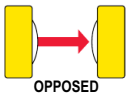
M12
Metal Barrel-Mount Sensors

The M12 is a rugged, 12 mm threaded metal sensor with fully encapsulated electronics.

- Easily replaces inductive sensors when target is too close to the sensor
- Available in NEMA 6P, IP67, IP69K and up to 1200 psi washdown depending on model
- Highly visible red sensing beam for easy alignment
- Provides single-turn sensitivity adjustment on opposed, retroreflective and diffuse models
- Cordsets and brackets see page 185

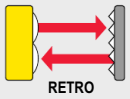
Opposed M12, 10-30 V DC

Visible Red LED

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

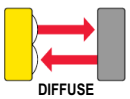
Retro & Polar Retro M12, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 RETRO	2.5 m†	2 m	M12NLV	M12PLV
		4-Pin Euro QD	M12NLVQ8	M12PLVQ8
 POLAR RETRO	1.5 m†	2 m	M12NLP	M12PLP
		4-Pin Euro QD	M12NLPQ8	M12PLPQ8

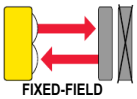
Diffuse M12, 10-30 V DC

Visible Red LED

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

Fixed-Field M12, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	25 mm Cutoff	2 m	M12NFF25	M12PFF25
		4-Pin Euro QD	M12NFF25Q8	M12PFF25Q8
	50 mm Cutoff	2 m	M12NFF50	M12PFF50
		4-Pin Euro QD	M12NFF50Q8	M12PFF50Q8
	75 mm Cutoff	2 m	M12NFF75	M12PFF75
		4-Pin Euro QD	M12NFF75Q8	M12PFF75Q8

For more specifications see page 185.

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

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

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

Cordsets

Euro QD (for ..Q8 or ..Q5 models)

See page 906

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


Additional cordset information available.
See page 902.

Brackets

M12

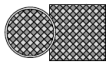
See page 864

SMBQS12PD

Additional brackets and information available.
See page 852.

Other Accessories

Reflectors	Apertures
See page 932	See page 958




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

M12 Specifications

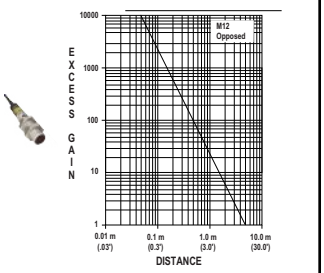
Sensing Beam	**Fixed-Field:** 680 nm visible red **All others:** 660 nm visible red
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) @ 20 mA max current (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Complementary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

Excess Gain Curves

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

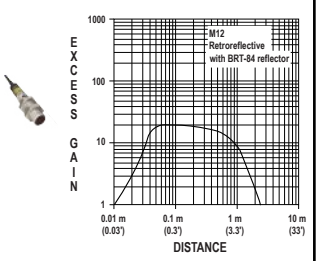
● = Visible Red LED P = Visible Red LED Polarized

Opposed Mode M12



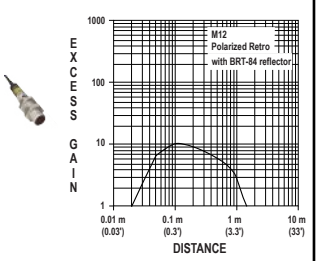
Range: 5 m | **LED:** ●

Retroreflective Mode M12



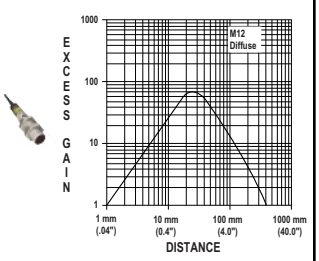
Range: 2.5 m | **LED:** ●

Polarized Retroreflective Mode M12



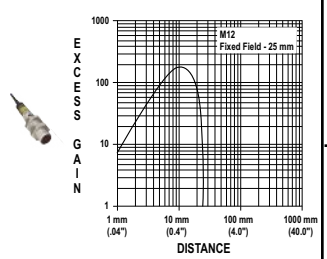
Range: 1.5 m | **LED:** P

Diffuse Mode M12



Range: 400 mm | **LED:** ●

Fixed-Field Mode M12



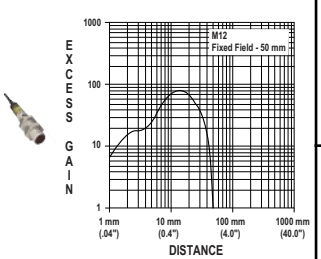
90% white test card:
Ø 2 mm spot size @ 25 mm focus
Ø 2 mm spot size @ 25 mm cutoff

Using 18% gray test card: cutoff distance will be 96% of value shown.

Using 6% black test card: cutoff distance will be 94% of value shown.

Cutoff: 25 mm | **LED:** ●

Fixed-Field Mode M12



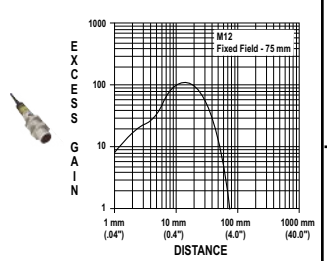
90% white test card:
Ø 2 mm spot size @ 25 mm focus
Ø 7 mm spot size @ 50 mm cutoff

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 M12



90% white test card:
Ø 2 mm spot size @ 25 mm focus
Ø 13 mm spot size @ 75 mm cutoff

Using 18% gray test card: cutoff distance will be 80% of value shown.

Using 6% black test card: cutoff distance will be 70% of value shown.

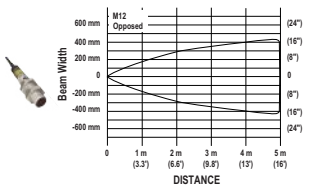
Cutoff: 75 mm | **LED:** ●

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

● = Visible Red LED P = Visible Red LED Polarized

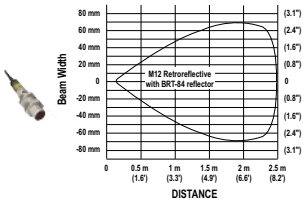
Opposed Mode M12

Effective Beam: 10 mm



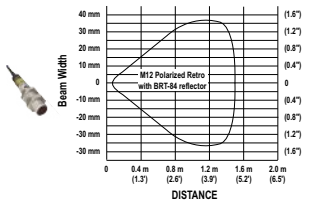
Range: 5 m | **LED:** ●

Retroreflective Mode M12



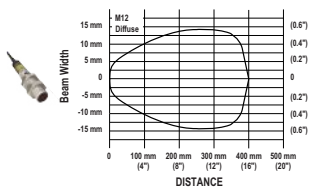
Range: 2.5 m | **LED:** ●

Retroreflective Mode M12



Range: 1.5 m | **LED:** P

Diffuse Mode M12



Range: 400 mm | **LED:** ●