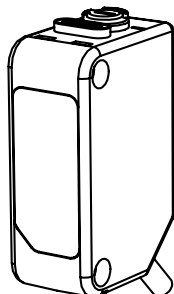


# WORLD-BEAM® Q20 Sensor with Background Suppression



## Datasheet

*Compact sensors featuring adjustable range background suppression mode*



- Photoelectric sensors in a compact, rugged, sealed, over-molded plastic housing
- Standard 3 mm threaded mounting holes on 25.4 mm (1 in) spacing
- Simple single-turn potentiometer adjustment of cutoff distance from 30 to 200 mm
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- High-intensity, bright red LED spot makes sensor alignment fast and easy
- Bright indicator LEDs show operating status from 360°
- Small bright red spot for reliable detection of colorfully printed packages and small parts or features



### WARNING:

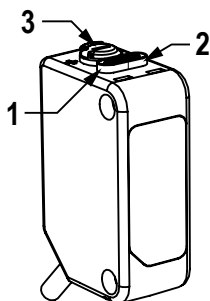
- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Models

Model <sup>1</sup>	Output Type	Sensing Range	Supply Voltage
Q20NAF200	Complementary NPN	Adjustable Cutoff: 30 mm to 200 mm	10 V dc to 30 V dc
Q20PAF200	Complementary PNP		
Q20KAF200Q7	IO-Link		

## Overview

The WORLD-BEAM® Q20 Sensor with Background Suppression detects targets within the cutoff distance while ignoring objects in the background. Background suppression mode is recommended when target position is repeatable, but target color and background conditions vary.



### Key

- 1 Green LED: Power Indicator
- 2 Amber LED: Light Sensed Indicator (Flashes for Marginal Conditions)
- 3 Cutoff Point Adjustment Potentiometer

<sup>1</sup> 2 m (6.5 ft) PVC cabled models are listed for the complementary output models. 2 m (6.5 ft) and 9 m (30 ft) PVC cabled options are not available on IO-Link models.

- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, Q20NAF200 W/30.
- To order the 4-pin M8/Pico-style integral quick disconnect model, add the suffix "Q7" to the model number. For example, Q20NAF200Q7.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, add the suffix "Q5" to the model number. For example, Q20NAF200Q5.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8/Pico-style quick disconnect, add the suffix "Q" to the model number. For example, Q20NAF200Q.
- Models with a quick disconnect require a mating cordset.



## Installation Instructions

### Sensor Orientation

Optimize detection reliability and minimum object separation performance with correct sensor-to-target orientation. To ensure reliable detection, orient the sensor as shown in relation to the target to be detected.

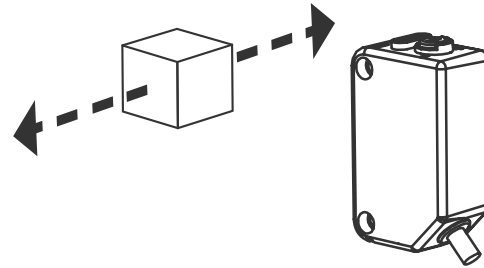
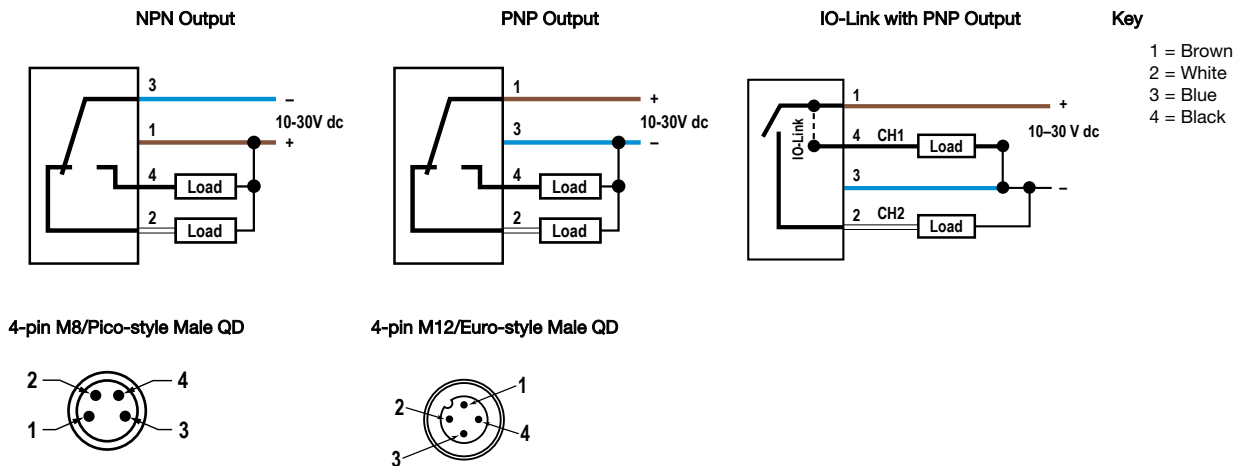


Figure 1. Optimal Orientation of Target to Sensor

### Wiring Diagrams

Cabled wiring diagrams are shown. Quick disconnect wiring diagrams are functionally identical.



### Set up the Sensor

**Background Suppression Mode:** Objects beyond the set cutoff distance will not be detected. Background suppression mode can be used in most situations with varying object colors and positions or with varying background conditions.

To ensure reliable background suppression, a minimum separation distance between the object and the background is necessary.

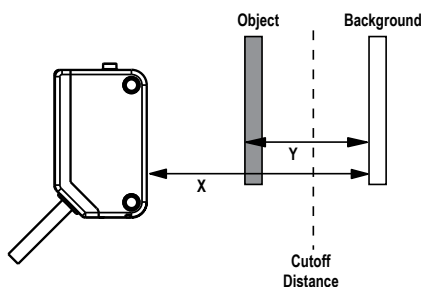


Figure 2. Minimum Separation Distance

X: Distance to the Object

Y: Minimum Separation Between the Object and the Background

Set the cutoff distance approximately midway between the farthest object and the closest background.

1. Mount the sensor with the darkest object at the longest application distance.

The distance to the object must be less than shown in [Figure 4](#) (p. 5) for your object color.

2. Turn the adjustment potentiometer counter-clockwise until the amber indicator turns off.
3. Turn the adjustment potentiometer clockwise until the amber indicator turns on.
4. Replace the darkest object with the brightest background at the closest application distance.
5. Turn the adjustment potentiometer clockwise until the amber indicator turns on.
6. Turn the adjustment potentiometer counter-clockwise approximately half of the adjustment rotation from the previous step. This places the cutoff distance approximately half-way between the object and the background switch points. If sufficient separation exists between the object and background, the sensor is ready for operation.

## IO-Link Interface

IO-Link is a point-to-point communication link between a master device and sensor. Use IO-Link to parameterize sensors and transmit process data automatically.

For the latest IO-Link protocol and specifications, see [www.io-link.com](http://www.io-link.com).

Each IO-Link device has an IODD (IO Device Description) file that contains information about the manufacturer, article number, functionality etc. This information can be easily read and processed by the user. Each device can be unambiguously identified via the IODD as well as via an internal device ID. Download the Q20's IO-Link IODD package (p/n 209012) from Banner Engineering's website at [www.bannerengineering.com](http://www.bannerengineering.com).

Banner has also developed Add On Instruction (AOI) files to simplify ease-of-use between the Q20, multiple third-party vendors' IO-Link masters, and the Logix Designer software package for Rockwell Automation PLCs. Three types of AOI files for Rockwell Allen-Bradley PLCs are listed below. These files and more information can be found at [www.bannerengineering.com](http://www.bannerengineering.com).

**Process Data AOIs**—These files can be used alone, without the need for any other IO-Link AOIs. The job of a Process Data AOI is to intelligently parse out the Process Data word(s) in separate pieces of information. All that is required to make use of this AOI is an EtherNet/IP connection to the IO-Link Master and knowledge of where the Process Data registers are located for each port.

**Parameter Data AOIs**—These files require the use of an associated IO-Link Master AOI. The job of a Parameter Data AOI, when working in conjunction with the IO-Link Master AOI, is to provide quasi-realtime read/write access to all IO-Link parameter data in the sensor. Each Parameter Data AOI is specific to a given sensor or device.

**IO-Link Master AOIs**—These files require the use of one or more associated Parameter Data AOIs. The job of an IO-Link Master AOI is to translate the desired IO-Link read/write requests, made by the Parameter Data AOI, into the format a specific IO-Link Master requires. Each IO-Link Master AOI is customized for a given brand of IO-Link Master.

Add and configure the relevant Banner IO-Link Master AOI in your ladder logic program first; then add and configure Banner IO-Link Device AOIs as desired, linking them to the Master AOI as shown in the relevant AOI documentation.

## Specifications

### Supply Voltage

10 V dc to 30 V dc (10% maximum ripple within specified limits)

### Maximum Power Consumption (exclusive of load)

Less than 300 mW

### Sensing Beam

Visible red LED, 640 nm

### Supply Protection Circuitry

Protected against reverse polarity and transient voltages

### Output Configuration

Solid-state complementary: open collector NPN or PNP, depending on model

Rating: 50 mA per output

**Output Voltage High:** Greater than  $V_{supply} - 2.5\text{ V}$

**Output Voltage Low:** Less than 2.5 V

For loads less than 1 Meg Ohm

Protected against false pulse on power-up and continuous overload or short circuit of outputs

### Output Response

1.7 milliseconds ON; 1.1 milliseconds OFF

**Note:** 200 millisecond delay on power-up; outputs do not conduct during this time

### Adjustments

Single-turn adjustment potentiometer sets the cutoff distance between minimum and maximum positions

### Repeatability

130  $\mu\text{s}$  (standard mode)

### Indicators

2 LED indicators on sensor top:

Green solid: Power on

Amber: Light sensed

Amber flashing: Marginal sensing condition

### Construction

ABS front housing and gain adjuster, PMMA lenses; Copolyamide rear housing

**Connections**

2 m (6.5 ft) unterminated 4-wire PVC cable; 9 m (30 ft) unterminated 4-wire PVC cable; 150 mm (6 in) PVC cable with a 4-pin M8/Pico-style quick disconnect; 150 mm (6 in) PVC cable with a 4-pin M12/Euro-style quick disconnect or Integral 4-pin M8/Pico-style quick disconnect, depending on model

Models with a quick disconnect require a mating cordset

**IO-Link Interface**

Supports Smart Sensor Profile: Yes

Baud Rate: 38400 bps

Process Data Widths: 16 bits

IODD Files: Provides all programming options plus additional functionality; please see the IO-Link Data Reference Guide for more details

**Environmental Rating**

IEC IP67; NEMA 6

**Operating Conditions**

-20 °C to +60 °C (-4 °F to +140 °F)

95% relative humidity at 50 °C (non-condensing)

**Vibration and Mechanical Shock**

All models meet MIL-STD-202F, Method 201A (Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G maximum acceleration) requirements. Also meets IEC 60947-5-2 (Shock: 30G 11 ms duration, half sine wave) requirements.

**Certifications****Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

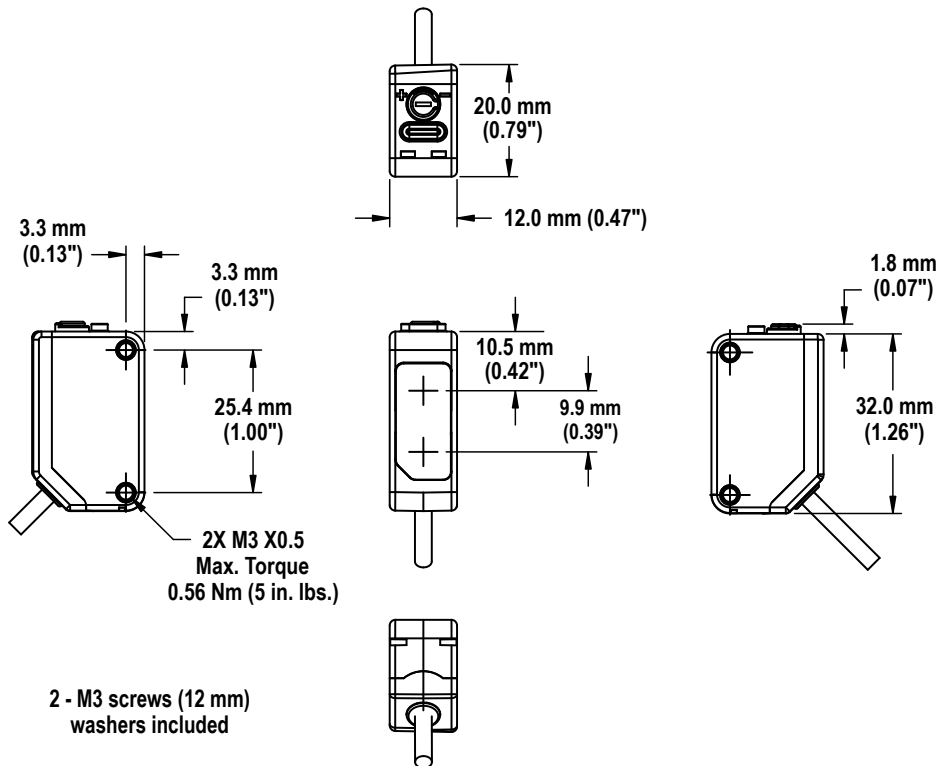
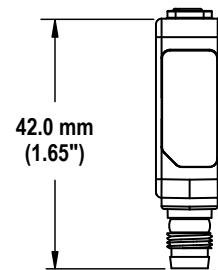
Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

**Dimensions****Cabled and Pigtail QD Models****Integral QD Models****Performance Curves**

The minimum sensing range for 6% reflectivity is 14 mm.

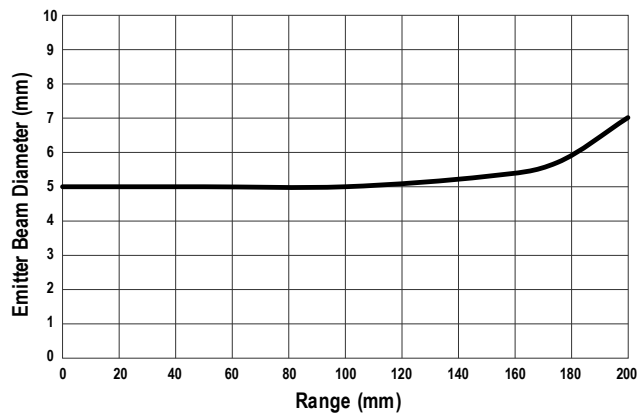


Figure 3. Emitter Beam Diameter graph

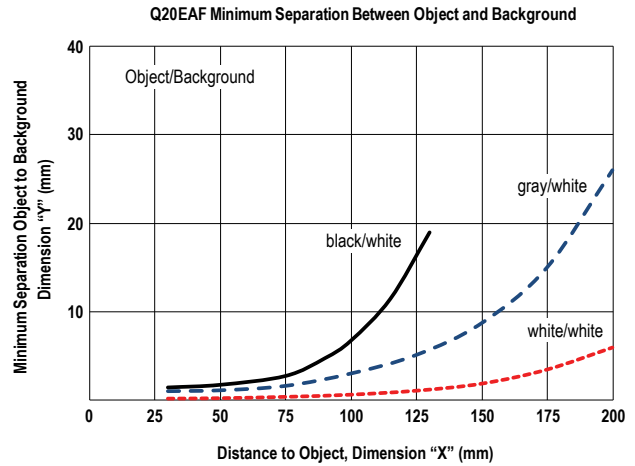


Figure 4. Minimum Separation Between Object and Background

## Excess Gain Curves

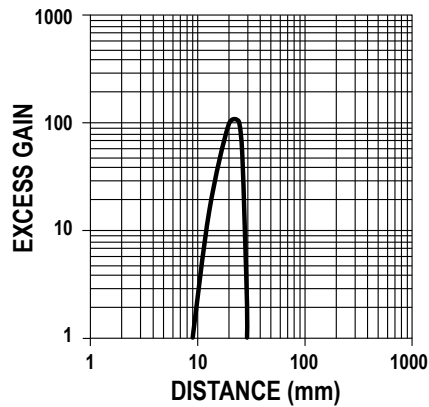


Figure 5. 30 mm Excess Gain

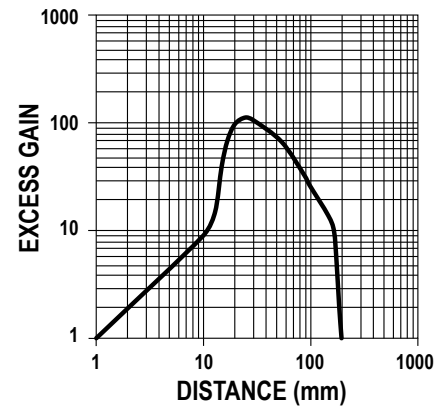
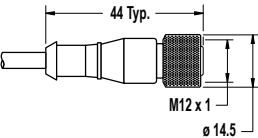

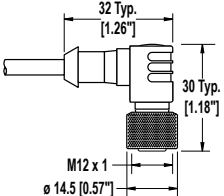
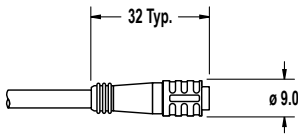
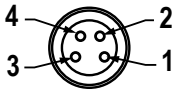
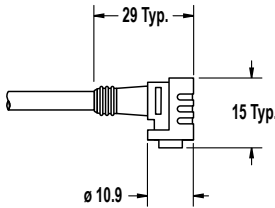


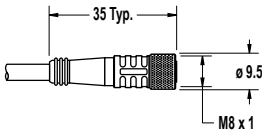

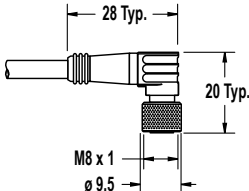
Figure 6. 200mm Excess Gain

## Accessories

### Quick-Disconnect (QD) Cordsets

4-Pin Threaded M12/Euro-Style Cordsets—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
MQDC-406	1.83 m (6 ft)	Straight		  1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-415	4.57 m (15 ft)			
MQDC-430	9.14 m (30 ft)			
MQDC-450	15.2 m (50 ft)			
MQDC-406RA	1.83 m (6 ft)	Right-Angle		
MQDC-415RA	4.57 m (15 ft)			
MQDC-430RA	9.14 m (30 ft)			
MQDC-450RA	15.2 m (50 ft)			

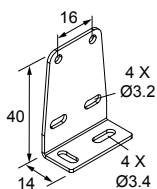
4-Pin Snap-on M8/Pico-Style Cordsets—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
PKG4-2	2 m (6.56 ft)	Straight		 <p>1 = Brown 2 = White 3 = Blue 4 = Black</p>
PKW4Z-2	2 m (6.56 ft)	Right-Angle		

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

## Mounting Brackets

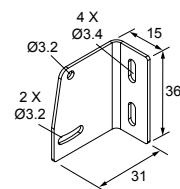
### SMBQ20L

- Sensor vertical base mount
- $\pm 5^\circ$  tip,  $\pm 7^\circ$  swivel
- Stainless steel



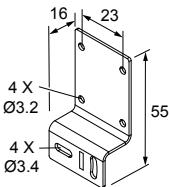
### SMBQ20LV

- Sensor vertical back mount
- $\pm 10^\circ$  tip
- Stainless steel



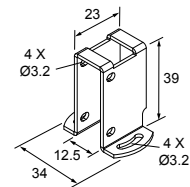
### SMBQ20H

- Sensor horizontal flange mount
- $\pm 10^\circ$  swivel
- Stainless steel



### SMBQ20U

- Sensor vertical base mount with protection
- $\pm 22.5^\circ$  swivel
- Stainless steel



## Banner Engineering Corp. Limited Warranty

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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.

**THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.**

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).

## FCC Part 15 and CAN ICES-3 (B)/NMB-3(B)

This device complies with part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

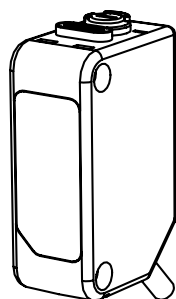
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the manufacturer.



more sensors, more solutions

## Datasheet



- Photoelectric sensors in a compact, rugged, sealed, over-molded plastic housing
- Standard 3 mm threaded mounting holes on 25.4 mm (1 in) spacing
- Advanced electronic design for excellent noise immunity and cross-talk avoidance
- Threaded metal M8 connector on Pico-style quick-disconnect models
- 10 V dc to 30 V dc operation with complementary solid-state outputs (1 normally open, 1 normally closed); PNP or NPN, depending on model
- Complete offering of mounting brackets and apertures available
- Crosstalk prevention filters available for visible red opposed mode pairs
- Exceptional optical performance with easy to align visible red emitters
- Background suppression models provide reliable detection up to 150 mm while ignoring objects in the background
- Background suppression models provide stable detection in the presence of fluorescent lights



### WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Models

Model <sup>1</sup>	Sensing Mode	Range	Output <sup>2</sup>	Model <sup>1</sup>	Sensing Mode	Range	Output <sup>2</sup>
Q20E	Opposed, 624 nm Visible Red Effective Beam: 10 mm (0.4 in)	12 m (39.4 ft)	N/A	Q20PDXL	Long Range Diffuse, 850 nm Infrared	1500 mm (59 in)	PNP
Q20PR			PNP	Q20NDXL			NPN
Q20NR			NPN	Q20PD	Short Range Diffuse, 624 nm Visible Red	250 mm (10 in)	PNP
Q20EL	Opposed, 850 nm Infrared Effective Beam: 10 mm (0.4 in)	20 m (65.6 ft)	N/A	Q20ND			NPN
Q20PRL			PNP	Q20PDVS	Small Spot Diffuse, 660 nm Visible Red	250 mm (10 in)	PNP
Q20NRL			NPN	Q20NDVS			NPN
Q20PLP	Polarized Retroreflective, 645 nm Visible Red	4 m (13 ft) (specified using reflector BRT-84)	PNP	Q20PFF50	Fixed Field, 655 nm Visible Red	50 mm (2 in) cutoff	PNP
Q20NLP			NPN	Q20NFF50			NPN
Q20PLV	Retroreflective, 645 nm Visible Red	6 m (20 ft) (specified using reflector BRT-84)	PNP	Q20PFF100		100 mm (4 in) cutoff	PNP
Q20NLV			NPN	Q20NFF100			NPN
Q20PDL	Long-Range Diffuse, 624 nm Visible Red	800 mm (32 in)	PNP	Q20PFF150		150 mm (6 in) cutoff	PNP
Q20NDL			NPN	Q20NFF150			NPN

Diffuse-mode and fixed-field performances are based on the use of a 90% reflectance white test card.

<sup>1</sup> Integral 2 m (6.5 ft) unterminated cable models are listed.

- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, Q20E W/30.
- To order the 4-pin M8/Pico-style integral quick disconnect model, add the suffix "Q7" to the model number. For example, Q20EQ7.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8/Pico-style quick disconnect, add the suffix "Q" to the model number. For example, Q20EQ.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, add the suffix "Q5" to the model number. For example, Q20EQ5.
- To order the 150 mm (6 in) PUR cable model with a 4-pin M12/Euro-style quick disconnect, add the suffix "QPMA" to the model number. For example, Q20EQPMA.
- Models with a quick disconnect require a mating cordset.

<sup>2</sup> Available with Health or Alarm Mode output; contact Banner Engineering for details.

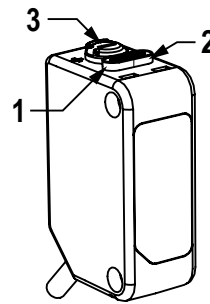




## Overview

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 LEDs (positioned on top of the housing for 360° visibility) provide easy alignment and configuration for reliable sensing.

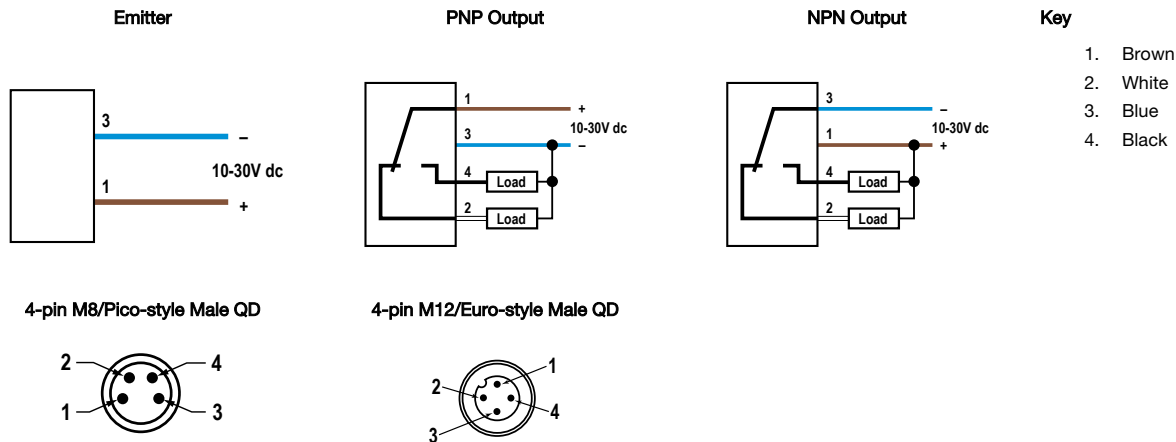


(varies with model)

1. Output LED
2. Power LED
3. Single-Turn Gain Potentiometer (Retro and Diffuse models only)

## Wiring Diagrams

Cabled wiring diagrams are shown. Quick disconnect wiring diagrams are functionally identical.



## Specifications

### Supply Voltage

**Fixed-Field:** 10 to 30V dc (10% maximum ripple within specified limits) at less than 25 mA, exclusive of load

**All others:** 10 to 30V dc (10% maximum ripple within specified limits) at less than 18 mA, exclusive of load

### Supply Protection Circuitry

Protected against reverse polarity and transient voltages

### Repeatability

Opposed mode: 140 microseconds

All other models: 90 microseconds

### Construction

ABS housing; PMMA lenses; PBT Gain Adjuster (Retro and Diffuse models only)

**Output Configuration for Receiver**

100 mA with short circuit protection

OFF-state leakage current:

NPN: < 200  $\mu$ A sinking (see Application Note 2);PNP: < 10  $\mu$ A sourcing

ON-state saturation voltage

NPN: &lt; 1.6 V at 100 mA

PNP: &lt; 3.0 V at 100 mA

**Output Configuration for all Other Models**Maximum Current  $\leq$  100 mA

PNP Output Voltage:

High  $\geq$  Vsupply – VsaturationLow  $\leq$  1 V ( $\leq$  1M  $\Omega$ )

NPN Output Voltage:

High  $\geq$  Vsupply – 1 V ( $\leq$  1M  $\Omega$ )Low  $\leq$  VsaturationVsaturation  $\leq$  3 V**Output Response Time**

Opposed mode: 1 millisecond ON/600 microseconds OFF

All other models: 850 microseconds ON/OFF

100 millisecond delay on power-up; outputs do not conduct during this time

**Applications Notes**

1. Opposed mode sensor spacing can be reduced by alternating emitters and receivers or by applying cross talk filters (visible red models only)
2. For receiver only: NPN off-state leakage current is <200  $\mu$ A for load resistances > 3k $\Omega$  or optically isolated loads. For load currents of 100 mA, leakage is <1% of load current.

**Operating Conditions**

–20 °C to +60 °C (–4 °F to +140 °F)

95% at +50 °C maximum relative humidity (non-condensing)

**Environmental Rating**

IEC IP67; NEMA 6

**Vibration and Mechanical Shock**

All models meet MIL-STD-202F, Method 201A (Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G maximum acceleration) requirements. Also meets IEC 60947-5-2 (Shock: 30G 11 ms duration, half sine wave) requirements.

**Certifications**

(Class 2 power supply required)

**Connections**

2 m (6.5 ft) or 9 m (30 ft) 4-wire PVC cable, 150 mm (6 in) cable with 4-pin threaded M8/Pico-style (Q) or M12/Euro-style (Q5) connector, or 4-pin integral threaded M8/Pico-style connector (Q7), depending on the model ordered

**Indicators**

Two LED Indicators: Power (green) and Output (amber)

Fixed-Field models:

Green on: Power ON

Amber on: Black (LO) wire conducting

All other models:

Green on: Power ON

Amber on: Black (LO) wire conducting

Amber flashing: Marginal excess gain (1 to 1.5x)

Black (LO) wire conducting

**Adjustments****Diffuse, Retroreflective, and Polarized Retroreflective models (only):**

Single-turn Sensitivity (Gain) adjustment potentiometer

**Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

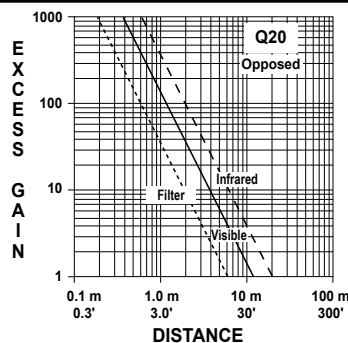
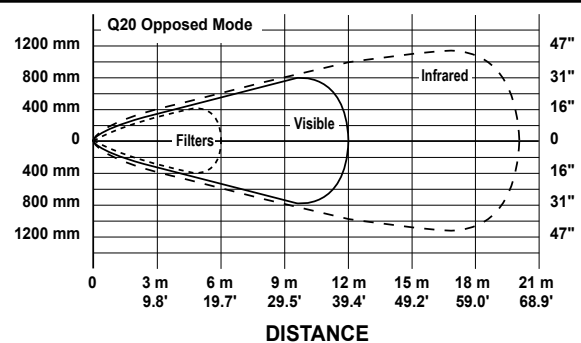
Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

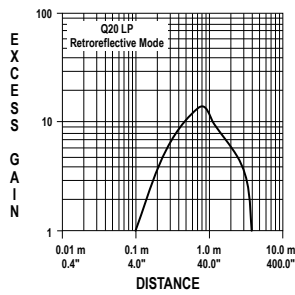
For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

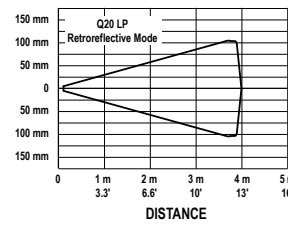
**Performance Curves****Opposed Mode Models****Excess Gain****Beam Pattern**

## Retroreflective Mode Models (based on retroreflector BRT-84)

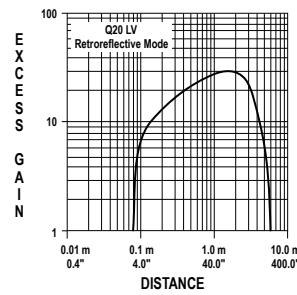
Excess Gain



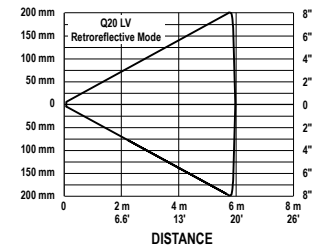
Beam Pattern



Excess Gain

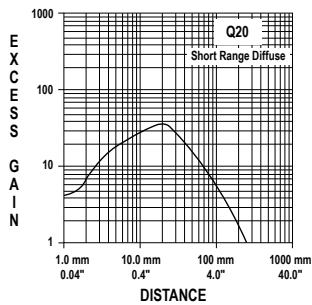


Beam Pattern

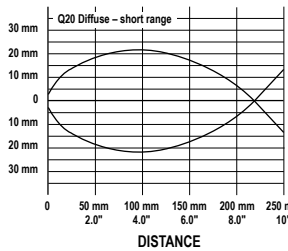


## Diffuse Mode Models (based on 90% reflectance white test card)

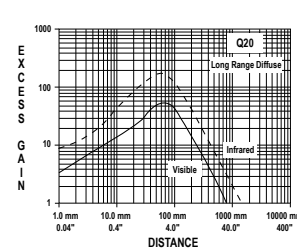
Excess Gain



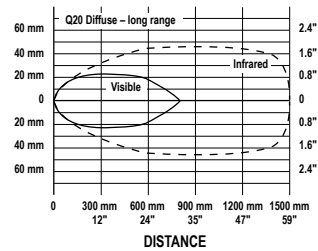
Beam Pattern



Excess Gain

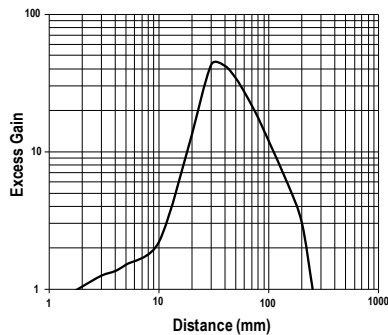


Beam Pattern

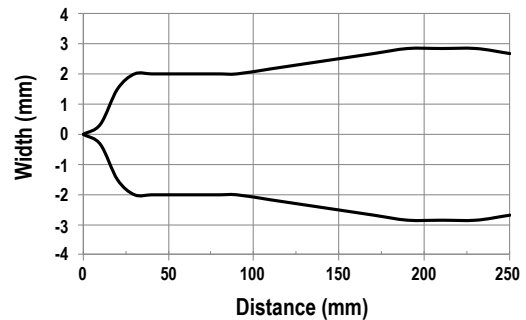


## Q20DVS Models

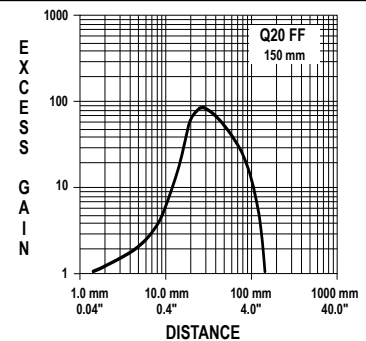
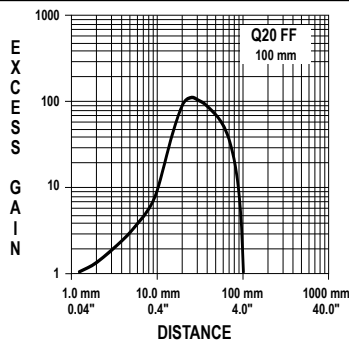
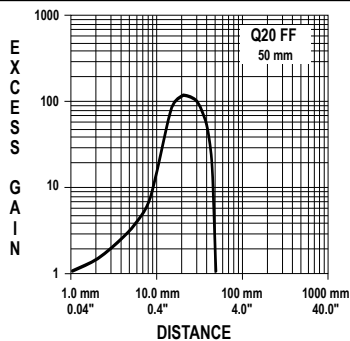
Excess Gain



Beam Pattern



## Fixed-Field Excess Gain (based on 90% reflectance white test card)



## Fixed-Field Excess Gain (based on 90% reflectance white test card)

Ø 6 mm spot size at 25 mm  
 Ø 6 mm spot size at 50 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

Ø 6 mm spot size at 50 mm

Ø 6 mm spot size at 100 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

Ø 6 mm spot size at 75 mm

Ø 9 mm spot size at 150 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

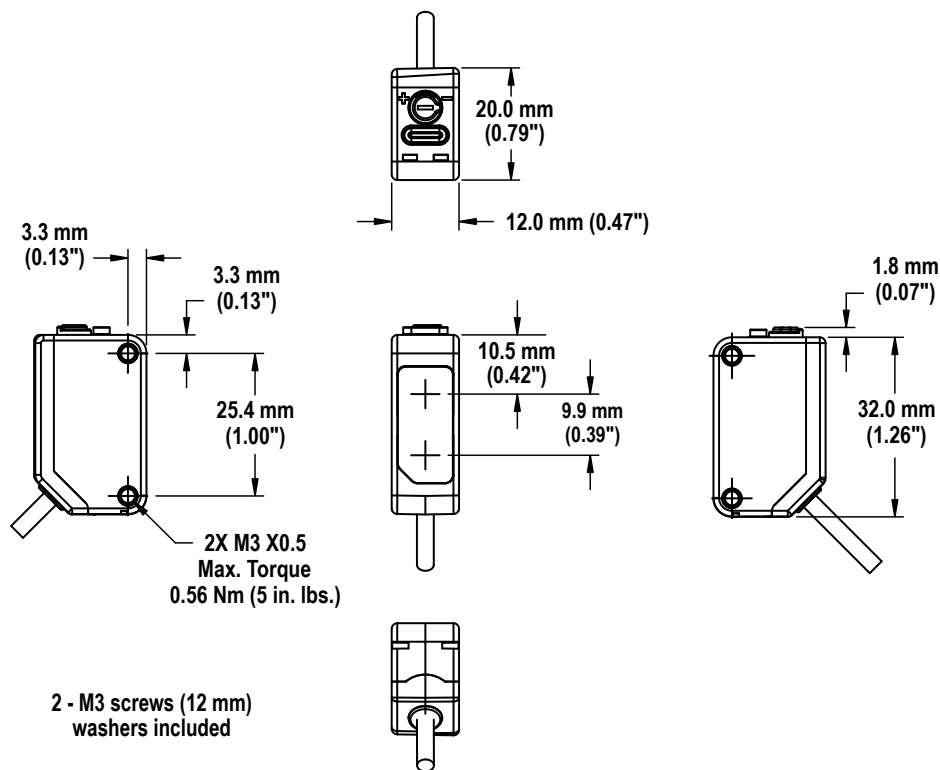
See [Accessories](#) (p. 5), the Accessories section of the current Banner catalog, or [www.bannerengineering.com](http://www.bannerengineering.com) for complete information.



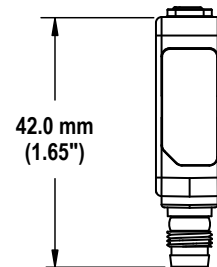
**Note:** Polarized sensors require corner cube type retroreflective targets only.

## Dimensions

## Cabled and Pigtail QD Models



## Integral QD Models

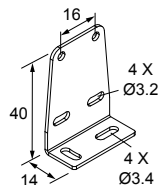


## Accessories

## Mounting Brackets

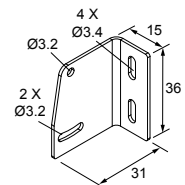
## SMBQ20L

- Sensor vertical base mount
- $\pm 5^\circ$  tip,  $\pm 7^\circ$  swivel
- Stainless steel



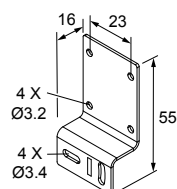
## SMBQ20LV

- Sensor vertical back mount
- $\pm 10^\circ$  tip
- Stainless steel

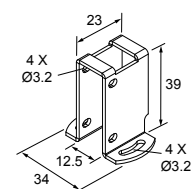


**SMBQ20H**


- Sensor horizontal flange mount
- $\pm 10^\circ$  swivel
- Stainless steel

**SMBQ20U**

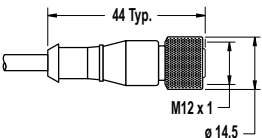
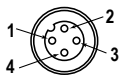
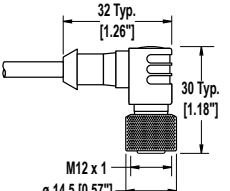
- Sensor vertical base mount with protection
- $\pm 22.5^\circ$  swivel
- Stainless steel

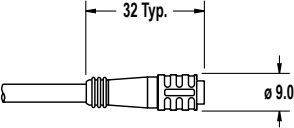
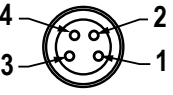
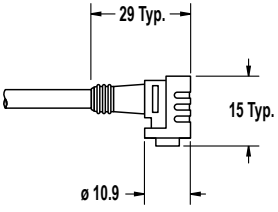


## Cross Talk Prevention Filters

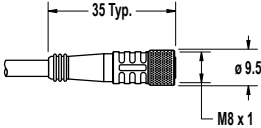

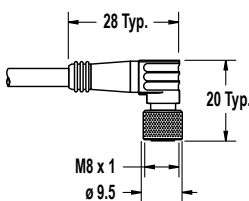
Model <sup>3</sup>	Description		Reduced Sensor Range E/R (two apertures used)	
PFQ20-H		Stainless steel (natural color)	7.5 mm (0.3 in) dia.	6.0 m (21.3 in)
PFQ20-V		Stainless steel (colorized black)		

## Quick-Disconnect (QD) Cordsets

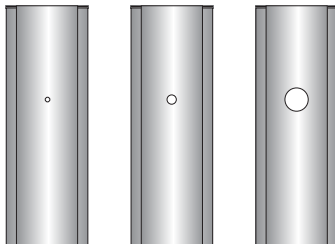
4-Pin Threaded M12/Euro-Style Cordsets—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
MQDC-406	1.83 m (6 ft)	Straight		
MQDC-415	4.57 m (15 ft)			
MQDC-430	9.14 m (30 ft)			
MQDC-450	15.2 m (50 ft)			
MQDC-406RA	1.83 m (6 ft)	Right-Angle		1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-415RA	4.57 m (15 ft)			
MQDC-430RA	9.14 m (30 ft)			
MQDC-450RA	15.2 m (50 ft)			

4-Pin Snap-on M8/Pico-Style Cordsets—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
PKG4-2	2 m (6.56 ft)	Straight		
PKW4Z-2	2 m (6.56 ft)	Right-Angle		

<sup>3</sup> For visible red models only. The "H" and "V" in the model numbers refer to the polarization of the filter material. Since they are visually identical, the "H" models have been left the natural stainless steel and the "V" models have been colored black.

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

## Apertures

Model		Reduced Sensor Range E/R (two apertures used)	Reduced Sensor Range EL/RL (two apertures used)	Description
Circular				
APQ20-0.5	0.5 mm (0.02") dia.	0.10 m (0.33 ft)	0.18 m (0.6 ft)	
APQ20-1	1 mm (0.04") dia.	0.35 m (1.14 ft)	0.66 m (2.1 ft)	
APQ20-2	2 mm (0.08") dia.	1.5 m (4.9 ft)	2.9 m (9.5 ft)	
Vertical Slot				
APQ20-0.5V	0.5 mm (0.02") dia.	1.4 m (4.6 ft)	2.3 m (7.5 ft)	
APQ20-1V	1 mm (0.04") dia.	2.8 m (9.2 ft)	4.8 m (15.7 ft)	
APQ20-2V	2 mm (0.08") dia.	5.8 m (19.0 ft)	8.6 m (28.2 ft)	
APK-Q20	Includes two of each type			

## 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.

**THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.**

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).

## FCC Part 15 and CAN ICES-3 (B)/NMB-3(B)

This device complies with part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the manufacturer.



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