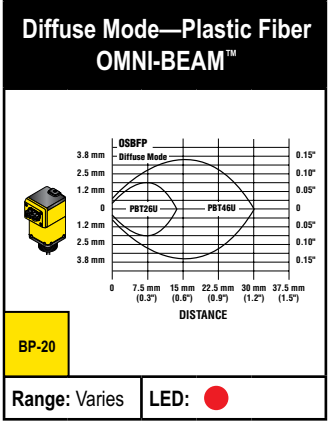
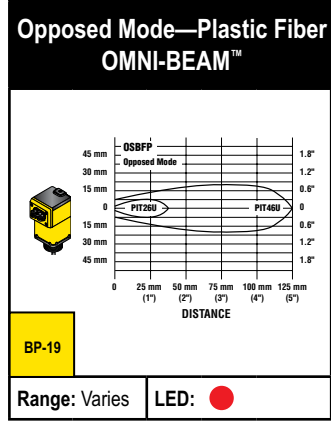
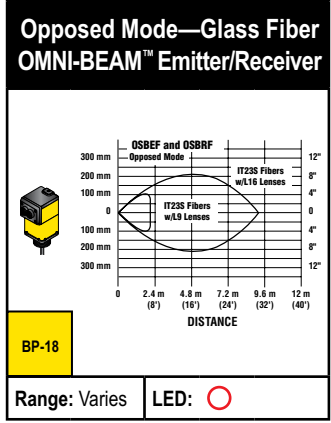
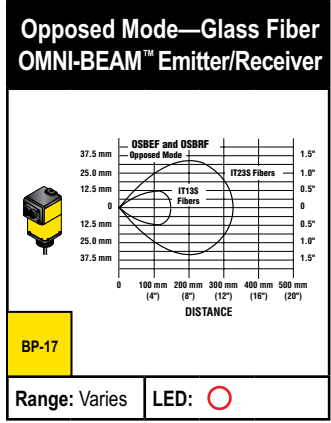
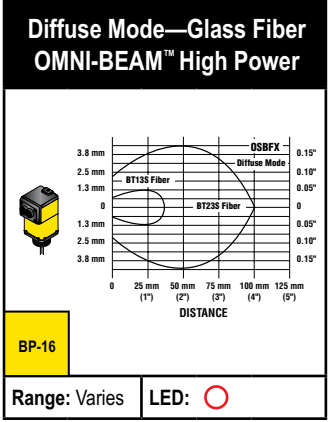
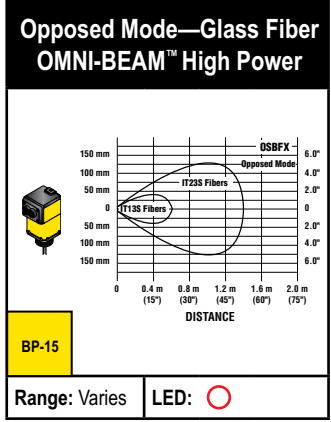
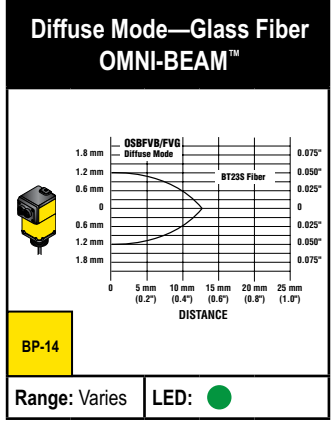
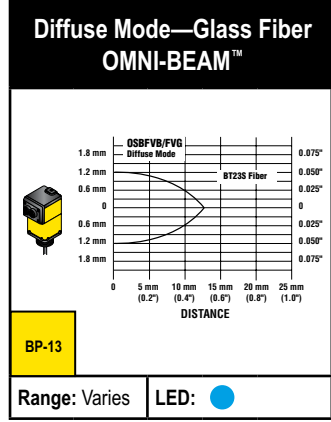
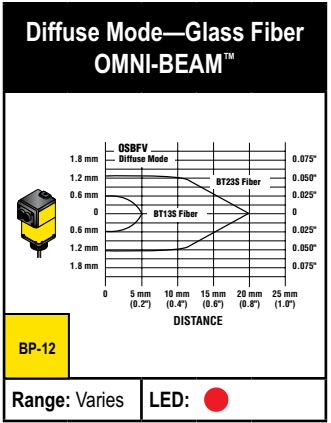
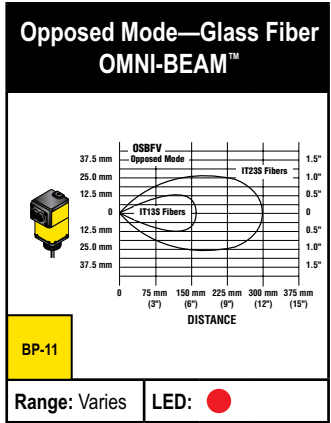
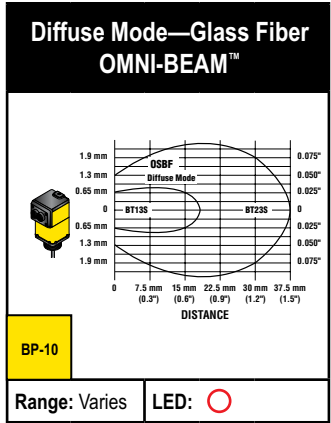
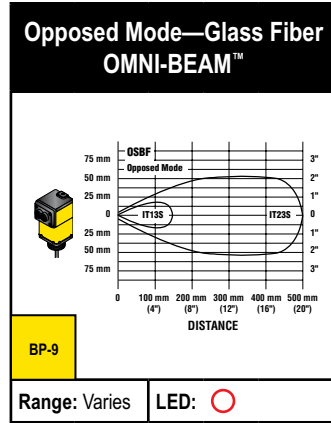
Q45

OMNI-BEAM

Q60

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

○ = Infrared LED ● = Visible Red LED ● = Visible Blue LED ● = Visible Green LED





Q60

Long-Range Adjustable-Field Sensors

- Detects objects within a defined sensing field, ignoring objects located just beyond the sensing field cutoff
- Features two-turn, logarithmic adjustment of sensing field cutoff point from 0.2 to 2 m, to make it easy to set cutoff point
- Offers infrared, visible red LED or laser sensing beam
- Uses rotating pointer to indicate relative cutoff point setting within sensing range
- Features easy push-button or remote programming of light/dark operate and output timing
- Uses continuous status indicators to verify all settings at a glance
- Available in models for dc or ac/dc universal voltage operation
- Models with visible red lasers for small part detection from long distances

Photoelectronics Sensors

- Fiber Optic Sensors
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- Vision
- Wireless
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- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control

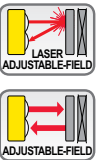
ACCESSORIES
page 220



Adjustable-field Models
Suffix AF, AFV and LAF

MINIATURE
COMPACT
MIDSIZE
FULLSIZE

Q45
OMNI-BEAM
Q60



Q60, 10-30V dc

⇨ Infrared LED ⇨ Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain and Cutoff Point Deviation
 ADJUSTABLE-FIELD	Min.: 65 - 130 mm [†] Cutoff: 200 - 1000 mm	2 m	Bipolar NPN/PNP	Q60BB6AFV1000	EGC-1 (p. 220)
		5-Pin Euro QD		Q60BB6AFV1000Q	Cutoff Point Deviation Curves CPD-3 & CPD-4 (p. 221)
 ADJUSTABLE-FIELD	Min.: 50 - 125 mm [†] Cutoff: 200 - 2000 mm	2 m		Q60BB6AF2000	EGC-2 (p. 220)
		5-Pin Euro QD		Q60BB6AF2000Q	Cutoff Point Deviation Curves CPD-1 & CPD-2 (p. 221)

More on next page

Connection options: A model with a QD requires a mating cordset (see page 220).

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

[†] Minimum range varies by established cutoff point (see excess gain curves, page 220 and cutoff point deviation curves, page 221).

Q60, 10-30V dc (cont'd)

Visible Red Laser

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain and Cutoff Point Deviation
	Min.: 100 - 260 mm [†] Cutoff: 200 - 1400 mm	2 m	Bipolar NPN/PNP	Q60BB6LAF1400	EGC-3 (p. 220)
		5-Pin Euro QD		Q60BB6LAF1400Q	Cutoff Point Deviation Curves CPD-5 & CPD-6 (p. 221)
	Min.: 75 - 240 mm [†] Cutoff: 200 - 2000 mm	2 m		Q60BB6LAF2000	EGC-4 (p. 220)
		5-Pin Euro QD		Q60BB6LAF2000Q	Cutoff Point Deviation Curves CPD-5 & CPD-6 (p. 221)

Connection options: A model with a QD requires a mating cordset (see page 220).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q60BB6LAF2000 W/30**).

[†] Minimum range varies by established cutoff point (see excess gain curves, page 220 and cutoff point deviation curves, page 221).

ACCESSORIES
page 220

Q60 Universal Voltage, 12-250V dc or 24-250V ac

Infrared LED Visible Red LED Visible Red Laser

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain and Cutoff Point Deviation
	Min.: 65 - 130 mm [†] Cutoff: 200 - 1000 mm	2 m	SPDT e/m Relay	Q60VR3AFV1000	EGC-1 (p. 220)
		4-Pin Micro QD	SPST e/m Relay	Q60VR3AFV1000Q1	Cutoff Point Deviation Curves CPD-3 & CPD-4 (p. 221)
	Min.: 50 - 125 mm [†] Cutoff: 200 - 2000 mm	2 m	SPDT e/m Relay	Q60VR3AF2000	EGC-2 (p. 220)
		4-Pin Micro QD	SPST e/m Relay	Q60VR3AF2000Q1	Cutoff Point Deviation Curves CPD-1 & CPD-2 (p. 221)
	Min.: 100 - 260 mm [†] Cutoff: 200 - 1400 mm	2 m	SPDT e/m Relay	Q60VR3LAF1400	EGC-3 (p. 220)
		4-Pin Micro QD	SPST e/m Relay	Q60VR3LAF1400Q1	Cutoff Point Deviation Curves CPD-5 & CPD-6 (p. 221)
	Min.: 75 - 240 mm [†] Cutoff: 200 - 2000 mm	2 m	SPDT e/m Relay	Q60VR3LAF2000	EGC-4 (p. 220)
		4-Pin Micro QD	SPST e/m Relay	Q60VR3LAF2000Q1	Cutoff Point Deviation Curves CPD-5 & CPD-6 (p. 221)

Connection options: A model with a QD requires a mating cordset (see page 220).

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

[†] Minimum range varies by established cutoff point (see excess gain curves, page 220 and cutoff point deviation curves, page 221).

Q60 Specifications

Supply Voltage and Current	Q60BB6AF and Q60BB6AFV models: 10 to 30V dc (10% max. ripple) at less than 50 mA exclusive of load Q60BB6LAF models: 10 to 30V dc (10% max. ripple) at less than 35 mA exclusive of load Q60VR3LAF and Q60VR3AFV Universal models: 12 to 250V dc or 24 to 250V ac, 50/60 Hz Input power 1.5 W max.
Supply Protection Circuitry	Protected against reverse polarity and transient voltages (Q60VR3 models' dc hookup is without regard to polarity)

More on next page

Q60 Specifications (cont'd)	
Output Configuration	Q60BB6AF, Q60BB6AFV and Q60BB6LAF models: Bipolar: one NPN (current sinking) and one PNP (current sourcing) open-collector transistor Q60VR3AF, Q60VR3LAF and Q60VR3AFV cabled models: E/M Relay (SPDT), normally closed and normally open contacts Q60VR3AFQ1, Q60VR3AFVQ1 and Q60VR3LAFQ1 (QD) models: E/M Relay (SPST), normally open contact
Output Rating	DC models: 150 mA max. each output @ 25 °C OFF-state leakage current: less than 5 µA @ 30V dc Output saturation NPN: less than 200 mV @ 10 mA; less than 1V @ 150 mA Output saturation PNP: less than 1V at 10 mA; less than 1.5V at 150 mA Universal Voltage models: Min. voltage and current: 5V dc, 10 mA Mechanical life of relay: 50,000,000 operations Electrical life of relay at full resistive load: 100,000 operations Max. switching power (resistive load): Cabled models: 1250VA, 150 W QD models: 750VA, 90W Max. switching voltage (resistive load): Cabled models: 250V ac, 125V dc QD models: 250V ac, 125V dc Max. switching current (resistive load): Cabled models: 5 A @ 250V ac, 5 A @ 30V dc derated to 200 mA @ 125V dc QD models: 3 A @ 250V ac, 3 A @ 30V dc derated to 200 mA @ 125V dc
Output Protection Circuitry	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: Protected against continuous overload or short circuit of outputs All models: Protected against false pulse on power-up
Output Response Time	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: 2 milliseconds ON/OFF Q60VR3AF, Q60VR3LAF and Q60VR3AFV Universal models: 15 milliseconds ON/OFF
Delay at Power-up	150 milliseconds (Q60BB6LAF has 1 second max.); outputs do not conduct during this time.
Repeatability	500 microseconds
Sensing Hysteresis	For Infrared models, see chart HC-2; for Visible Red models, see chart HC-1; and for Laser models, see chart HC-3, all on page 221. 2000 mm cutoff - less than 3% of set cutoff distance 1600 mm cutoff - less than 2.25% of set cutoff distance 1200 mm cutoff - less than 1.30% of set cutoff distance 800 mm cutoff - less than 0.5% of set cutoff distance 400 mm cutoff - less than 0.25% of set cutoff distance
Adjustments	2 momentary push buttons: ON-delay an OFF-delay ON Delay select: 8 milliseconds to 16 seconds LO/DO select OFF Delay select: 8 milliseconds to 16 seconds Push-button lockout for security Slotted, geared, 2-turn, cutoff range adjustment screw (mechanical stops on both ends of travel)
Indicators	Q60AF, Q60AFV and Q60LAF models: ON-Delay Green ON Steady: Run mode, ON-delay is active Green Flashing: ON-delay Selection mode is active OFF-Delay Green ON Steady: Run mode, OFF-delay is active Green Flashing: OFF-delay Selection mode is active 5-Segment Light Bar*: Indicates relative delay time during ON/OFF-delay Selection modes Output Amber ON Steady: Outputs are conducting Green ON Steady: During ON/OFF-delay Selection modes Dark Operate Green ON Steady: Dark Operate is selected Lockout Green ON Steady: Buttons are locked out Light Operate Green ON Steady: Light Operate is selected Signal Green ON Steady: Sensor is receiving signal Green Flashing: Marginal signal (1.0 to 2.25 excess gain) *Output, Dark Operate, Lockout, Light Operate and Signal indicators function as 5-Segment Light Bar during ON/OFF-delay Selection modes
Laser Characteristics	Spot Size: approximately 4 x 2 mm throughout range (collimated beam) Angle of Divergence: 5 milliradians NOTE: Contact factory for custom laser spot size.
Construction	Housing: ABS polycarbonate blend Lens: acrylic Cover: Clear ABS
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m integral cable. DC models offer a 5-pin Euro-style QD fitting. AC models offer 4-pin Micro-style QD fitting. QD cordsets are ordered separately. See page 220.
Operating Conditions	Temperature: Q60BB6LAF (DC) models: -10° to +50° C Q60VR3LAF Universal models: -10° to +45° C All others: -20° to +55° C Relative humidity: 90% at 50° C (non-condensing)

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- MINIATURE
- COMPACT
- MIDSIZE
- FULLSIZE
- Q45
- OMNI-BEAM
- Q60



Q60 Specifications (cont'd)

Certifications			
Hookup Diagrams	DC: DC08 (p. 745)	Universal Cabled: UN01 (p. 753)	Universal QD: UN08 (p. 754)

CLASS 1 LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated 7-26-01.

Pulse Power < 5.6 mW, 650 - 670 nm, 15 kHz, 4.5 uS Pulse. Complies to 21 CFR 1040.10 & EN60825-1:2001 except for deviations pursuant to laser notice No. 50, dated 7-26-01.

LASER LIGHT - DO NOT STARE INTO BEAM

CLASS 2 LASER PRODUCT

Class 1 Lasers

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

For safe laser use:

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

Class 2 Lasers

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

For safe laser use:

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

Cordsets

Euro QD			Micro QD		
See page 685			See page 698		
	Threaded 5-Pin			Threaded 4-Pin	
Length	Straight	Right-Angle	Length	Straight	Right-Angle
1.83 m	MQDC1-506	MQDC1-506RA	1.83 m	MQAC-406	MQAC-406RA
4.57 m	MQDC1-515	MQDC1-515RA	4.57 m	MQAC-415	MQAC-415RA
9.14 m	MQDC1-530	MQDC1-530RA	9.14 m	MQAC-430	MQAC-430RA

Additional cordset information available. See page 679.

Brackets

Q60		
pg. 651	pg. 651	pg. 669
SMBAMQ60IP	SMBAMQ60P	SMBQ60

Additional bracket information available. See page 620.

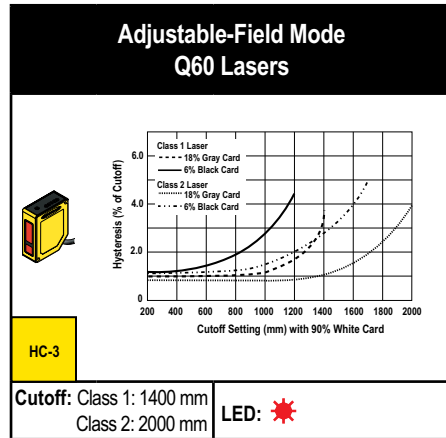
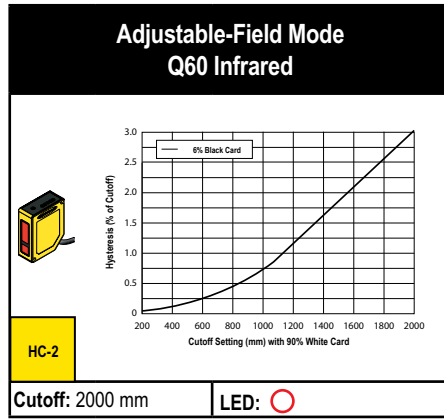
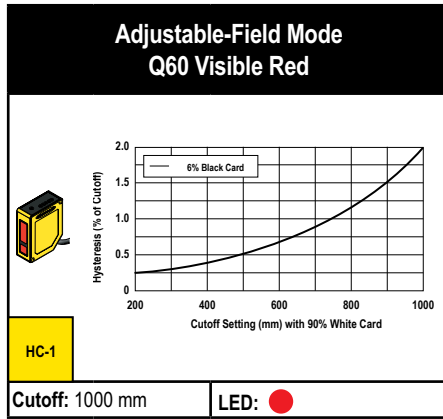
Excess Gain (Performance based on 90% reflectance white card)

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

Adjustable-Field Mode Q60 Visible Red	Adjustable-Field Mode Q60 Infrared	Adjustable-Field Mode Q60 Class 1 Laser	Adjustable-Field Mode Q60 Class 2 Laser
EGC-1	EGC-2	EGC-3	EGC-4
Cutoff: 200- 1000 mm	Cutoff: 200- 2000 mm	Cutoff: 200- 1400 mm	Cutoff: 300- 2000 mm
LED: ●	LED: ○	LED: ✶	LED: ✶

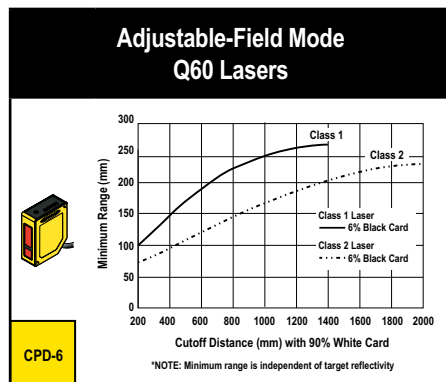
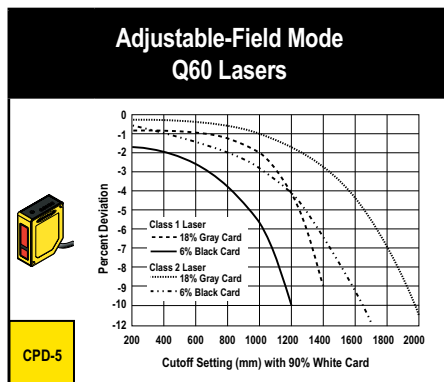
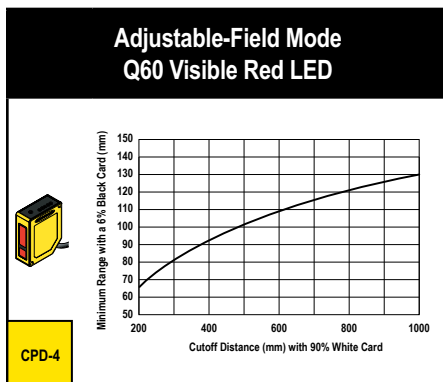
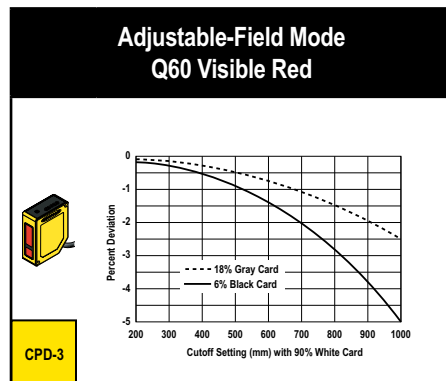
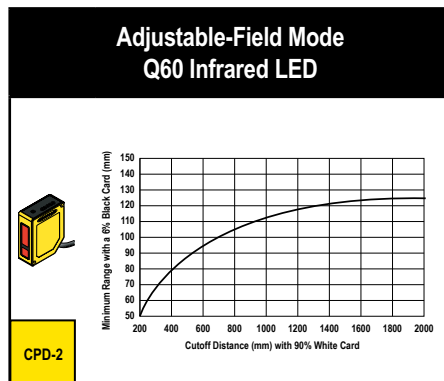
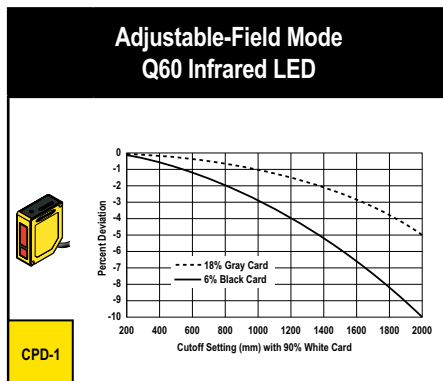
Hysteresis Curves

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



- Photoelectrics Sensors
- Fiber Optic Sensors
- Special Purpose Sensors
- Measurement & Inspection Sensors
- Vision
- Wireless
- Lighting & Indicators
- Safety Light Screens
- Safety Laser Scanners
- Fiber Optic Safety Systems
- Safety Controllers & Modules
- Safety Two-Hand Control Modules
- Safety Interlock Switches
- Emergency Stop & Stop Control

Cutoff Point Deviation Curves



See data sheet for detailed deviation information.

- MINIATURE
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- Q60

R58 Registration Mark Sensors

Provide High-Speed, Low-Contrast Sensitivity



Two Sensors Detect all Registration Marks on Hard-To-Read Surfaces.

R58 Registration Mark Sensors detect subtle registration marks in common printing and material registration applications often found in the printing, packaging and pharmaceutical industries. The excellent contrast sensitivity of the R58, coupled with its small 1.2 x 3.8 mm sensing image, makes it easy to detect critical features even on difficult-to-sense material.

- Outstanding color contrast sensitivity; detecting contrasts as low as 2% over a wide range of colors
- Excellent performance in low-contrast or high-gloss applications
- Ultra-fast 10 kHz switching frequency (10,000 actuations per second); 15 μ s repeatability
- Rugged, mechanical housing to withstand ambient electrical noise and vibration; rated IP67
- High-quality acrylic lens suitable for food processing applications
- Choice of high-performance, *Expert*[™] push-button models or easy-to-apply and cost-effective potentiometer setup models
- Fast warm-up and excellent temperature stability
- Bright, highly visible LEDs for easy configuration and monitoring during operation
- Bipolar NPN/PNP with selectable light/dark operate (LO/DO)

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Detect small color marks and differentiate low-contrast colors

Fast and reliable detection of registration marks in variety of industries



High-Speed Detection in Printing and Labeling



Splice Detection



Tube Filling

Range and application tolerant

- ▶ Tolerates a +/-3 mm shift from the 10 mm focal point
- ▶ Accommodates web flutter and similar variations in the target's location



Convenient and flexible mounting

- ▶ Includes two lens locations on each sensor
- ▶ Offers threaded lens and cap for easy exchange without tools
- ▶ Available with a vertical or horizontal light spot, depending on model
- ▶ Includes industry standard mounting holes



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