WORLD-BEAM® Q20 Series Sensors

Compact, Self-Contained Family of Sensors

Features

- Photoelectric sensors in a compact, rugged, sealed, over-molded plastic housing
- Standard 3 mm threaded mounting holes on 25.4 mm (1") spacing
- Advanced ASIC design for excellent noise immunity and cross-talk avoidance
- Threaded metal M8 connector on Pico-style quick-disconnect models
- 10 to 30V dc operation with complementary solid-state outputs (1 normally open, 1 normally closed); PNP (sourcing) or NPN (sinking), depending on model
- Complete offering of mounting brackets and apertures available

Models

Sensing Mode		Model*	Range	Output**
Opposed	624 nm Visible Red	**Q20E**	10 m (33')	N/A
	Effective Beam: 10 mm (0.4") OPPOSED	**Q20PR**		PNP
		Q20NR		NPN
	850 nm Infrared	**Q20EL**	15 m (49')	N/A
	Effective Beam: 10 mm (0.4") OPPOSED	**Q20PRL**		PNP
		Q20NRL		NPN
Polarized Retro	660 nm Visible Red POLAR RETRO	**Q20PLP**	4 m† (13')	PNP
		Q20NLP		NPN
Retro	660 nm Visible Red RETRO	**Q20PLV**	6 m† (20')	PNP
		Q20NLV		NPN

Sensing Mode		Model*	Range	Output**
	Diffuse-mode performance based on use of 90% reflectance white test card.			
Diffuse – Long-Range	624 nm Visible Red DIFFUSE	**Q20PDL**	800 mm (32")	PNP
		Q20NDL		NPN
	850 nm Infrared DIFFUSE	**Q20PDXL**	1500 mm (59")	PNP
		Q20NDXL		NPN
Diffuse – Short-Range	624 nm Visible Red DIFFUSE	**Q20PD**	250 mm (10")	PNP
		Q20ND		NPN

* Only standard 2 m (6.5') cable models are listed. For 9 m (30') cable, add suffix "**W/30**" to the model number (e.g., **Q20E W/30**).

QD models:
- For 4-pin Pico-style (threaded) integral QD, add suffix "**Q7**" (e.g., **Q20EQ7**).
- For 4-pin Pico-style (threaded) 150 mm (6") pigtail QD, add suffix "**Q**" (e.g., **Q20EQ**).
- For 4-pin Euro-style 150 mm (6") pigtail QD, add suffix "**Q5**" (e.g., **Q20EQ5**).
- For 150 mm (6") PUR pigtail cable with 4-pin threaded Euro-style QD connector, add "**QPMA**" to the model number (e.g., **Q20EQPMA**)

†Range is specified using a model **BRT-84** reflector.

**Available with Health or Alarm Mode output; contact factory for details.

⚠️ **WARNING . . . Not To Be Used for Personnel Protection**

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

WORLD-BEAM® Q20 Series Sensors

Overview

Banner's Q20 family of sensors offers a full complement of sensing modes, with the excellent performance expected of much larger sensors. Their compact plastic housings feature overmolded construction for superior robustness and sealing. Their popular rectangular design is easy to mount into tight spaces; integral threaded mounting holes eliminate the need for separate mounting nuts.

The single-turn Gain potentiometer on most models and bright Signal LED (positioned on top of the housing for 360° visibility) provide easy alignment and configuration for reliable sensing (see Figure 1).
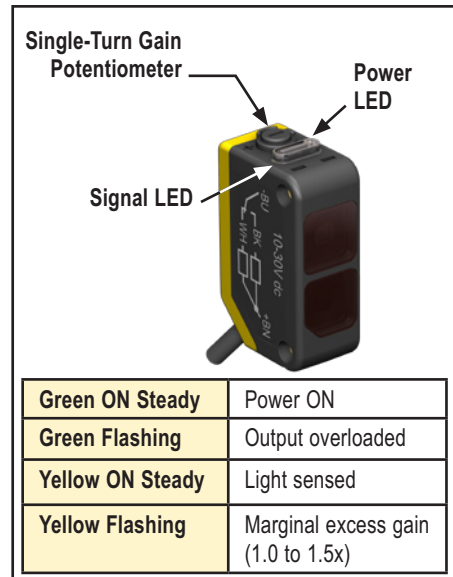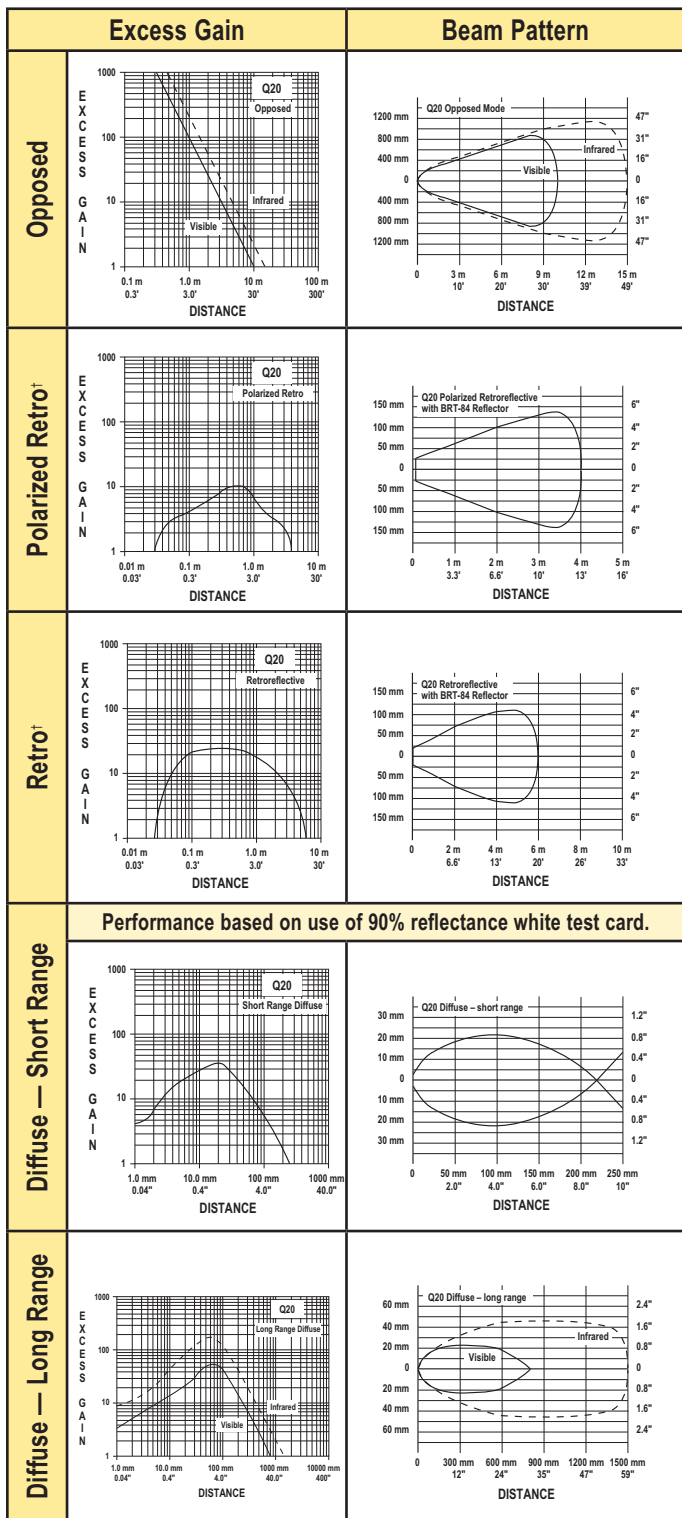

Single-Turn Gain Potentiometer — Power LED — Signal LED

Green ON Steady	Power ON
Green Flashing	Output overloaded
Yellow ON Steady	Light sensed
Yellow Flashing	Marginal excess gain (1.0 to 1.5x)

Figure 1. Features

Specifications

Supply Voltage	10 to 30V dc (10% maximum ripple) at less than 18 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	100 mA with short circuit protection **OFF-state leakage current: NPN:** < 200 µA sinking **PNP:** < 20 µA sourcing **ON-state saturation voltage: NPN:** < 1.6V @ 100 mA **PNP:** < 3.0V @ 100 mA
Output Response Time	**Opposed Mode:** 1 millisecond ON/600 microseconds OFF **All others:** 800 microseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time
Repeatability	**Opposed Mode:** 140 microseconds **All others:** 155 microseconds
Adjustments	**Diffuse, Retroreflective, and Polarized Retroreflective models (only):** Single-turn Sensitivity (Gain) adjustment potentiometer
Indicators	Two LED Indicators: Power (green) and Signal (yellow) **Green ON Steady:** Power ON **Yellow ON steady:** Light sensed **Green flashing:** Output overloaded **Yellow flashing:** Marginal excess gain (1 to 1.5X)
Construction	**Housing:** ABS **Lenses:** PMMA **Gain Adjuster:** PBT
Connections	2 m (6.5') or 9 m (30') 4-wire PVC cable, 150 mm (6") pigtail with 4-pin threaded Pico-style (Q) or Euro-style (Q5) connector, or 4-pin integral threaded Pico-style connector (Q7), depending on model
Operating Conditions	**Temperature:** –20° to +60° C (–4° to +140° F) **Relative Humidity:** 95% @ 50° C (non-condensing)
Environmental Rating	IEC IP67 (NEMA 6) and 1200 PSI washdown NEMA ICS 5, Annex F-2002
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration, half sine wave
Certifications	Approvals pending

Performance Curves

Excess Gain	Beam Pattern

Opposed

Q20 Opposed
EXCESS GAIN
Infrared
Visible
DISTANCE
0.1 m / 0.3' — 1.0 m / 3.0' — 10 m / 30' — 100 m / 300'

Q20 Opposed Mode
Infrared
Visible
DISTANCE
0 / 3 m 10' / 6 m 20' / 9 m 30' / 12 m 39' / 15 m 49'
1200 mm / 47" 800 mm / 31" 400 mm / 16" 0 400 mm / 16" 800 mm / 31" 1200 mm / 47"

Polarized Retro†

Q20 Polarized Retro
EXCESS GAIN
DISTANCE
0.01 m / 0.03' — 0.1 m / 0.3' — 1.0 m / 3.0' — 10 m / 30'

Q20 Polarized Retroreflective with BRT-84 Reflector
DISTANCE
0 / 1 m 3.3' / 2 m 6.6' / 3 m 10' / 4 m 13' / 5 m 16'
150 mm / 6" 100 mm / 4" 50 mm / 2" 0 50 mm / 2" 100 mm / 4" 150 mm / 6"

Retro†

Q20 Retroreflective
EXCESS GAIN
DISTANCE
0.01 m / 0.03' — 0.1 m / 0.3' — 1.0 m / 3.0' — 10 m / 30'

Q20 Retroreflective with BRT-84 Reflector
DISTANCE
0 / 2 m 6.6' / 4 m 13' / 6 m 20' / 8 m 26' / 10 m 33'
150 mm / 6" 100 mm / 4" 50 mm / 2" 0 50 mm / 2" 100 mm / 4" 150 mm / 6"

Performance based on use of 90% reflectance white test card.

Diffuse — Short Range

Q20 Short Range Diffuse
EXCESS GAIN
DISTANCE
1.0 mm / 0.04" — 10.0 mm / 0.4" — 100 mm / 4.0" — 1000 mm / 40.0"

Q20 Diffuse – short range
DISTANCE
0 / 50 mm 2.0" / 100 mm 4.0" / 150 mm 6.0" / 200 mm 8.0" / 250 mm 10"
30 mm / 1.2" 20 mm / 0.8" 10 mm / 0.4" 0 10 mm / 0.4" 20 mm / 0.8" 30 mm / 1.2"

Diffuse — Long Range

Q20 Long Range Diffuse
EXCESS GAIN
Infrared
Visible
DISTANCE
1.0 mm / 0.04" — 10.0 mm / 0.4" — 100 mm / 4.0" — 1000 mm / 40.0" — 10000 mm / 400"

Q20 Diffuse – long range
Infrared
Visible
DISTANCE
0 / 300 mm 12" / 600 mm 24" / 900 mm 35" / 1200 mm 47" / 1500 mm 59"
60 mm / 2.4" 40 mm / 1.6" 20 mm / 0.8" 0 20 mm / 0.8" 40 mm / 1.6" 60 mm / 2.4"

Dimensions

Cabled and Pigtail QD Models

20.0 mm (0.79")
12.0 mm (0.47")
3.3 mm (0.13")
3.3 mm (0.13")
25.4 mm (1.00")
10.5 mm (0.42")
10.9 mm (0.43")
1.8 mm (0.07")
32.0 mm (1.26")
2X M3 X0.5
2 M3 screws (12 mm) and washers included

Integral QD Models

42.0 mm (1.65")

Hookups

NPN (Sinking) Outputs

bn (1)
bu (3)
bk (4) Load
wh (2) Load
10-30V dc

PNP (Sourcing) Outputs

bn (1)
bu (3)
bk (4) Load
wh (2) Load
10-30V dc

Emitters

bn +
bu −
10-30V dc
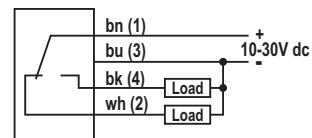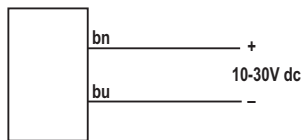
Cabled hookups only are shown. QD hookups are functionally identical.

4-Pin Pico-Style Pinout (Cable Connector Shown)

Black Wire (4)
White Wire (2)
Blue Wire (3)
Brown Wire (1)

4-Pin Euro-Style Pinout (Cable Connector Shown)

White Wire (2)
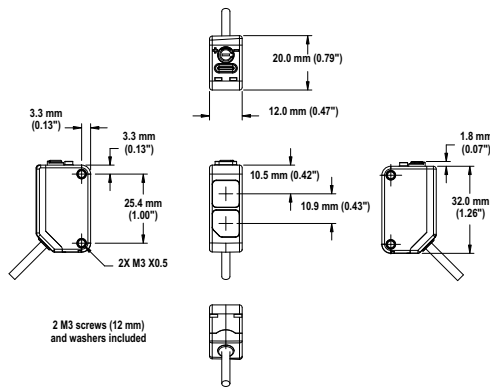Brown Wire (1)
Blue Wire (3)
Black Wire (4)

†Performance based on use of a model **BRT-84** retroreflector.

See the Accessories section of your current Banner Sensors catalog or www.bannerengineering.com for complete information.
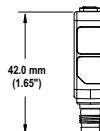
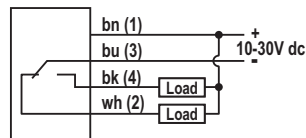NOTE: Polarized sensors require corner cube type retroreflective targets only.
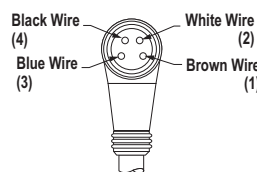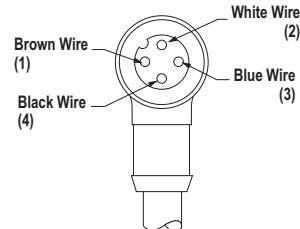
WORLD-BEAM® Q20 Series Sensors

Quick-Disconnect (QD) Cordsets

Style	Model	Length	Dimensions	Style	Model	Length	Dimensions
4-pin Euro-style Straight	MQDC-406 MQDC-415 MQDC-430	2 m (6.5') 5 m (15') 9 m (30')		4-pin Pico-style Right-angle	PKW4Z-2	2 m (6.5')	
4-pin Euro-style Right-angle	MQDC-406RA MQDC-415RA MQDC-430RA	2 m (6.5') 5 m (15') 9 m (30')		4-pin Threaded Pico-style Straight	PKG4M-2 PKG4M-9	2 m (6.5') 9 m (30')	
4-pin Pico-style Straight	PKG4-2	2 m (6.5')		4-pin Threaded Pico-style Right-angle	PKW4M-2 PKW4M-9	2 m (6.5') 9 m (30')	

Mounting Brackets

SMBQ20L	• Sensor vertical base mount • +/- 5° tip, +/- 7° swivel • Stainless steel	
SMBQ20H	• Sensor horizontal flange mount • +/- 10° swivel • Stainless steel	

SMBQ20LV	• Sensor vertical back mount • +/- 10° tip • Stainless steel	
SMBQ20U	• Sensor vertical base mount with protection • +/- 22.5° swivel • Stainless steel	

Refer to your current Banner Sensors catalog for more mounting bracket options. Bracket dimensions can be found at www.bannerengineering.com.

Apertures

Model	Description		Reduced Sensor Range E/R (two apertures used)	Reduced Sensor Range EL/RL (two apertures used)
APQ20-0.5	Circular Hole	0.5 mm (0.02") dia.	0.10 m (0.33')	0.18 m (0.6')
APQ20-1		1 mm (0.04") dia.	0.35 m (1.14')	0.66 m (2.1')
APQ20-2		2 mm (0.08") dia.	1.5 m (4.9')	2.9 m (9.5')
APQ20-0.5V	Vertical Slot	0.5 mm (0.02")	1.27 m (4.1')	2.1 m (6.9')
APQ20-1V		1 mm (0.04")	2.6 m (8.5')	4.2 m (13.8')
APQ20-2V		2 mm (0.08")	4.8 m (15.7')	7.3 m (24.0')
APK-Q20	Kit	Includes two of each type.		

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Banner Engineering Corp., 9714 Tenth Ave. No., Minneapolis, MN USA 55441 • Phone: 763.544.3164 • www.bannerengineering.com • Email: sensors@bannerengineering.com

For Sales and Support, Contact Walker EMD • Toll-free: (800) 876-4444 • Tel: (203) 426-7700 • Fax: (203) 426-7800 • www.walkeremd.com