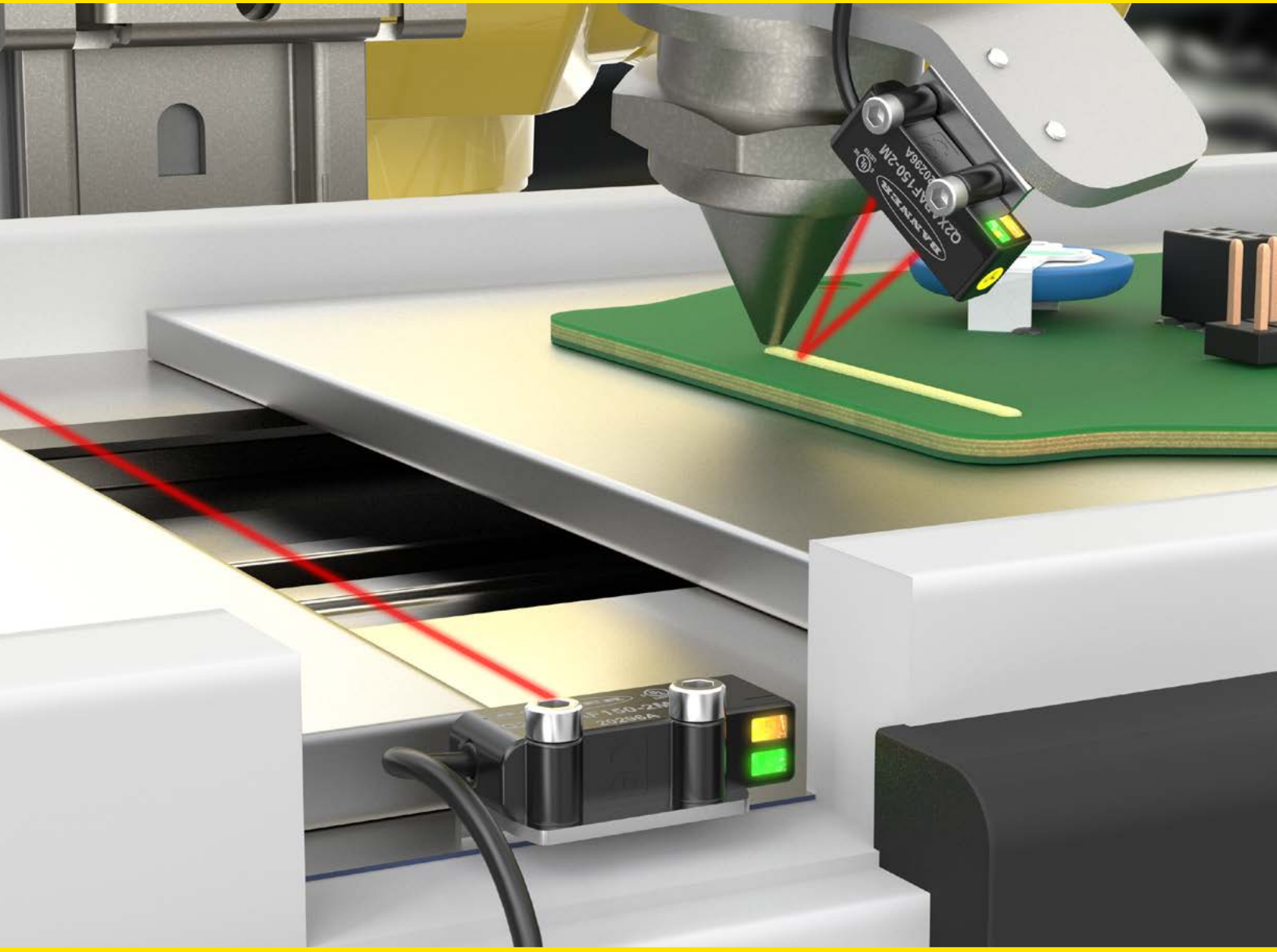
Q2X Miniature Photoelectric Sensors



Space-saving photoelectric sensor with short- and long-range models

- Install in small or constrained spaces, due to the sensor's compact housing design
- Precisely detect small objects using short-range models
- Sense across a larger area or mount the sensor up to 3.3 m away from the target using long-range models
- Solve challenging problems in many applications by consolidating to one sensor family with an array of sensing modes available

BANNER®

Select the Mode to Fit Your Application

Ideal for installation in precise machinery and tight industrial spaces, Banner's compact Q2X Series features the widest range of sensing modes for any automation application.

Simplest to install and use

Start with Fixed-Field Mode

For an adjustable cutoff distance

Fixed-Field

- Accurately detect targets while ignoring objects beyond a fixed cutoff distance
- Fastest commissioning with no configuration or setup required
- Simplify installation with fewer components and less wiring; no retro target or receiver required

Adjustable-Field

- Accurately detect targets while ignoring objects beyond a user-settable cutoff distance
- Simplify installation with fewer components and less wiring; no retro target or receiver required

For detection up to 3 meters

For reliable detection in dirty environments

Opposed

- Detect almost any target regardless of shape, color, or finish and as small as 4.3 mm
- With high excess gain and no dead zone, reduce false and missed detections

For the lowest cost for extended range

Polarized Retroreflective

- Reliably detect dark and shiny targets over long ranges
- Ideal for reliable leading-edge detection with its fast, 600 µs response time

For long range, diffuse sensing

Laser Measurement

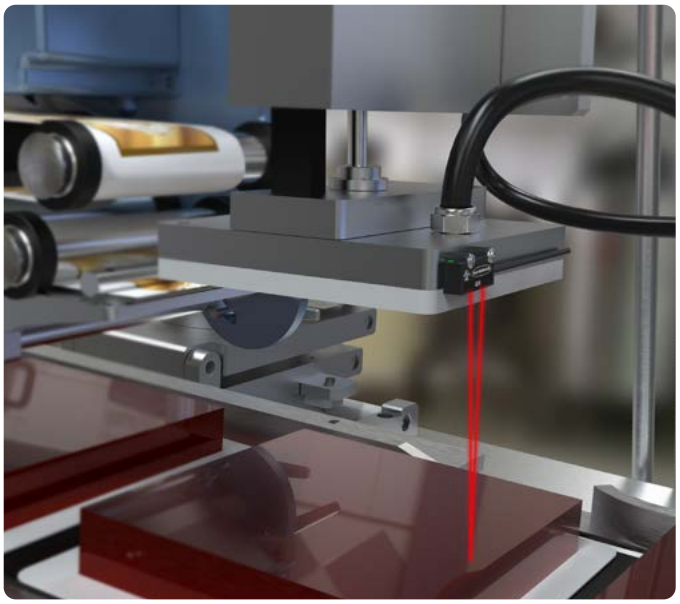
- Solve challenging problems in many applications with a full-featured sensor that offers a 3 m range for detection and measurement
- Sense the most challenging targets like dark or shiny poly bags with a powerful infrared laser with best-in-class excess gain

	Fixed-Field	Adjustable-Field	Laser Measurement	Polarized Retro	Opposed
Sensing Range (mm)	15, 30, 50	100, 150	3000	3300	3000
Type of Emitter	Visible Red LED	Visible Red LED, Visible Red Class 1 Laser	Infrared Class 1 Laser	Visible Red LED	Visible Red LED
Response Time	850 µs	850 µs	Fast: 33 ms Medium: 100 ms Slow: 500 ms	600 µs	1 ms
IP Rating	IP67	IP67	IP67	IP67	IP67

Fixed-Field

- Simplify installation while still having mounting flexibility with 15, 30, and 50 mm sensing ranges available with no configuration required
- Consistently detect challenging targets with best-in-class background suppression
- Avoid crosstalk when mounting multiple sensors in close proximity due to the advanced crosstalk immunity algorithm

Series	Output State	Output	Mode	Range	Connection
Q2X	**A**	**P**	**FF**	**30**	**Q8**
	A = Light operate **R** = Dark operate	**P** = PNP **N** = NPN **B** = Bipolar	**FF** = Fixed-field	**15** = 15 mm **30** = 30 mm **50** = 50 mm	**2M** = 2 m (6.5 ft) cable **Q** = 150 mm (6 in) 4-pin M8 pigtail **Q3** = 150 mm (6 in) 3-pin M8 pigtail **Q5** = 150 mm (6 in) 4-pin M12 pigtail



Challenge

Applying pressure-sensitive labels to packages requires lowering a tamp head to the product and applying enough pressure to adhere the label without damaging the product.

Solution

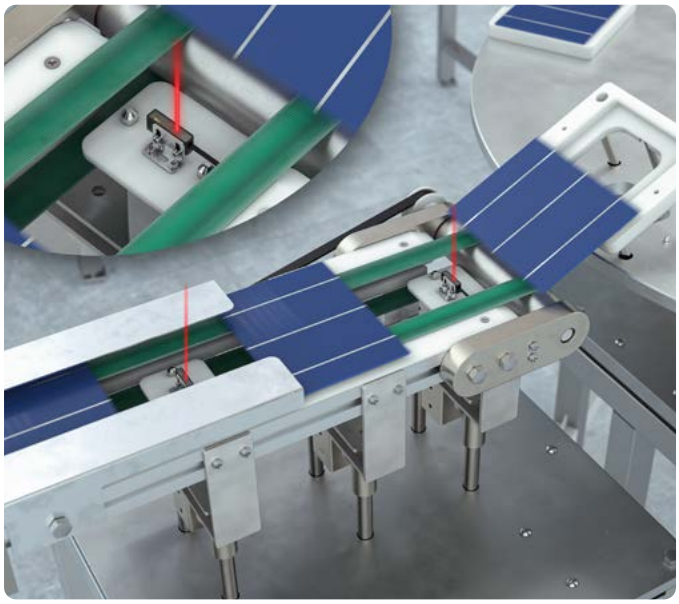
A Q2X fixed-field sensor can be fitted onto the labeling machine's tamp head to sense targets at a fixed distance, regardless of the product's color. The sharp 15 mm cutoff distance allows the tamp arm to lower to a consistent distance away from the target, even with products of differing heights. Once the tamp head is close enough to the product, it slows until it makes contact. It applies the appropriate amount of pressure to adhere the label, then rises to repeat the process.

Adjustable-Field

- Ignore objects in the background with an adjustable cutoff distance between 18 mm and 150 mm
- Detect dark and challenging targets using powerful emitters with high excess gain
- Detect precise features with the small, bright-red LED or Class 1 laser emitter
- Avoid crosstalk when mounting multiple sensors in close proximity due to the advanced crosstalk immunity algorithm

Series	Output State	Output	Mode	Range	Connection
Q2X	**A**	**P**	**LAF**	**100**	**Q8**
	A = Light operate **R** = Dark operate	**P** = PNP **N** = NPN **B** = Bipolar	**LAF** = Laser adjustable-field **AF** = LED adjustable-field	**100** = 18–100 mm* **150** = 18–150 mm**	**2M** = 2 m (6.5 ft) cable **Q** = 150 mm (6 in) 4-pin M8 pigtail **Q3** = 150 mm (6 in) 3-pin M8 pigtail **Q5** = 150 mm (6 in) 4-pin M12 pigtail

*Available with LAF models only
**Available with AF models only



Challenge

Silicone wafers can be an extremely challenging target to detect, due to their dark, shiny surface. Ensuring correct positioning is vital for these delicate substrates while they are moved and lifted through their processes. Size is also a limiting factor in the machine design.

Solution

The high excess gain of the adjustable-field Q2X allows it to reliably detect dark wafers. The tight minimum object separation can trigger the machine to move the next wafer into position as soon as the previous one is out of the way. And the small form factor easily fits into the machine without getting in the way.

Laser Measurement

- Measure farther with the industry's longest sensing range for a sensor in a compact housing
- Sense the most challenging targets like dark or shiny poly bags with a powerful infrared laser with best-in-class excess gain
- Employ in many applications by consolidating to one sensor model with the array of sensing modes, including background suppression, window mode, and dual mode
- Integrate easily into most control systems and access measurement values, delay timers, and advanced diagnostics via IO-Link
- Provide real-time visual feedback to machine operators without using a PLC by integrating the PulsePro output directly into Banner Pro lights

Series	Housing Style	Mode	Range	Beam Color		Connection
Q2X	**K**	**LAF**	**3**	**IR**	—	**Q5**
	K = IO-Link with discrete	**LAF** = Laser adjustable-field	**3** = 3 m **2** = 2 m	**IR** = Infrared		**Q** = 150 mm (6 in) M8 pigtail QD **Q5** = 150 mm (6 in) M12 pigtail QD

QD models require mating cordset

Challenge

Within warehouses, retroreflective sensors are often used to detect blocked chutes before they can disrupt throughput. However, a single package stuck blocking a beam can cause a false jam and shut down equipment.

Solution

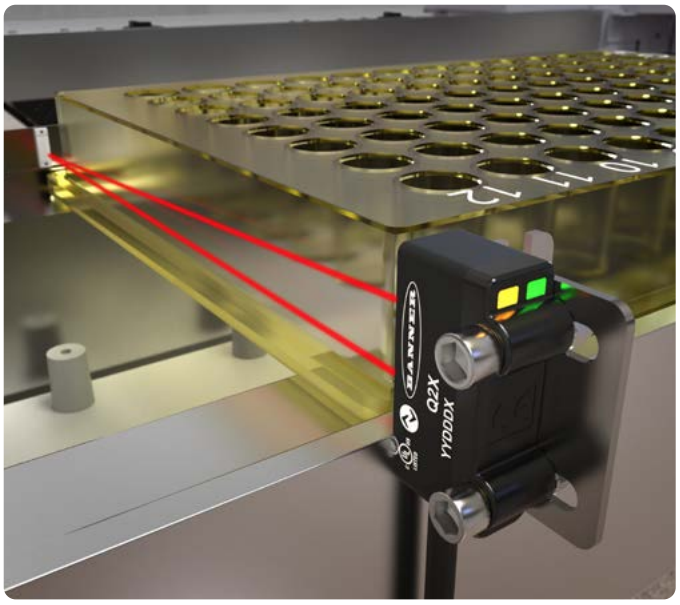
The Q2X Laser Measurement sensor with adjustable background suppression can be used. A cutoff distance taught slightly away from the back wall allows temporarily stuck packages to be ignored without disabling the entire chute. The built-in delay timing (available over IO-Link) can be implemented to wait until there is a real jam before shutting down the machine. One customer was able to reduce false jams by more than 90 percent and improve their throughput.

Polarized Retroreflective

- Reduce installation time with an easy-to-align, bright-red LED
- Detect targets moving at high speeds with the 600 µs response time
- Sense light, dark, and shiny targets farther away with industry-leading 3.3 m range
- Mount the reflector as close as 3 mm from the face of the sensor for ultra short range applications*

*40 mm x 19 mm reflector required (model: BRT-40x19A)

Series	Output State	Output	Mode	Connection
Q2X	**A**	**P**	**LPF**	**Q8**
	A = Light operate **R** = Dark operate	**P** = PNP **N** = NPN **B** = Bipolar	**LPF** = Fixed-gain polarized retroreflective	**2M** = 2 m (6.5 ft) cable **Q** = 150 mm (6 in) 4-pin M8 pigtail **Q3** = 150 mm (6 in) 3-pin M8 pigtail **Q5** = 150 mm (6 in) 4-pin M12 pigtail



Challenge

Medical and scientific laboratories need a method to ensure that their microwell plates are accurately positioned in testing machines. Polarized retroreflective sensors work well for leading-edge detection, but many testing machines have a small footprint and are already crowded with internal components.

Solution

The Q2X polarized retroreflective sensor is small enough to fit inside many types of machines that cannot accommodate larger sensors. In addition to its reduced size, the sensor offers a fast response time of 600 µs, which ensures accurate positioning relative to the known speed of conveyors. By using retroreflective sensing, the Q2X can detect microwell plates of any color, shade, or reflectivity.

Opposed

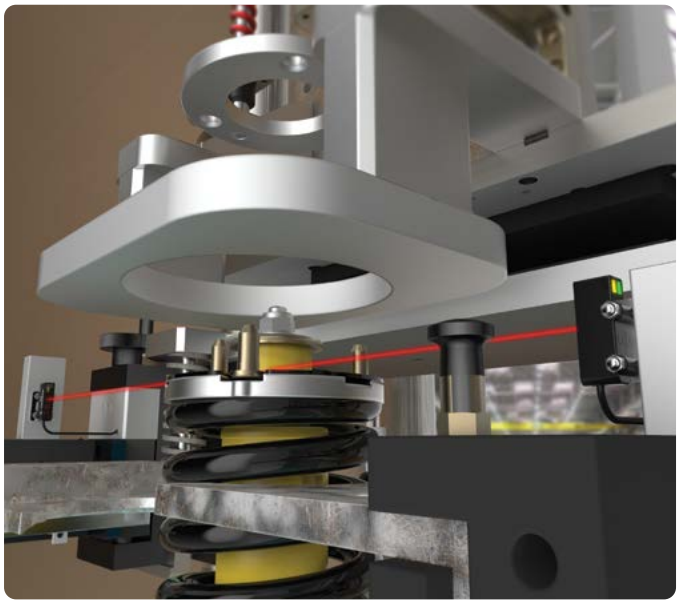
- Simplify installation with an easy to align, large visible spot
- Decrease false and missed detections by ignoring most dust and debris
- Emitter and receiver can be up to 3 m (10 ft) apart and will reliably detect objects as small as 4 mm anywhere within the beam

Opposed Emitter

Series	Output	Mode	Connection
Q2X	**NA**	**E**	**Q8**
	NA = No output	**E** = Emitter	**2M** = 2 m (6.5 ft) cable **Q** = 150 mm (6 in) 4-pin M8 pigtail **Q3** = 150 mm (6 in) 3-pin M8 pigtail **Q5** = 150 mm (6 in) 4-pin M12 pigtail

Opposed Receiver

Series	Output State	Output	Mode	Connection
Q2X	**A**	**P**	**R**	**Q8**
	A = Light operate **R** = Dark operate	**P** = PNP **N** = NPN **B** = Bipolar	**R** = Receiver	**2M** = 2 m (6.5 ft) cable **Q** = 150 mm (6 in) 4-pin M8 pigtail **Q3** = 150 mm (6 in) 3-pin M8 pigtail **Q5** = 150 mm (6 in) 4-pin M12 pigtail



Challenge

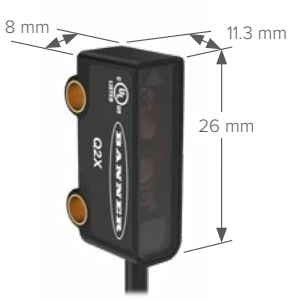
Before a suspension strut assembly can proceed down the line, the presence of all parts must be verified. However, Tier 1 automotive assembly machines may not have enough physical space to house a larger or even average-sized sensor for this verification.

Solution

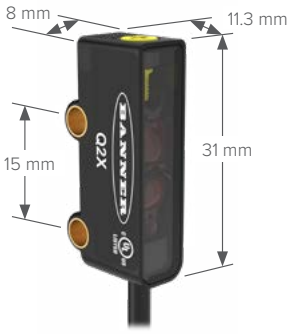
The miniature housing of the opposed-mode Q2X can be fit into most assembly machines. Once the Q2X is installed, its 4.3 mm effective beam can accurately sense whether the top cap of the strut is present; deciding if it can advance to the next stage of assembly.

Specifications

Fixed-Field, Opposed, and Polarized Retro



Adjustable-Field and Laser Measurement



Response Speed	Fixed-Field: 850 µs ON/OFF Adjustable-Field: 850 µs, ON/OFF Opposed: 1 ms ON, 0.6 ms OFF Polarized Retro: 600 µs, ON/OFF Laser Measurement: Fast 33 ms, Medium 100 ms, Slow 500 ms
Operating Conditions	Laser Measurement: -20 to +50 ˚C All other: -25 to +50 ˚C
Environmental Rating	IP67
Construction	Housing: PC/ABS Lens cover: Acrylic
Certifications	Industrial Control Equipment TJJ

Accessories

SMBQ2XA
Right-angle mount bracket

SMBQ2XB
Right-angle mount bracket

BRT-2X2
51 x 51 mm
retroreflective target

BRT-60X40C
60 x 40 mm
retroreflective target

BRT-40x19A
45 x 19 mm
retroreflective target

SMBQ20FA
Bracket kit for 10 mm (3/8 in) rod bracket systems

APQ2X-VH*
Cross-talk avoidance filters (1 set of 4)

APQ2X-1*
1 mm round aperture kit (set of 2)

APQ2X-1.5*
1.5 mm round aperture kit (set of 2)

APQ2X-2*
2 mm round aperture kit (set of 2)

*For opposed mode only

3-Pin M8 Connector
Straight connector models listed; for right-angle, replace **G** with **W** in the model number (example, **PKW3M-2**)

PKG3M-2
2 m (6.5')
PKG3M-5
5 m (16')
PKG3M-9
9 m (30')

4-Pin M8 Connector
Straight connector models listed; for right-angle, replace **G** with **W** in the model number (example, **PKW4M-2**)

PKG4M-2
2 m (6.5')
PKG4M-5
5 m (16')
PKG4M-9
9 m (30')

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

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

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