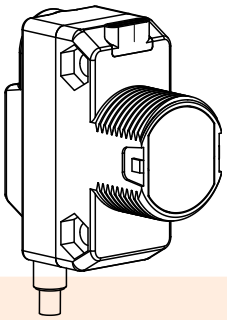
QS18 Clear Object Detection Series Sensor

Features

Cost-effective coaxial optics clear object sensor

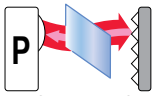
- Reliably detects clear, translucent, or opaque objects — including PET, glass containers, and transparent films
- Coaxial optics enable reliable detection of targets to the face of the sensor with no dead zone
- Simple setup and adjustment with a single-turn sensitivity adjuster
- Signal strength indicator aids in adjusting sensor sensitivity and monitoring performance
- Fast response speed with low jitter for high-speed bottling and packaging applications
- Bright, visible red light spot for easy alignment
- Convenient mounting options available for 18 mm barrel or side mount
- Bright indicator LEDs show operating status from 360°
- IP67 rated ABS housing
- Dedicated PNP or NPN output depending on model



WARNING:

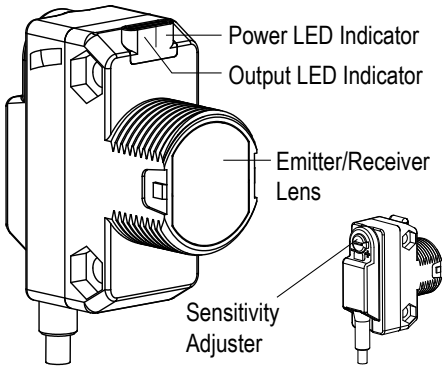
- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction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

Models

Models	Mode	Range	Output	Connector
QS18VN6XLP	COAXIAL  POLAR RETRO CLEAR OBJECT	0 to 2.0 m (0 to 6.5 ft) on BRT-60X40C 0 to 2.5 m (0 to 8.1 ft) on BRT-51X51BM 0 to 3.0 m (0 to 9.8 ft) on BRT-92X92C	NPN	2 m cable (6.5 ft)
QS18VP6XLP			PNP	

- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, QS18VN6XLP W/30.
- To order the 4-pin M12 integral quick disconnect model, add the suffix "Q8" to the model number. For example, QS18VN6XLPQ8.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12 quick disconnect, add the suffix "Q5" to the model number. For example, QS18VN6XLPQ5.
- To order the 4-pin M8 integral quick disconnect model, add the suffix "Q7" to the model number. For example, QS18VN6XLPQ7.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8 quick disconnect, add the suffix "Q" to the model number. For example, QS18VN6XLPQ.
- Models with a quick disconnect require a mating cordset.

Overview



The Banner QS18 sensor is a high-performance clear object detection sensor. The polarized coaxial optical design ensures reliable detection of transparent, translucent, and opaque targets at any distance between the sensor and the reflector. Low contrast sensing applications include PET bottles, glass containers, and transparent films. The sensor can also be used to detect optical surfaces such as LCD panels with built-in polarizing films, solar panels, and semiconductor wafers.

Original Instructions
26-Sep-24

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195634
p/n: 195634 Rev. C

Sensor Condition	Green LED	Amber LED
Output OFF (black wire)	ON	OFF
Output ON (black wire)	ON	ON
Notification — Signal strength is near the switch point and indicates a marginal sensing condition	Flashing at 5 Hz	Can be ON or OFF
Power ON	ON	—

Installing and Mounting the Sensor for Low Contrast Applications

Reliable transparent object detection depends on the sensor always detecting the object as "dark state" and the reflector as the "light state". Using a recommended reflector, and proper orientation of the sensor to the reflector, is key to good clear object detection. Optimize the reliable detection of transparent and clear objects by applying the following steps when mounting the sensor and selecting a retroreflective target.

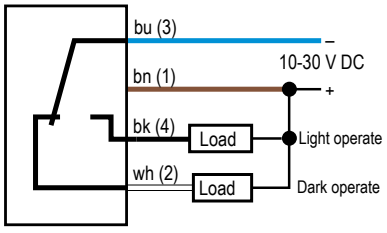
1. If a bracket is needed, mount the sensor onto the bracket.
2. Mount the sensor (or the sensor and the bracket) to the equipment at the desired location. Do not tighten at this time.
3. Align the sensor's light spot to the middle of the retroreflector.
4. Mount the retroreflector perpendicular to the sensor optical axis (± 5°).
5. Tighten the screws to secure the sensor (or the sensor and the bracket) to the aligned position.

Mounting Considerations for Opaque Objects with Mirror Like Surfaces

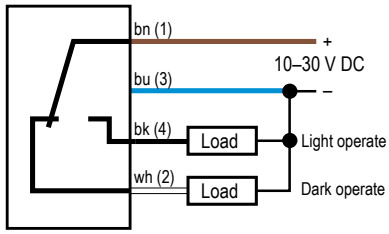
To minimize the potential for reflections from mirror like objects affecting the sensor, it is best to side mount the sensor.

Wiring Diagrams

NPN

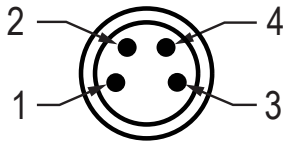


PNP

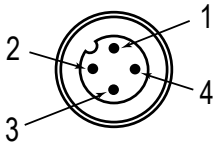


1. Brown
2. White
3. Blue
4. Black

4-pin M8 Male



4-pin M12 Male



In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/taught target.

In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target.

In **retroreflective** sensing modes, light operate is active when the beam is unblocked and dark operate is active when the beam is blocked.

Sensor Sensitivity Adjustment

After the sensor and retroreflector have been properly installed, the sensor is ready to be adjusted to ensure detection of the desired object. Sensor sensitivity is adjusted with the single turn adjuster.

Sensor Sensitivity Adjustment for Transparent Object Detection

To adjust the sensor sensitivity to detect transparent objects, follow these steps:

1. Ensure there is nothing obstructing the optical path between the sensor and retroreflector.
2. Turn the sensitivity adjuster counterclockwise to the adjuster stop position.
3. Slowly rotate the sensitivity adjuster clockwise until the Green LED starts flashing and the Amber LED turns off.

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4. Continue to turn the sensitivity adjuster clockwise until the Green LED stops flashing.
5. At this point the sensor is set to detect low contrast glass and plastic containers.
6. Check to make sure that the sensor can now reliably detect the transparent target.

This level of adjustment should work for most transparent object detection applications. For more demanding applications, the sensor can be adjusted closer to the switch point.

Sensor Sensitivity Adjustment for Opaque Object Detection

To adjust the sensor sensitivity to detect objects that are completely opaque, follow these steps:

1. Ensure there is nothing obstructing the optical path between the sensor and retroreflector.
2. Turn the sensitivity adjuster clockwise to the adjuster stop position. The amber LED should be off.
3. Place the opaque object between the sensor and the reflector.
4. Turn the sensitivity adjuster counterclockwise until the amber LED turns on and the green LED is on solid.
5. Check to make sure the sensor can reliably detect the opaque object.

If the sensor cannot reliably detect the object, use the procedure specified above for transparent object detection.

Specifications

Supply Voltage
10 V to 30 V DC (10% maximum ripple) within specified limits

Supply Current (Exclusive of Load Current)
< 25 mA

Repeatability
100 µs

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Output Protection Circuitry
Protected against false pulse on power-up and continuous overload or short-circuit

Output Configuration
Current sourcing (PNP) or current sinking (NPN), depending on model
Rating: 100 mA maximum
OFF-State leakage current: < 50 µA at 30 V
ON-state saturation voltage: < 1.5 V at 10 mA; < 3 V 100 mA

Output Response Time
Note: Momentary delay on power-up; output does not conduct during this time
400 µs ON/OFF

Emitter LED
Visible red, 625 nm

Indicators
Two LEDs (1 green, 1 amber)
Green solid: Indicates power is applied and the sensor is ready
Green flashing: Indicates the sensor is operating near the switch point
Amber solid: Indicates output conducting

Mounting Torque
Barrel mount: 18 mm mounting nut, 20 lbf·in (2.3 N·m)
Side mount: Two M3 screws, 5 lbf·in (0.6 N·m)

Construction
ABS housing, PMMA window

Connections
PVC-jacketed 4-conductor 2 m (6.5 ft) or 9 m (30 ft) unterminated cable, or 4-pin Euro-style or 4-pin Pico-style quick-disconnect, either integral or 150 mm (6 in) cabled, are available. Quick disconnect cordsets are ordered separately.

Operating Conditions
Temperature: –40 °C to +70 °C (–40 °F to +158 °F)
Humidity: 95% at +50 °C maximum relative humidity (non-condensing)

Environmental
IP67; NEMA 6

Adjustments
Single-turn sensitivity adjustment

Application Notes
Reflectors with micro-prism geometry, such as the BRT-51X51BM, are recommended for demanding transparent object detection applications.
Retroreflective tape is not recommended for transparent object detection applications.

Certifications

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GREAT BRITAIN

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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.

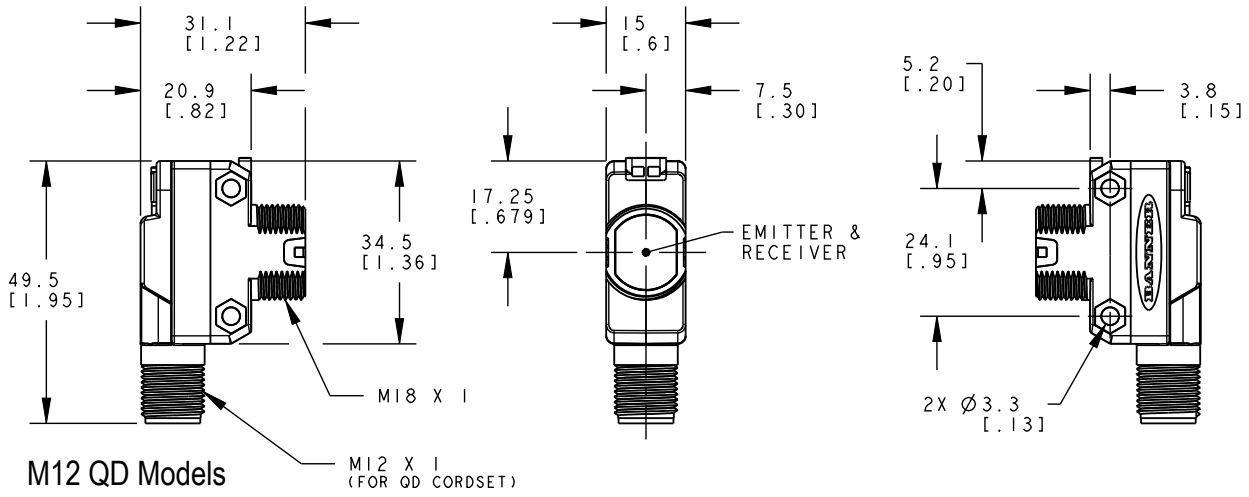
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

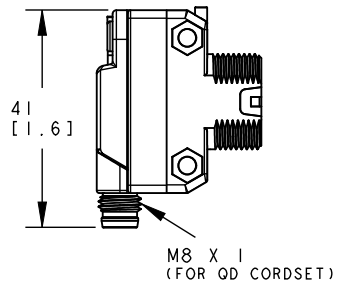
Supply wiring leads < 24 AWG shall not be spliced.

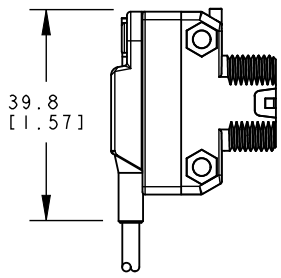
For additional product support, go to www.bannerengineering.com.

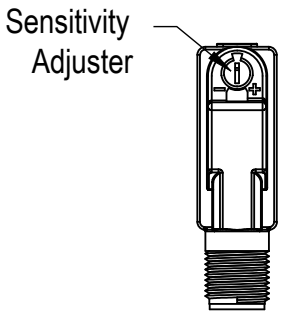
Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	1.0	30	0.5

Dimensions









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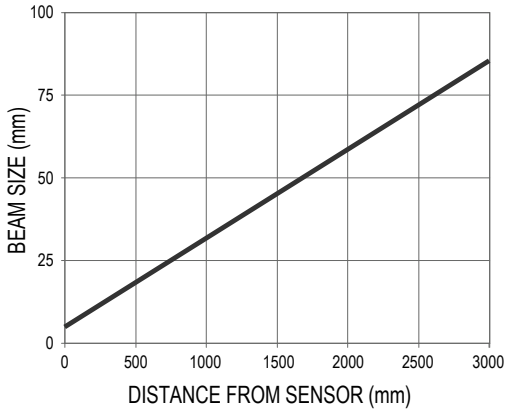
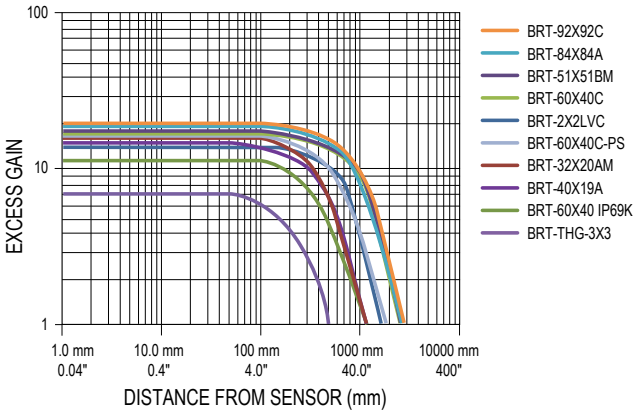
Performance Curves

Spot size vs. distance



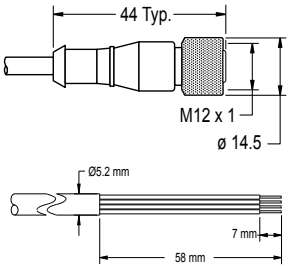
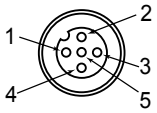
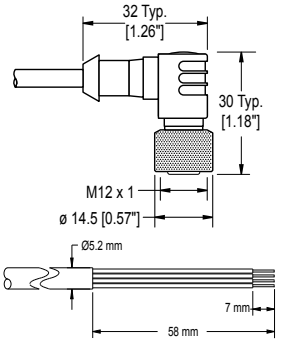
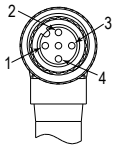
Excess gain



Accessories

Cordsets

Use the M12 cordsets with the QS18 models with an M12 quick disconnect connector. Use the M8 cordsets with the QS18 models with an M8 QD.

4-Pin Single-Ended M12 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-406	2 m (6.56 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				
MQDC-406RA	2 m (6.56 ft)	Right-Angle			
MQDC-415RA	5 m (16.4 ft)				
MQDC-430RA	9 m (29.5 ft)				
MQDC-450RA	15 m (49.2 ft)				

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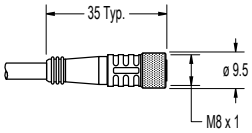
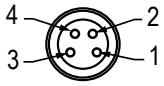
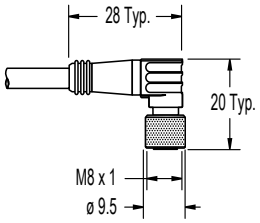
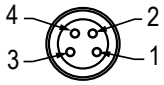
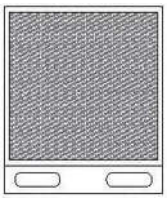
4-Pin Single-Ended M8 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
PKG4M-2	2 m (6.56 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black
PKG4M-5	5 m (16.4 ft)				
PKG4M-9	9 m (29.52 ft)				
PKW4M-2	2 m (6.56 ft)	Right Angle			
PKW4M-5	5 m (16.4 ft)				
PKW4M-9	9 m (29.5 ft)				

Retroreflectors

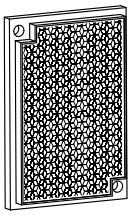
BRT-51X51BM

- Square, acrylic target
- Reflectivity Factor: 1.5
- Temperature:
- Micro-prism geometry
- Optional brackets are available
- Approximate size: 51 mm × 51 mm



BRT-60X40C

- Rectangular, acrylic target
- Reflectivity Factor: 1.4
- Temperature:
- Optional brackets are available
- Approximate size: 40 mm × 60 mm



BRT-92X92C

- Square, acrylic target
- Reflectivity Factor: 3.0
- Temperature:
- Optional brackets are available
- Approximate size: 92 mm × 92 mm



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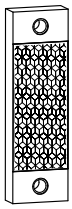
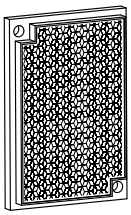
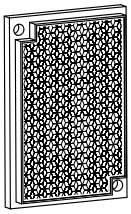
BRT-40X19A
- Rectangular, acrylic target
- Reflectivity Factor: 1.3
- Temperature:
- Approximate size: 19 mm × 60 mm overall; 19 mm × 40 mm reflector



BRT-60X40IP69K
- Rectangular, acrylic target (color is amber)
- Reflectivity Factor: 0.7
- Temperature: –20 °C to +140 °C (–4 °F to +284 °F)
- Chemically resistant
- IP69K washdown rated
- Optional brackets are available
- Approximate size: 40 mm × 60 mm



BRT-60X40C-PS
- Rectangular, polystyrene target
- Reflectivity Factor: 1.1
- Temperature:
- Optional brackets are available
- Chemically compatible with hydrogen peroxide
- Yellow back
- Approximate size: 40 mm × 60 mm



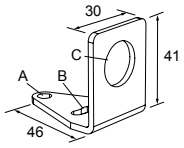
2-inch retroreflective tape, 2.5 m (100 in)

Model	Reflectivity Factor	Maximum Temperature	Size
BRT-THG-2-100	0.7	+60 °C (+140 °F)	50 mm (2 in) wide, 2.5 m (100 in) long

Brackets

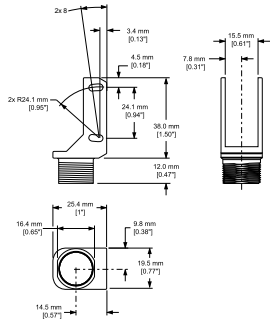
SMB18A
- Right-angle mounting bracket with a curved slot for versatile orientation
- 12-ga. stainless steel
- 18 mm sensor mounting hole
- Clearance for M4 (#8) hardware

Hole center spacing: A to B = 24.2
Hole size: A = ø 4.6, B = 17.0 × 4.6, C = ø 18.5



SMBQS18Y
- Die-cast bracket for 18 mm holes
- Includes metal hex nut and lock washer
- Allows ± 8° for cabled sensors

Hole size: A = ø 15.3



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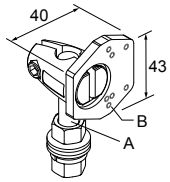
SMBQ4X..

- Swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- Metric and inch size bolts are available
- Side mounting of some sensors with the 3 mm screws included with the sensor

B = 7 × M3 × 0.5
Bolt thread (A): 3/8 - 16 × 2¼ in for SMBQ4XFA; M10 - 1.5 × 50 for SMBQ4XFAM10; n/a; no bolt included. Mounts directly to 12 mm (½ in) rods for SMBQ4XFMA1



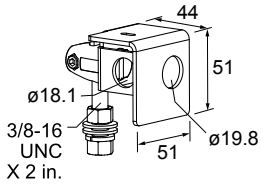
SMB18AFA..

- Protective, swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- Metric and inch size bolts available
- Mounting hole for 18 mm sensors

Hole size: B = ø 18.1

Bolt Thread (A):

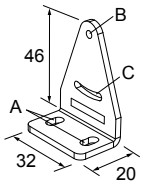
SMB18AFA = 3/8 - 16 × 2 in
SMB18AFAM10 = M10 - 1.5 × 50



SMB312S

- Stainless steel 2-axis, side-mount bracket

A = 4.3 × 7.5, B = diam. 3, C = 3 × 15.3



Product Support and Maintenance

Clean with Compressed Air Then Isopropyl Alcohol

Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. may create stray light that may degrade the peak performance of the sensor. Blow dust from the sensor using filtered, compressed air. If the sensor is still dirty, gently wipe the sensor with a dry optical cloth. If the dry optical cloth does not remove all residue, use 70% isopropyl alcohol on a clean optical cloth, then dry with a clean dry optical cloth and blow with filtered, compressed air.

Contact Us

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For worldwide locations and local representatives, visit www.bannerengineering.com.

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