Quick Start Guide

Expert™ Coaxial Polarized Retroreflective Sensor for Clear Object Detection

This guide is designed to help you set up and install the QS18 Clear Object Detection. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at www.bannerengineering.com. Search for p/n 194469 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

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.

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 shrink wrap. The sensor can also be used to detect optical surfaces such as: LCD panels with built in polarizing films, solar panels, and semiconductor wafers.

Indicators (Two LEDs: One Green, One Amber)

<table>
<thead>
<tr>
<th>Sensor Condition (Run Mode)</th>
<th>Green LED</th>
<th>Amber LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Output ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Notification — Sensor needs to be reconfigured for reliable detection</td>
<td>Flashing at 5 Hz</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Notification — Push button has been locked out</td>
<td>Flashes 4 times and returns to solid on</td>
<td>ON/OFF</td>
</tr>
</tbody>
</table>

Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Mode</th>
<th>Range</th>
<th>Output</th>
<th>Connector</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>QS18EN6XLPC</td>
<td></td>
<td>0 to 1.3 m (0 to 4.2 ft) on BRT-40X19A</td>
<td>NPN</td>
<td>2 m cable (6.5 ft)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 2.0 m (0 to 6.5 ft) on BRT-51X51BM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0 to 3.0 m (0 to 9.8 ft) on BRT-92X92C</td>
<td>PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QS18EP6XLPC</td>
<td>P</td>
<td>Polar retro clear object</td>
<td></td>
<td>2 m cable (6.5 ft)</td>
<td></td>
</tr>
</tbody>
</table>

The standard 2 m (6.5 ft) cable models are listed.

- To order the 9 m (30 ft) cable models, add the suffix “W/30” to the cabled model number (for example QS18EN6XLPC W/30)
- To order the 4 pin Euro M12 integral connector, add the suffix “Q8” (for example QS18EN6XLPCQ8)
- To order the 4 pin Euro M12 150 mm (6 inch) cable, add the suffix “Q5” (for example QS18EN6XLPCQ5)
- To order a 4 pin Pico M8 integral connector, add the suffix “Q7” (for example QS18EN6XLPCQ7)
- To order a 4 pin Pico M8 150 mm (6 inch) cable, add the suffix “Q” (for example QS18EN6XLPCQ)
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

![Wiring Diagrams for NPN and PNP Models](image)

Sensor Configuration

Sensor configuration can be implemented with the push button or the remote program wire. Configuration options include two sensing modes: LIGHT SET and DARK SET. For configuration using the push button see Figure 1 on page 2. For configuration using the remote program wire, please refer to the Instruction Manual at [http://www.bannerengineering.com](http://www.bannerengineering.com). Search for p/n 194469 to view the Instruction Manual.

![Sensor Push Button Configuration](image)

![User Interface Push Button Configuration](image)

Figure 1. Push Button Input Flowchart
Light Set

Use Light SET for low contrast applications. Use either the push button or remote input wire procedure to configure the sensor.

<table>
<thead>
<tr>
<th>Example Applications For Offset Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>8%</td>
</tr>
<tr>
<td>16%</td>
</tr>
<tr>
<td>32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1: LIGHT SET Push Button Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
</tr>
</tbody>
</table>
| Clear the light path to the reflector. | Press and hold the push button 2 to 4 seconds. | LIGHT SET Configuration Accepted  
- Green LED Indicator: Flashes 3 times.  
- Green and Amber LED Indicators: Acceptance flash - both LEDs flash 5 times rapidly in unison.  
  The sensor returns to Run mode with the new settings.  
LIGHT SET Configuration Not Accepted  
If there is not enough return signal, the sensor will perform in DARK SET indicated by the green and amber LED indicators flashing in unison 2 times followed by the green and amber LED indicators flashing rapidly in unison 5 times. |

Dark Set

Dark SET (maximum operating range) is the factory default setting and provides maximum sensing range, ease of alignment, and reliable detection of opaque objects. Dark Set provides a fixed threshold whenever the sensor is taught an obstructed view.

**Note:** The sensor’s light spot is made brighter for 60 seconds to assist in aligning the sensor to the reflector. This is particularly useful for long range applications.

<table>
<thead>
<tr>
<th>Table 2: DARK SET Push Button Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
</tr>
</tbody>
</table>
| Block the light path to the reflector. | Press and hold the push button 2 to 4 seconds. | DARK SET Configuration Accepted  
- Green and Amber LED Indicators: Flash 2 times.  
- Green and Amber LED Indicators: Acceptance flash - both LEDs flash 5 times rapidly in unison.  
  The sensor returns to Run mode with the new settings.  
DARK SET Configuration Not Accepted  
If there is too much return signal, the sensor will perform in LIGHT SET indicated by the green LED indicator flashing 3 times followed by the green and amber LED indicators flashing rapidly in unison 5 times. |
Specifications

Supply Voltage
10 V to 30 V dc (10% maximum ripple)

Supply Current (Exclusive of Load Current)
< 25 mA at 15 V
< 40 mA at 24 V

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 of output

Output Configuration
Current sourcing (PNP) or current sinking (NPN), depending on model; Light- or dark-operate selectable; Selectable 30 ms output OFF-delay
Rate: 100 mA max
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

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.

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

### Supply Wiring (AWG) vs Required Overcurrent Protection (Amps)

<table>
<thead>
<tr>
<th>Supply Wiring (AWG)</th>
<th>Required Overcurrent Protection (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5.0</td>
</tr>
<tr>
<td>22</td>
<td>3.0</td>
</tr>
<tr>
<td>24</td>
<td>2.0</td>
</tr>
<tr>
<td>26</td>
<td>1.0</td>
</tr>
<tr>
<td>28</td>
<td>0.8</td>
</tr>
<tr>
<td>30</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Emitter LED
Visible red, 625 nm

Indicators
Two LEDs (1 green, 1 amber)
Green solid: Indicates power applied and sensor ready
Green flashing: Indicates sensor operating in marginal state, in need of reconfiguration
Amber solid: Indicates output conducting

Factory Default Settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Factory Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing Mode</td>
<td>Dark Set</td>
</tr>
<tr>
<td>Output Logic</td>
<td>Dark Operate</td>
</tr>
<tr>
<td>Offset Percent</td>
<td>16%</td>
</tr>
<tr>
<td>Push Button</td>
<td>Unlocked</td>
</tr>
<tr>
<td>Auto Compensation</td>
<td>Disabled</td>
</tr>
<tr>
<td>OFF Delay</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

Mounting Torque
Nose 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 (QD), either integral or 150 mm (6 in) pigtail, are available. QD cordsets are ordered separately.

Operating Conditions
Temperature: –40 °C to +70 °C (–40 °F to +158 °F)
Relative Humidity: 90% at +50 °C (non-condensing)

Environmental
IEC IP67

Application Notes
If the push button does not appear to be responsive, perform the push button enable procedure

Certifications

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