Quick Start Guide

_Expert™ Sensor with IO-Link_

This guide is designed to help you set up and install the QS18 Expert with IO-Link. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at [www.bannerengineering.com](http://www.bannerengineering.com). Search for p/n 196872 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

**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.

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### Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing Mode</th>
<th>Range</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS18EK6LPQ8</td>
<td>POLAR RETRO</td>
<td>3.5 m (12 ft)</td>
<td></td>
</tr>
<tr>
<td>QS18EK6DQ8</td>
<td>DIFFUSE</td>
<td>800 mm (31.5 in)</td>
<td></td>
</tr>
<tr>
<td>QS18EK6DVQ8</td>
<td>DIFFUSE</td>
<td>600 mm (23.6 in)</td>
<td>IO-Link push/pull output and multi-function input/output</td>
</tr>
<tr>
<td>QS18EK6CV15Q8</td>
<td>CONVERGENT</td>
<td>16 mm (0.65 in)</td>
<td></td>
</tr>
<tr>
<td>QS18EK6CV45Q8</td>
<td>PLASTIC FIBER</td>
<td>43 mm (1.7 in)</td>
<td></td>
</tr>
<tr>
<td>QS18EK6FPQ8</td>
<td>Varies by mode and fiber optics used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1. 4-Pin M12/Euro-style integral quick disconnect models listed.
   - To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, replace the suffix "Q8" with "Q5" in the model number. For example, QS18EK6LPQ5.
   - To order the 4-in M8/Pico-style integral quick disconnect model, replace the suffix "Q8" with "Q7" in the model number. For example, QS18EK6LPQ7.
   - To order the 150 mm (6 in) PVC cable model with a 4-Pin M8/Pico-style quick disconnect model, replace the suffix "Q8" with "Q" in the model number. For example, QS18EK6LPQ.
   - Models with a quick disconnect require a mating cordset.

2. With the use of a BRT-84 reflector.

3. Based on 90% reflectance white test card.
Overview

The Banner QS18E sensor is a high performance photoelectric sensor with IO-link and configurable multifunction input/output.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Green LED</th>
<th>Amber LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Condition (Run Mode)</td>
<td>ON</td>
<td>OFF</td>
</tr>
<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</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Notification—Push button has been locked out</td>
<td></td>
<td>ON/OFF</td>
</tr>
</tbody>
</table>

Wiring Diagrams

IO-Link with PNP Output (Factory Default)

- bk (4)
- bn (1)
- bu (3)
- wh (2)

Figure 1. Channel 1 = IO-Link, Channel 2 = PNP Output

IO-Link with PNP Remote Input

- 10-30V dc
- Remote Input

Figure 2. Channel 1 = IO-Link, Channel 2 = PNP Remote Input

Key

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

Mount the Device

1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.
3. Check the device alignment.
4. Tighten the mounting screws to secure the device (or the device and the bracket) in the aligned position.

Sensor Configuration

Configure the sensor using the TEACH or SET methods to define the sensing limits. Use the setup procedure to enable a 30 ms OFF-delay or to change the Light/Dark Operate setting.

Sensing limit configuration options include:
- Two-Point Static TEACH: One switching threshold, determined by two taught conditions
- Dynamic TEACH: One switching threshold, determined by multiple sampled conditions
- Window SET: A sensing window, centered around a single sensing condition
- Light SET and Dark SET: One switching threshold, offset from a single sensing condition

The sensor’s output is disabled during all TEACH and SET procedures, and is enabled upon return to Run mode. Following any TEACH or SET procedure other than Two-Point Static TEACH, the Output ON condition (Light or Dark Operate setting) remains as it was last configured. To change that setting, or the OFF-delay setting, see Figure 5 on p. 3.

Push Button Configuration

Use the push button to configure the sensor. Click the push button according to the Input Flowchart.
Remote Input Configuration

The remote input wire is disabled by default. Enable the remote input wire using IO-Link. Use the remote input function to configure the sensor remotely. Connect the white wire of the sensor as shown in the wiring diagram. Pulse the remote line according to the Input Flowchart.

**Remote Input Wire**

*Configuration using remote input wire is disabled by default and can be enabled through IO-Link*

- 1x Remote Input Wire
  - Starts Selected Teach and Teaches First Target Condition (same function as holding Teach Button for > 2 sec)
  - Teaches Second Target Condition (2-Point Static and Dynamic Teach only)

**Basic Configuration** (alternating flashing Green and Amber LEDs at 1Hz)

- 1x Remote Input Wire
  - Configure output to Light Operate (flashing Green and Amber 1X followed by acceptance flash) default for D, DV, CV and FP models
  - Configure output to Dark Operate (flashing Green and Amber 2X followed by acceptance flash) default for LP models
  - Configure offset percentage to 10% (flashing Green and Amber 3X followed by acceptance flash)
  - Configure offset percentage to 30% (flashing Green and Amber 4X followed by acceptance flash) default
  - Configure offset percentage to 50% (flashing Green and Amber 5X followed by acceptance flash)

**Advanced Configuration** (simultaneous flashing both Green and Amber LEDs at 1Hz)

- 1x Remote Input Wire
  - Unlock push buttons (flashing Green and Amber 1X followed by acceptance flash) default
  - Lock push buttons (flashing Green and Amber 2X followed by acceptance flash)
  - Enable Auto compensation (flashing Green and Amber 3X followed by acceptance flash) default
  - Disable Auto compensation (flashing Green and Amber 4X followed by acceptance flash)
  - Enable 30 ms Off Delay (flashing Green and Amber 5X followed by acceptance flash)
  - Disable 30 ms Off Delay (flashing Green and Amber 6X followed by acceptance flash) default

**Toggle TEACH Button Lock/Unlock** (flashing both Green and Amber LEDs 4X followed by acceptance flash)

- 4x Remote Input Wire
  - Remote Input Wire only.

**Select TEACH/SET Method** (flashing Amber LED at 1Hz)

- Select 2-Point Static TEACH default for D, DV, CV and FP models
  - Select Dynamic TEACH
  - Select Window SET
  - Select Light SET default for LP models
  - Select Dark SET

**Reset to Factory Defaults** (flashing both Green and Amber LEDs 8X followed by acceptance flash)

- 8x Remote Input Wire
  - Remote Input Wire only. Using Push Button will not reset sensor to factory defaults.

**Note:** Reconfiguration is required before a new TEACH/SET method takes effect.

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**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 QS18E’s IO-Link IODD package (p/n 199851) 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 QS18E, 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 AOs**—These files can be used alone, without the need for any other IO-Link AOs. The job of a Process Data AOI is to intelligently parse out the Process Data words 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 AOs**—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 AOs**—These files require the use of one or more associated Parameter Data AOs. 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.
Specifications

**Supply Voltage and Current**
10 V dc to 30 V dc (10% maximum ripple within specified limits) at 30 mA

**Supply Protection Circuity**
Protected against reverse polarity and transient overvoltages

**Output Protection Circuity**
Protected against false pulse on power-up and continuous overload or short-circuit of output

**Output Configuration**
Channel 1: IO-Link, Push/pull output, configurable PNP or NPN output
Channel 2: Multi-function remote input/output, configurable PNP or NPN

**Output Response Time**
Momentary delay on power-up, < 0.5 s, output does not conduct during this time
1 millisecond ON & OFF for standard response time
2 milliseconds ON & 1 millisecond OFF for robust response time

**Repeatability**
140 microseconds for high speed
175 microseconds for standard and robust

**IO-Link Interface**
 Supports Smart Sensor Profile: Yes

**Supply Wiring (AWG)**

<table>
<thead>
<tr>
<th>Supply Wiring (AWG)</th>
<th>Required Overcurrent Protection (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.0</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>

**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.

**Emitter LED**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV, CV, FP, and LP: Visible red, 625 nm</td>
<td></td>
</tr>
<tr>
<td>D models: Infrared, 940 nm</td>
<td></td>
</tr>
</tbody>
</table>

**Indicators**

- Two LEDs (1 green, 1 amber)
- Green: On indicates power applied and sensor ready
- Green Flashing: Indicates sensor operating in marginal state, in need of reconfiguration
- Amber: On indicates output conducting

**Factory Default Settings**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Factory Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEACH/SET</td>
<td>D, CV, and FP Models: Two-point Static TEACH</td>
</tr>
<tr>
<td>Output Logic</td>
<td>D, CV, and FP Models: Light Operate</td>
</tr>
<tr>
<td>Output Response Time</td>
<td>Standard</td>
</tr>
<tr>
<td>Offset Percentage</td>
<td>30%</td>
</tr>
<tr>
<td>Push Button</td>
<td>Unlocked</td>
</tr>
<tr>
<td>Auto Compensation</td>
<td>Enabled</td>
</tr>
<tr>
<td>Off Delay</td>
<td>Disabled</td>
</tr>
<tr>
<td>Pin 4 Output</td>
<td>IO-Link Enabled Detection Output (Push-pull)</td>
</tr>
<tr>
<td>Pin 2 Output</td>
<td>Detection Output: High-speed output when using IO-Link on Pin 4</td>
</tr>
</tbody>
</table>

**Construction**

Housing: ABS

Window: PMMA

Mounting Torque

<table>
<thead>
<tr>
<th>Mounting Torque</th>
<th>Nose Mount: 18 mm mounting nut, 20 lb-in (2.3 N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Side Mount: Two M3 screws, 5 lb-in (0.6 N·m)</td>
</tr>
</tbody>
</table>

**Connections**

PVC-jacketed 4-conductor 2 m (6.5 ft) or 9 m (30 ft) unterminated cable, or 4-pin M12/Euro-style or 4-pin M8/Pico-style quick-disconnect, either integral or 150 mm (6 in) cable, are available.

Models with a quick disconnect require a mating cordset.

**Operating Conditions**

- 40 °C to +70 °C (–40 °F to +158 °F)
- 85% at +50 °C maximum relative humidity (non-condensing)

**Environmental Rating**

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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