Instruction Manual

Expert Wide-Beam Retroreflective Sensor



- Wide beam retroreflective sensor for reliable leading edge detection of irregular shaped objects or pallets
- Visible red beam for simple alignment and bright LEDs for visual indication
- Up to 4 meter range for mounting flexibility
- Two sensitivity levels for detection of challenging targets such as shrink wrapped pallets, small objects and film or perforated packaging
- Easy set-up, adjustment and LO/DO selectable via single push button
- 250 Hz switching frequency for high speed production lines
- IP67 and IP69 with ECOLAB® certification for washdown applications

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	Range	Input	Output	Connection
Q76E-VP-ZLVC-Q5	0.4 m to 4.0 m (1.3 ft to 13.1 ft)[1]	10 V dc to 30 V DC	Complementary PNP	200 mm (7.5 in) PUR cable with a 4-pin M12/Euro-style male quick disconnect
Q76E-VP-ZLVC-Q8				Integral 4-pin M12/Euro-style male quick disconnect
Q76E-VP-ZLVC-2M				2 m (6.5 ft) unterminated 4-wire PVC cable
Q76E-VN-ZLVC-Q5			Complementary NPN	200 mm (7.5 in) PUR cable with a 4-pin M12/Euro-style male quick disconnect
Q76E-VN-ZLVC-Q8				Integral 4-pin M12/Euro-style male quick disconnect
Q76E-VN-ZLVC-2M				2 m (6.5 ft) unterminated 4-wire PVC cable
Q76E-KP-ZLVC-Q5			1 PNP/NPN Light Operate with IO-Link; 1 PNP Dark Operate	200 mm (7.5 in) PUR cable with a 4-pin M12/Euro-style male quick disconnect

[1] Range with a BRT-92X92CB reflector.

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Features and Indicators

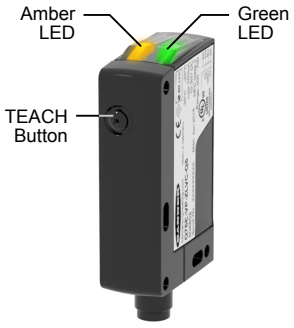


Figure 1. Q76 Features

LED Status		Sensor Status
Green LED	**Amber LED**	
Green on	Off	Ready
Green on	Amber on	Light path clear (Light Operate mode only)
Green flashing	Amber flashing	TEACH in process

Installation

Sensor Orientation

Optimize sensor performance with correct sensor-to-target orientation.

The small gap in the sensing beam allows precise alignment of the sensor with the object to be detected or with the reflector. Install the sensor so that the object to be detected moves horizontally to the sensor.

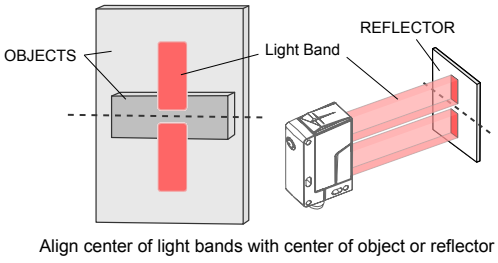


Figure 2. Beam Alignment

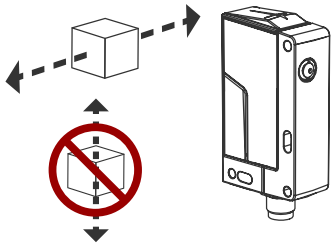


Figure 3. Sensing Beam Alignment

The reflector opposite the sensor must have a complete reflective surface that is at least 50 mm (2 in) wide and 30 mm (1.2 in) tall.

Mount the Sensor

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

Wiring

Quick disconnect wiring diagrams are functionally identical.

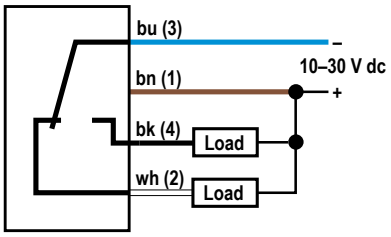


Figure 4. Complimentary NPN

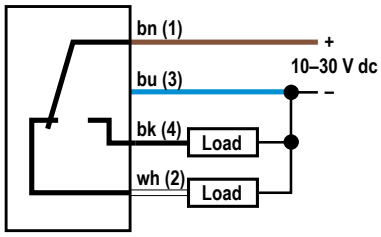


Figure 5. Complimentary PNP

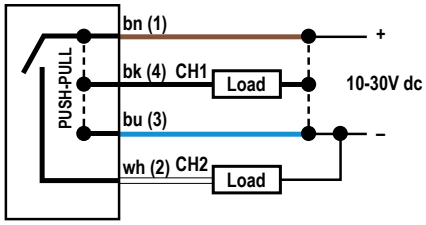
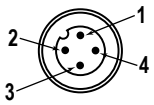


Figure 6. IO-Link



4-pin M12/Euro-style Models (Male)

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

Configure the Sensor

Use the button to set the sensor sensitivity or switching behavior.

Important: Configure the sensor before the first use. The sensor is factory-set to the maximum operating range.

Sensitivity Setting	Max Range 100×100 reflector	Max Range 40×60 reflector	Minimum Object Detection Size
Standard	4.0 m	3.0 m	19 mm
Increased	4.0 m	3.0 m	12 mm
Increased with Fine Adjustment	4.0 m	3.0 m	8 mm

TEACH Sensor Sensitivity

Use the following procedure to set the sensor sensitivity as Standard or Increased.

Configure the sensor before it is used for the first time. The default setting is the maximum operating range.

- Standard sensitivity—the sensor switches when 28% of the sensing beam is covered by the object to be detected. Standard sensitivity is suitable for detection of opaque objects.
- Increased sensitivity—the sensor switches when 18% of the sensing beam is covered by the object to be detected. Increased sensitivity is suitable for detection of containers with openings and transparent objects.

1. Make sure that the sensing beam is aligned with the center of the object and reflector.
2. Clear the path to the reflector.
3. Configure the sensitivity.

Sensitivity	Action	Result
Standard	Press and hold the TEACH button 2 to 7 seconds until both the green and the amber LEDs flash synchronously, then release the TEACH button.	**TEACH Accepted** Both LEDs remain on.
Increased	Press and hold the TEACH button 7 to 12 seconds until both the green and the amber LEDs flash alternately, then release the TEACH button.	**TEACH Not Accepted** The amber LED flashes. Repeat the Teach procedure.

The sensitivity is set and the sensor is ready for use.

TEACH Sensitivity Fine Adjustment

Use the following procedure to adjust the sensor sensitivity in small steps using the teach button during normal operation.

Sensitivity	Action	Result
Increase Sensitivity (reduce switching threshold)	Press and release the TEACH button (2 to 200 ms).	Sensitivity is increased slightly and the switching threshold is reduced slightly. The sensor confirms the button press by flashing both LEDs one time.
Reduce Sensitivity (increase switching threshold)	Press and hold the TEACH button 200 ms to 2 seconds, then release the TEACH button.	Sensitivity is reduced slightly and the switching threshold is increased slightly. The sensor confirms the button press by flashing both LEDs one time.

If the upper or lower end of the adjustment range is reached, both LEDs flash at a much higher frequency.

Select Light Operate/Dark Operate

Use the following procedure to change the sensor operation to light operate or dark operate for the desired application.

Action	Result
Press and hold the TEACH button for more than 12 seconds until the green LED flashes.	The amber LED indicates the current switching output setting with the beam clear. • LED On = Output 1 light operate, Output 2 dark operate • LED Off = Output 1 dark operate, Output 2 light operate
Release the TEACH button.	The change is complete.

Specifications

Sensing Range
0.4 m to 4.0 m (1.3 ft to 13.1 ft) with 100 × 100 mm reflector, BRT-92X92CB

Sensing Beam
Visible red LED, 620 nm

Operating Voltage
10 to 30 V DC, ≤15% residual ripple

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

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

Output Configuration
Discrete output models
Solid-state complementary (SPDT): NPN or PNP (current sinking or sourcing), depending on model
IO-Link model
Channel 1 (Q1): IO-Link, Push/pull
Channel 2 (Q2): PNP (current sourcing) Dark Operate

Response Time
2 ms

Switching Frequency
250 Hz

Resolution
19 mm standard sensitivity
12 mm increased sensitivity
8 mm when increased sensitivity is manual adjusted

Delay at Start Up
<300 ms

Connection
Q5 models: 200 mm (7.5 in) PUR cable with a 4-pin M12/Euro-style quick disconnect
Q8 models: Integral M12/Euro-style quick disconnect
2M models: 2 m (6.5 ft) unterminated 4-wire PVC cable

Construction
Housing: PC-PBT
Lens cover: PMMA

Operating Conditions
Operating Temperature:–40 °C to +60 °C (–40 °F to +140 °F)
Storage Temperature:–40 °C to +70 °C (–40 °F to +158 °F)

Environmental Rating
IEC IP67, IEC IP69

Certifications

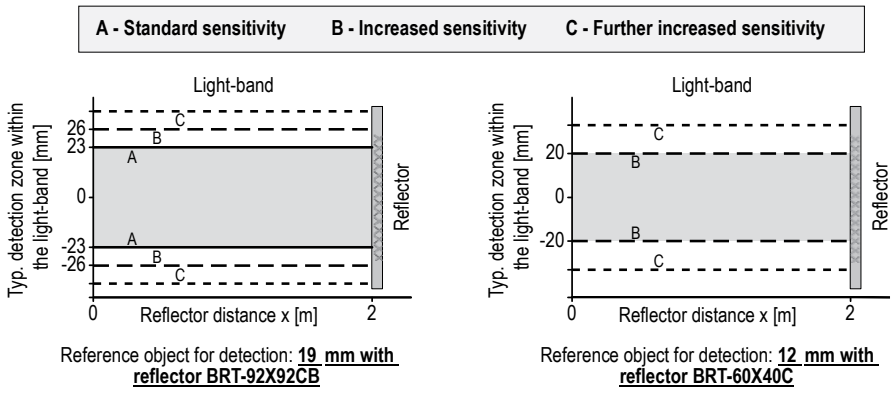
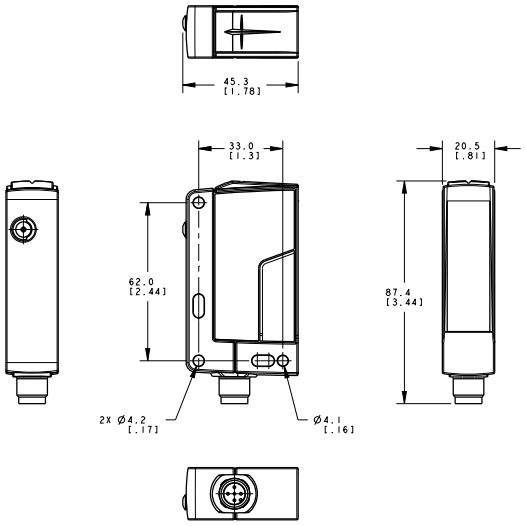


Figure 7. Sensitivity Diagrams

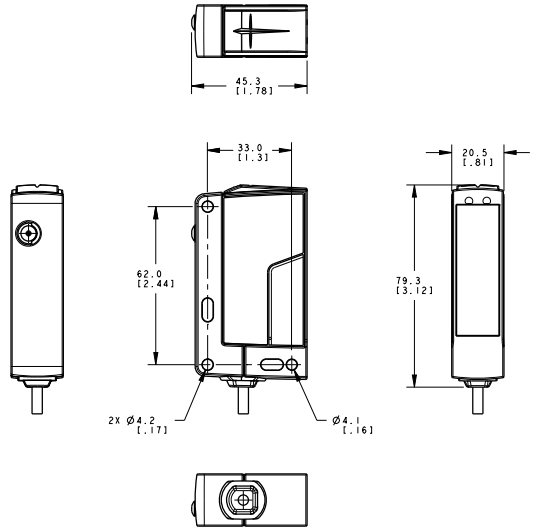
Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise.

QD Models

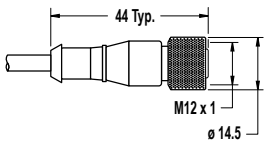
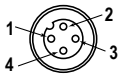


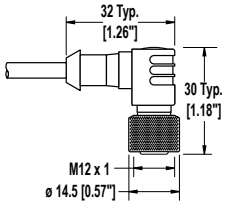
Cable Models



Accessories

Cordsets

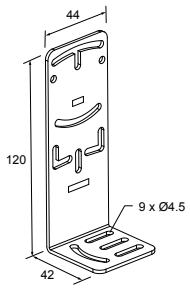
4-Pin Threaded M12/Euro-Style Cordsets—Single Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC-406	2 m (6.56 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-415	5 m (16.4 ft)			
MQDC-430	9 m (29.5 ft)			
MQDC-450	15 m (49.2 ft)			

4-Pin Threaded M12/Euro-Style Cordsets—Single Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
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)			

Brackets

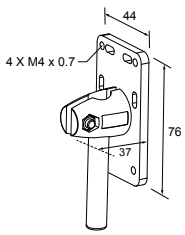
SMBQ76A

- Right-angle mounting bracket
- 14-ga Stainless Steel
- ±12 degree tilt adjustment
- Clearance for M4 (#8) hardware



SMBQ76FAM12

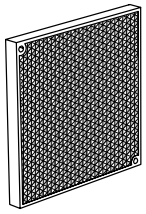
- Swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- No bolt included. Mounts directly to 12 mm (½ in) rods



Reflectors

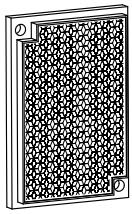
BRT-92X92CB

- Square, acrylic target with black mounting base
- Reflectivity Factor: 3.0
- Max. Temperature: +50 °C (+122 °F)
- Optional brackets are available
- Approximate size: 92 mm × 92 mm



BRT-60X40C

- Rectangular, acrylic target
- Reflectivity Factor: 1.4
- Temperature: –20 °C to +60 °C (–4 °F to +140 °F)
- Optional brackets are available
- Approximate size: 40 mm × 60 mm



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