WORLD-BEAM® Q12 Series Sensors

Miniature self-contained photoelectric sensors in universal housing

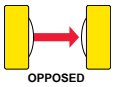
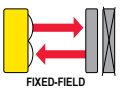


Standard Model **Chemical-Resistant Model**

- Bright, visible red (640 nm) light source
- Standard models available with 4-wire 2 m (6.5 ft) or 9 m (30 ft) cable or 3 or 4-wire 150 mm (6 in) pigtail with Pico-style M8 threaded connector
- Solid-state, bipolar outputs: one current sourcing (PNP) and one current sinking (NPN) standard on 4-wire models
- Single output solid-state PNP or NPN standard on Q3 models
- Light Operate (L.O.) or Dark Operate (D.O.), depending on model
- Models available with PFA chemical-resistant jacket (1200 psi washdown rated) for use in harsh environments (see *Chemical-Resistant Models* on page 1).
- Compact 8 mm (0.31 in) housing mounts almost anywhere
- Crosstalk avoidance circuitry for applications with multiple sensors
- LED status indicators for Power ON, Output Overload, Signal Received, and Marginal Signal
- Models with black housing are available

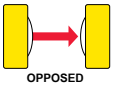
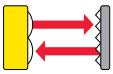
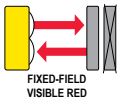
WARNING: Not To Be Used for Personnel Protection
Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Chemical-Resistant Models

Sensing Mode		Model[1] [2]	Range	Output
Opposed	640 nm Visible Red	Q126ECR	1.5 m (4.9 ft)	N/A
	Effective Beam: 5.7 mm (0.22 in) 	Q12AB6RCR		Bipolar LO
		Q12RB6RCR		Bipolar DO
Fixed-Field	Performance based on use of 90% reflectance white test card.			
	640 nm Visible Red 	Q12AB6FF15CR	13 mm (0.5 in) cutoff; 8 mm (0.3 in) focus	Bipolar LO
		Q12RB6FF15CR		Bipolar DO
		Q12AB6FF30CR	28 mm (1.1 in) cutoff; 14 mm (0.6 in) focus	Bipolar LO
		Q12RB6FF30CR		Bipolar DO
		Q12AB6FF50CR	48 mm (1.9 in) cutoff; 14 mm (0.6 in) focus	Bipolar LO
		Q12RB6FF50CR		Bipolar DO

1 Only standard 2 m (6.5 ft) cables are available for chemical-resistant models.
2 For black housing, add prefix **D** to the model number, for example, **DQ12AB6FF15CR**.

Standard Models

Sensing Mode		Model[3] [4]	Range	Output
640 nm Visible Red		**Q126E (emitter)**	2 m (6.5 ft)	N/A
Opposed	Effective Beam: 5.7 mm (0.22 in) 	**Q12AB6R**		Bipolar LO
		Q12RB6R		Bipolar DO
		Q12AP6RQ3		1 PNP LO
		Q12RP6RQ3		1 PNP DO
		Q12AN6RQ3		1 NPN LO
		Q12RN6RQ3		1 NPN DO
Polarized Retro[5]	640 nm Visible Red 	**Q12AB6LP**	1 m (40 in)	Bipolar LO
		Q12RB6LP		Bipolar DO
		Q12AP6LPQ3		1 PNP LO
		Q12RP6LPQ3		1 PNP DO
		Q12AN6LPQ3		1 NPN LO
		Q12RN6LPQ3		1 NPN DO
Retro [5]	640 nm Visible Red 	**Q12AB6LV**	1.5 m (59 in)	Bipolar LO
		Q12RB6LV		Bipolar DO
		Q12AP6LVQ3		1 PNP LO
		Q12RP6LVQ3		1 PNP DO
		Q12AN6LVQ3		1 NPN LO
		Q12RN6LVQ3		1 NPN DO
Performance based on use of 90% reflectance white test card.				
Fixed-Field	640 nm Visible Red 	**Q12AB6FF15**	15 mm (0.6 in) cutoff; 10 mm (0.4 in) focus	Bipolar LO
		Q12RB6FF15		Bipolar DO
		Q12AP6FF15Q3		1 PNP LO
		Q12RP6FF15Q3		1 PNP DO
		Q12AN6FF15Q3		1 NPN LO
		Q12RN6FF15Q3		1 NPN DO
		Q12AB6FF30	30 mm (1.2 in) cutoff; 16 mm (0.63 in) focus	Bipolar LO
		Q12RB6FF30		Bipolar DO
		Q12AP6FF30Q3		1 PNP LO
		Q12RP6FF30Q3		1 PNP DO
		Q12AN6FF30Q3		1 NPN LO
		Q12RN6FF30Q3		1 NPN DO
		Q12AB6FF50	50 mm (2 in) cutoff 16 mm (0.63 in) focus	Bipolar LO
		Q12RB6FF50		Bipolar DO

[3] For black housing, add prefix **D** to the model number, for example **DQ12AB6FF15.**

[4] **Q3 models:** 3-pin Pico-style (M8 threaded) 150 mm (6 in) pigtail QD. Not available for bipolar models. For 9 m (30 ft) cable, add suffix **W/30** to the model number, for example, **Q126E W/30**. For 4-pin Pico-style (M8 threaded) 150 mm (6 in) pigtail QD, add suffix **Q** to the model number, for example, **Q126EQ**. For 4-pin Euro-style (M12 threaded) 150 mm (6 in) pigtail QD, add suffix **Q5** to the model number, for example **Q126EQ5**.

[5] Retroreflective range is specified using one model **BRT-60X40C** retroreflector. Actual sensing range may be more or less than specified, depending upon efficiency and reflective area of the retroreflector(s) used.

Sensing Mode		Model[3] [4]	Range	Output
		Q12AP6FF50Q3		1 PNP LO
		Q12RP6FF50Q3		1 PNP DO
		Q12AN6FF50Q3		1 NPN LO
		Q12RN6FF50Q3		1 NPN DO

Specifications

Sensing Beam

640 nm visible red

Supply Voltage and Current

10 to 30V dc (10% max. ripple) at 20 mA max current

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Output Configuration

Bipolar (1 NPN and 1 PNP) solid-state output or Single output (PNP or NPN), LO or DO, depending on model

Output Ratings

OFF-state leakage current:

- **NPN:** 200 µA
- **PNP:** 10 µA

ON-state saturation voltage:

- **NPN:** 1.25V at 50 mA
- **PNP:** 1.45V at 50 mA

Output Protection Circuitry

Protected against false pulse on power-up, short-circuit protected

Output Response Time

Opposed Mode: 1.3 ms ON; 900 µs OFF

All Other Modes: 700 µs ON/OFF

NOTE: 120 ms delay on power-up; outputs do not conduct during this time.

Repeatability

175 microseconds

Switching Frequency

Opposed Mode: 385 Hz

All Other Modes: 715 Hz

Indicators

One Yellow and one Green LED (see Figure 1)

Construction

Polarized Retro Models: Thermoplastic elastomer housing with glass lens

All Other Standard Models: Thermoplastic elastomer housing with polycarbonate lens

Chemical-Resistant Models: Housing encased in PFA jacket; cable encased in 3/16 in O.D. PFA tubing

Environmental Rating

Standard Models: IEC IP67

Chemical-Resistant Models: IEC IP67 (NEMA6) and PW12 1200 psi washdown per NEMA ICS5, Annex F-2002

Connections

Standard Models: 2 m (6.5 ft) or 9 m (30 ft) attached PVC cable, or 150 mm (6 in) pigtail with M8 or M12 threaded connection

Chemical-Resistant Models: 2 m (6.5 ft) cable encased in 3/16 in O.D. PFA tubing

Operating Conditions

Operating temperature: -20 °C to +55 °C (-4 °F to +131 °F)

Storage temperature: -30 °C to +75 °C (-22 °F to +167 °F)

Relative humidity: 95% max at +50 °C (+122 °F) non-condensing

Certifications

[3] For black housing, add prefix **D** to the model number, for example **DQ12AB6FF15.**

[4] **Q3 models:** 3-pin Pico-style (M8 threaded) 150 mm (6 in) pigtail QD. Not available for bipolar models. For 9 m (30 ft) cable, add suffix **W/30** to the model number, for example, **Q126E W/30**. For 4-pin Pico-style (M8 threaded) 150 mm (6 in) pigtail QD, add suffix **Q** to the model number, for example, **Q126EQ**. For 4-pin Euro-style (M12 threaded) 150 mm (6 in) pigtail QD, add suffix **Q5** to the model number, for example **Q126EQ5**.

Indicator Features



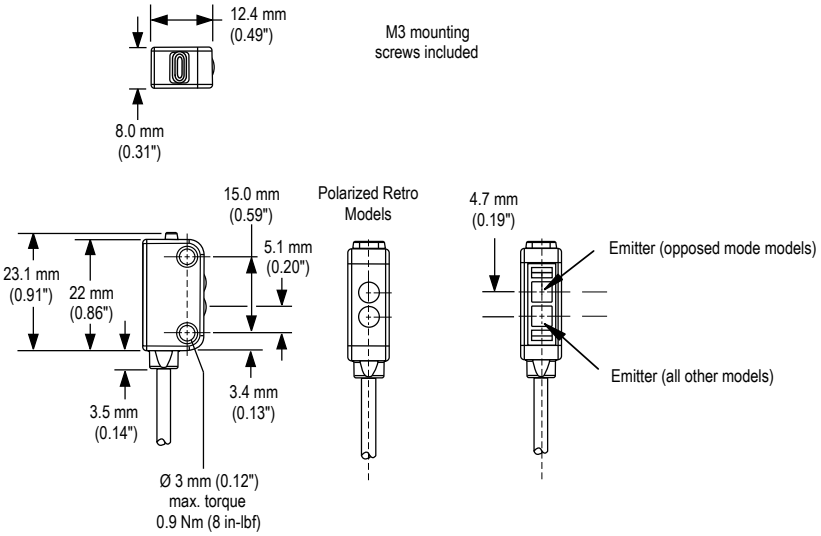
Figure 1. Features

1. Yellow and Green LEDs
   - Green ON steady: power to sensor is ON
   - Green flashing: output is overloaded
   - Yellow ON steady: received signal
   - Yellow flashing: marginal signal

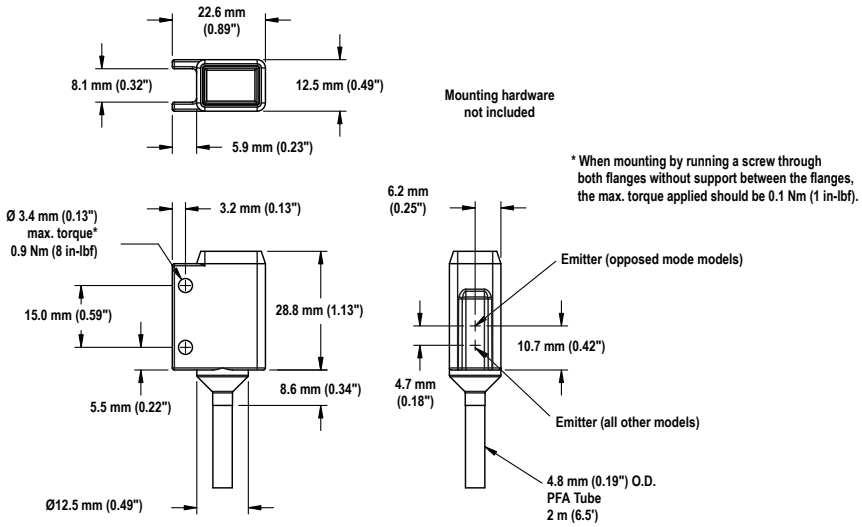
Chemical-Resistant models: LEDs are visible through translucent PFA jacket. Rated to 1200 psi washdown.

Dimensions

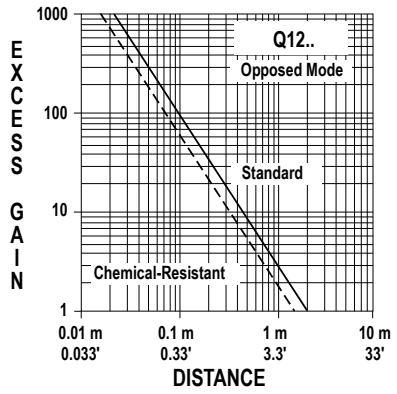
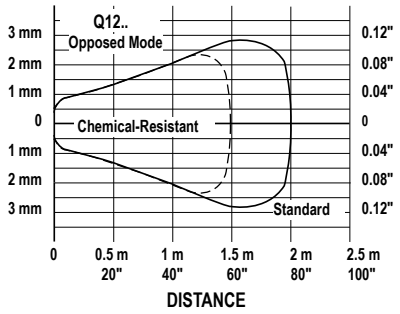
Standard Models



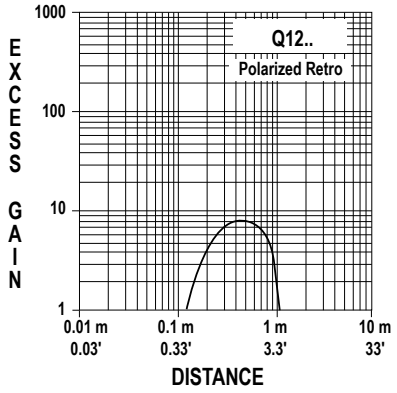
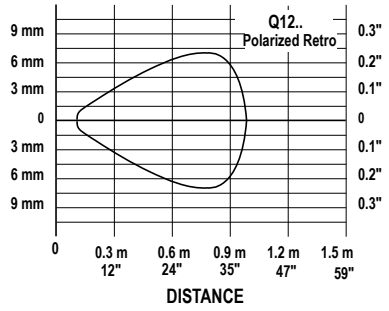
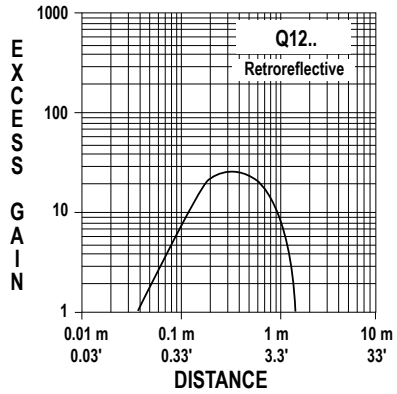
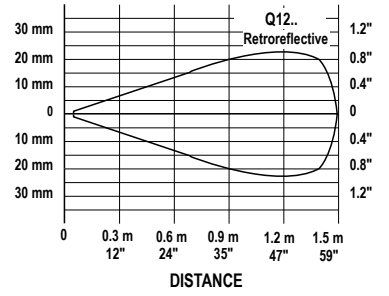
Chemical-Resistant Models



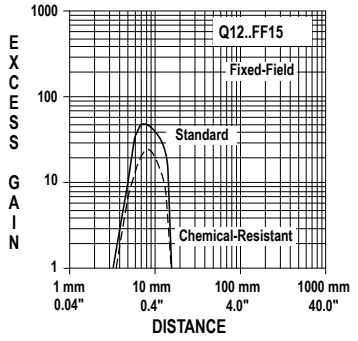
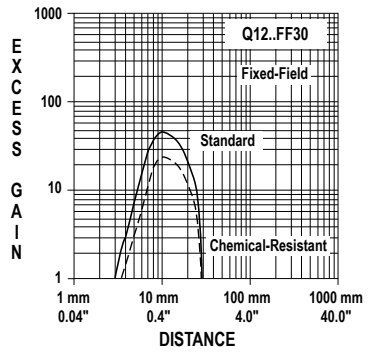
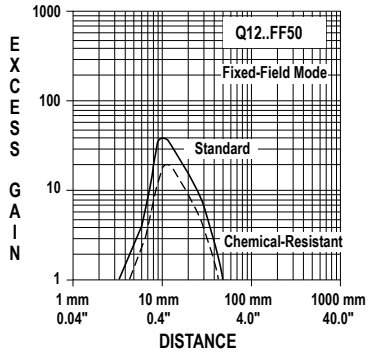
Performance Curves - Opposed Mode

	Excess Gain	Beam Pattern
Opposed		

Performance Curves - Retro Mode

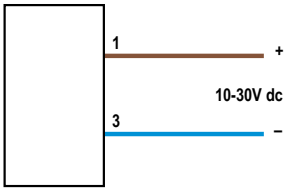
	Excess Gain	Beam Pattern
Polarized Retro	Performance based on use of a model **BRT-60X40C** retroreflector.	
		
Retro		

Performance Curves - Fixed-Field

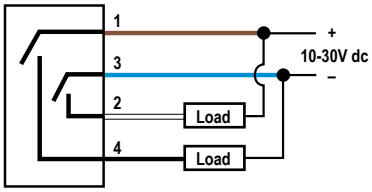
	Excess Gain	
	Performance based on use of 90% reflectance white test card.*	
Fixed-Field – 15 mm		**Standard Models:** • Ø 0.4 mm spot size at 10 mm focus • Ø 1.5 mm spot size at 15 mm cutoff **Chemical-Resistant Models:** • Ø 0.4 mm spot size at 8 mm focus • Ø 1.5 mm spot size at 13 mm cutoff *** Using 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 – 30 mm		**Standard Models:** • Ø 0.5 mm spot size at 16 mm focus • Ø 3.0 mm spot size at 30 mm cutoff **Chemical-Resistant Models:** • Ø 0.5 mm spot size at 14 mm focus • Ø 3.0 mm spot size at 28 mm cutoff *** Using 18% gray test card:** cutoff distance will be 90% of value shown. *** Using 6% black test card:** cutoff distance will be 80% of value shown.
Fixed-Field – 50 mm		**Standard Models:** • Ø 0.5 mm spot size at 16 mm focus • Ø 6.5 mm spot size at 50 mm cutoff *** Using 18% gray test card:** cutoff distance will be 80% of value shown. *** Using 6% black test card:** cutoff distance will be 60% of value shown. **Chemical-Resistant Models:** • Ø 0.5 mm spot size at 14 mm focus • Ø 6.5 mm spot size at 48 mm cutoff *** Using 18% gray test card:** cutoff distance will be 70% of value shown. *** Using 6% black test card:** cutoff distance will be 50% of value shown.
Focus and spot sizes are typical.		
Legend: ——— Standard models		– – – – – Chemical-Resistant models

Hookups

Emitters



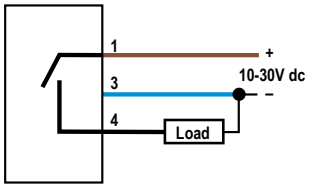
Bipolar Models



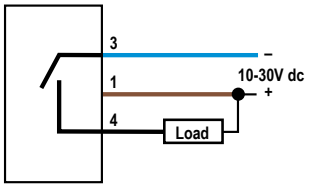
Wiring Key:

1 = Brown
2 = White
3 = Blue
4 = Black

PNP Models



NPN Models

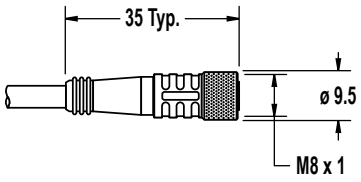
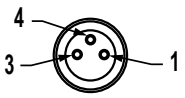
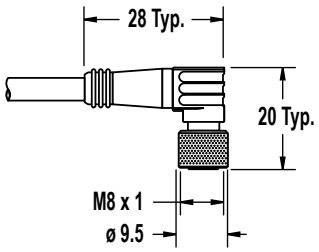


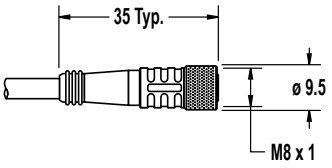
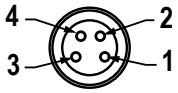
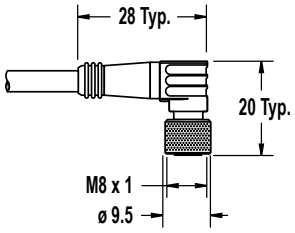
Cabled hookups only are shown. Hookups for QD models are functionally identical. (Emitters have no connection to black and white.)

NOTE: Please observe proper ESD precautions (grounding) when connecting QD models.

Accessories

Cordsets

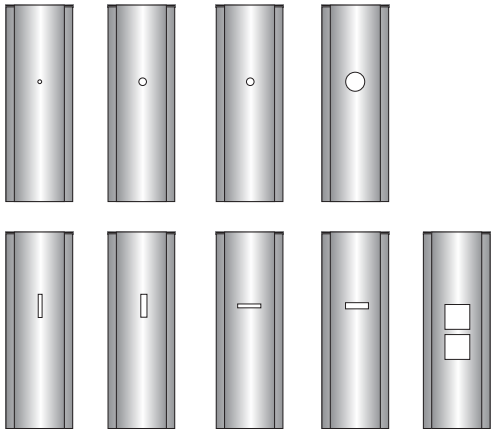
3-Pin Threaded M8/Pico-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
PKG3M-2	2.00 m (6.56 ft)	Straight		 1 = Brown 3 = Blue 4 = Black
PKG3M-5	5.00 m (16.40 ft)			
PKG3M-7	7.00 m (22.97 ft)			
PKG3M-9	9.00 m (29.53 ft)			
PKG3M-10	10.0 m (32.81 ft)			
PKW3M-2	2.00 m (6.56 ft)	Right-Angle		
PKW3M-5	5.00 m (16.40 ft)			
PKW3M-9	9.00 m (29.53 ft)			

4-Pin Threaded M8/Pico-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
PKG4M-2	2.00 m (6.56 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
PKG4M-5	5.00 m (16.4 ft)			
PKG4M-9	9.00 m (29.5 ft)			
PKW4M-2	2.00 m (6.56 ft)	Right Angle		
PKW4M-5	5.00 m (16.4 ft)			
PKW4M-9	9.00 m (29.5 ft)			

Apertures

Opposed-mode Q12 sensors (standard models only) may be fitted with apertures to narrow or shape the sensor's effective beam to more closely match the size or profile of the objects being sensed. A common example is the use of "line" (or "slot") type apertures to sense thread.

NOTE: The use of apertures will reduce the sensing range (see table below).

Model	Description	Pieces	Reduced Sensor Range (Two Apertures Used)	
Circular				
APQ12-.5	0.5 mm (0.02 in) diameter	10	60 mm (2.4 in)	
APQ12-1	1 mm (0.04 in) diameter	10	190 mm (7.5 in)	
APQ12-1.5	1.5 mm (0.06 in) diameter	10	400 mm (15.7 in)	
APQ12-2	2 mm (0.08 in) diameter	10	725 mm (28.5 in)	
Horizontal Slot				
APQ12-.5H	0.5 mm (0.02 in)	10	350 mm (13.8 in)	
APQ12-1H	1 mm (0.04 in)	10	725 mm (28.5 in)	
Vertical Slot				
APQ12-.5V	0.5 mm (0.02 in)	10	450 mm (17.7 in)	
APQ12-1V	1 mm (0.04 in)	10	900 mm (35.4 in)	
Protective Jacket				
APQ12-4S	4 mm (0.16 in) square	10	2000 mm (78.7 in)	
APKQ12	Kit containing two of each aperture above	18	—	

Brackets

SMBQ12T

- Right-angle bracket
- 20-ga. 300 series stainless steel



Hole center spacing: A to B = 7.6

Hole size: A = 3.5 x 8.1, B=ø 3.2

SMBQ12A

- Adjustable right-angle bracket
- 20-ga. 300 series stainless steel



Hole center spacing: A to B = 7.6

Hole size: A = 3.5 x 8.1, B=ø 3.2

Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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