

## Quick Start Guide

Expert™ Sensor with IO-Link


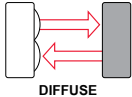
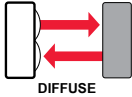
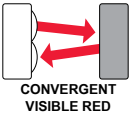
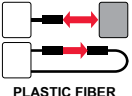
This guide is designed to help you set up and install the QS18 Expert with IO-Link. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at [www.bannerengineering.com](http://www.bannerengineering.com). Search for p/n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

## Models

Model <sup>1</sup>	Sensing Mode	Range	Output
QS18EK6LPQ8	 POLAR RETRO	3.5 m (12 ft) <sup>2</sup>	IO-Link push/pull output and multi-function input/output
QS18EK6DQ8	 DIFFUSE	800 mm (31.5 in) <sup>3</sup>	
QS18EK6DVQ8	 DIFFUSE	600 mm (23.6 in) <sup>3</sup>	
QS18EKCV15Q8	 CONVERGENT VISIBLE RED	16 mm (0.65 in) <sup>3</sup>	
QS18EK6CV45Q8		43 mm (1.7 in) <sup>3</sup>	
QS18EK6FPQ8	 PLASTIC FIBER	Varies by mode and fiber optics used	

## Overview

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

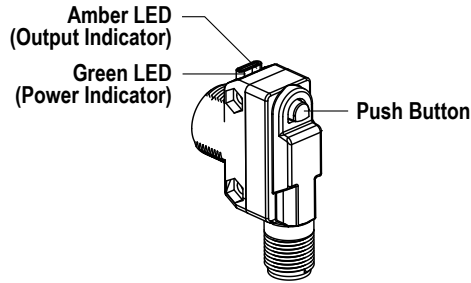
<sup>1</sup> 4-Pin M12/Euro-style integral quick disconnect models listed.

- 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.

<sup>2</sup> With the use of a BRT-84 reflector.

<sup>3</sup> Based on 90% reflectance white test card.





Sensor Condition (Run Mode)	Green LED	Amber LED
Output OFF	ON	OFF
Output ON	ON	ON
Notification—Sensor needs to be reconfigured for reliable detection	Flashing	ON/OFF
Notification—Push button has been locked out	Flashes four times and returns to solid On after button press	ON/OFF

## Wiring Diagrams

Figure 1. Channel 1 = IO-Link, Channel 2 = PNP Output (factory default)

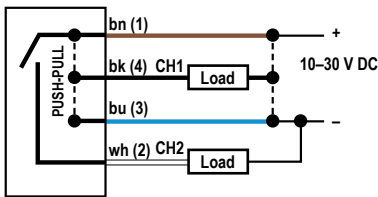
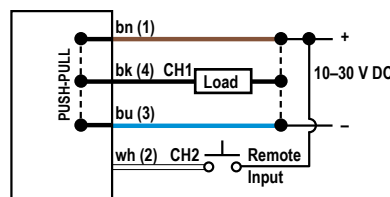


Figure 2. Channel 1 = IO-Link, Channel 2 = PNP Remote Input



**Key**

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



**Note:** NPN/PNP and Remote Input configurations are programmable using IO-Link.



**Note:** Enable the remote input wire function using IO-Link. The default for the remote input wire function is Detection Output.

Figure 3. Sensor Pinout M12/Euro-style Models (Male)

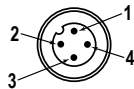


Figure 4. Sensor Pinout M8/Pico-Style Models (Male)



## 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.

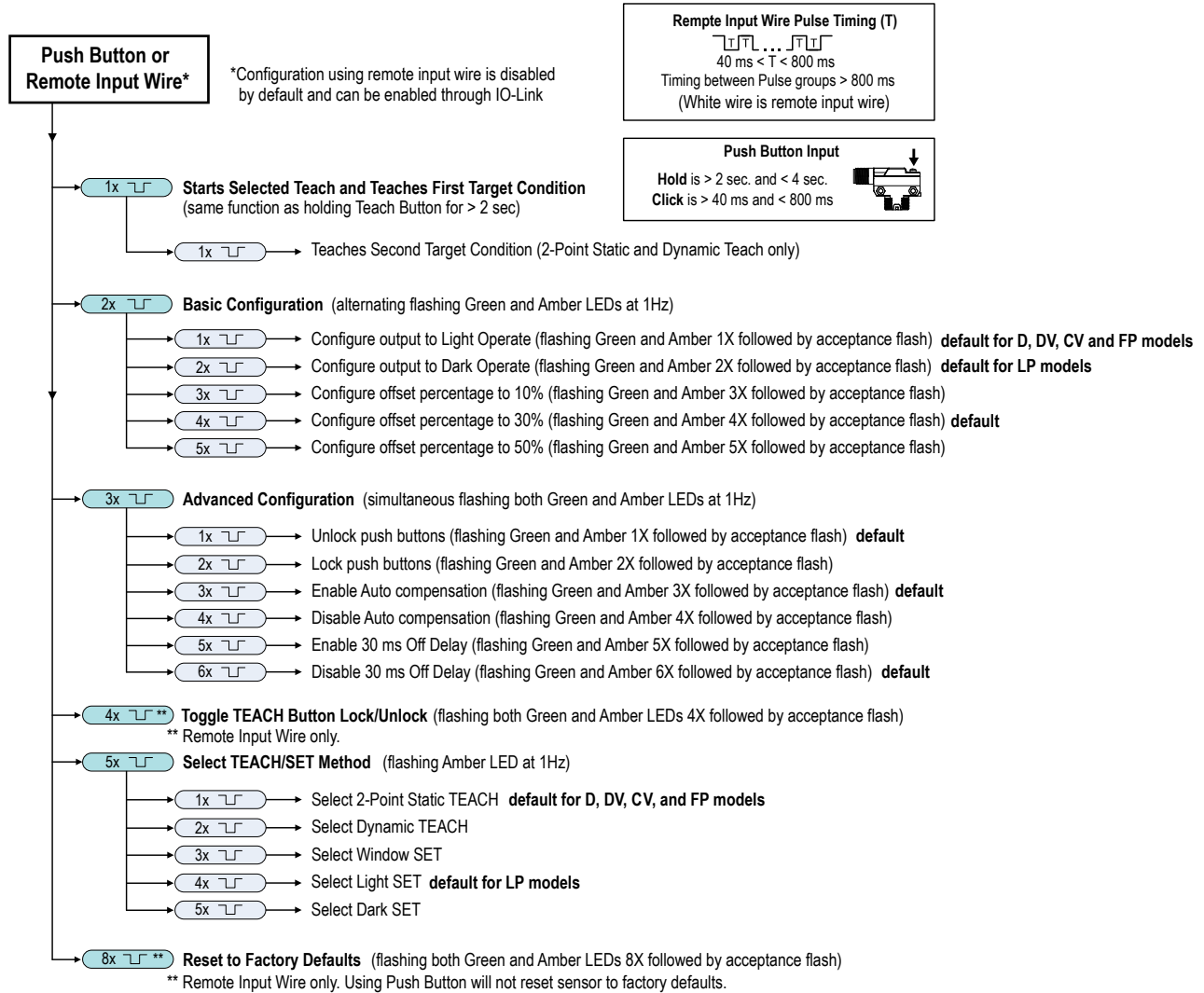
### Push Button Configuration

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.

Figure 5. Input Flowchart



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

## 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 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 and Current

10 V DC to 30 V DC (10% maximum ripple within specified limits) at 30 mA

### Supply Protection Circuitry

Protected against reverse polarity and transient overvoltages

### Output Protection Circuitry

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  
 Rating: 50 mA maximum each output at 25 °C

### Output Response Time

Momentary delay on power-up, < 0.5 s, output does not conduct during this time  
 350 microseconds ON & OFF for high speed response time  
 1 millisecond ON & OFF for standard response time  
 2 millisecond 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  
**Baud Rate:** 38400 bps  
**Process Data Widths:** 32 bits In, 8 bits Out  
**IODD Files:** Provides all programming options of push button and remote input wire, plus additional functionality. See the IO-Link Data Reference Guide for more details.

### Emitter LED

DV, CV, FP, and LP: Visible red, 625 nm  
 D models: Infrared, 940 nm

### 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

Setting	Factory Default
TEACH/SET	D, DV, CV, and FP Models: Two-point Static TEACH LP Models: Light SET
Output Logic	D, DV, CV, and FP Models: Light Operate LP Models: Dark Operate
Output Response Time	Standard
Offset Percentage	30%
Push Button	Unlocked
Auto Compensation	Enabled
OFF Delay	Disabled
Pin 4 Output	IO-Link Enabled Detection Output (Push-pull)
Pin 2 Output	Detection Output: High-speed output when using IO-Link on Pin 4

### 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

### Construction

Housing: ABS  
 Window: PMMA

### 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)

### 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)  
 95% 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



## 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.

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