SENSORS

MINI-BEAM®
Comprehensive Family of Photoelectric Sensors

- Available models include opposed, opposed clear plastic detection, diffuse and divergent diffuse, polarized and non-polarized retroreflective, convergent, glass and plastic fiber optic.
- Compact, high-performance sensors feature 18 mm threaded lens or side mount.
- Models are available for ac or dc operation.
- Convergent and fiber optic models offer infrared or visible red, blue, white, or green LED light source; select a color based on the application.
- SME312 *Expert*™ models offer easy, push-button TEACH-mode setup.
- MIAD9 series NAMUR models are for hazardous environments with approved switching amplifiers having intrinsically safe input circuits.
- MINI-BEAM models detect clear plastic; MINI-BEAM *Expert*™ models detect clear objects.

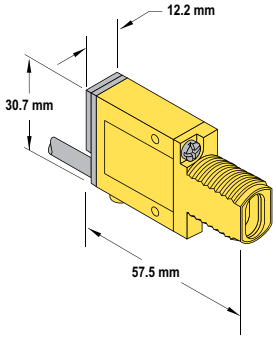
ACCESSORIES page 118
OPPOSED
CLEAR PLASTIC OPPOSED
RETRO
POLAR RETRO
CLEAR PLASTIC POLAR RETRO
DIFFUSE
DIVERGENT DIFFUSE
CONVERGENT
GLASS FIBER
PLASTIC FIBER

DC Models	page 108
AC Models	111
Expert™ Models	114
NAMUR Models	117

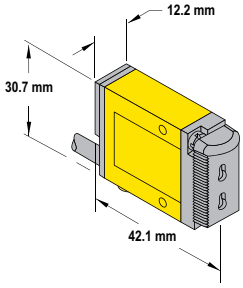
MINI-BEAM® DC Sensors

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

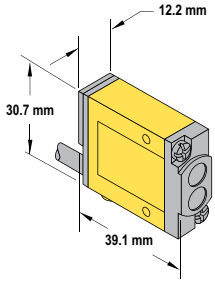
ONLINE
AUTOCAD, STEP, IGES & PDF



Glass Fiber Models
Suffix F, FV, FVG and FVB



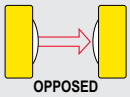
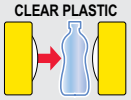
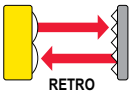
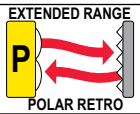
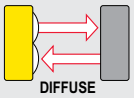
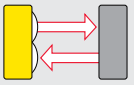
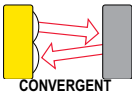
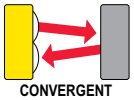
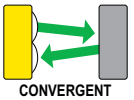
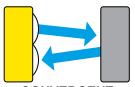
Plastic Fiber Models
Suffix FP, FPG and FPB



Diffuse Models
Suffix DBZ and W

MINI-BEAM®, 10-30V dc

Infrared LED · Visible Red LED · Visible Green LED · Visible Blue LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
 OPPOSED	3 m	2 m	Bipolar NPN/PNP	**SM31E Emitter**	EGC-1 (p. 119)	BP-1 (p. 123)
		4-Pin Euro QD		**SM31EQD Emitter**		
		2 m		**SM31R**		
		4-Pin Euro QD		**SM31RQD**		
	30 m	2 m		**SM31EL Emitter**	EGC-2 (p. 119)	BP-2 (p. 123)
		4-Pin Euro QD		**SM31ELQD Emitter**		
		2 m		**SM31RL**		
		4-Pin Euro QD		**SM31RLQD**		
CLEAR PLASTIC  OPPOSED	0.3 m	2 m		**SM31EPD Emitter**	See Note Below***	See Note Below***
		4-Pin Euro QD		**SM31EPDQD Emitter**		
		2 m		**SM31RPD**		
		4-Pin Euro QD		**SM31RPDQD**		
 RETRO	5 m†	2 m	Bipolar NPN/PNP	**SM312LV**	EGC-4 (p. 119)	BP-4 (p. 123)
		4-Pin Euro QD		**SM312LVQD**		
 POLAR RETRO	50 mm - 2 m†	2 m		**SM312LVAG**	EGC-5 (p. 119)	BP-5 (p. 123)
		4-Pin Euro QD		**SM312LVAGQD**		
EXTENDED RANGE  POLAR RETRO	10 mm - 3 m†	2 m		**SM312LP**	EGC-6 (p. 119)	BP-6 (p. 123)
		4-Pin Euro QD		**SM312LPQD**		
 DIFFUSE	380 mm	2 m	Bipolar NPN/PNP	**SM312D**	EGC-12 (p. 119)	BP-12 (p. 123)
		4-Pin Euro QD		**SM312DQD**		
	300 mm	2 m		**SM312DBZ**	EGC-13 (p. 119)	BP-13 (p. 123)
		4-Pin Euro QD		**SM312DBZQD**		
 DIVERGENT DIFFUSE	130 mm	2 m		**SM312W**	EGC-14 (p. 119)	BP-14 (p. 123)
		4-Pin Euro QD		**SM312WQD**		
 CONVERGENT	16 mm	2 m	Bipolar NPN/PNP	**SM312C**	EGC-20 (p. 120)	BP-20 (p. 124)
		4-Pin Euro QD		**SM312CQD**		
	43 mm	2 m		**SM312C2**	EGC-21 (p. 120)	BP-21 (p. 124)
		4-Pin Euro QD		**SM312C2QD**		
 CONVERGENT	16 mm	2 m		**SM312CV**	EGC-22 (p. 120)	BP-22 (p. 124)
		4-Pin Euro QD		**SM312CVQD**		
	43 mm	2 m		**SM312CV2**	EGC-23 (p. 120)	BP-23 (p. 124)
		4-Pin Euro QD		**SM312CV2QD**		
 CONVERGENT	16 mm	2 m		**SM312CVG**	EGC-24 (p. 120)	BP-24 (p. 124)
		4-Pin Euro QD		**SM312CVGQD**		
	49 mm	2 m		**SM312CV2G**	EGC-25 (p. 120)	BP-25 (p. 124)
		4-Pin Euro QD		**SM312CV2GQD**		
 CONVERGENT	16 mm	2 m		**SM312CVB**	EGC-26 (p. 120)	BP-26 (p. 124)
		4-Pin Euro QD		**SM312CVBQD**		
	49 mm	2 m		**SM312CV2B**	EGC-27 (p. 120)	BP-27 (p. 124)
		4-Pin Euro QD		**SM312CV2BQD**		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 118).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM312D W/30**).

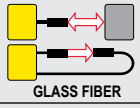
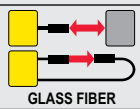
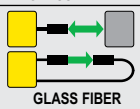
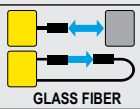
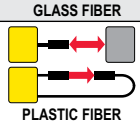
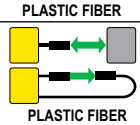
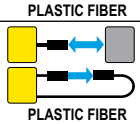
*** Actual range depends on light transmission through the plastic being sensed. Some clear plastic materials may not be detected. When in doubt, ask your Banner representative to evaluate material samples.

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

ACCESSORIES page 118

MINI-BEAM®, 10-30V dc (cont'd)

Infrared LED | Visible Red LED | Visible Green LED | Visible Blue LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	**SM312F**	EGC-35 & EGC-36 (p. 121)	BP-35 & BP-36 (p. 125)
		4-Pin Euro QD		**SM312FQD**		
 GLASS FIBER		2 m		**SM312FV**	EGC-37 & EGC-38 (p. 121)	BP-37 & BP-38 (p. 125)
		4-Pin Euro QD		**SM312FVQD**		
 GLASS FIBER		2 m		**SM312FVG**	EGC-39 (p. 121)	BP-39 (p. 125)
		4-Pin Euro QD		**SM312FVGQD**		
 GLASS FIBER		2 m		**SM312FVB**	EGC-40 (p. 121)	BP-40 (p. 125)
		4-Pin Euro QD		**SM312FVBQD**		
 PLASTIC FIBER		2 m	Bipolar NPN/PNP	**SM312FP**	EGC-50 & EGC-51 (p. 122)	BP-50 & BP-51 (p. 126)
		4-Pin Euro QD		**SM312FPQD**		
 PLASTIC FIBER		2 m		**SM312FPG**	EGC-52 (p. 122)	BP-52 (p. 126)
		4-Pin Euro QD		**SM312FPGQD**		
 PLASTIC FIBER		2 m		**SM312FPB**	EGC-53 (p. 122)	BP-53 (p. 126)
		4-Pin Euro QD		**SM312FPBQD**		

Connection options: A model with a QD requires a mating cordset (see page 118).

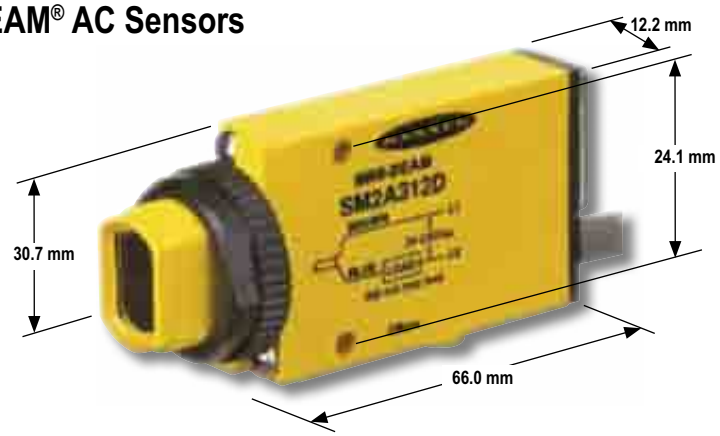
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM312F W/30**).

MINI-BEAM® DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 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; light operate (LO) or dark operate (DO) selectable.
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈ 1 mA per ° C) **OFF-state leakage current:** less than 1 µA **Output saturation voltage (PNP output):** less than 1 V @ 10 mA; less than 2 V @ 150 mA **Output saturation voltage (NPN output):** less than 200 mV @ 10mA; less than 1 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 1 millisecond or longer duration, 500 Hz max. 0.3 millisecond response modification is available. See note below†.
Delay at Power-up	100 millisecond; outputs do not conduct during this time.
Repeatability	**Opposed:** 0.14 milliseconds **Non-Polarized and Polarized Retroreflective, Diffuse, Convergent, and Glass and Plastic Fiber Optic:** 0.3 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	LIGHT/DARK OPERATE select switch and 15-turn GAIN (sensitivity) adjustment potentiometer
Indicators	Alignment Indicating Device system (AID) lights a rear-panel mounted red LED indicator whenever the sensor sees a "light" condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 4-conductor 2 m or 9 m cables, or 4-pin Euro-style quick-disconnect (**QD**) fitting are available. QD cordsets are ordered separately. See page 118.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	
Hookup Diagrams	**Emitters:** DC02 (p. 744) **Other Models:** DC04 (p. 744)

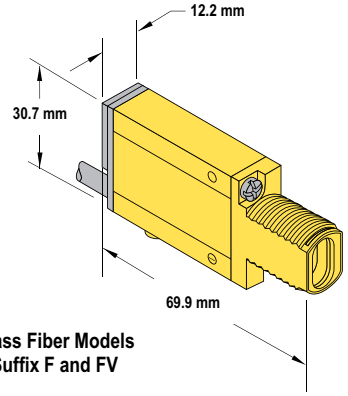
† NOTE: DC MINI-BEAMs may be ordered with 0.3 millisecond ON/OFF response by adding suffix **MHS** to the model number (example, **SM312LVMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM® AC Sensors

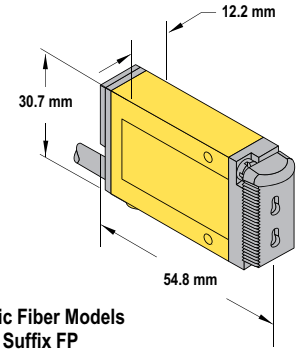


Opposed, Retroreflective,
Diffuse and Convergent Models
Suffix E, R, EPD, RPD, D, LV, LP, C and CV

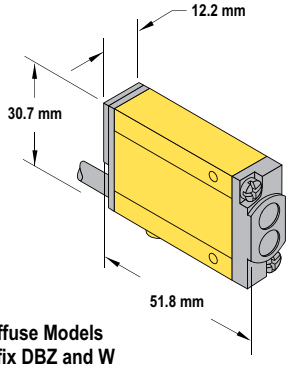
ONLINE
AUTOCAD, STEP, IGES & PDF



Glass Fiber Models
Suffix F and FV



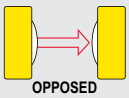
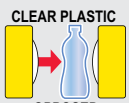
Plastic Fiber Models
Suffix FP



Diffuse Models
Suffix DBZ and W

MINI-BEAM®, 24-240V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
 OPPOSED	3 m	2 m	SPST Solid-State 2-Wire	SMA31E Emitter	EGC-1 (p. 119)	BP-1 (p. 123)
		3-Pin Micro QD		SMA31EQD Emitter		
		2 m		SM2A31R		
		3-Pin Micro QD		SM2A31RQD		
	30 m	2 m		SMA31EL Emitter	EGC-2 (p. 119)	BP-2 (p. 123)
		3-Pin Micro QD		SMA31ELQD Emitter		
		2 m		SM2A31RL		
		3-Pin Micro QD		SM2A31RLQD		
 CLEAR PLASTIC OPPOSED	0.3 m	2 m		SM2A31EPD Emitter	See Note Below***	See Note Below***
		3-Pin Micro QD		SM2A31EPQD Emitter		
		2 m		SM2A31RPD		
		3-Pin Micro QD		SM2A31RPDQD		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 118).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM2A312D W/30**).

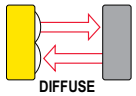
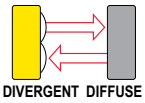
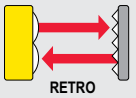
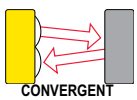
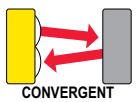
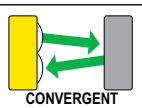
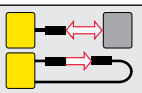
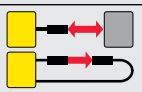
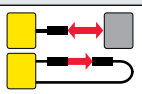
*** Actual range depends on light transmission through the plastic being sensed. Some clear plastic materials may not be detected. When in doubt, ask your Banner representative to evaluate material samples.

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
ACCESSORIES page 118
MINIATURE
COMPACT
WORLD-BEAM QS18
WORLD-BEAM Q20
MINI-BEAM
S18/M18
T18
TM18
Q25
MIDSIZE
FULLSIZE

ACCESSORIES page 118

MINI-BEAM®, 24-240V ac (cont'd)

Infrared LED | Visible Red LED | Visible Green LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
 DIFFUSE	380 mm	2 m	SPST Solid-State 2-Wire	**SM2A312D**	EGC-12 (p. 119)	BP-12 (p. 123)
		3-Pin Micro QD		**SM2A312DQD**		
	300 mm	2 m		**SM2A312DBZ**	EGC-13 (p. 119)	BP-13 (p. 123)
		3-Pin Micro QD		**SM2A312DBZQD**		
 DIVERGENT DIFFUSE	130 mm	2 m		**SM2A312W**	EGC-14 (p. 119)	BP-14 (p. 123)
		3-Pin Micro QD		**SM2A312WQD**		
 RETRO	5 m†	2 m	SPST Solid-State 2-Wire	**SM2A312LV**	EGC-4 (p. 119)	BP-4 (p. 123)
		3-Pin Micro QD		**SM2A312LVQD**		
 POLAR RETRO	50 mm - 2 m†	2 m		**SM2A312LVAG**	EGC-5 (p. 119)	BP-5 (p. 123)
		3-Pin Micro QD		**SM2A312LVAGQD**		
 EXTENDED RANGE POLAR RETRO	10 mm - 3 m†	2 m		**SM2A312LP**	EGC-6 (p. 119)	BP-6 (p. 123)
		3-Pin Micro QD		**SM2A312LPQD**		
 CONVERGENT	16 mm	2 m	SPST Solid-State 2-Wire	**SM2A312C**	EGC-20 (p. 120)	BP-20 (p. 124)
		3-Pin Micro QD		**SM2A312CQD**		
	43 mm	2 m		**SM2A312C2**	EGC-21 (p. 120)	BP-21 (p. 124)
		3-Pin Micro QD		**SM2A312C2QD**		
 CONVERGENT	16 mm	2 m		**SM2A312CV**	EGC-22 (p. 120)	BP-22 (p. 124)
		3-Pin Micro QD		**SM2A312CVQD**		
	43 mm	2 m		**SM2A312CV2**	EGC-23 (p. 120)	BP-23 (p. 124)
		3-Pin Micro QD		**SM2A312CV2QD**		
 CONVERGENT	16 mm	2 m		**SM2A312CVG**	EGC-24 (p. 120)	BP-24 (p. 124)
		3-Pin Micro QD		**SM2A312CVGQD**		
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	SPST Solid-State 2-Wire	**SM2A312F**	EGC-35 & EGC-36 (p. 121)	BP-35 & BP-36 (p. 125)
		3-Pin Micro QD		**SM2A312FQD**		
 GLASS FIBER		2 m		**SM2A312FV**	EGC-37 & EGC-38 (p. 121)	BP-37 & BP-38 (p. 125)
		3-Pin Micro QD		**SM2A312FVQD**		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	SPST Solid-State 2-Wire	**SM2A312FP**	EGC-50 & EGC-51 (p. 122)	BP-50 & BP-51 (p. 126)
		3-Pin Micro QD		**SM2A312FPQD**		

Connection options: A model with a QD requires a mating cordset (see page 118).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM2A312LP W/30**).

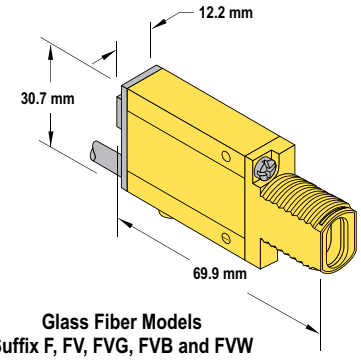
† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

MINI-BEAM® AC Specifications

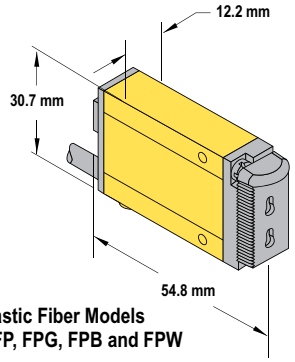
Supply Voltage and Current	24 to 240V ac (50/60 Hz), 250V ac max
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPST SCR solid-state relay (light/dark operate selectable); 2-wire hookup
Output Rating	Min. load current 5 mA max. steady-state load capability 300 mA to 50° C ambient 100 mA to 70° C ambient **Inrush capability:** 3 amps for 1 second (non repetitive); 10 amps for 1 cycle (non repetitive) **OFF-state leakage current:** less than 1.7 mA rms **ON-state voltage drop:** ≤ 5 volts at 300 mA load, ≤ 10 volts at 15 mA load
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 2 milliseconds ON and 1 millisecond OFF **Non-Polarized and Polarized Retroreflective, Convergent and Plastic Fiber Optic:** 4 milliseconds ON and OFF **Diffuse and Glass Fiber Optic:** 8 milliseconds ON and OFF OFF response time specification does not include load response of up to ½ ac cycle (8.3 milliseconds). Response time specification of load should be considered when important.
Delay at Power-up	300 milliseconds
Repeatability	**Opposed:** 0.3 milliseconds **Non-Polarized and Polarized Retroreflective, Convergent and Plastic Fiber Optic:** 1.3 milliseconds **Diffuse and Glass Fiber Optics:** 2.6 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	LIGHT/DARK OPERATE select switch and 15-turn slotted GAIN (sensitivity) adjustment potentiometer
Indicators	Red indicator LED on rear of sensor is “ON” when the load is energized
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 2-conductor 2 m or 9 m cables, or 3-pin Micro-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately. See page 118.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	1) Overload conditions can destroy ac MINI-BEAM sensors. Directly wiring sensor without load series across hot and neutral will damage sensor (except emitter models). 2) Low voltage use requires careful analysis of the load to determine if the leakage current or on-state voltage of the sensor will interfere with proper operation of the load. 3) The false-pulse protection feature may cause momentary drop-out of the load when the sensor is wired in series or parallel with mechanical switch contacts.
Certifications	CE c UL us CSA
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **All Other Cables Models:** AC01 (p. 750) **QD Emitters:** AC04 (p. 750) **All Other Cabled Models:** AC02 (p. 750)

MINI-BEAM® *Expert*™ Sensors

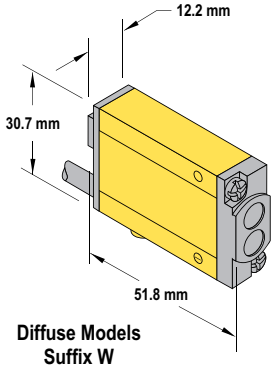
Retroreflective, Diffuse and Convergent Models
Suffix LV, LP, D, DV, CV, CV2, CVG, CVB and CVW



Glass Fiber Models
Suffix F, FV, FVG, FVB and FVW



Plastic Fiber Models
Suffix FP, FPG, FPB and FPW



Diffuse Models
Suffix W

ACCESSORIES page 118

ONLINE
AUTOCAD, STEP, IGES & PDF

MINI-BEAM® *Expert*, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
RETRO	5 m†	2 m	Bipolar NPN/PNP	**SME312LV**	EGC-7 (p. 119)	BP-7 (p. 123)
		5-Pin Euro QD		**SME312LVQD**		
P POLAR RETRO	10 mm - 3 m†	2 m		**SME312LP**	EGC-8 (p. 119)	BP-8 (p. 123)
		5-Pin Euro QD		**SME312LPQD**		
CLEAR OBJECT POLAR RETRO	1 m	2 m		**SME312LPC***	EGC-9 (p. 119)	BP-9 (p. 123)
		5-Pin Euro QD		**SME312LPCQD***		
DIFFUSE	380 mm	2 m	Bipolar NPN/PNP	**SME312D**	EGC-15 (p. 119)	BP-15 (p. 123)
		5-Pin Euro QD		**SME312DQD**		
DIFFUSE	1100 mm	2 m		**SME312DV**	EGC-17 (p. 120)	BP-17 (p. 124)
		5-Pin Euro QD		**SME312DVQD**		
DIVERGENT DIFFUSE	130 mm	2 m		**SME312W**	EGC-16 (p. 119)	BP-16 (p. 123)
		5-Pin Euro QD		**SME312WQD**		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 118).

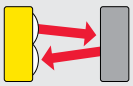
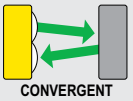
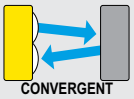
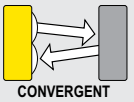
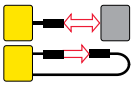
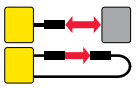
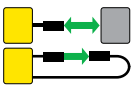
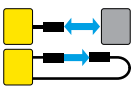
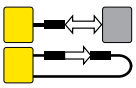
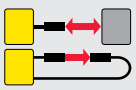
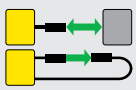
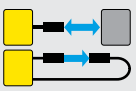
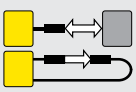
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SME312D W/30**).

* NOTE: For clear object detection, sensing range varies, according to the efficiency and reflective area of the retroreflector(s) used.
For these low-contrast applications, the model BRT-2X2 reflector is recommended and is included with each SME312LPC(QD) sensor.
- For applications with high vibration, the model BRT-51X51BM, with its micro-prism geometry, is recommended.
- For long-range applications, the BRT-77X77C reflector provides a range up to 2 m.
- SME312LPC(QD) are for use with corner cube type reflectors only; reflective tape is not recommended. See page 710 for more information.

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

MINI-BEAM® *Expert*, 10-30V dc (cont'd)

Infrared LED · Visible Red LED · Visible Green LED · Visible Blue LED · Visible White LED

Sensing Mode/LED	Range	Connection	Output	Models	Excess Gain	Beam Pattern
 CONVERGENT	16 mm	2 m	Bipolar NPN/PNP	SME312CV	EGC-28 (p. 120)	BP-28 (p. 124)
		5-Pin Euro QD		SME312CVQD		
	43 mm	2 m		SME312CV2	EGC-29 (p. 120)	BP-29 (p. 124)
		5-Pin Euro QD		SME312CV2QD		
 CONVERGENT	16 mm	2 m		SME312CVG	EGC-30 (p. 120)	BP-30 (p. 124)
		5-Pin Euro QD		SME312CVGQD		
 CONVERGENT	16 mm	2 m		SME312CVB	EGC-31 (p. 120)	BP-31 (p. 124)
		5-Pin Euro QD		SME312CVBQD		
 CONVERGENT	16 mm	2 m		SME312CVW	EGC-32 (p. 120)	BP-32 (p. 124)
		5-Pin Euro QD		SME312CVWQD		
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m		SME312F	EGC-41 & EGC-42 (p. 121)	BP-41 & BP-42 (p. 125)
		5-Pin Euro QD		SME312FQD		
 GLASS FIBER		2 m		SME312FV	EGC-43 & EGC-44 (p. 121)	BP-43 & BP-44 (p. 125)
		5-Pin Euro QD		SME312FVQD		
 GLASS FIBER		2 m		SME312FVG	EGC-45 (p. 121)	BP-45 (p. 125)
		5-Pin Euro QD		SME312FVGQD		
 GLASS FIBER		2 m		SME312FVB	EGC-46 (p. 121)	BP-46 (p. 125)
		5-Pin Euro QD		SME312FVBQD		
 GLASS FIBER		2 m		SME312FVW	EGC-47 (p. 121)	BP-47 (p. 125)
		5-Pin Euro QD		SME312FVWQD		
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	SME312FP	EGC-54 & EGC-55 (p. 122)	BP-54 & BP-55 (p. 126)
		5-Pin Euro QD		SME312FPQD		
 PLASTIC FIBER		2 m		SME312FPG	EGC-56 (p. 122)	BP-56 (p. 126)
		5-Pin Euro QD		SME312FPGQD		
 PLASTIC FIBER		2 m		SME312FPB	EGC-57 (p. 122)	BP-57 (p. 126)
		5-Pin Euro QD		SME312FPBQD		
 PLASTIC FIBER		2 m		SME312FPW	EGC-58 (p. 122)	BP-58 (p. 126)
		5-Pin Euro QD		SME312FPWQD		

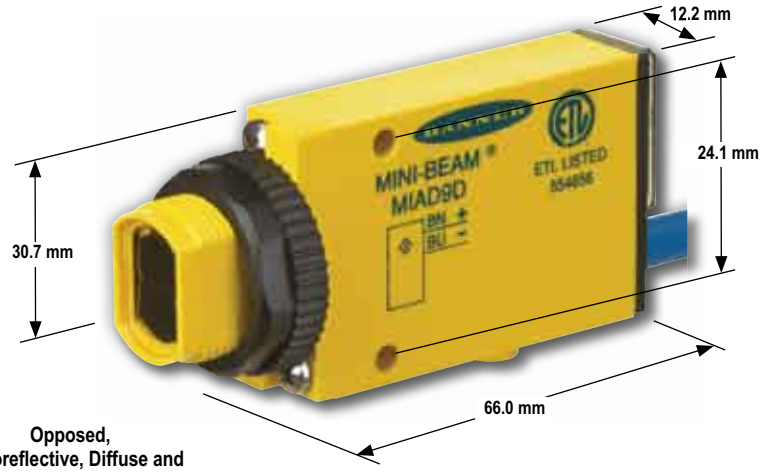
Connection options: A model with a QD requires a mating cordset (see page 118).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SME312CV W/30**).

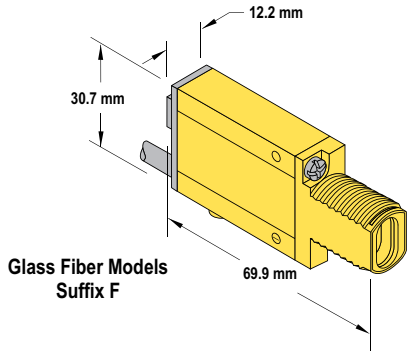
MINI-BEAM® *Expert*™ Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** One current sourcing (PNP) and one current sinking (NPN) open-collector transistor. Configuration in TEACH sequence for Light Operate (LO) or Dark Operate (DO).
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈ 1 mA per ° C) **OFF-state leakage current:** less than 5 µA @ 30V dc **Output saturation voltage (PNP output):** less than 1 V at 10 mA and less than 2 V at 150 mA **Output saturation voltage (NPN output):** less than 200 mV at 10 mA and less than 1 V at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a “light” or a “dark” signal of 500 microseconds or longer duration, 1 kHz max.
Delay at Power-up	1 second; outputs do not conduct during this time.
Repeatability	100 microseconds (all models)
Adjustments	Push-button TEACH mode sensitivity setting; remote TEACH mode input is provided (gray wire)
Indicators	**Two LEDs:** Yellow and Bicolor Green/Red **Green:** power ON **Red:** OFF when no signal is received. **Yellow (TEACH Mode):** ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition **Yellow (RUN Mode):** ON when outputs are conducting See data sheet for more detailed information.
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring seal, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 5-conductor 2 m or 9 m unterminated cable, or 5-pin Euro-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately. See page 118.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	The first condition presented during TEACH mode becomes the output ON condition.
Certifications	CE c UL us
Hookup Diagrams	DC08 (p. 745)

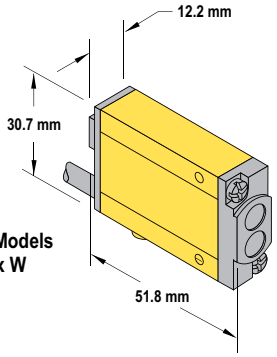
MINI-BEAM® NAMUR Sensors



Opposed, Retroreflective, Diffuse and Convergent Models
Suffix E, R, LV, D and CV



Glass Fiber Models
Suffix F



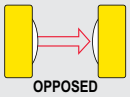
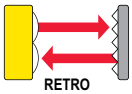
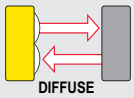
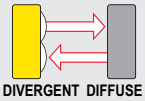
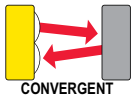
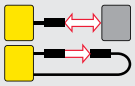
Diffuse Models
Suffix W

ONLINE
AUTOCAD, STEP, IGES & PDF

ACCESSORIES
page 118

MINI-BEAM® NAMUR Sensors, 5-15V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models	Excess Gain	Beam Pattern
 OPPOSED	6 m	2 m	—	**MI9E Emitter**	EGC-3 (p. 119)	BP-3 (p. 123)
		4-Pin Euro QD		**MI9EQ Emitter**		
		2 m	Constant Current: ≤1.2 mA dark ≥2.1 mA light	**MIAD9R**		
		4-Pin Euro QD		**MIAD9RQ**		
 RETRO	5 m†	2 m		**MIAD9LV**	EGC-10 (p. 119)	BP-10 (p. 123)
		4-Pin Euro QD		**MIAD9LVQ**		
 POLAR RETRO	50 mm - 2 m†	2 m		**MIAD9LVAG**	EGC-11 (p. 119)	BP-11 (p. 123)
		4-Pin Euro QD		**MIAD9LVAGQ**		
 DIFFUSE	380 mm	2 m		**MIAD9D**	EGC-18 (p. 120)	BP-18 (p. 124)
		4-Pin Euro QD		**MIAD9DQ**		
 DIVERGENT DIFFUSE	75 mm	2 m		**MIAD9W**	EGC-19 (p. 120)	BP-19 (p. 124)
		4-Pin Euro QD		**MIAD9WQ**		
 CONVERGENT	16 mm	2 m		**MIAD9CV**	EGC-33 (p. 121)	BP-33 (p. 125)
		4-Pin Euro QD		**MIAD9CVQ**		
	43 mm	2 m		**MIAD9CV2**	EGC-34 (p. 121)	BP-34 (p. 125)
		4-Pin Euro QD		**MIAD9CV2Q**		
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m		**MIAD9F**	EGC-48 & EGC-49 (p. 121)	BP-48 & BP-49 (p. 125)
		4-Pin Euro QD		**MIAD9FQ**		

Connection options: A model with a QD requires a mating cordset (see page 118).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **MIAD9LV 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 section for more information.

MINI-BEAM® NAMUR Specifications

Supply Voltage	5 to 15V dc (provided by the amplifier to which the sensor is connected)
Output	**Constant current output:** ≤ 1.2 mA in the "dark" condition and ≥ 2.1 mA in the "light" condition
Output Response Time	**Opposed receiver:** 2 milliseconds ON/400 microseconds OFF **All others:** 5 milliseconds ON/OFF (does not include amplifier response)
Adjustments	GAIN (sensitivity) adjustment potentiometer
Indicators	Red LED Alignment Indicator Device (AID) located on rear panel lights when the sensor sees a "light" condition; pulse rate is proportional to signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12 and 13; IEC IP67
Connections	PVC-jacketed 2-conductor 2 m or 9 m cables, or special 4-pin Euro-style quick-disconnect (QD) fitting are available; QD cordsets are ordered separately. See page 118.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Design Standards	**MIAD9 Series sensors comply with the following standards:** DIN 19 234, EN 50 014 Part 1. 1977, EN50 020 Part 7. 1977, Factory Mutual #3610 and 3611, CSA 22.2 #157-92 and 22.2 #213-M1987
Certifications	CE KEMA FM APPROVED ETL LISTED CSA®
Hookup Diagrams	SP01 (p. 756)

APPROVALS

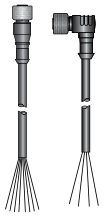
CSA:	#LR 41887	Instrinsically Safe, with Entity for Class I, Groups A-D Class I, Div. 2, Groups A-D	**FM:**	#J.I. 5Y3A4.AX	Intrinsically Safe, with Entity for Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G
KEMA:	#03ATEX1441X	II IG EEx ia IIC T6	**ETL:**	#553868	

Cordsets

Euro QD

See page 682

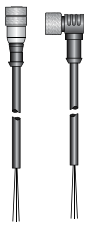
Length	Threaded 4-Pin		Threaded 5-Pin	
	Straight	Right-Angle	Straight	Right-Angle
1.83 m	MQDC-406	MQDC-406RA	MQDC1-506	MQDC1-506RA
4.57 m	MQDC-415	MQDC-415RA	MQDC1-515	MQDC1-515RA
9.14 m	MQDC-430	MQDC-430RA	MQDC1-530	MQDC1-530RA



Micro

See page 698

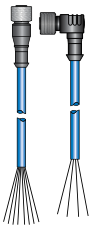
Length	Threaded 3-Pin	
	Straight	Right-Angle
1.83 m	MQDC-306	MQDC-306RA
4.57 m	MQDC-315	MQDC-315RA
9.14 m	MQDC-330	MQDC-330RA



NAMUR Euro QD

See page 683

Length	Threaded 4-Pin	
	Straight	Right-Angle
1.83 m	MQD9-406	MQD9-406RA
4.57 m	MQD9-415	MQD9-415RA



Additional cordset information available. See page 679.

Brackets

MINI-BEAM


pg. 637
SMB18A


pg. 638
SMB18FA..


pg. 638
SMB18SF


pg. 642
SMB312B


pg. 639
SMB3018SC

Additional brackets and information available. See page 620.

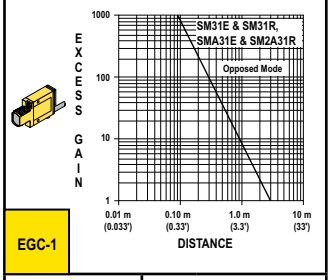
REFLECTORS PAGE 710

APERTURES PAGE 736

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

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

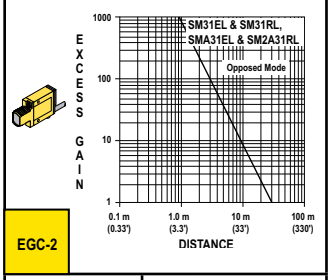
Opposed Mode MINI-BEAM®



EGC-1

Range: 3 m **LED:** ○

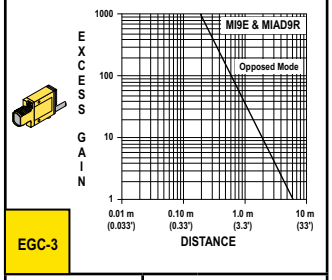
Opposed Mode MINI-BEAM®



EGC-2

Range: 30 m **LED:** ○

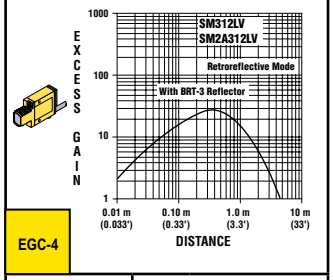
Opposed Mode MINI-BEAM® NAMUR



EGC-3

Range: 6 m **LED:** ○

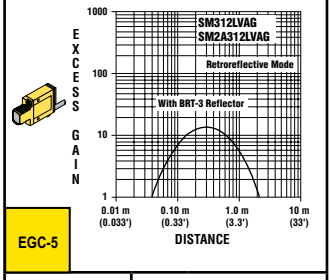
Retroreflective Mode MINI-BEAM®



EGC-4

Range: 5 m **LED:** ●

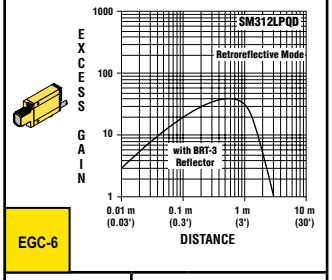
Polarized Retroreflective Mode MINI-BEAM®



EGC-5

Range: 2 m **LED:** P

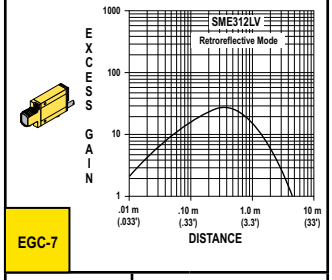
Retroreflective Mode MINI-BEAM®



EGC-6

Range: 3 m **LED:** P

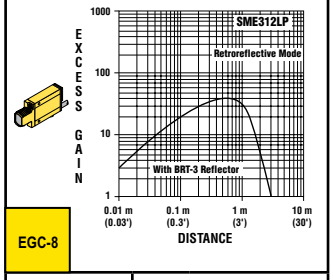
Retroreflective Mode MINI-BEAM® *Expert*™



EGC-7

Range: 5 m **LED:** ●

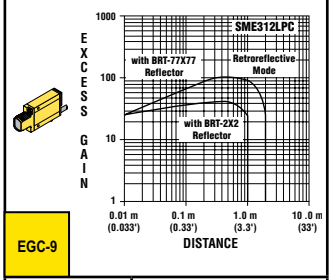
Polarized Retroreflective Mode MINI-BEAM® *Expert*™



EGC-8

Range: 3 m **LED:** P

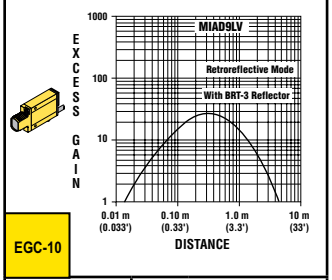
Retroreflective Mode MINI-BEAM® *Expert*™



EGC-9

Range: 1 m **LED:** ■

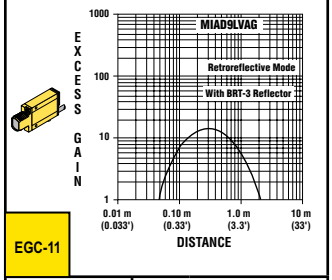
Retroreflective Mode MINI-BEAM® NAMUR



EGC-10

Range: 5 m **LED:** ●

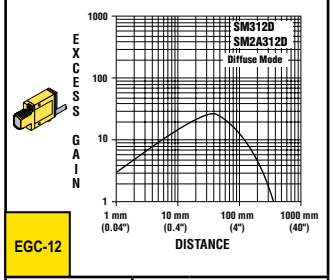
Polarized Retroreflective Mode MINI-BEAM® NAMUR



EGC-11

Range: 2 m **LED:** P

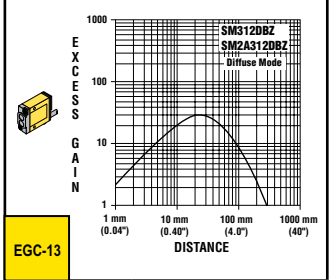
Diffuse Mode MINI-BEAM®



EGC-12

Range: 380 mm **LED:** ○

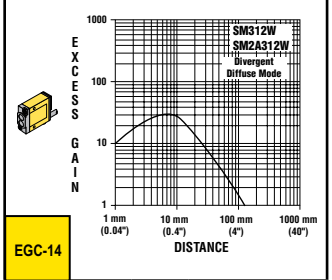
Diffuse Mode MINI-BEAM®



EGC-13

Range: 300 mm **LED:** ○

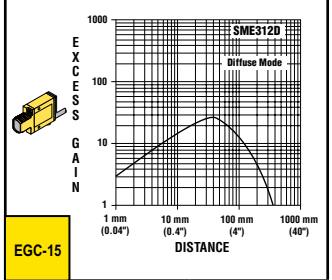
Divergent Diffuse Mode MINI-BEAM®



EGC-14

Range: 130 mm **LED:** ○

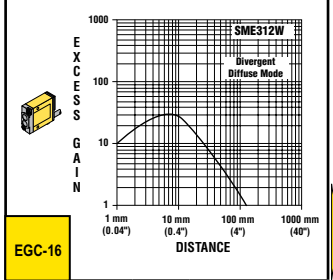
Diffuse Mode MINI-BEAM® *Expert*™



EGC-15

Range: 380 mm **LED:** ○

Divergent Diffuse Mode MINI-BEAM® *Expert*™



EGC-16

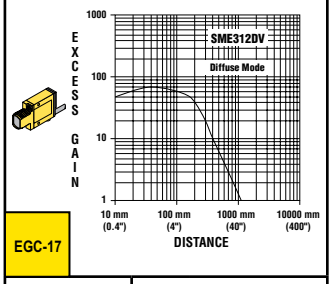
Range: 130 mm **LED:** ○

More on next page

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

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

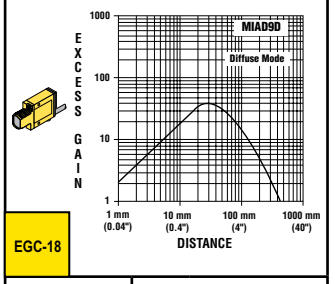
Diffuse Mode MINI-BEAM® *Expert*™



EGC-17

Range: 1100 mm **LED:** ●

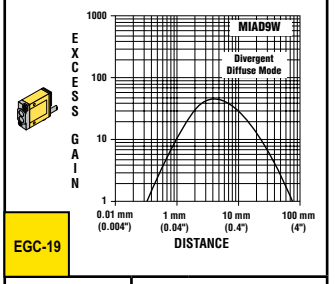
Diffuse Mode MINI-BEAM® NAMUR



EGC-18

Range: 380 mm **LED:** ○

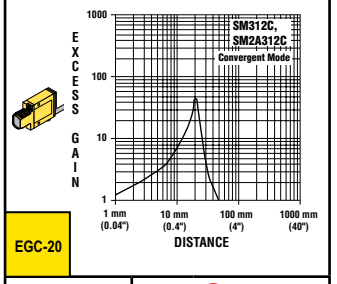
Divergent Diffuse Mode MINI-BEAM® NAMUR



EGC-19

Range: 75 mm **LED:** ○

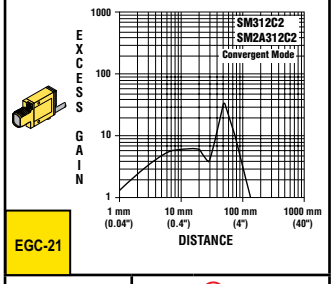
Convergent Mode MINI-BEAM®



EGC-20

Range: 16 mm **LED:** ○

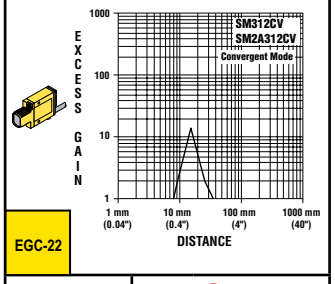
Convergent Mode MINI-BEAM®



EGC-21

Range: 43 mm **LED:** ○

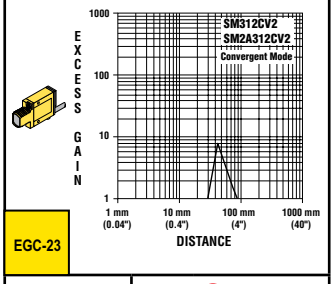
Convergent Mode MINI-BEAM®



EGC-22

Range: 16 mm **LED:** ●

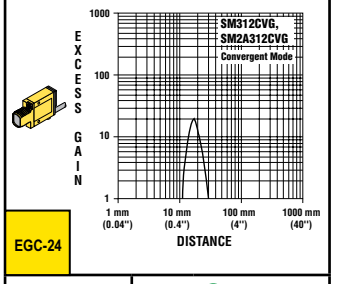
Convergent Mode MINI-BEAM®



EGC-23

Range: 43 mm **LED:** ●

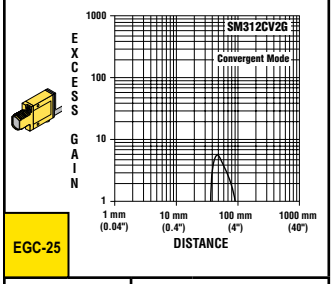
Convergent Mode MINI-BEAM®



EGC-24

Range: 16 mm **LED:** ●

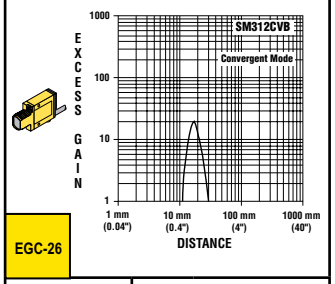
Convergent Mode MINI-BEAM®



EGC-25

Range: 49 mm **LED:** ●

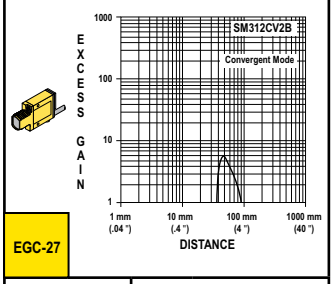
Convergent Mode MINI-BEAM®



EGC-26

Range: 16 mm **LED:** ●

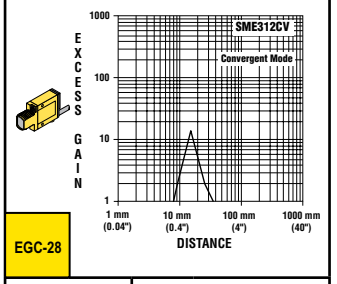
Convergent Mode MINI-BEAM®



EGC-27

Range: 49 mm **LED:** ●

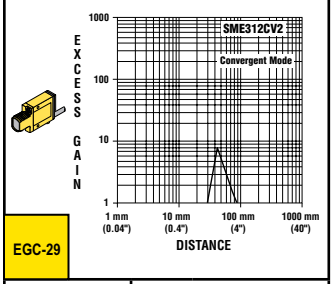
Convergent Mode MINI-BEAM® *Expert*™



EGC-28

Range: 16 mm **LED:** ●

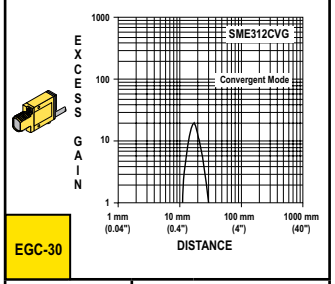
Convergent Mode MINI-BEAM® *Expert*™



EGC-29

Range: 43 mm **LED:** ●

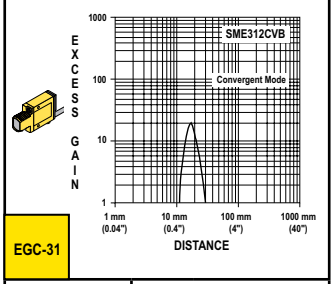
Convergent Mode MINI-BEAM® *Expert*™



EGC-30

Range: 16 mm **LED:** ●

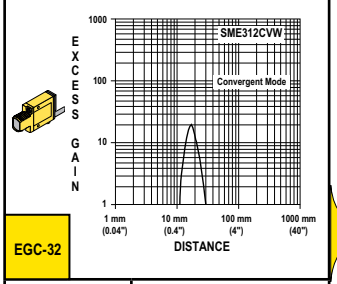
Convergent Mode MINI-BEAM® *Expert*™



EGC-31

Range: 16 mm **LED:** ●

Convergent Mode MINI-BEAM® *Expert*™



EGC-32

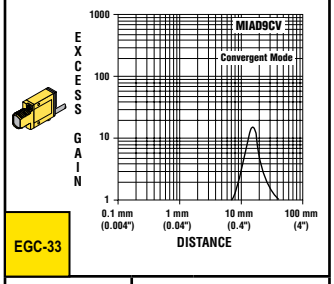
Range: 16 mm **LED:** ○

More on next page

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

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

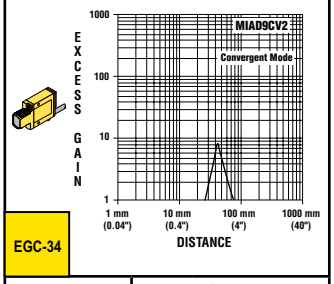
Convergent Mode MINI-BEAM® NAMUR



EGC-33

Range: 16 mm **LED:** ●

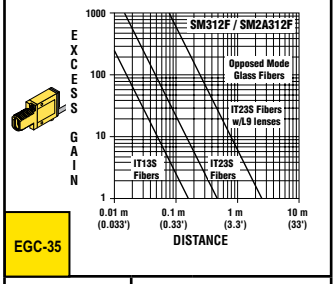
Convergent Mode MINI-BEAM® NAMUR



EGC-34

Range: 43 mm **LED:** ●

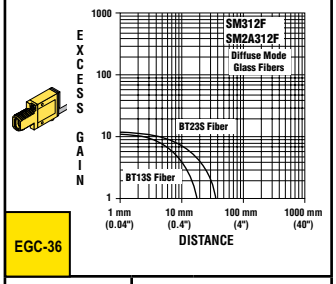
Opposed Mode—Glass Fiber MINI-BEAM®



EGC-35

Range: Varies **LED:** ○

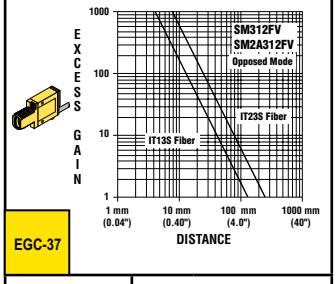
Diffuse Mode—Glass Fiber MINI-BEAM®



EGC-36

Range: Varies **LED:** ○

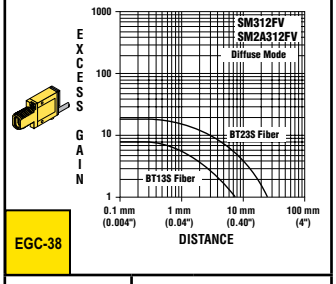
Opposed Mode—Glass Fiber MINI-BEAM®



EGC-37

Range: Varies **LED:** ●

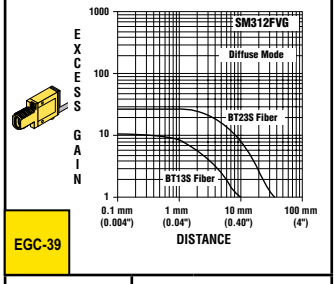
Diffuse Mode—Glass Fiber MINI-BEAM®



EGC-38

Range: Varies **LED:** ●

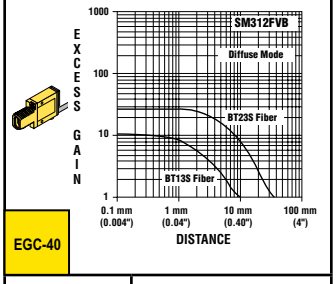
Diffuse Mode—Glass Fiber MINI-BEAM®



EGC-39

Range: Varies **LED:** ●

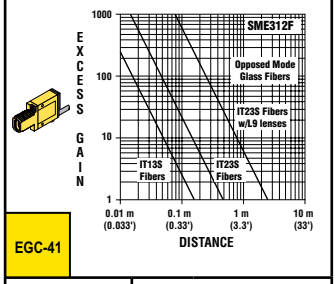
Diffuse Mode—Glass Fiber MINI-BEAM®



EGC-40

Range: Varies **LED:** ●

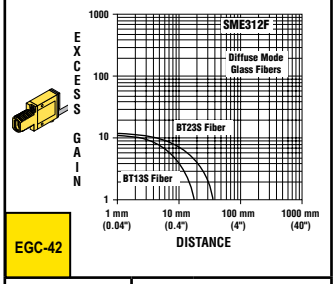
Opposed Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-41

Range: Varies **LED:** ○

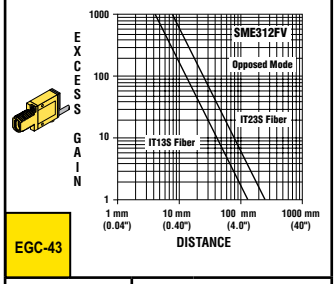
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-42

Range: Varies **LED:** ○

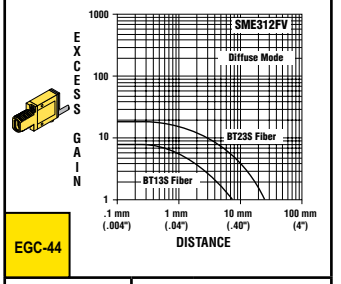
Opposed Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-43

Range: Varies **LED:** ●

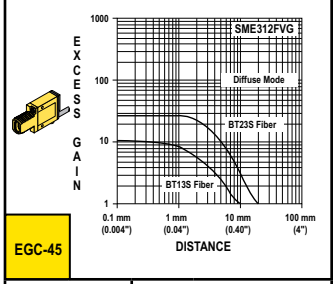
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-44

Range: Varies **LED:** ●

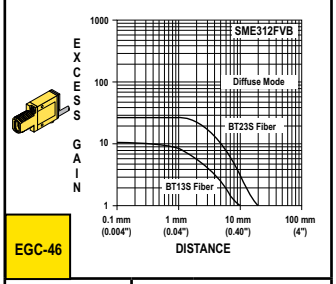
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-45

Range: Varies **LED:** ●

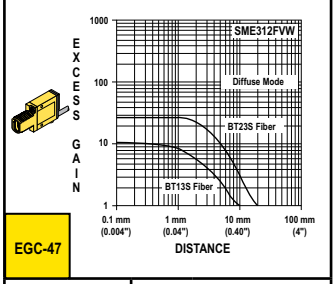
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-46

Range: Varies **LED:** ●

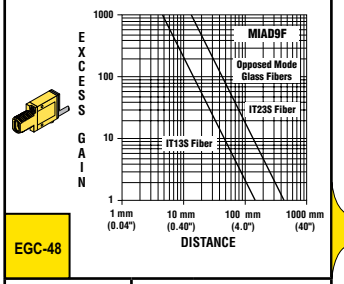
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



EGC-47

Range: Varies **LED:** ○

Opposed Mode—Glass Fiber MINI-BEAM® NAMUR



EGC-48

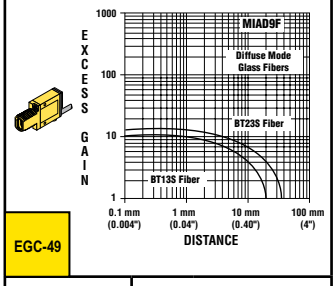
Range: Varies **LED:** ○

More on next page

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

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

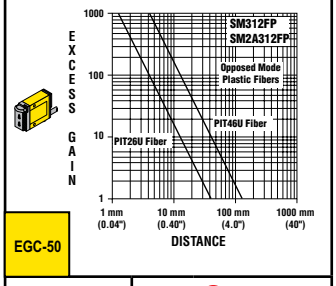
Diffuse Mode—Glass Fiber MINI-BEAM® NAMUR



EGC-49

Range: Varies **LED:** ○

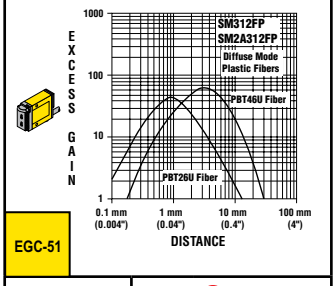
Opposed Mode—Plastic Fiber MINI-BEAM®



EGC-50

Range: Varies **LED:** ●

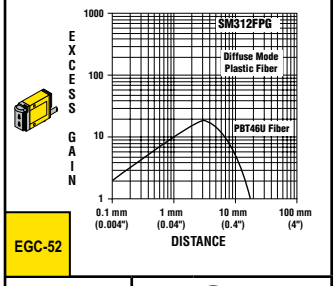
Diffuse Mode—Plastic Fiber MINI-BEAM®



EGC-51

Range: Varies **LED:** ●

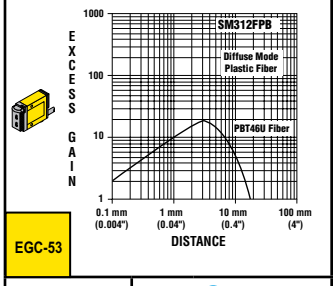
Diffuse Mode—Plastic Fiber MINI-BEAM®



EGC-52

Range: Varies **LED:** ●

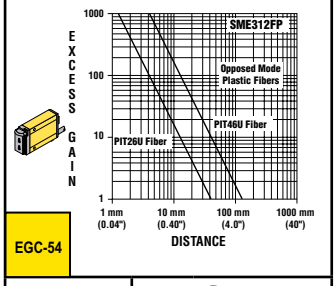
Diffuse Mode—Plastic Fiber MINI-BEAM®



EGC-53

Range: Varies **LED:** ●

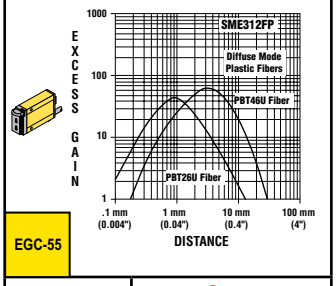
Opposed Mode—Plastic Fiber MINI-BEAM® *Expert*™



EGC-54

Range: Varies **LED:** ●

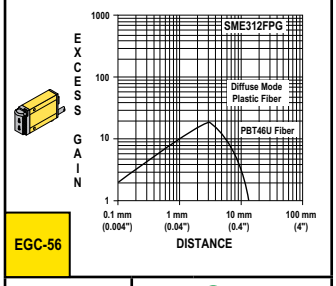
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



EGC-55

Range: Varies **LED:** ●

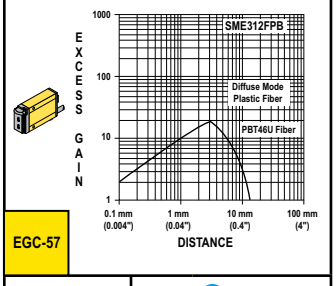
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



EGC-56

Range: Varies **LED:** ●

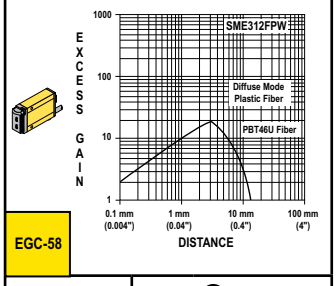
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



EGC-57

Range: Varies **LED:** ●

Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



EGC-58

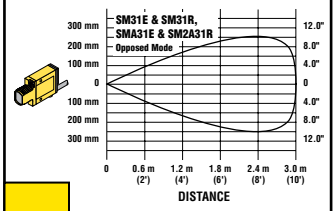
Range: Varies **LED:** ○

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

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

Opposed Mode MINI-BEAM®

Effective Beam: 3.5 mm

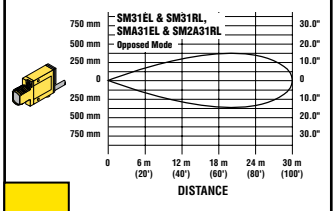


BP-1

Range: 3 m **LED:** ○

Opposed Mode MINI-BEAM®

Effective Beam: 13 mm

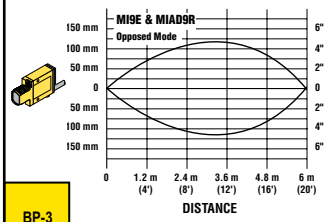


BP-2

Range: 30 m **LED:** ○

Opposed Mode MINI-BEAM® NAMUR

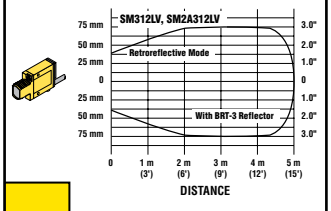
Effective Beam: 13 mm



BP-3

Range: 6 m **LED:** ○

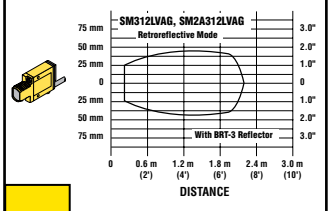
Retroreflective Mode MINI-BEAM®



BP-4

Range: 5 m **LED:** ●

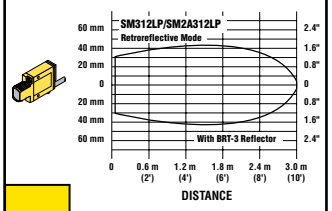
Polarized Retroreflective Mode MINI-BEAM®



BP-5

Range: 2 m **LED:** P

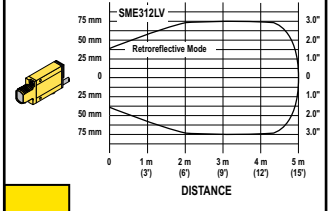
Polarized Retroreflective Mode MINI-BEAM®



BP-6

Range: 3 m **LED:** P

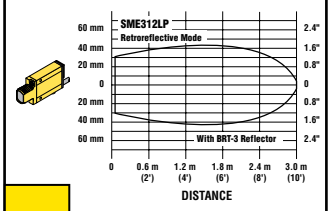
Retroreflective Mode MINI-BEAM® *Expert*™



BP-7

Range: 5 m **LED:** ●

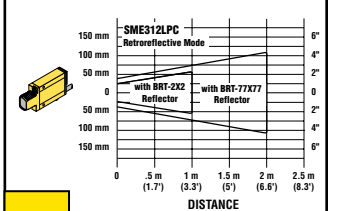
Polarized Retroreflective Mode MINI-BEAM® *Expert*™



BP-8

Range: 3 m **LED:** P

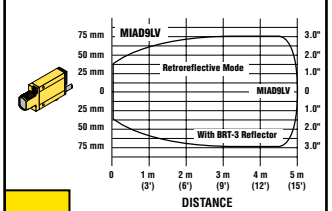
Retroreflective Mode MINI-BEAM® *Expert*™



BP-9

Range: 1 m **LED:** ■

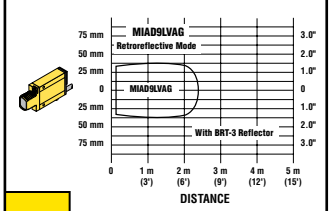
Retroreflective Mode MINI-BEAM® NAMUR



BP-10

Range: 5 m **LED:** ●

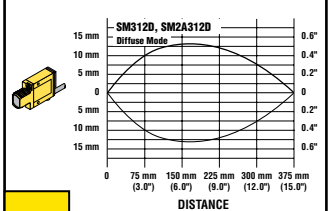
Polarized Retroreflective Mode MINI-BEAM® NAMUR



BP-11

Range: 2 m **LED:** P

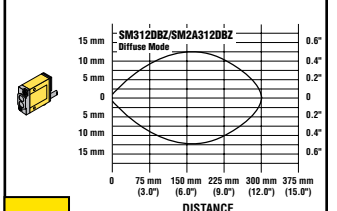
Diffuse Mode MINI-BEAM®



BP-12

Range: 380 mm **LED:** ○

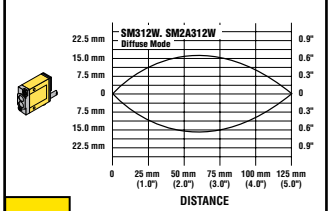
Diffuse Mode MINI-BEAM®



BP-13

Range: 300 mm **LED:** ○

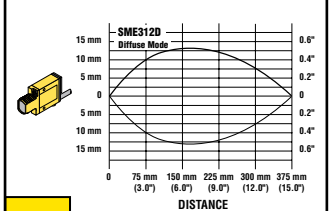
Divergent Diffuse Mode MINI-BEAM®



BP-14

Range: 130 mm **LED:** ○

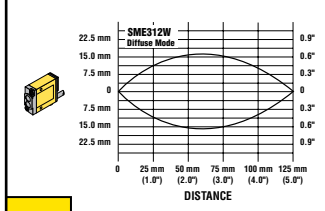
Diffuse Mode MINI-BEAM® *Expert*™



BP-15

Range: 380 mm **LED:** ○

Diffuse Mode MINI-BEAM® *Expert*™



BP-16

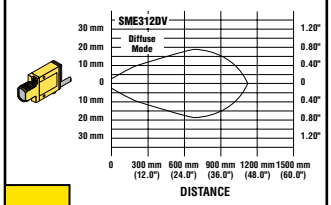
Range: 130 mm **LED:** ○

More on next page

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

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

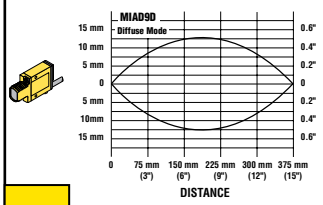
Diffuse Mode MINI-BEAM® *Expert*™



BP-17

Range: 1100 mm **LED:** ●

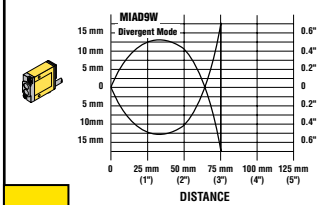
Diffuse Mode MINI-BEAM® NAMUR



BP-18

Range: 380 mm **LED:** ○

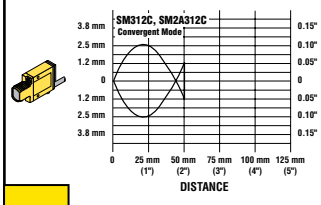
Divergent Diffuse Mode MINI-BEAM® NAMUR



BP-19

Range: 75 mm **LED:** ○

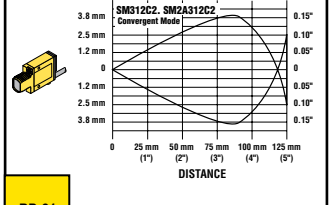
Convergent Mode MINI-BEAM®



BP-20

Range: 16 mm **LED:** ○

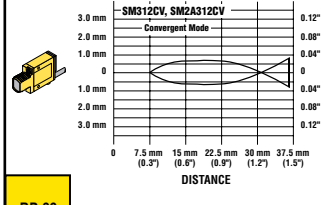
Convergent Mode MINI-BEAM®



BP-21

Range: 43 mm **LED:** ○

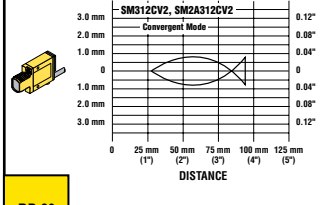
Convergent Mode MINI-BEAM®



BP-22

Range: 16 mm **LED:** ●

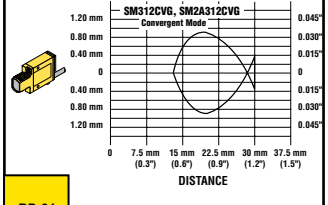
Convergent Mode MINI-BEAM®



BP-23

Range: 43 mm **LED:** ●

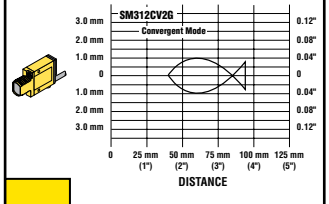
Convergent Mode MINI-BEAM®



BP-24

Range: 16 mm **LED:** ●

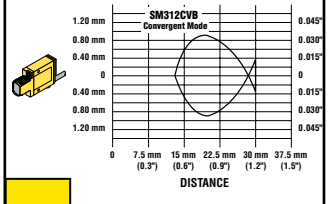
Convergent Mode MINI-BEAM®



BP-25

Range: 49 mm **LED:** ●

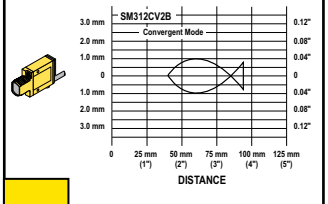
Convergent Mode MINI-BEAM®



BP-26

Range: 16 mm **LED:** ●

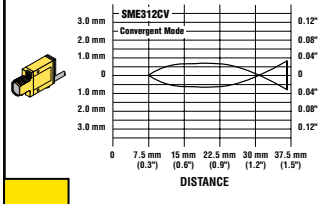
Convergent Mode MINI-BEAM®



BP-27

Range: 49 mm **LED:** ●

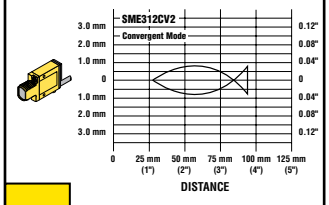
Convergent Mode MINI-BEAM® *Expert*™



BP-28

Range: 16 mm **LED:** ●

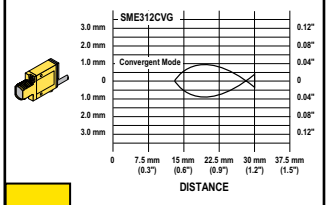
Convergent Mode MINI-BEAM® *Expert*™



BP-29

Range: 43 mm **LED:** ●

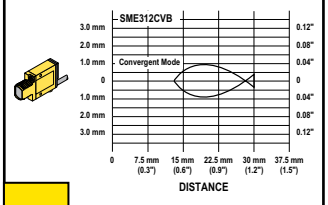
Convergent Mode MINI-BEAM® *Expert*™



BP-30

Range: 16 mm **LED:** ●

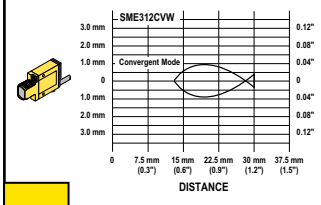
Convergent Mode MINI-BEAM® *Expert*™



BP-31

Range: 16 mm **LED:** ●

Convergent Mode MINI-BEAM® *Expert*™



BP-32

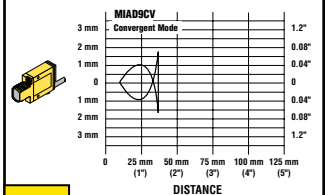
Range: 16 mm **LED:** ○

More on next page

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

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

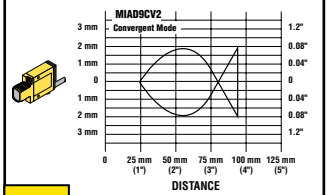
Convergent Mode MINI-BEAM® NAMUR



BP-33

Range: 16 mm **LED:** ●

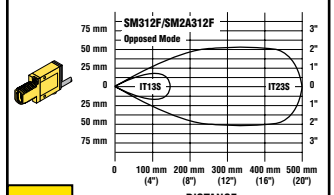
Convergent Mode MINI-BEAM® NAMUR



BP-34

Range: 43 mm **LED:** ●

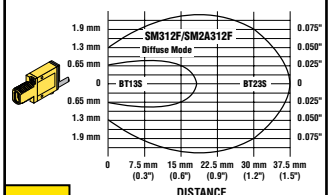
Opposed Mode—Glass Fiber MINI-BEAM®



BP-35

Fiber: Individual **LED:** ○

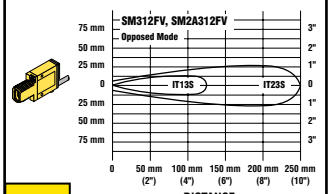
Diffuse Mode—Glass Fiber MINI-BEAM®



BP-36

Range: Varies **LED:** ○

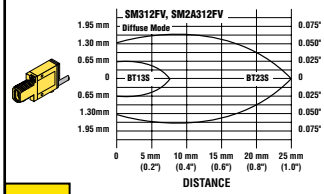
Opposed Mode—Glass Fiber MINI-BEAM®



BP-37

Range: Varies **LED:** ●

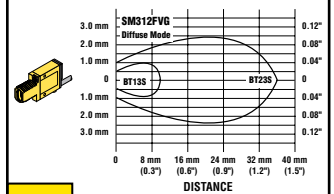
Diffuse Mode—Glass Fiber MINI-BEAM®



BP-38

Range: Varies **LED:** ●

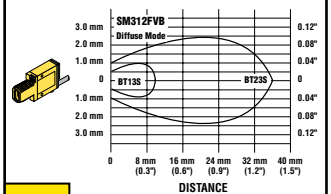
Diffuse Mode—Glass Fiber MINI-BEAM®



BP-39

Range: Varies **LED:** ●

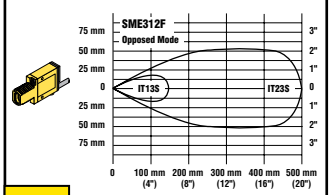
Diffuse Mode—Glass Fiber MINI-BEAM®



BP-40

Range: Varies **LED:** ●

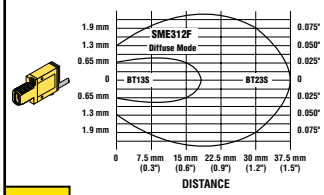
Opposed Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-41

Range: Varies **LED:** ○

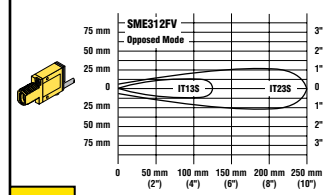
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-42

Range: Varies **LED:** ○

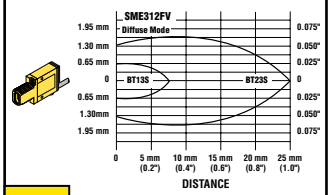
Opposed Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-43

Range: Varies **LED:** ●

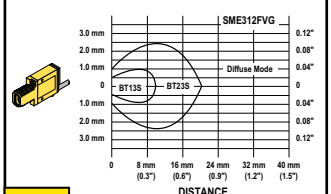
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-44

Range: Varies **LED:** ●

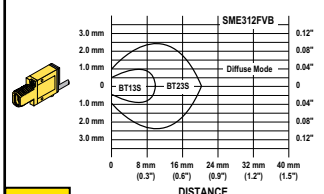
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-45

Range: Varies **LED:** ●

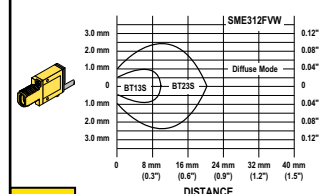
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-46

Range: Varies **LED:** ●

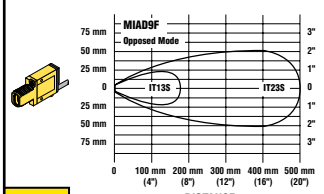
Diffuse Mode—Glass Fiber MINI-BEAM® *Expert*™



BP-47

Range: Varies **LED:** ○

Opposed Mode—Glass Fiber MINI-BEAM® NAMUR



BP-48

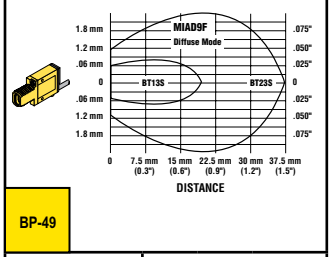
Range: Varies **LED:** ○

More on next page

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

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

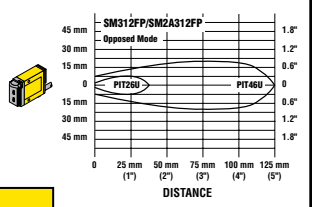
Diffuse Mode—Glass Fiber MINI-BEAM® NAMUR



BP-49

Range: Varies **LED:** ○

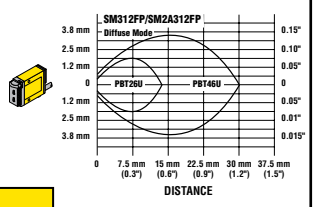
Opposed Mode—Plastic Fiber MINI-BEAM®



BP-50

Range: Varies **LED:** ●

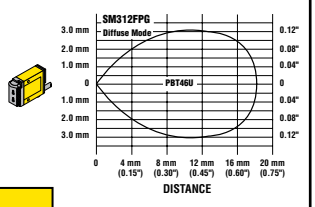
Diffuse Mode—Plastic Fiber MINI-BEAM®



BP-51

Range: Varies **LED:** ●

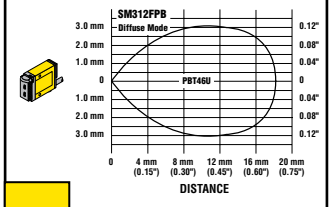
Diffuse Mode—Plastic Fiber MINI-BEAM®



BP-52

Range: Varies **LED:** ●

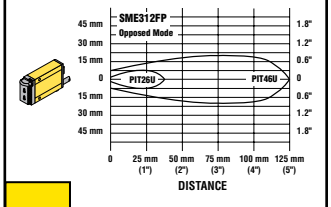
Diffuse Mode—Plastic Fiber MINI-BEAM®



BP-53

Range: Varies **LED:** ●

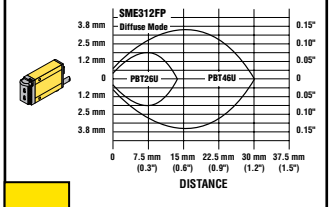
Opposed Mode—Plastic Fiber MINI-BEAM® *Expert*™



BP-54

Range: Varies **LED:** ●

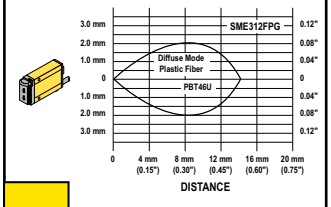
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



BP-55

Range: Varies **LED:** ●

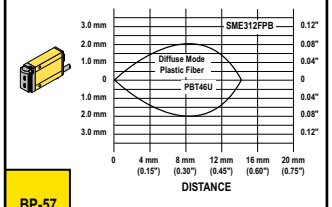
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



BP-56

Range: Varies **LED:** ●

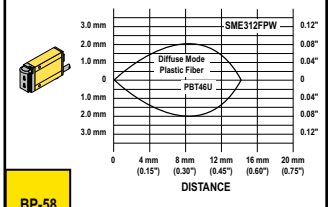
Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



BP-57

Range: Varies **LED:** ●

Diffuse Mode—Plastic Fiber MINI-BEAM® *Expert*™



BP-58

Range: Varies **LED:** ○

S18 and M18
Barrel-Mount Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in plastic threaded barrel sensor (S18) and stainless steel threaded barrel sensor (M18)
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)
- Meets rigorous IP69K standards for use in washdown applications

S18 DC Models page 127
M18 DC Models 127
S18 AC Models page 130

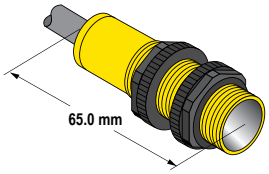
ACCESSORIES page 131

S18 and M18 DC Sensors

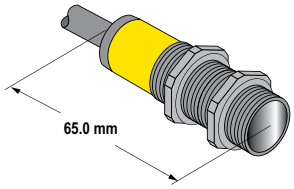
S18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L and D

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

ONLINE
AUTOCAD, STEP, IGES & PDF



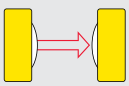
S18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF



M18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF

S18, 10-30V dc

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	S186E Emitter		EGC-1 (p. 132)	BP-1 (p. 133)
		4-pin Euro QD	S186EQ Emitter			
		2 m	S18SN6R	S18SP6R		
		4-pin Euro QD	S18SN6RQ	S18SP6RQ		

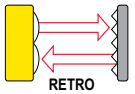
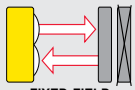
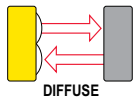
More on next page

Connection options: A model with a QD requires a mating cordset (see pages 131).

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

S18, 10-30V dc (cont'd)

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 RETRO	2 m†	2 m	**S18SN6L**	**S18SP6L**	EGC-2 (p. 132)	BP-2 (p. 133)
		4-pin Euro QD	**S18SN6LQ**	**S18SP6LQ**		
 POLAR RETRO	2 m†	2 m	**S18SN6LP**	**S18SP6LP**	EGC-3 (p. 132)	BP-3 (p.133)
		4-pin Euro QD	**S18SN6LPQ**	**S18SP6LPQ**		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	**S18SN6FF25**	**S18SP6FF25**	EGC-6 (p. 132)	—
		4-pin Euro QD	**S18SN6FF25Q**	**S18SP6FF25Q**		
	0 - 50 mm Cutoff	2 m	**S18SN6FF50**	**S18SP6FF50**	EGC-7 (p. 132)	—
		4-pin Euro QD	**S18SN6FF50Q**	**S18SP6FF50Q**		
	0 - 100 mm Cutoff	2 m	**S18SN6FF100**	**S18SP6FF100**	EGC-8 (p. 132)	—
		4-pin Euro QD	**S18SN6FF100Q**	**S18SP6FF100Q**		
 DIFFUSE	100 mm	2 m	**S18SN6D**	**S18SP6D**	EGC-4 (p. 132)	BP-4 (p. 133)
		4-pin Euro QD	**S18SN6DQ**	**S18SP6DQ**		
	300 mm	2 m	**S18SN6DL**	**S18SP6DL**	EGC-5 (p. 132)	BP-5 (p. 133)
		4-pin Euro QD	**S18SN6DLQ**	**S18SP6DLQ**		

ACCESSORIES page 131

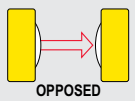
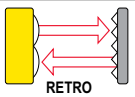
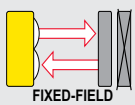
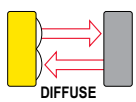
Connection options: A model with a QD requires a mating cordset (see page 131).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S18SP6D 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 section for more information.

M18, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	**M186E Emitter**		EGC-1 (p. 132)	BP-1 (p. 133)
		4-pin Euro QD	**M186EQ Emitter**			
		2 m	**M18SN6R**	**M18SP6R**		
		4-pin Euro QD	**M18SN6RQ**	**M18SP6RQ**		
 RETRO	2 m†	2 m	**M18SN6L**	**M18SP6L**	EGC-2 (p. 132)	BP-2 (p. 133)
		4-pin Euro QD	**M18SN6LQ**	**M18SP6LQ**		
 POLAR RETRO	2 m†	2 m	**M18SN6LP**	**M18SP6LP**	EGC-3 (p. 132)	BP-3 (p.133)
		4-pin Euro QD	**M18SN6LPQ**	**M18SP6LPQ**		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	**M18SN6FF25**	**M18SP6FF25**	EGC-6 (p. 132)	—
		4-pin Euro QD	**M18SN6FF25Q**	**M18SP6FF25Q**		
	0 - 50 mm Cutoff	2 m	**M18SN6FF50**	**M18SP6FF50**	EGC-7 (p. 132)	—
		4-pin Euro QD	**M18SN6FF50Q**	**M18SP6FF50Q**		
	0 - 100 mm Cutoff	2 m	**M18SN6FF100**	**M18SP6FF100**	EGC-8 (p. 132)	—
		4-pin Euro QD	**M18SN6FF100Q**	**M18SP6FF100Q**		
 DIFFUSE	100 mm	2 m	**M18SN6D**	**M18SP6D**	EGC-4 (p. 132)	BP-4 (p. 133)
		4-pin Euro QD	**M18SN6DQ**	**M18SP6DQ**		
	300 mm	2 m	**M18SN6DL**	**M18SP6DL**	EGC-5 (p. 132)	BP-5 (p. 133)
		4-pin Euro QD	**M18SN6DLQ**	**M18SP6DLQ**		

Connection options: A model with a QD requires a mating cordset (see page 131).

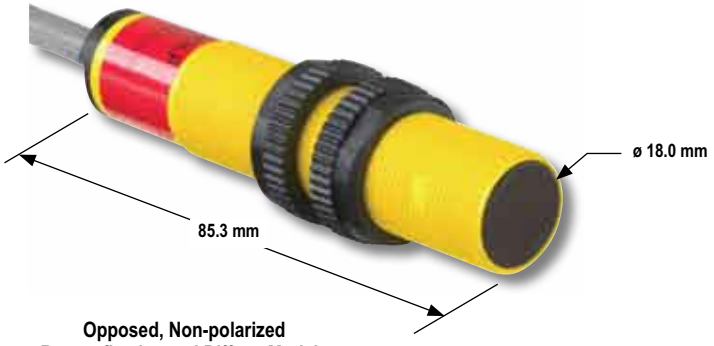
For 9 m cable, add suffix **W/30** to the 2 m model number (example, **M18SP6D W/30**).

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

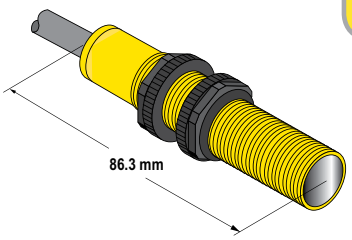
S18 and M18 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Non-polarized Retroreflective:** 25 mA **Fixed-field:** 35 mA **Diffuse:** 25 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds. Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** **Green:** Power is ON **Yellow:** Light Operate (LO) output is energized
Construction	**M18 models:** stainless steel housing **S18 models:** thermoplastic polyester housing Lenses are polycarbonate or acrylic; S18 and M18 models come with two jam nuts.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 131.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	**S18 and M18 models:** CE **S18 models:** CSA, UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 745) **PNP Models:** DC06 (p. 745)

S18 AC Sensors



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



Polarized Retroreflective and Fixed-field Models Suffix LP and FF

ONLINE
AUTOCAD, STEP, IGES & PDF

S18, 20-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
OPPOSED	20 m	2 m	S183E Emitter		EGC-1 (p. 132)	BP-1 (p. 133)
		4-pin Micro QD	S183EQ1 Emitter			
		2 m	S18AW3R	S18RW3R		
		4-pin Micro QD	S18AW3RQ1	S18RW3RQ1		
RETRO	2 m†	2 m	S18AW3L	S18RW3L	EGC-2 (p. 132)	BP-2 (p. 133)
		4-pin Micro QD	S18AW3LQ1	S18RW3LQ1		
POLAR RETRO	2 m†	2 m	S18AW3LP	S18RW3LP	EGC-3 (p. 132)	BP-3 (p.133)
		4-pin Micro QD	S18AW3LPQ1	S18RW3LPQ1		
FIXED-FIELD	0 - 25 mm Cutoff	2 m	S18AW3FF25	S18RW3FF25	EGC-6 (p. 132)	—
		4-pin Micro QD	S18AW3FF25Q1	S18RW3FF25Q1		
	0 - 50 mm Cutoff	2 m	S18AW3FF50	S18RW3FF50	EGC-7 (p. 132)	—
		4-pin Micro QD	S18AW3FF50Q1	S18RW3FF50Q1		
	0 - 100 mm Cutoff	2 m	S18AW3FF100	S18RW3FF100	EGC-8 (p. 132)	—
		4-pin Micro QD	S18AW3FF100Q1	S18RW3FF100Q1		
DIFFUSE	100 mm	2 m	S18AW3D	S18RW3D	EGC-4 (p. 132)	BP-4 (p. 133)
		4-pin Micro QD	S18AW3DQ1	S18RW3DQ1		
	300 mm	2 m	S18AW3DL	S18RW3DL	EGC-5 (p. 132)	BP-5 (p. 133)
		4-pin Micro QD	S18AW3DLQ1	S18RW3DLQ1		

ACCESSORIES page 131

Connection options: A model with a QD requires a mating cordset (see page 131).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S18AW3D W/30**).

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

S18 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA. **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model. **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac

More on next page

S18 AC Specifications (cont'd)

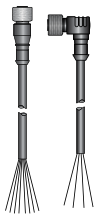
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** **Green:** Power ON **Yellow:** Light sensed
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 131.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE, CSA, UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Other Cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **Other QD Models:** AC06 (p. 751)

Cordsets

Euro QD

See page 682

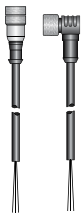
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Micro QD

See page 698

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



Additional cordset information available. See page 679.

Brackets

M18 & S18

 pg. 638	 pg. 637	 pg. 639	 pg. 647
SMB18FA..	SMB18A	SMB3018SC	SMBAMS18P

Additional brackets and information available. See page 620.

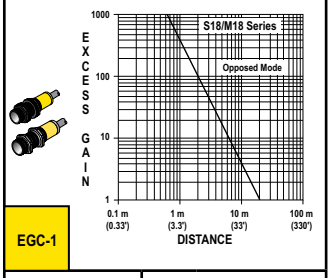
REFLECTORS PAGE 710

APERTURES PAGE 737

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

○ = Infrared LED P = Visible Red LED Polarized

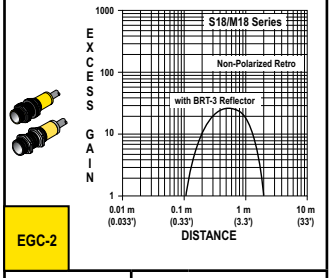
Opposed Mode S18/M18



EGC-1

Range: 20 m **LED:** ○

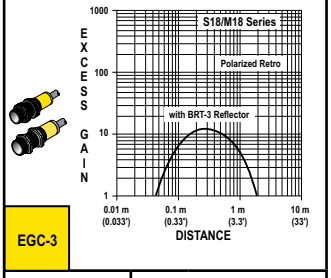
Retroreflective Mode S18/M18



EGC-2

Range: 2 m **LED:** ○

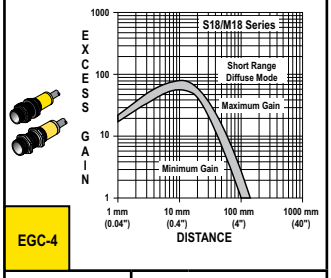
Polarized Retroreflective Mode S18/M18



EGC-3

Range: 2 m **LED:** P

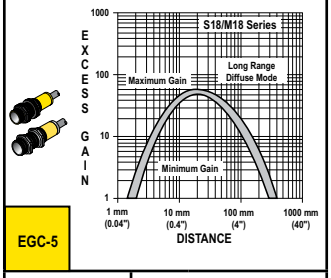
Diffuse Mode S18/M18



EGC-4

Range: 100 mm **LED:** ○

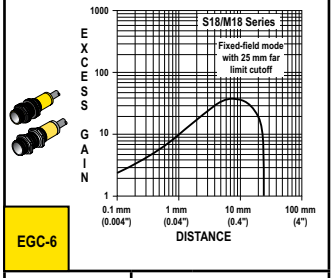
Diffuse Mode S18/M18



EGC-5

Range: 300 mm **LED:** ○

Fixed-Field Mode S18/M18



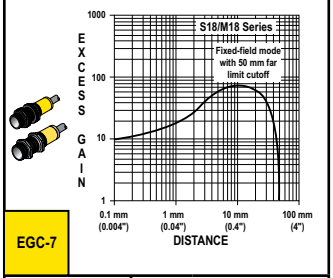
EGC-6

Cutoff: 25 mm **LED:** ○

Ø 10 mm spot size @ 8 mm focus
Ø 10 mm spot size @ 25 mm cutoff

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

Fixed-Field Mode S18/M18



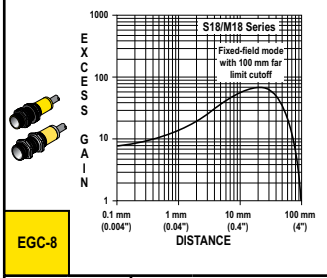
EGC-7

Cutoff: 50 mm **LED:** ○

Ø 10 mm spot size @ 10 mm focus
Ø 10 mm spot size @ 50 mm cutoff

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

Fixed-Field Mode S18/M18



EGC-8

Cutoff: 100 mm **LED:** ○

Ø 10 mm spot size @ 20 mm focus
Ø 10 mm spot size @ 100 mm cutoff

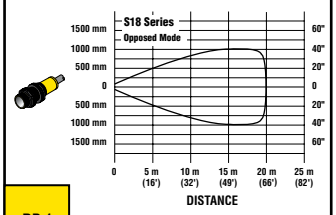
† Using 18% gray test card: Cutoff distance will be 85% of value shown.
† Using 6% black test card: Cutoff distance will be 75% of value shown.

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

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode S18/M18

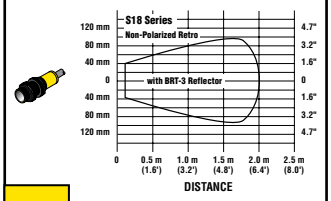
Effective Beam: 13 mm



BP-1

Range: 20 m **LED:** ○

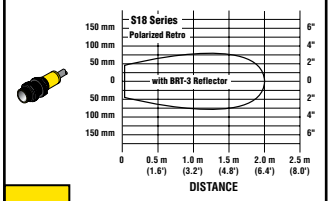
Retroreflective Mode S18/M18



BP-2

Range: 2 m **LED:** ○

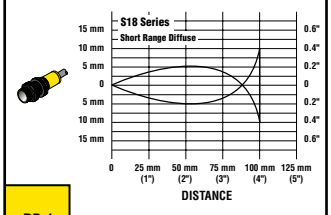
Polarized Retroreflective Mode S18/M18



BP-3

Range: 2 m **LED:** P

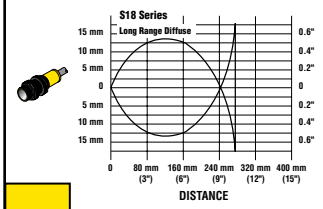
Diffuse Mode S18/M18



BP-4

Range: 100 mm **LED:** ○

Diffuse Mode S18/M18



BP-5

Range: 300 mm **LED:** ○

T18
Right-Angle Barrel-Mount Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments on most models
- T-style plastic housing with 18 mm threaded lens mount
- Available in opposed, retroreflective, diffuse and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

ACCESSORIES page 138

RETRO

POLAR RETRO

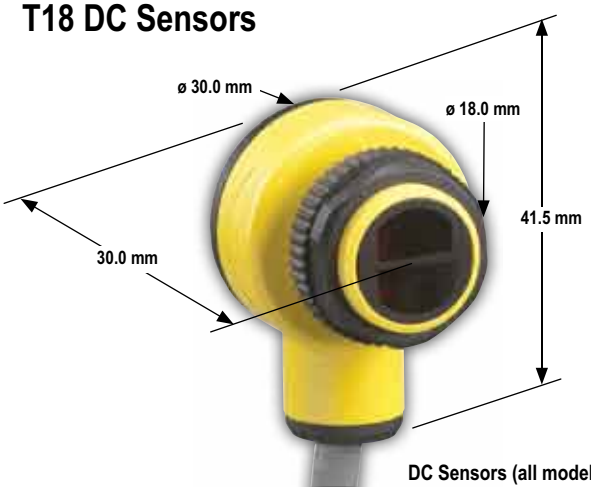
DIFFUSE

FIXED-FIELD

T18 DC Models page 134

T18 AC Models 136

T18 DC Sensors

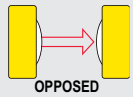
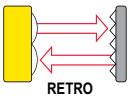


DC Sensors (all models)

ONLINE
AUTOCAD, STEP, IGES & PDF

T18, 10-30V dc

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	T186E Emitter		EGC-1 (p. 138)	BP-1 (p. 139)
		4-pin Euro QD	T186EQ Emitter			
		2 m	T18SN6R	T18SP6R		
		4-pin Euro QD	T18SN6RQ	T18SP6RQ		
 RETRO	2 m†	2 m	T18SN6L	T18SP6L	EGC-2 (p. 138)	BP-2 (p. 139)
		4-pin Euro QD	T18SN6LQ	T18SP6LQ		
 POLAR RETRO	2 m†	2 m	T18SN6LP	T18SP6LP	EGC-3 (p. 138)	BP-3 (p. 139)
		4-pin Euro QD	T18SN6LPQ	T18SP6LPQ		

More on next page

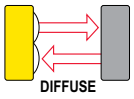
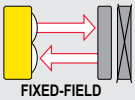
Connection options: A model with a QD requires a mating cordset (see page 138).

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

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

T18, 10-30V dc (cont'd)

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 DIFFUSE	500 mm	2 m	**T18SN6D**	**T18SP6D**	EGC-4 (p. 138)	BP-4 (p. 139)
		4-pin Euro QD	**T18SN6DQ**	**T18SP6DQ**		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	**T18SN6FF25**	**T18SP6FF25**	EGC-6 (p. 138)	—
		4-pin Euro QD	**T18SN6FF25Q**	**T18SP6FF25Q**		
	0 - 50 mm Cutoff	2 m	**T18SN6FF50**	**T18SP6FF50**	EGC-7 (p. 139)	—
		4-pin Euro QD	**T18SN6FF50Q**	**T18SP6FF50Q**		
	0 - 100 mm Cutoff	2 m	**T18SN6FF100**	**T18SP6FF100**	EGC-8 (p. 139)	—
		4-pin Euro QD	**T18SN6FF100Q**	**T18SP6FF100Q**		

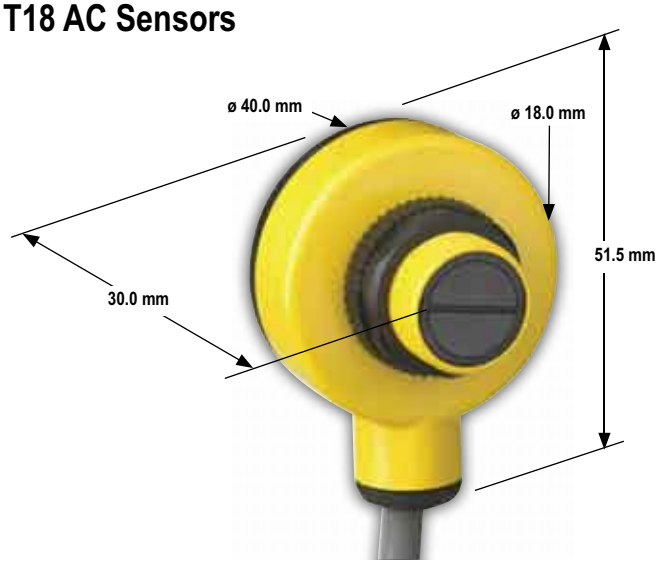
Connection options: A model with a QD requires a mating cordset (see page 138).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T18SN6D W/30**).

T18 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Non-polarized Retroreflective:** 25 mA **Diffuse:** 25 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Adjustments	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn SENSITIVITY control for adjustment of system gain
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** **Green:** Power ON **Yellow:** Light Operate (LO) output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 138.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 745) **PNP Models:** DC06 (p. 745)

T18 AC Sensors



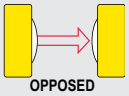
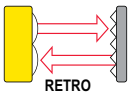
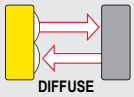
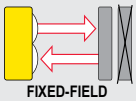
AC Sensors (all models)

ONLINE
AUTOCAD, STEP, IGES & PDF

ACCESSORIES page 138

T18, 20-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	T183E Emitter		EGC-1 (p. 138)	BP-1 (p. 139)
		4-pin Micro QD	T183EQ1 Emitter			
		2 m	T18AW3R	T18RW3R		
		4-pin Micro QD	T18AW3RQ1	T18RW3RQ1		
 RETRO	2 m†	2 m	T18AW3L	T18RW3L	EGC-2 (p. 138)	BP-2 (p. 139)
		4-pin Micro QD	T18AW3LQ1	T18RW3LQ1		
 POLAR RETRO	2 m†	2 m	T18AW3LP	T18RW3LP	EGC-3 (p. 138)	BP-3 (p. 139)
		4-pin Micro QD	T18AW3LPQ1	T18RW3LPQ1		
 DIFFUSE	300 mm	2 m	T18AW3D	T18RW3D	EGC-5 (p. 138)	BP-5 (p. 139)
		4-pin Micro QD	T18AW3DQ1	T18RW3DQ1		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	T18AW3FF25	T18RW3FF25	EGC-6 (p. 138)	—
		4-pin Micro QD	T18AW3FF25Q1	T18RW3FF25Q1		
	0 - 50 mm Cutoff	2 m	T18AW3FF50	T18RW3FF50	EGC-7 (p. 139)	—
		4-pin Micro QD	T18AW3FF50Q1	T18RW3FF50Q1		
	0 - 100 mm Cutoff	2 m	T18AW3FF100	T18RW3FF100	EGC-8 (p. 139)	—
		4-pin Micro QD	T18AW3FF100Q1	T18RW3FF100Q1		

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

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T18AW3FF25 W/30**).

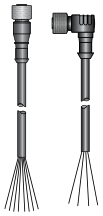
† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

T18 AC Specifications

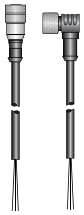
Supply Voltage and Current	20 to 250V ac (50/60 Hz) **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model. **Light Operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark Operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 4 milliseconds Repeatability and response are independent of signal strength.
Adjustments	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn SENSITIVITY control for adjustment of system gain
Indicators	**Two LEDs:** Green and Yellow **Green:** Power ON **Yellow:** Light sensed
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4 pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 138.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE, CSA®, UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Other cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **Other QD Models:** AC06 (p. 751)

Cordsets

Euro QD		
See page 682		
Length	Threaded 4-Pin	
	Straight	Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



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



Additional cordset information available. See page 679.

Brackets

T18			
 pg. 637	 pg. 637	 pg. 638	 pg. 647
SMB1815SF	SMB18A	SMB18FM	SMBAMS18P

Additional brackets and information available. See page 620.

REFLECTORS PAGE 710

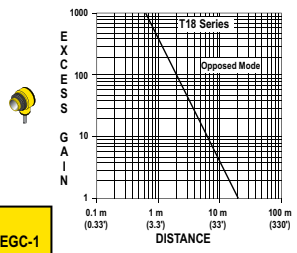
APERTURES PAGE 737

Excess Gain Curves

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

○ = Infrared LED P = Visible Red LED Polarized

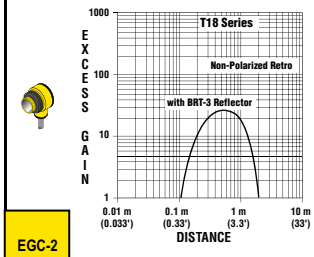
Opposed Mode T18



EGC-1

Range: 20 m **LED:** ○

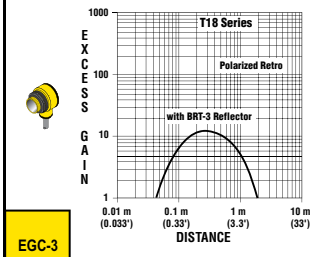
Retroreflective Mode T18



EGC-2

Range: 2 m **LED:** ○

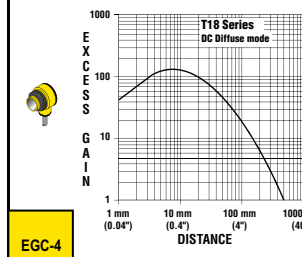
Polarized Retroreflective Mode T18



EGC-3

Range: 2 m **LED:** P

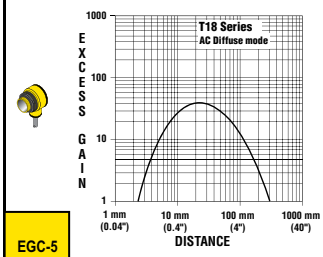
Diffuse Mode T18



EGC-4

Range: 500 mm **LED:** ○

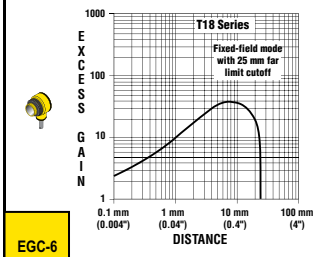
Diffuse Mode T18



EGC-5

Range: 300 mm **LED:** ○

Fixed-Field Mode T18



EGC-6

Cutoff: 25 mm **LED:** ○

Ø 10 mm spot size @ 8 mm focus
Ø 10 mm spot size @ 25 mm cutoff

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

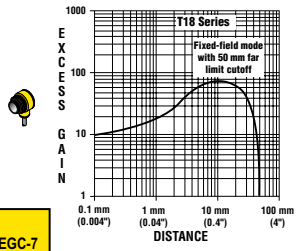
More on next page

Excess Gain Curves

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

○ = Infrared LED

Fixed-Field Mode T18



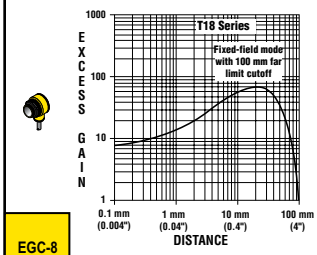
EGC-7

Ø 10 mm spot size @ 10 mm focus
Ø 10 mm spot size @ 50 mm cutoff

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

Cutoff: 50 mm | **LED:** ○

Fixed-Field Mode T18



EGC-8

Ø 10 mm spot size @ 20 mm focus
Ø 10 mm spot size @ 100 mm cutoff

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

Cutoff: 100 mm | **LED:** ○

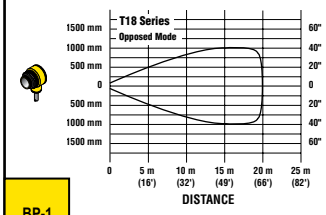
Beam Patterns

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

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode T18

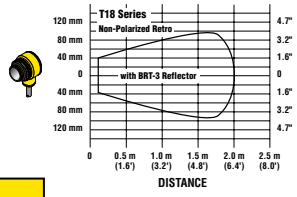
Effective Beam: 13 mm



BP-1

Range: 20 m | **LED:** ○

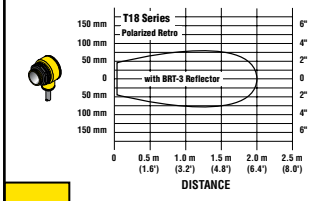
Retroreflective Mode T18



BP-2

Range: 2 m | **LED:** ○

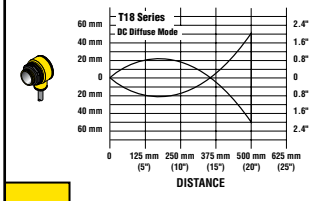
Polarized Retroreflective Mode T18



BP-3

Range: 2 m | **LED:** P

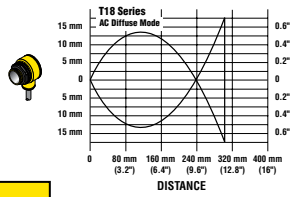
Diffuse Mode T18



BP-4

Range: 500 mm | **LED:** ○

Diffuse Mode T18

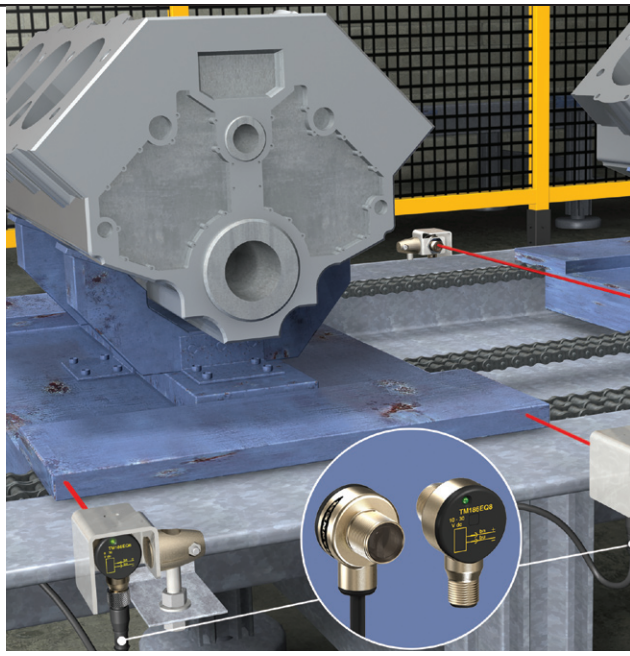


BP-5

Range: 300 mm | **LED:** ○

SENSORS

TM18
Heavy-Duty Right-Angle Barrel-Mount Sensors



- Heavy-duty, die-cast metal housing with integral metal QD prevents sensor damage during machine assembly, transport, maintenance and operation.
- Compact, right-angle T-style housing with 18 mm threaded lens mounts easily in tight places for added sensor protection.
- EZ-BEAM® technology with specially designed optics and electronics provides reliable sensing without adjustments.
- All models have a visible red sensing beam for easy sensor alignment.
- Completely epoxy-encapsulated electronics deliver superior durability, especially in harsh sensing environments.
- Sensors models with a QD are rated IP69K for resistance to intermittent high-pressure washdown.
- Fixed-field models have enhanced immunity to fluorescent lights.
- Crosstalk avoidance, on polarized and fixed-field models, allows two sensors to be used in close proximity.
- Innovative dual-indicator system takes the guesswork out of sensor performance monitoring.

ACCESSORIES page 142

OPPOSED

POLAR RETRO

FIXED-FIELD

ONLINE
AUTOCAD, STEP, IGES & PDF

TM18, 10-30V dc

Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models NPN	Models PNP	Excess Gain	Beam Pattern
OPPOSED	20 m	2 m	—	TM186E Emitter		EGC-1 (p. 142)	BP-1 (p. 143)
		4-pin Euro QD		TM186EQ8 Emitter			
		2 m	LO	TM18AN6R	TM18AP6R		
		4-pin Euro QD		TM18AN6RQ8	TM18AP6RQ8		
		2 m	DO	TM18RN6R	TM18RP6R		
		4-pin Euro QD		TM18RN6RQ8	TM18RP6RQ8		
		2 m	LO/DO	TM18VN6R	TM18VP6R		
		4-pin Euro QD		TM18VN6RQ8	TM18VP6RQ8		

More on next page

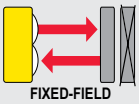
Connection options: A model with a QD requires a mating cordset (see page 142).

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

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

TM18, 10-30V dc (cont'd)

Visible Red LED

Sensing Mode/LED	Range	Connection	Output Type	Models NPN	Models PNP	Excess Gain	Beam Pattern
 POLAR RETRO	5.5 m†	2 m	LO	**TM18AN6LP**	**TM18AP6LP**	EGC-2 (p. 142)	BP-2 (p. 143)
		4-pin Euro QD		**TM18AN6LPQ8**	**TM18AP6LPQ8**		
		2 m	DO	**TM18RN6LP**	**TM18RP6LP**		
		4-pin Euro QD		**TM18RN6LPQ8**	**TM18RP6LPQ8**		
		2 m	LO/DO	**TM18VN6LP**	**TM18VP6LP**		
		4-pin Euro QD		**TM18VN6LPQ8**	**TM18VP6LPQ8**		
 FIXED-FIELD	25 mm	2 m	LO	**TM18AN6FF25**	**TM18AP6FF25**	—	—
		4-pin Euro QD		**TM18AN6FF25Q8**	**TM18AP6FF25Q8**		
		2 m	LO/DO	**TM18VN6FF25**	**TM18VP6FF25**		
		4-pin Euro QD		**TM18VN6FF25Q8**	**TM18VP6FF25Q8**		
	50 mm	2 m	LO	**TM18AN6FF50**	**TM18AP6FF50**	—	—
		4-pin Euro QD		**TM18AN6FF50Q8**	**TM18AP6FF50Q8**		
		2 m	LO/DO	**TM18VN6FF50**	**TM18VP6FF50**		
		4-pin Euro QD		**TM18VN6FF50Q8**	**TM18VP6FF50Q8**		
	100 mm	2 m	LO	**TM18AN6FF100**	**TM18AP6FF100**	—	—
		4-pin Euro QD		**TM18AN6FF100Q8**	**TM18AP6FF100Q8**		
		2 m	LO/DO	**TM18VN6FF100**	**TM18VP6FF100**		
		4-pin Euro QD		**TM18VN6FF5100Q8**	**TM18VP6FF100Q8**		

Connection options: A model with a QD requires a mating cordset (see page 142).

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

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

TM18 Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripplewithin specified limits); supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflector**: 20 mA **Fixed Field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. **Light Operate:** Output conducts when sensor sees its own (or the emitter's) modulated light. **Dark Operate:** Output conducts when sensor does not see its own (or the emitter's) modulated light
Output Rating	150 mA max. each output at 25° C, derated to 100mA at 70° C (derate about 1mA per °C) **OFF-state leakage current:** less than 1 µA @ 30V dc **ON-state saturation voltage**: less than 1V @ 10 mA dc; less than 1.5V @ 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 1.5 milliseconds ON, 0.75 milliseconds OFF **Polarized Retroreflective:** 3 milliseconds ON/OFF **Fixed-Field:** 3 milliseconds ON, 1.5 milliseconds OFF
Delay at Power-up	100 milliseconds Outputs do not conduct during this time.
Repeatability	**Opposed:** 190 microseconds **Polarized Retroreflective:** 585 microseconds **Fixed-Field:** 250 microseconds

More on next page

TM18 Specifications (cont'd)

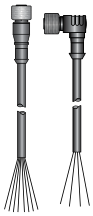
Adjustments	None
Indicators	**Two LEDs: Green:** Power ON **Yellow:** Output energized
Construction	**Housing:** Zinc die-cast with nickel plating **Lens:** PC or PMMA **Black Cover:** PBT polyester housing; polycarbonate (opposed mode) or acrylic lens
Environmental Rating	Leakproof design rated NEMA 6; IP67, IP69K QD models and cable models when PVC jacket is protected.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style integral or pigtail QD, depending on model. QD cordsets are ordered separately. See page 142.
Operating Conditions	**Temperature:** −40° to +70° C **Relative humidity:** 90% @ 50° C
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06" acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	Approvals pending
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC01 (p. 744) **PNP Models:** DC01 (p. 744) **All Others:** DC03 (p. 744)

Cordsets

Euro QD

See page 682

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



Additional cordset information available. See page 679.

Brackets

TM18

pg. 673	pg. 637	pg. 647
SMBT18Y	SMB18A	SMBAMS18P

Additional brackets and information available. See page 620.

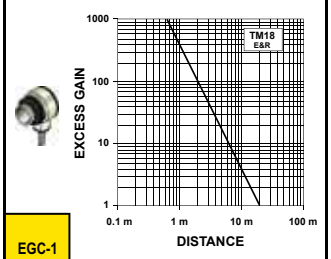
REFLECTORS

PAGE 710

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

● = Visible Red LED P = Visible Red LED Polarized

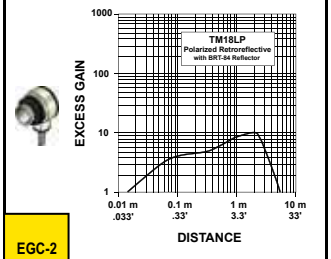
Opposed Mode TM18



EGC-1

Range: 20 m **LED:** ●

Polarized Retroreflective Mode TM18



EGC-2

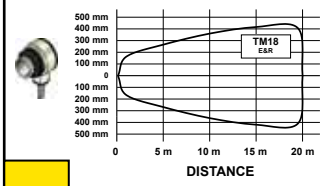
Range: 5.5 m **LED:** P

Beam Patterns

● = Visible Red LED P = Visible Red LED Polarized

Opposed Mode TM18

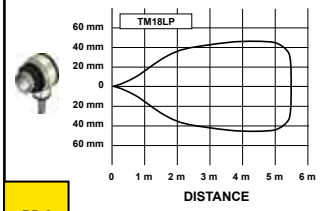
Effective Beam: 13 mm



BP-1

Range: 20 m | **LED:** ●

Polarized Retroreflective Mode TM18



BP-2

Range: 5.5 m | **LED:** P

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

MINIATURE
COMPACT
WORLD-BEAM QS18
WORLD-BEAM Q20
MINI-BEAM
S18/M18
T18
TM18
Q25
MIDSIZE
FULLSIZE

Q25
Right-Angle Base-Mount Rectangular Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in opposed, retroreflective or fixed-field modes in rectangular 25 mm plastic housing with 18 mm threaded mounting base
- Completely epoxy-encapsulated for superior durability, even in harsh sensing environments
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

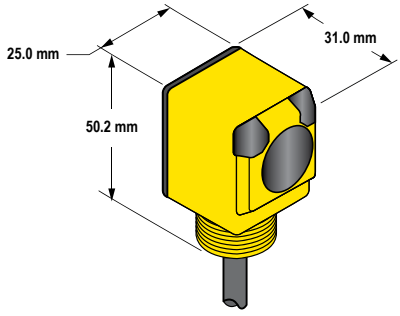
ACCESSORIES page 147

OPPOSED

POLAR RETRO

FIXED-FIELD

Opposed and Retroreflective Models
Suffix E, R and LP

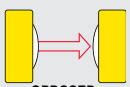


Fixed-field Models
Suffix FF

ONLINE
AUTOCAD, STEP, IGES & PDF

Q25, 10-30V dc

Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	Q256E Emitter		EGC-1 (p. 148)	BP-1 (p. 148)
		4-pin Euro QD	Q256EQ Emitter			
		2 m	Q25SN6R	Q25SP6R		
		4-pin Euro QD	Q25SN6RQ	Q25SP6RQ		

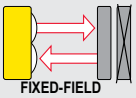
More on next page

Connection options: A model with a QD requires a mating cordset (see page 147).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q25SN6R W/30**).

Q25, 10-30V dc (cont'd)

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
	2 m†	2 m	Q25SN6LP	Q25SP6LP	EGC-2 (p. 148)	BP-2 (p. 148)
		4-pin Euro QD	Q25SN6LPQ	Q25SP6LPQ		
	0 - 25 mm Cutoff	2 m	Q25SN6FF25	Q25SP6FF25	EGC-3 (p. 148)	—
		4-pin Euro QD	Q25SN6FF25Q	Q25SP6FF25Q		
	0 - 50 mm Cutoff	2 m	Q25SN6FF50	Q25SP6FF50	EGC-4 (p. 148)	—
		4-pin Euro QD	Q25SN6FF50Q	Q25SP6FF50Q		
	0 - 100 mm Cutoff	2 m	Q25SN6FF100	Q25SP6FF100	EGC-5 (p. 148)	—
		4-pin Euro QD	Q25SN6FF100Q	Q25SP6FF100Q		

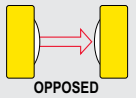
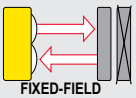
Connection options: A model with a QD requires a mating cordset (see page 147).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q25SN6LP 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 section for more information.

Q25, 20-250V ac

Infrared LED Visible Red LED

Sensing Mode/LED	Range	Connection	Models LO	Models DO	Excess Gain	Beam Pattern
	20 m	2 m	Q253E Emitter		EGC-1 (p. 148)	BP-1 (p. 148)
		4-pin Micro QD	Q253EQ1 Emitter			
		2 m	Q25AW3R	Q25RW3R		
		4-pin Micro QD	Q25AW3RQ1	Q25RW3RQ1		
	2 m†	2 m	Q25AW3LP	Q25RW3LP	EGC-2 (p. 148)	BP-2 (p. 148)
		4-pin Micro QD	Q25AW3LPQ1	Q25RW3LPQ1		
	0 - 25 mm Cutoff	2 m	Q25AW3FF25	Q25RW3FF25	EGC-3 (p. 148)	—
		4-pin Micro QD	Q25AW3FF25Q1	Q25RW3FF25Q1		
	0 - 50 mm Cutoff	2 m	Q25AW3FF50	Q25RW3FF50	EGC-4 (p. 148)	—
		4-pin Micro QD	Q25AW3FF50Q1	Q25RW3FF50Q1		
	0 - 100 mm Cutoff	2 m	Q25AW3FF100	Q25RW3FF100	EGC-5 (p. 148)	—
		4-pin Micro QD	Q25AW3FF100Q1	Q25RW3FF100Q1		

Connection options: A model with a QD requires a mating cordset (see page 147).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q25AW3LP 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 section for more information.

Q25 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.

More on next page

Q25 DC Specifications (cont'd)

Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs do not conduct during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective and Fixed-field:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** **Green:** Power ON **Yellow:** Light Operate (LO) output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 147.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 744) **NPN Models:** DC05 (p. 745) **PNP Models:** DC06 (p. 745)

Q25 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz) **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Choose Light Operate (LO) or Dark Operate (DO), depending on model. **Light Operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark Operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 mA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	**Opposed:** 2 milliseconds; **Polarized Retroreflective and Fixed-field:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green:** Power ON **Yellow:** Light sensed
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 147.

More on next page

Q25 AC Specifications (cont'd)

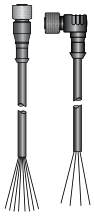
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE, CSA, UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 750) **Other Cabled Models:** AC05 (p. 751) **QD Emitters:** AC07 (p. 751) **Other QD Models:** AC06 (p. 751)

Cordsets

Euro QD

See page 682

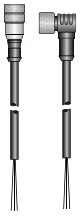
Length	Threaded 4-Pin Straight	Threaded 4-Pin Right-Angle
1.83 m	MQDC-406	MQDC-406RA
4.57 m	MQDC-415	MQDC-415RA
9.14 m	MQDC-430	MQDC-430RA



Micro QD

See page 698

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



Additional cordset information available. See page 679.

Brackets

Q25

		
pg. 637	pg. 638	pg. 638
SMB18A	SMB18FA..	SMB18SF

Additional brackets and information available. See page 620.

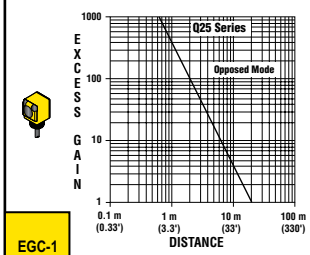
REFLECTORS
PAGE 710

Excess Gain Curves

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

○ = Infrared LED P = Visible Red LED Polarized

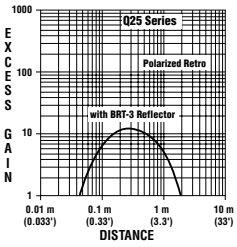
Opposed Mode Q25



EGC-1

Range: 20 m **LED:** ○

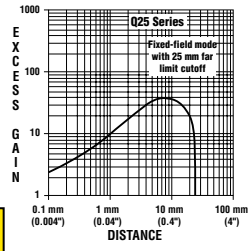
Polarized Retroreflective Mode Q25



EGC-2

Range: 2 m **LED:** P

Fixed-Field Mode Q25



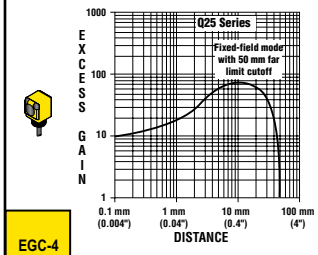
EGC-3

Cutoff: 25 mm **LED:** ○

Ø 10 mm spot size @ 8 mm focus
Ø 10 mm spot size @ 25 mm cutoff

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

Fixed-Field Mode Q25



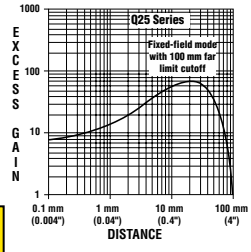
EGC-4

Cutoff: 50 mm **LED:** ○

Ø 10 mm spot size @ 10 mm focus
Ø 10 mm spot size @ 50 mm cutoff

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

Fixed-Field Mode Q25



EGC-5

Cutoff: 100 mm **LED:** ○

Ø 10 mm spot size @ 20 mm focus
Ø 10 mm spot size @ 100 mm cutoff

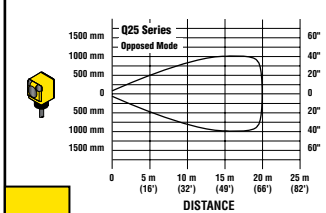
† Using 18% gray test card: Cutoff distance will be 85% of value shown.
† Using 6% black test card: Cutoff distance will be 75% of value shown.

Beam Patterns

○ = Infrared LED P = Visible Red LED Polarized

Opposed Mode Q25

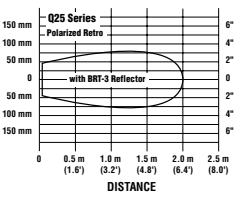
Effective Beam: 23 mm



BP-1

Range: 20 m **LED:** ○

Polarized Retroreflective Mode Q25



BP-2

Range: 2 m **LED:** P