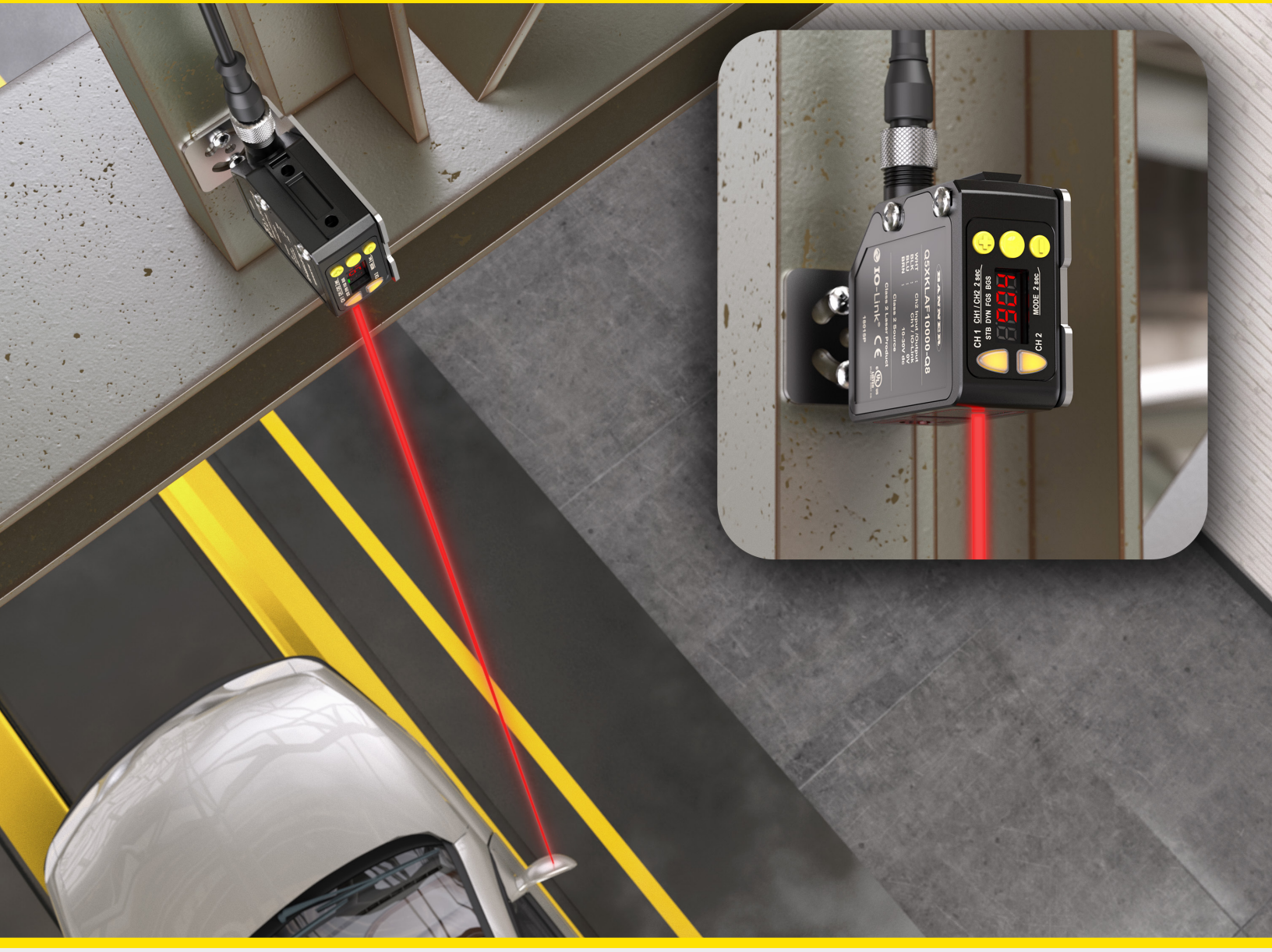
Q5X Multi-Purpose Photoelectric Sensors



High-Power, Multi-Function Laser Sensor

- Reduce inventory and verify multiple conditions with a single device
- Compact housing designed for tight spaces with a rotatable M12 quick disconnect
- Reliable detection from 50 mm to 10 m, even at an angle
- Simplified setup, remote monitoring, control, and configuration with optional Remote Sensor Display (RSD)
- Reduce or prevent downtime with specialized Jam-detection models

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Multi-Purpose Laser Measurement Sensor

Versatile, easy-to-use problem solver



Rated IP67 for reliable performance in wet environments

Class 2 laser with small, highly visible spot for easy alignment and small object detection



270-degree rotatable M12 quick disconnect for simple mounting

- Four-digit display and three-button interface for easy setup and adjustment
- Distance to target viewable as centimeters (default) or inches



IO-Link®

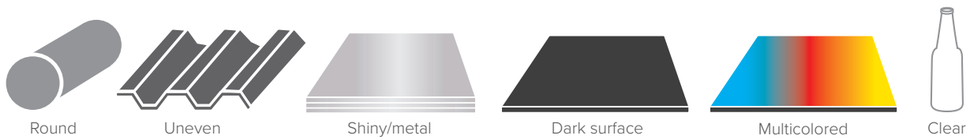
Program with push-button, remote teach, IO-Link, or optional Remote Sensor Display (RSD1QP). Cordset MQDC-4501SS required to use RSD.





Protective bracket(s) for use in harsh environments

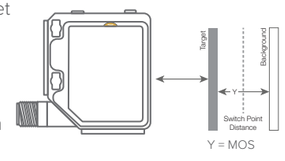
Reliably Detects Challenging Targets



Dynamically adjusted laser power increases output for dark targets or objects at steep or uneven angles, while reducing power for shiny targets, providing accurate measurements. A small beam spot minimizes measurement variation across color transitions.

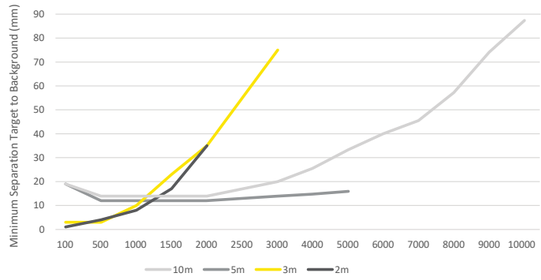
Minimum Object Separation (MOS)

The minimum distance a target must be from the background to be reliably detected by a sensor. An MOS of 5 mm means the sensor can detect an object that is at least 5 mm from the background.



Y = MOS

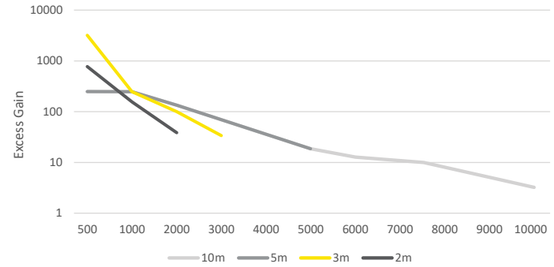
The triangulation sensor and time-of-flight sensor complement each other to solve a wide variety of problems. Triangulation technology is more robust in the near range, while time-of-flight is more consistent across the entire range.



Excess Gain

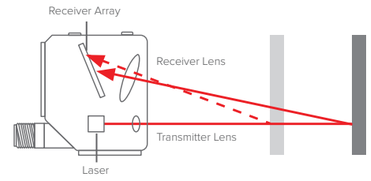
Excess gain is a measure of the minimum light energy needed for reliable sensor operation. Higher excess gain allows the sensor to detect darker objects at steeper angles.

The Q5X Series has very high excess gain. To detect the darkest targets, the time-of-flight sensor has higher excess gain as users get further away from the sensor compared to the triangulation. Excess gain of 100x means that you can reliably detect an object that only returns 1% of the light reflected off of it. The sensor can easily detect black rubber, foam, or neoprene.



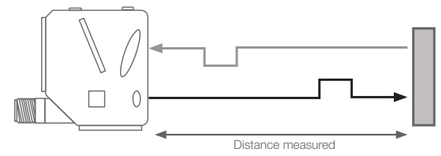
Triangulation (Short Range/Precise)

Triangulation sensors determine range by the position of the received light on the receiver array. Available in 2 m and 3 m models.



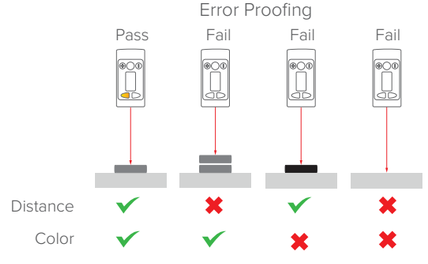
Time-of-Flight (Long Range)

Time-of-flight sensors derive range from the time it takes light to travel from the sensor to the target and return. Available in 5 m and 10 m models.

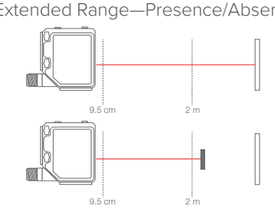


Dual Mode: Distance with Intensity to Detect Any Change

Error Proofing

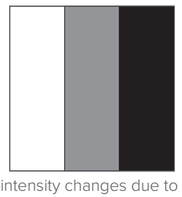


Extended Range—Presence/Absence



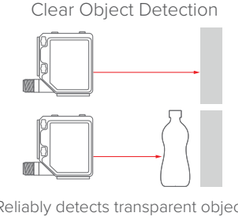
Can be taught references to detect changes in contrast, even past the maximum measuring range

Contrast

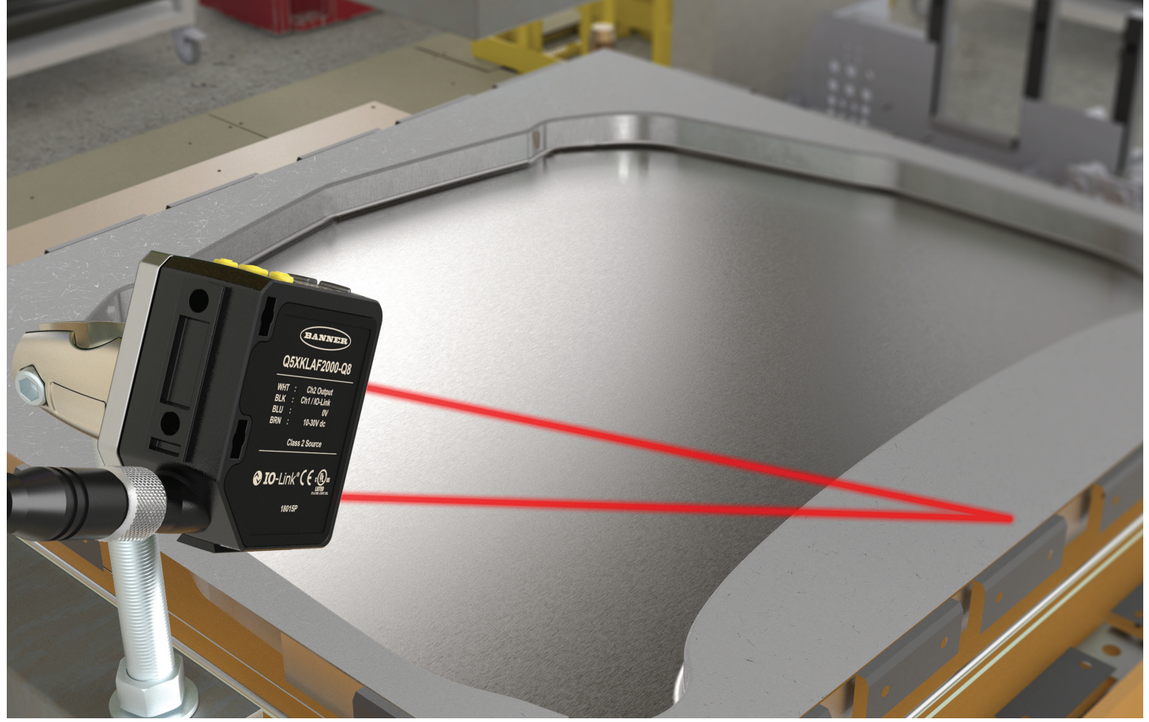


Detects intensity changes due to variation in surface finish, tone, or lightness

Clear Object Detection



Reliably detects transparent objects without the need of a retro reflector



Metal Stamping Press

Challenge

In metal-stamping-press applications, metal sheets must be placed and properly indexed on the press before stamping. A solution is needed to verify that a metal sheet is present and that it is positioned correctly on the press to reduce the risk of material waste and/or damage to the press die. Metal parts are reflective, which can be difficult for many sensors to detect, and the background is often a similar color.

Solution

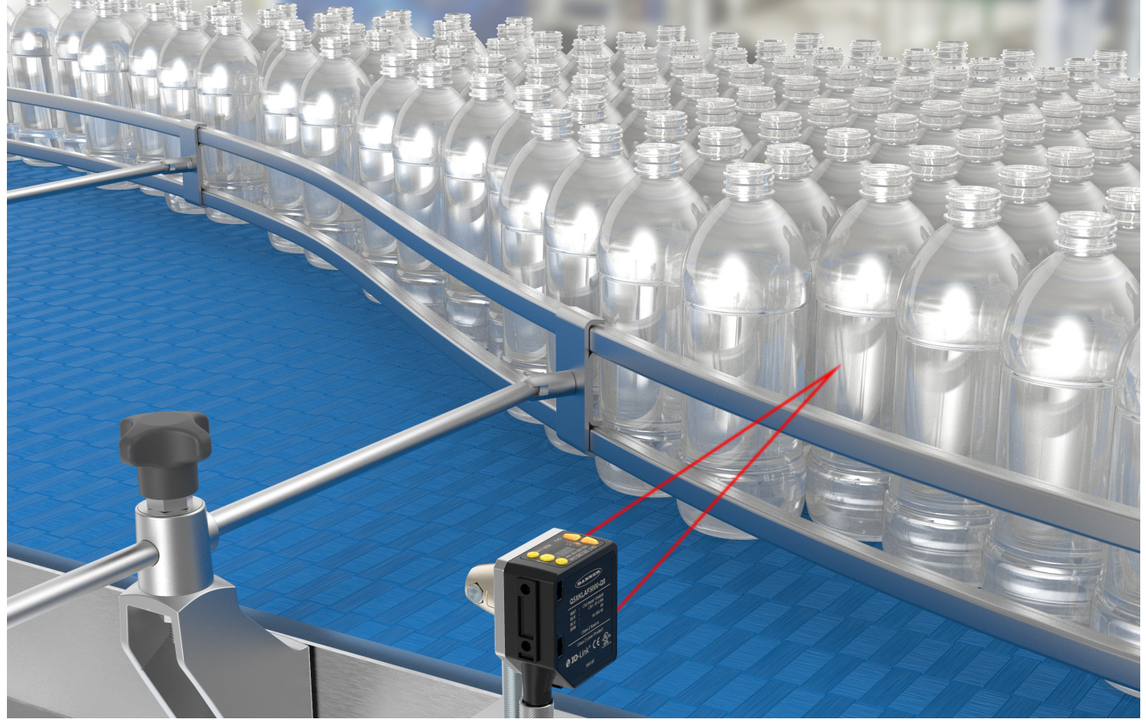
The Q5X sensor can both verify part presence and ensure that parts are properly indexed by identifying the leading edge of the material in the press. In addition, the Q5X can reliably detect shiny objects even at an acute angle. With background suppression, the sensor can ignore anything located beyond the cutoff point. Furthermore, with a range of up to 10 m, the Q5X can be mounted safely outside of the harsh process environment, reducing the risk of damage to the sensor, which saves replacement and maintenance costs.



Shiny/metal

Shiny Target Applications

- Powertrain and suspension assembly
- End effector part detection in rack
- Part-in-place
- Motion complete



Clear Bottle Detection

Challenge

When bottles are removed from a depalletizer, the bottles are swept off the pallet by a sweeper arm, layer by layer. The bottles then move into a single file and continue downstream. It is important to monitor the bottles in the staging area to make sure that they have moved on before another layer is swept onto the conveyor. The unstable signal from the moving bottles and low-contrast objects can be challenging for sensors to detect reliably.

Solution

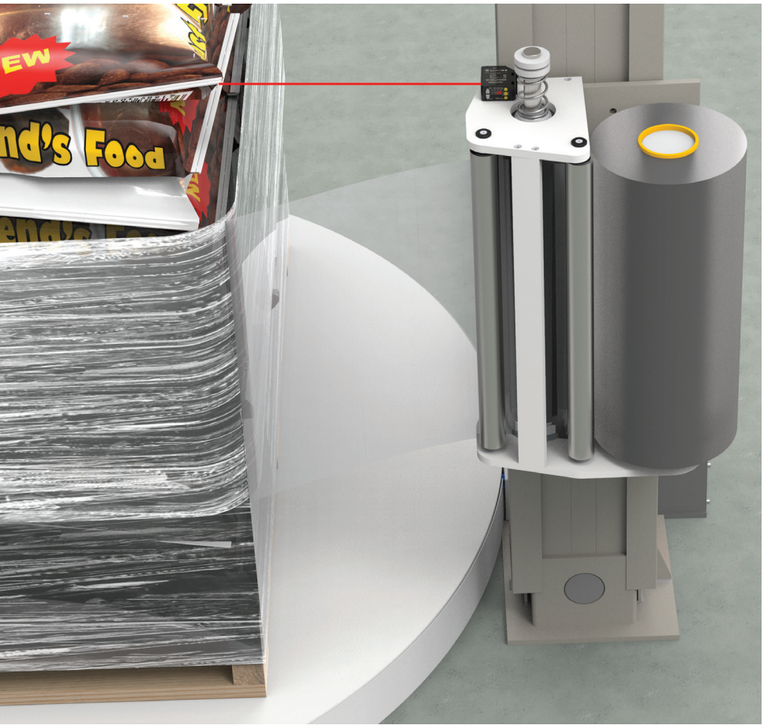
The Q5X background-suppression sensor detects when the staging area is clear of bottles, and the system is ready for the next layer of containers. The integral timing logic on the Q5X filters out any small gaps between objects as they move in a cluster. In dual teach mode—which measures both distance and light intensity—the Q5X can reliably detect the presence of clear bottles without the risk of double counting.



Clear

Clear Target Applications

- Glass and plastic bottles and jars
  - Precise edge detection
  - Counting—stable output with no double count
- Clear tray
  - Stack height
- Shrink wrap
  - Roll diameter
  - Detection



Dog Food Pallet Detection

Challenge

In packaging lines, the final step is the stretch wrapper. After bags of dog food are stacked on pallets, each pallet needs to be stretch wrapped to help protect the finished goods during transport. Varying pallet heights require a sensing solution to determine the position of the top of the pallet, to ensure that each pallet is fully wrapped.

Solution

The Q5X laser distance sensor is mounted to the top of the stretch wrapper to verify the height of dog food bags on the pallet. When the sensor no longer detects product at the taught distance, the stretch wrapper is stopped, since the pallet is fully wrapped. The Q5X sensor is unaffected by color transitions and can reliably detect all different varieties of dog food, regardless of package color or reflectivity.

Packaging Target Applications

- End-of-Line Pallet Detection
- Shrink Wrap Detection
- Carton Full/Empty
- Case Packer
- Flexible Packaging/Pouch Filling



Multicolored





Automotive Seat Inspection

Challenge

In automotive quality inspections, verifying the presence of dark parts against an equally dark background is extremely common. For example, many car seats consist of black fabric or leather material with black plastic components, such as levers and buttons to adjust seat height and tilt.

Solution

Banner's Q5X problem-solving sensor has no difficulty detecting dark targets on dark backgrounds when there is a height difference. The exceptionally high excess gain enables the Q5X sensor to reliably detect the darkest objects (<6% reflective black targets), even against a dark target, at all distances from 50 mm to 10 m.

Dark Target Applications

- Black plastic/rubber/leather detection
- Tire detection
- Dashboard assembly
- Interior/exterior panel assembly

Dark surface

Point, Teach, and Go

1. Align sensor to a stable reference surface
2. Press and hold TEACH for longer than 2 seconds
3. Press TEACH to teach the reference surface



Jam Detection Modes

Jam Retroreflective: The most reliable teach mode when using a back rail or other stationary target as a reference.

Jam Background Suppression: This allows for jam detection across a specific area without requiring a background.

Jam Detection

What is jam detection?

Throughout conveyor lines, there are many areas that are prone to jams, causing packages to pile up. Jams require a person to intervene by manually shutting down the conveyor to clear the jam or using tools to clear the jam while the conveyor is still running. This can impact throughput, cause damage to Products, create excessive wear on equipment, and pose a safety concern for people working near the equipment.

What is the problem with the current method for detecting jams?

The most common method for detecting jams is by using "jam photo-eyes." These jam photo-eyes require gaps between packages to detect a jam. It is very common for packages to be side by side and have no gaps between them. As a result, when no gaps are detected, the sensor falsely alerts the operator that there is a jam, wasting time and adding expense.

How does Banner solve this problem?

The Banner Q5X Jam Detection Sensor can detect jams faster and more accurately, because it does not rely on gaps. Instead, it extends the functionality of Banner's existing dual mode technology to look for a change in signal strength and distance between the face of the sensor and the packages. The sensor can easily detect when packages are freely flowing, and if the line becomes jammed, the Q5X immediately alerts the operator. This reduces false positives and excessive delays, while also allowing for increased line speeds and throughput.

Q5X Series Laser Measurement Sensor

Series	Output	Emitter	Mode	Range (mm)		Connector	Options
Q5X	**K**	**L**	**AF**	**2000**	—	**Q8**	

- **K** = Configurable dual discrete with IO-Link on all models
- **KU** = 0–10 V with push/pull discrete output or IO-Link
- **KI** = 4–20 mA with push/pull discrete output or IO-Link
- **L** = Laser
- **AF** = Adjustable-field background suppression
- **2000** = 2000
- **3000** = 3000*
- **5000** = 5000
- **10000** = 10000
- **Q8** = Integral swivel M12 connector
- **-Jam** = Jam model**
- **Blank** = Standard model

*KU and KI models available in 3000 mm range only
**Jam model available in 2000 mm range only

Specifications



Response Speed
2 m and 3 m models: User selectable: 3, 5, 15, 25, or 50 ms
3 m analog models: Total response speed varies between 0.5 ms and 2270 ms, depending on base measurement rate and averaging settings
5 m and 10 m models: User selectable: 2, 5, 15, 50, or 250 ms

Operating Conditions
–10 to +50 °C 35% to 95% relative humidity

Environmental Rating
IEC IP67 per IEC60529

Construction
Housing: ABS
Lens cover: PMMA acrylic
Lightpipe and display window: Polycarbonate

Temperature Effect

2 m and 3 m models:
< 0.5 mm/°C at < 500 mm
< 1.0 mm/°C at < 1000 mm
< 2.0 mm/°C at < 2000 mm

5m models:
< +/- 0.5 mm/°C at < 3000 mm
< +/- 0.75 mm/°C at < 5000 mm

3 m analog models:
< 0.5 mm/°C at < 500 mm
< 1.0 mm/°C at < 1000 mm
< 2.0 mm/°C at < 2000 mm
< 5.0 mm/°C at < 3000 mm

10m models:
< +/- 0.5 mm/°C at < 3000 mm
< +/- 0.75 mm/°C at < 5000 mm
< 2.0 mm/°C at < 7500 mm
< 6.0 mm/°C at < 10000 mm

Certifications
CE, cULus Industrial Control Equipment 3TJJ, IO-Link®

Accessories



SMBQ5XFAM10



SMBQ5XDT



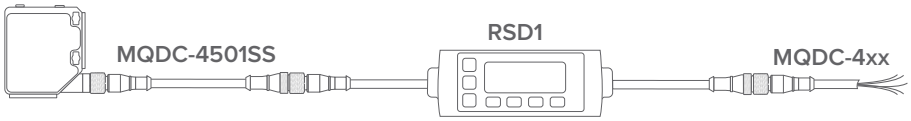
SMBQ5XM4F



SMBAMSQ5XIPRA



SPS30PAR2PQ5
In-line AC/DC Converter





Double-Ended
with 5-pin straight male to 4-pin straight female connectors. Required for use between RSD and sensor.

MQDC-4501SS
0.3 m (1')
MQDC-4506SS
1.83 m (6')



M12 Straight connector
models listed; for right-angle, add **RA** to the end of the model number (**example, MQDEC2-406RA**)

MQDC-406
2 m (6.5')
MQDC-415
5 m (15')
MQDC-430
9 m (30')
MQDC-450
15 m (50')

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