QS18E Expert Opposed-Mode with IO-Link Quick Start Guide

Features

Expert™ Opposed-Mode Sensor with IO-Link

This guide is designed to help you set up and install the WORLD-BEAM QS18E Expert Opposed-Mode Sensor with IO-Link. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Product Manual at www.bannerengineering.com. Search for part number 196872 to view the Product 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

Opposed Mode Models	Opposed-Mode	Range	Teachable Range	Output
QS18EK6EVQ8	Visible red, 625 nm	High Power Emitter Setting: 20m Low Power Emitter Setting: 4m	High Power Emitter Setting: 1 m to 20 m Low Power Emitter Setting: 0 m to 4 m	IO-Link and multi-function input
QS18EK6RVQ8				IO-Link push/pull output and multi-function input/output
QS18EK6EQ8	Infrared, 940 nm			IO-Link and multi-function input
QS18EK6RQ8				IO-Link push/pull output and multi-function input/output

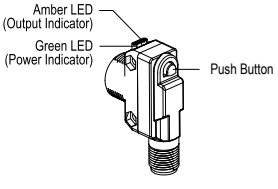
4-pin M12 quick disconnect models are listed.

- To order the 150 mm (6 in) PVC cable with a 4-pin M12 quick disconnect model, replace the suffix "Q8" with "Q5" in the model number. For example, QS18EK6LPQ5.
- To order the 4-pin M8 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 with a 4-pin M8 quick disconnect model, replace the suffix "Q8" with "Q" in the model number. For example, QS18EK6LPQ.
- To order the 2 m (6.5 ft) PVC cable model, remove the suffix "Q8" from the quick-disconnect model number. For example, QS18EK6EV. (The QS18EK6E/R models are no longer available with this connection.)

Models with a quick disconnect require a mating cordset.

For a list of discontinued models, see Discontinued Models.

Overview



The Banner QS18E sensor is a high-performance photoelectric sensor with IO-Link. The receiver has a configurable multifunction input/output. The emitter has a configurable multifunction input.

Emitter

Sensor Condition	Green LED	Amber LED
Power On	ON	OFF
Notification—Push button has been locked out	Flashes four times and returns to solid on after button press	OFF

Receiver

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 OR The emitter is set to High Power, and the receiver is saturated. Set the emitter to Low Power.	Flashing	ON/OFF
Notification—Push button has been locked out	Flashes four times and returns to solid on after button press	ON/OFF

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.

Wiring

Opposed-Mode Models: The following wiring diagrams apply to the receivers. The wiring diagrams that include remote input apply to the emitters.

Original Instructions
19-May-26

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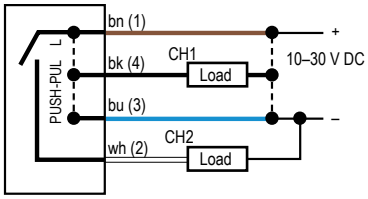
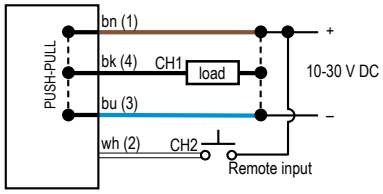
p/n: 211477 Rev F

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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



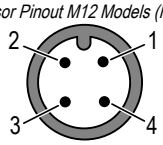
Channel 1 = IO-Link, Channel 2 = PNP Remote Input



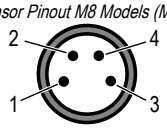
Key

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

Sensor Pinout M12 Models (Male)



Sensor Pinout M8 Models (Male)



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.

Sensor Configuration

Configure the receiver using any of six 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
- Opaque Mode: One switching threshold set to maximum excess gain

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: Receiver Input Flowchart" on page 4 for receiver setup.

Push Button Configuration

Use the push button to configure either the emitter or the receiver. Click the push button according to the Input Flowchart, see "Figure: Emitter Input Flowchart" on page 3 for emitter setup and see "Figure: Receiver Input Flowchart" on page 4 for receiver setup.

Remote Input Configuration

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, see "Figure: Emitter Input Flowchart" on page 3 for emitter setup and see "Figure: Receiver Input Flowchart" on page 4 for receiver setup.

[1] IO-Link only on emitters.

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Emitter Input Flowchart

EMITTER

Push Button or Remote Input Wire*

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

Remote Input Wire Pulse Timing (T)

40 ms < T < 800 ms
Timing between Pulse groups > 800 ms
(White wire is remote input wire)

Push Button Input

Hold is > 2 sec. and < 4 sec.
Click is > 40 ms and < 800 ms



- 2x → **Basic Configuration** (alternating flashing Green and Amber LEDs at 1Hz)
  - 1x → High Speed (flashing of both Green and Amber LEDs 1X followed by acceptance flash)
  - 2x → Configure to A Frequency (flashing of both Green and Amber LEDs 2X followed by acceptance flash) **default**
  - 3x → Configure to B Frequency (flashing of both Green and Amber LEDs 3X followed by acceptance flash)
  - 4x → Configure to C Frequency (flashing of both Green and Amber LEDs 4X followed by acceptance flash)
  - 5x → Configure to High Power (flashing of both Green and Amber LEDs 5X followed by acceptance flash) **default**
  - 6x → Configure to Low Power (flashing of both Green and Amber LEDs 6X followed by acceptance flash)
- 3x → **Advanced Configuration** (simultaneous flashing of both Green and Amber LEDs at 1Hz)
  - 1x → Unlock push buttons (flashing of both Green and Amber LEDs 1X followed by acceptance flash) **default**
  - 2x → Lock push buttons (flashing of both Green and Amber LEDs 2X followed by acceptance flash)
- 4x ** → **Toggle TEACH Button Lock/Unlock** (flashing of both Green and Amber LEDs 4X followed by acceptance flash)
  ** Remote Input Wire only.
- 8x ** → **Reset to Factory Defaults** (flashing of both Green and Amber LEDs 8X followed by acceptance flash)
  ** Remote Input Wire only.

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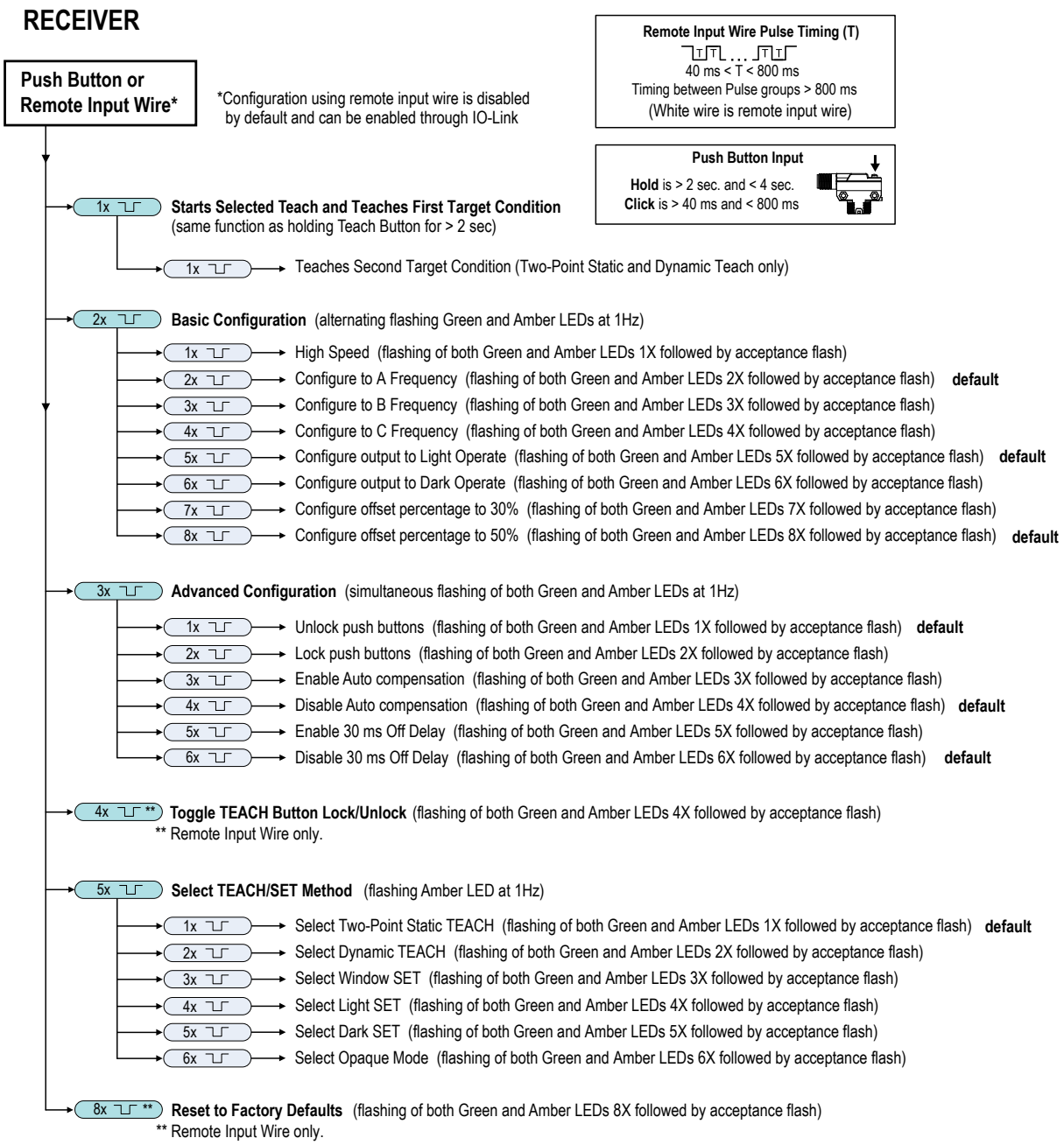
Receiver Input Flowchart



IO-Link Interface

IO-Link® [2] 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.

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 QS18's IO-Link IODD package (p/n 209310 for the emitter and 209311 for the receiver) from Banner Engineering's website at www.bannerengineering.com.

Banner has also developed Add On Instruction (AOI) files to simplify ease-of-use between the QS18, 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.

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.

[2] IO-Link® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

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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.

Banner has also developed Function Blocks to simplify ease-of-use between the QS18, multiple third-party vendors' IO-Link masters, and the Siemens TIA Portal software package for Siemens PLCs. Two types of Function Blocks files for TIA Portal are listed below. The files and more information can be found at www.bannerengineering.com.

Process Data Function Blocks—These files can be used alone, without the need for any other IO-Link Function Blocks. A Process Data Function Block intelligently parses out the Process Data byte(s) in separate pieces of information. To make use of this Function Block, a Profinet connection to the Io-Link Master and knowledge of where the Process Data registers are located for each port is required.

Parameter Data Function Blocks—These files require the Siemens TIA Portal Function Block IO_Link_Device. This is available from the Siemens website. A Parameter Function Block provides quasi-realtime read/write access to all IO-Link parameter data in the sensor. Each Parameter Function Block is specific to a given sensor.

Specifications

Supply Voltage and Current

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

Power and Current Consumption, exclusive of load

Normal Run Mode: 1.2W, Current consumption < 50 mA at 24 V DC

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

Power Up Delay

Momentary delay on power-up, < 1.5 s, output does not conduct during this time

Gain

The gain setting can be changed via IO-Link

Gain values are: **Auto** and the fixed modes **High**, **Mid**, and **Low**

Emitter LED

EV model: Visible red, 625 nm

E 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

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 or 4-pin M8 quick-disconnect, either integral or with a 150 mm (6 in) cable, are available.

Models with a quick disconnect require a mating cordset

Emitter Power

High Power is Power 5.

Low Power is Power 0.

The following power levels are available via IO-Link to set intermediate power levels when looking for good contrast control with separation distances > 4 m: Power 5, Power 4, Power 3, Power 2, Power 1, and Power 0

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 (p/n 209308) for more details.

Vibration and Mechanical Shock

All models meet MIL-STD-202G, Method 201A (Vibration: 10 Hz to 60 Hz, 0.06 inch (1.52 mm) double amplitude, 2 hours each along X, Y and Z axes) requirements. Also meets IEC 60947-5-2 (Shock: 30G 11 ms duration, half sine wave) requirements.

Environmental Rating

IP65, IP67

Operating Conditions

–20 °C to +70 °C (–4 °F to +158 °F)

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

Storage Temperature: –65 °C to +125 °C (-85 °F to 257 °F)

Application Notes

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

Response Time and Response Repeatability

When gain = **Auto**, the receiver optimizes the gain during Run mode for the current condition.

When gain = **Fixed**, the receiver optimizes the power for the presented configured condition(s).

Frequency	Gain Mode	Response Time (µs)	Response Repeatability (µs)
High Speed	Fixed	300	140
High Speed	Auto	350	212
A,B,C	Fixed	1000	400
A,B,C	Auto	1100	600

Factory Default Settings—Emitter

Setting	Factory Default
Basic Configuration	Frequency A
Power Setting	High Power
Push Button	Unlocked
Pin 4 Output	IO-Link (Push-pull)
Pin 2 Input	Detection Input: Deactivated
Power	High

Factory Default Settings—Receiver

Setting	Factory Default
Basic Configuration	Frequency A
TEACH/SET	Two-Point Static TEACH
Output Logic	Light Operate
Output Response Time	Standard
Offset Percentage	50%
Push Button	Unlocked
Auto Compensation	Disabled
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
Gain	Auto

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

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	2.0	30	0.5

FCC Part 15 Class A for Unintentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada ICES-003(A)

This device complies with CAN ICES-3 (A)/NMB-3(A). 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.

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Cet appareil est conforme à la norme NMB-3(A). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

Product Support and Maintenance

Discontinued Models

The following models are no longer available for order but are still covered by the information in this document.

Infrared, 940 nm

Opposed Mode Models	Teachable Range	Output	Connection
QS18EK6E	High Power Emitter Setting: 1 m to 20 m Low Power Emitter Setting: 0 m to 4 m	IO-Link and multi-function input	2 m (6.5 ft) PVC cable
QS18EK6R		IO-Link push/pull output and multi-function input/ output	2 m (6.5 ft) PVC cable

Contact Us

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

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