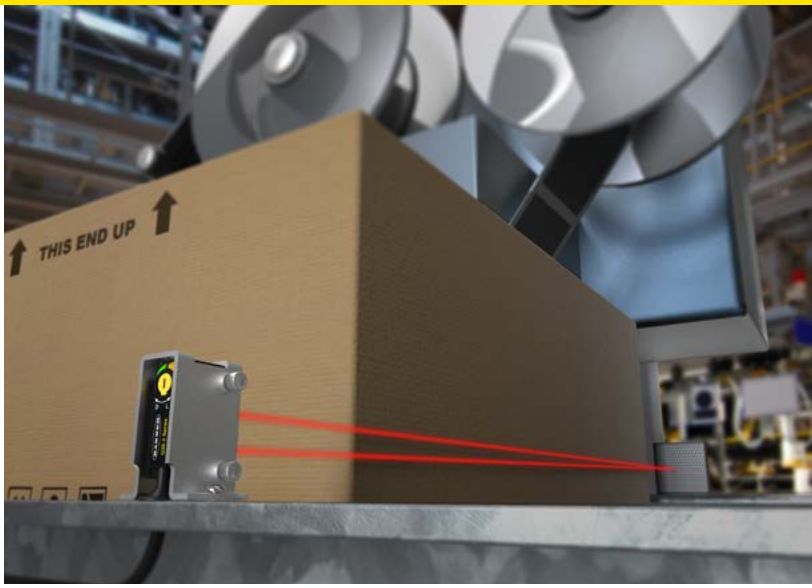
Leading Edge Detection Solutions



What Is Leading Edge Detection?

On equipment that moves a product, container, or package, sensors are used to detect the movement or presence of these items. Automated systems use these sensor readings to make critical decisions. Specifically, these applications rely on detecting the leading edge of the item as quickly and as accurately as possible.

Challenges of Leading Edge Detection

Types of Containers/Packaging

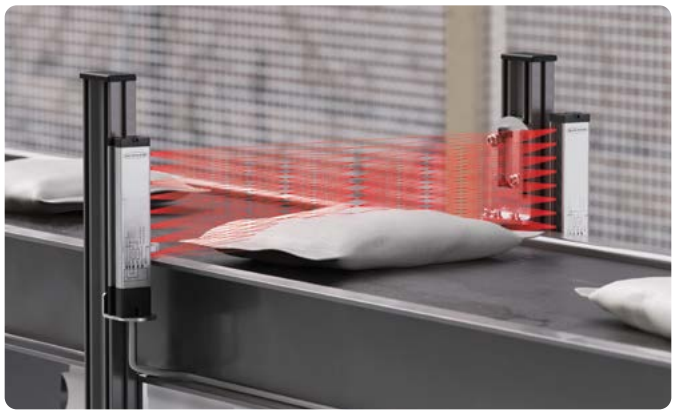
Trends in packaging have migrated from boxes to more challenging targets. Polybags, blister packs, envelopes, totes, and tubes are all commonly transported on conveyor lines and can have irregular shapes. As a result, sensing solutions need to be adapted to reliably detect all types of packaging.

Types of Conveyors/Equipment

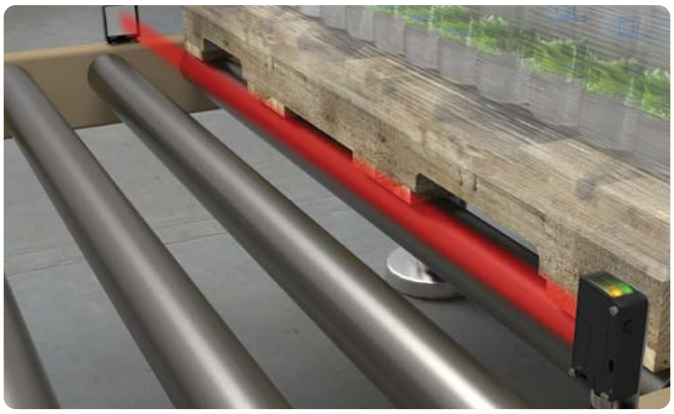
There are many different types of conveyors and machines used to move goods. Banner develops and supplies sensors for a wide variety of conveyor equipment.

Types of Leading Edge Detection

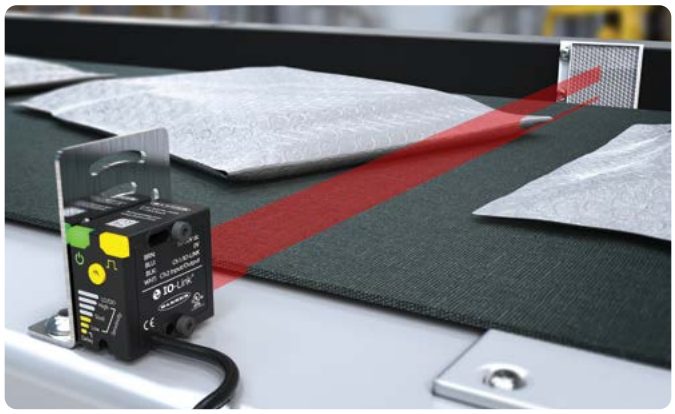
Single-Point
Leading Edge Detection



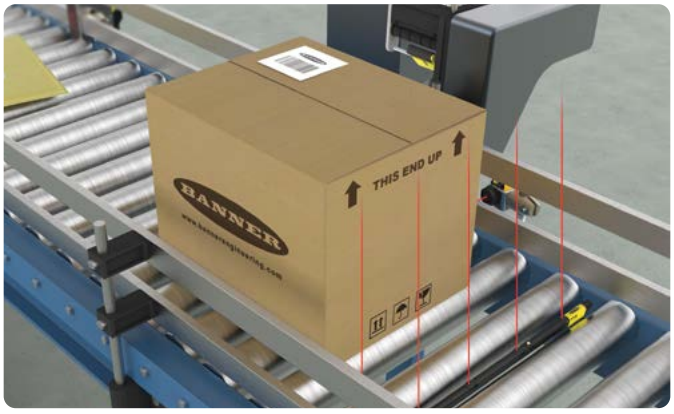
Small and Flat Object
Leading Edge Detection



Wide Beam Pallet
Leading Edge Detection



Wide Beam Small Object
Leading Edge Detection



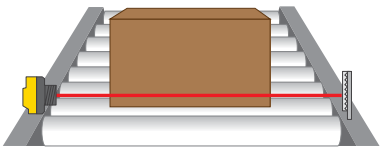
Through the Roller
Leading Edge Detection

Robust Array
Leading Edge Detection

Choosing a Banner Sensor

Because applications and products vary significantly, there are numerous choices when it comes to leading edge detection. For best results, select a sensor that aligns with your specific needs.

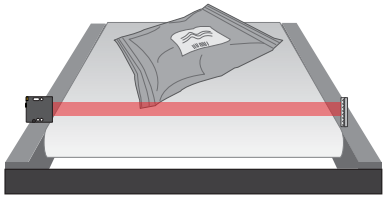
Single-Point Leading Edge Detection



QS18 or Q20-2

Cost-effective yet powerful, these compact sensors detect boxes, totes, and many other objects.

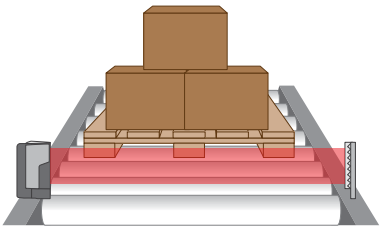
Wide Beam Small Object Leading Edge Detection



B25

Superior performance across a wide beam reliably detects targets regardless of shape, position, or material, and avoids chatter caused by folded edges, holes, or open flaps.

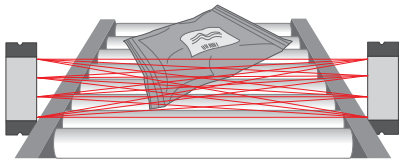
Wide Beam Pallet Leading Edge Detection



Q76E

With a wide sensing beam, this sensor detects items like pallets, polybags, or other irregularly shaped objects.

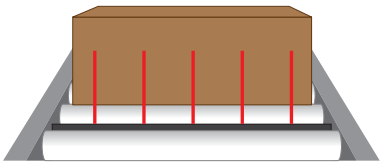
Small and Flat Object Leading Edge Detection



LX

This sensor's short response time and large detection area creates an accurate solution for very small or flat objects.

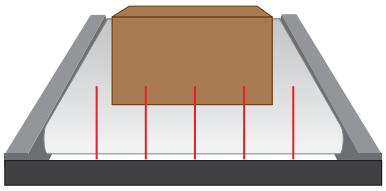
Through the Roller Leading Edge Detection



TTR

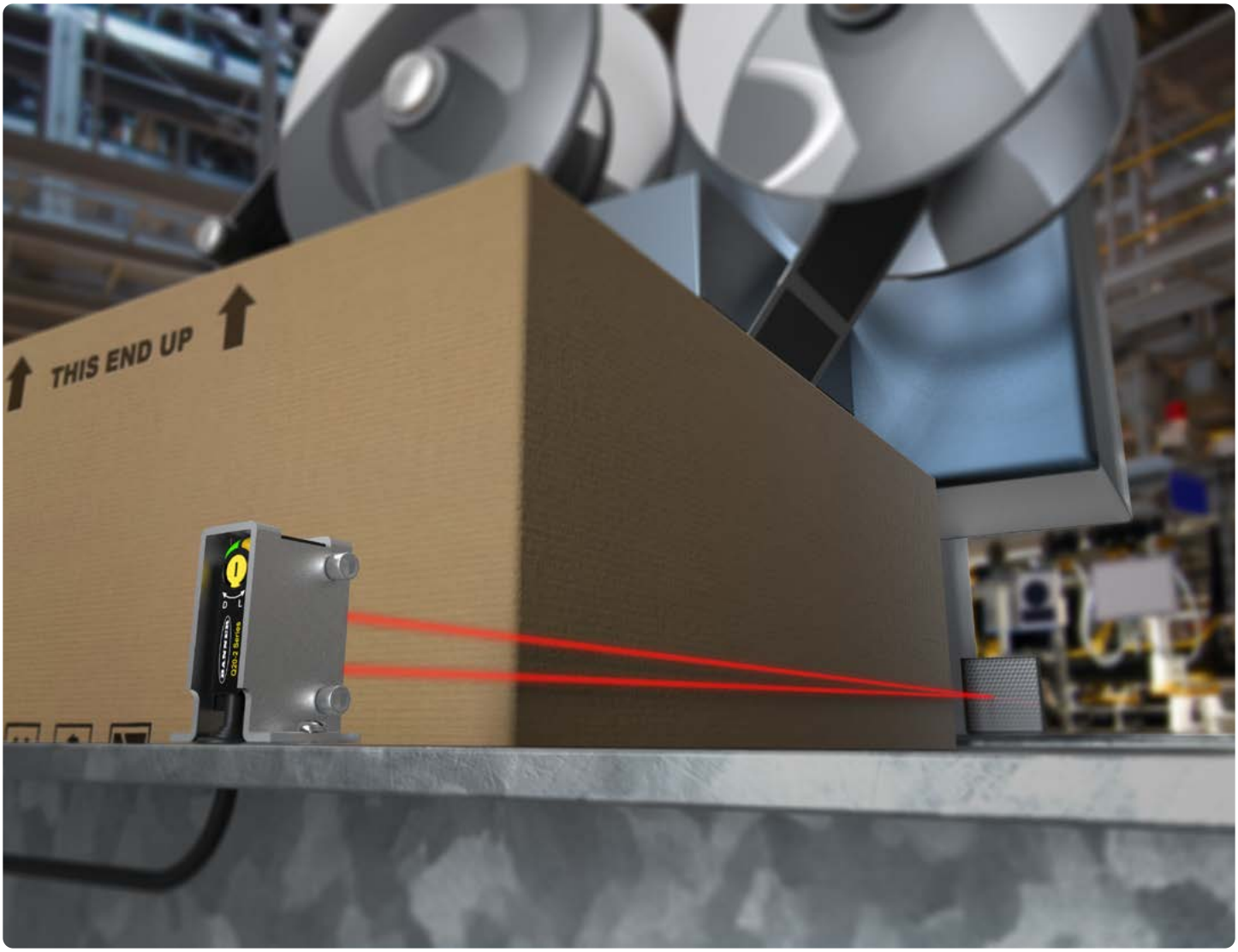
An improved solution for roller conveyors, this sensor mounts easily between rollers, detecting a variety of objects.

Robust Array Leading Edge Detection



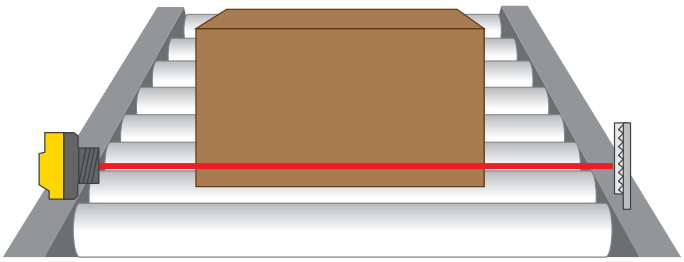
SAB

Heavy-duty sensor bar with robust housing, suitable for sorter chutes and roller-conveyor systems in which products could come in direct contact with sensors.



Single-Point Leading Edge Detection

- Lowest cost solution
- Sufficient for many targets
- Used on conveyors with rails on the sides
- Robust sensing solution that only requires power on one side of the conveyor
- Polarization assures reliable detection of highly reflective objects



Polarized Retroreflective Sensors

- Polarization assures reliable detection of highly reflective objects
- Fast response speed (less than 1 ms) for excellent sensing repeatability
- Features bright LED operating-status indicators for simple troubleshooting

Q20-2 Polarized Retroreflective Sensors

- Rectangular housing for versatile mounting, with M3 threaded inserts and 25.4 mm hole spacing

Sensing Range	Output	Operating Mode	Connection	Models
5000 mm	PNP	LO/DO selectable switch	Integral 4-pin M12 male quick disconnect	**Q20-2PLP-Q5**
	NPN			**Q20-2NLP-Q5**

*M12 pigtail quick disconnect models listed. Other models available on our website.

QS18 All-Purpose Photoelectric Sensors

- Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles

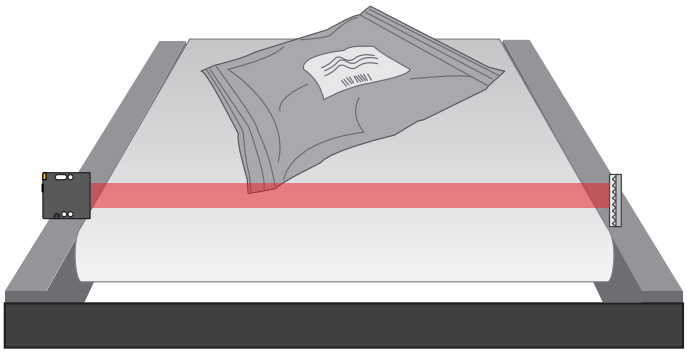
Sensing Range	Sensing Mode	Connection	Output	Models
3.5 m	630 nm visible red	4-Pin M12 integral QD	NPN	**QS18VN6LPQ8**
			PNP	**QS18VP6LPQ8**

*Integral QD models listed. Cabled and other models available on our website.

Specifications	QS18	Q20-2
Response Speed	850 µs	850 µs
Environmental Rating	IEC IP67	IEC IP67
Construction	ABS housing	ABS housing

Wide Beam Small Object Leading Edge Detection

- Reliably detects targets as thin as three millimeters, such as envelopes or poly bags
- Consistently detects clear and challenging targets, including folded edges, holes, and open flaps



B25 Wide Beam Sensors

- Reliably detect leading edges of polybags, mailers, and boxes
- Delivers superior detection across a wide beam regardless of target shape, position, or material
- Avoids chatter caused by targets with folded edges, holes, or open flaps
- Perform quick setup and configuration using a single button, remote input wire, or IO-Link interface

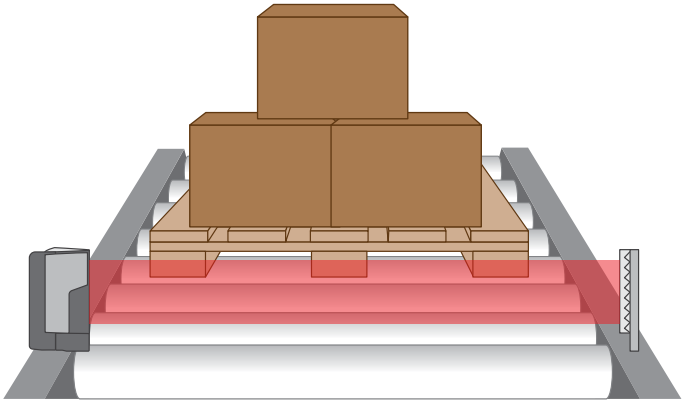
Range	Input	Output	Cable	Model
0 to 2 m	10 to 30 V DC	Push/pull with IO-Link, PNP	150 mm PVC jacketed cable with a 4-pin M12 male quick disconnect	**B25-K6LP-Q5**

Specifications

Range	0 to 2 m	
Sensing Beam	25 mm	
Response Time	0.5 ms	
Minimum Object Detection Size	Sensor to reflector distance	Minimum object detection size
	2 m	5 mm
	1.5 m	4 mm
	1.1 m	3 mm
Environmental Rating	IEC IP67	
Construction	PC/ABS	

Wide Beam Pallet Leading Edge Detection

- Detects irregular-shaped objects
- Retroreflective sensor, only requires wiring on one side



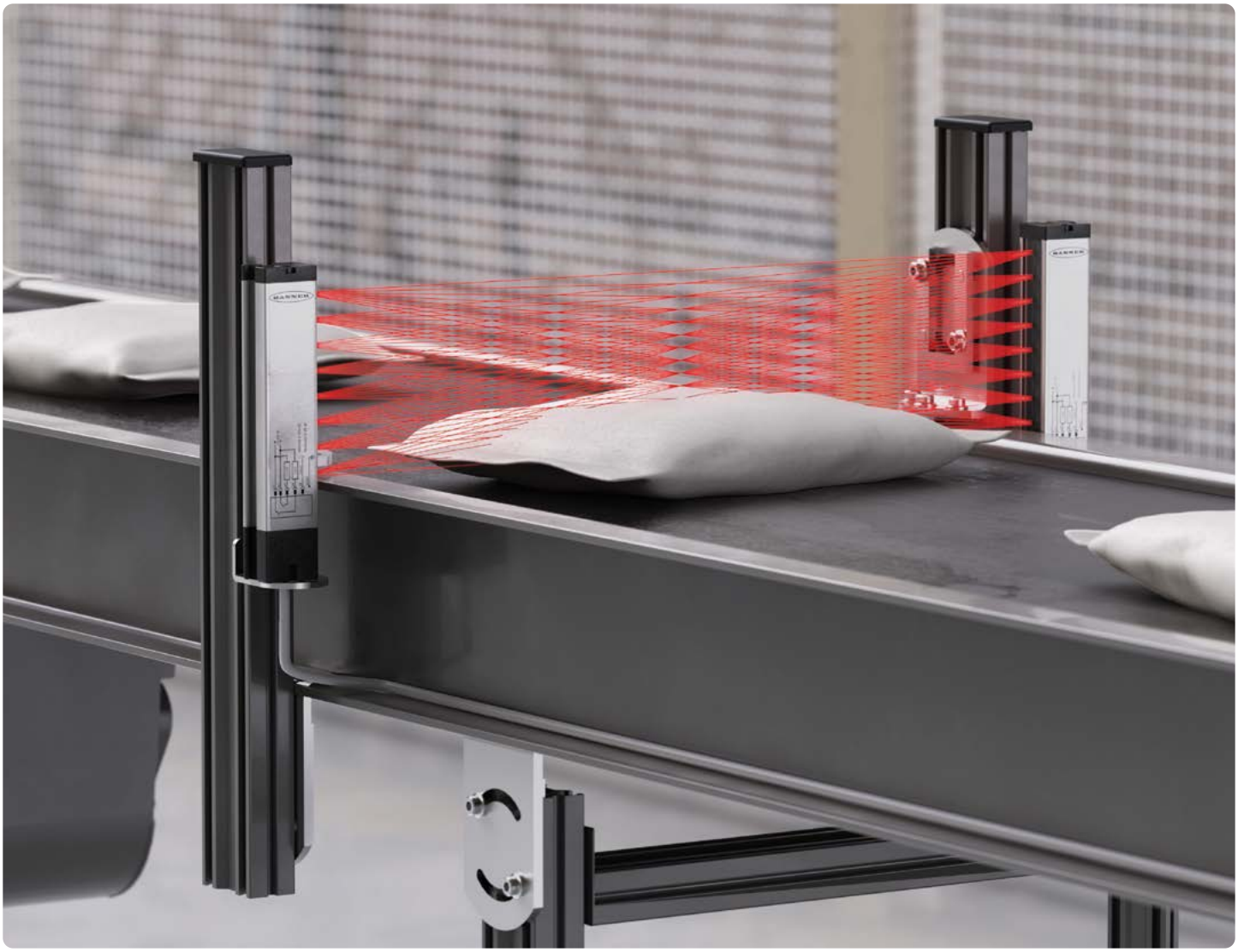
Q76E Wide Beam Retroreflective Sensors

- 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 m 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 setup and adjustment, with a single push button to select light operate or dark operate (LO/DO)
- 250 Hz switching frequency for high-speed production lines
- IP67- and IP69-rated for washdown applications

Range	Input	Output	Cable	Models
0.4 mm to 4.0 m	10 to 30 V DC	Complementary PNP	200 mm PUR cable with a 4-pin M12 male quick disconnect	**Q76E-VP-ZLVC-Q5**
			Integral 4-pin M12 male quick disconnect	**Q76E-VP-ZLVC-Q8**
			2 m unterminated 3-wire PVC cable	**Q76E-VP-ZLVC-2M**
		Complementary NPN	200 mm PUR cable with a 4-pin M12 male quick disconnect	**Q76E-VN-ZLVC-Q5**
			Integral 4-pin M12 male quick disconnect	**Q76E-VN-ZLVC-Q8**
			2 m unterminated 3-wire PVC cable	**Q76E-VN-ZLVC-2M**
		1 PNP/NPN light operate with IO-Link; 1 PNP dark operate	200 mm PUR cable with a 4-pin M12 male quick disconnect	**Q76E-KP-ZLVC-Q5**

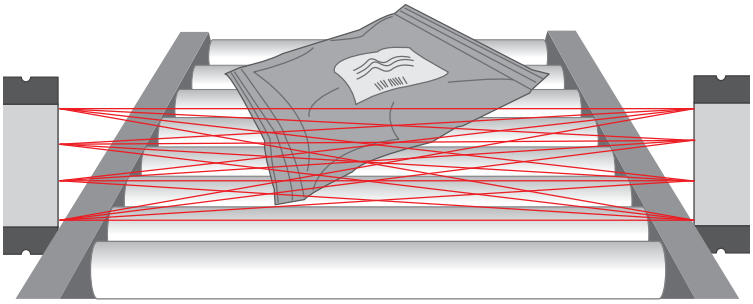
Specifications

Range	4 m			
Response Time	2 ms			
Minimum Object Detection Size	**Sensitivity setting**	Max. range 100x100 reflector	Max. range 40x60 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
Environmental Rating	IEC IP67, IEC IP69			
Construction	PC-PBT housing; PMMA lens cover			



Small or Flat Leading Edge Detection

- Crosshatch beam pattern detects very small or flat packages
- Durable housing design resists damage
- High-speed response time as fast as 0.8 milliseconds



LX Small and Flat Object Detection Sensors

- Large sensing area to provide consistent detection of packages where the leading edge varies
- Generates a cross-hatched beam pattern that can detect objects as thin as 1 mm, including envelopes
- Response times as fast as 0.8 ms allow automated systems to operate at higher line speeds, resulting in increased throughput

Response Time	Sensing Array Length	Output Type	Cable*	Models
0.8 ms ON-time, 6 ms OFF-time (5 ms OFF-delay)	67 mm	Bipolar NPN/PNP	2 m 5-wire integral cable	**LX3E** Emitter **LX3R** Receiver
1.6 ms ON-time, 7 ms OFF-time (5 ms OFF-delay)	143 mm			**LX6E** Emitter **LX6R** Receiver
2.4 ms ON-time, 7.5 ms OFF-time (5 ms OFF-delay)	218 mm			**LX9E** Emitter **LX9R** Receiver
3.2 ms ON-time, 8.5 ms OFF-time (5 ms OFF-delay)	295 mm			**LX12E** Emitter **LX12R** Receiver
4.0 ms ON-time, 9 ms OFF-time (5 ms OFF-delay)	371 mm			**LX15E** Emitter **LX15R** Receiver
4.8 ms ON-time, 10 ms OFF-time (5 ms OFF-delay)	447 mm			**LX18E** Emitter **LX18R** Receiver
5.6 ms ON-time, 11 ms OFF-time (5 ms OFF-delay)	523 mm			**LX21E** Emitter **LX21R** Receiver
6.4 ms ON-time, 11.5 ms OFF-time (5 ms OFF-delay)	599 mm			**LX24E** Emitter **LX24R** Receiver
7.2 ms ON-time, 12 ms OFF-time (5 ms OFF-delay)	686 mm			**LX27E** Emitter **LX27R** Receiver
8.0 ms ON-time, 13 ms OFF-time (5 ms OFF-delay)	762 mm			**LX30E** Emitter **LX30R** Receiver
8.8 ms ON-time, 14 ms OFF-time (5 ms OFF-delay)	838 mm			**LX33E** Emitter **LX33R** Receiver
9.6 ms ON-time, 15 ms OFF-time (5 ms OFF-delay)	914 mm			**LX36E** Emitter **LX36R** Receiver

*Integral cable models are listed.

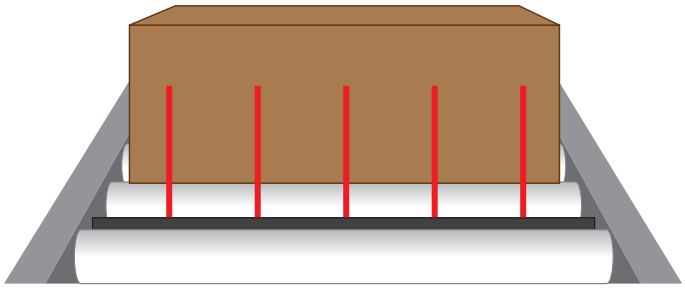
- To order the 5-pin M12 150 mm (6 in.) cable model, add suffix "Q" to model number (for example, LX3EQ).
- Models with a quick disconnect require a mating cordset.

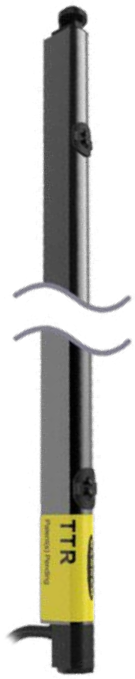
Specifications

Sensing Range	Short-range models: 75 to 150 mm or 100 to 200 mm, depending on mode Standard-range models: 150 mm to 600 mm or 300 mm to 2 m, depending on mode
Environmental Rating	Meets IEC IP65
Construction	Aluminum housing, die-cast zinc with black e-coat painted endcaps, acrylic lens window

Through-the-Roller Leading Edge Detection

- Designed for roller conveyors without sides for mounting sensors
- Detects irregularly shaped items
- Placement below rollers offers protection from collisions with large items





TTR Through The Roller Sensors

- Reliable leading edge detection of letters, thin packages, poly bags, totes, boxes, or other products on roller conveyors
- Mounts between conveyor roller gap, using standard hex or round side-rail holes (no extra hardware required) or on the T-Slot (with customer-supplied bracket and hardware)
- Spring-loaded end caps reduce installation and alignment time for reduced labor costs
- Built to order with specified length and beam spacing: 200 to 1500 mm (8 to 59 in.) with two to ten sensors for maximum flexibility
- Robust aluminum housing, with resistance to ambient light and electrostatic discharge (ESD) for enhanced durability

Series	Between Frame Distance (mm)	Output Type	Special Feature	Beam Spacing (mm)	No. of Beams	End Cap Style		Cable Length (m)	Connector Style		First Beam Distance from Cable End Cap
TTR	**384**	**AP**	**S**	**A**	**6**	**T**	–	**2.0**	**FL**	–	**CTR**
	200–1500*				**1–10**			**0.5, 1.0, 2.0**			

BM = Bimodal
AP = Light operate PNP
AN = Light operate NPN
RP = Dark operate PNP
RN = Dark operate NPN

A = 54 **E** = 186.2
B = 93.1 **F** = 75
C = 108 **G** = 150
D = 162

A,B,C,D,E,F,G,T

FL = Flying leads
RJ = RJ11
Q5 = M12
Q3 = M8

CTR = Beams centered between frames
059–200 = First beam distance from cable end cap (mm)

S = Standard range (120 mm)
G = Standard gain (120 mm) with ground strap
W = Low gain (85 mm) with ground strap
X = Low gain (85 mm)
Y = Low gain (100 mm) with ground strap
Z = Low gain (100 mm)

*Max length of models with end cap styles A, B, D, E is 915 mm
Max length of models with end cap styles C, F, G is 750 mm
Max length of models with end cap style T is 1500 mm

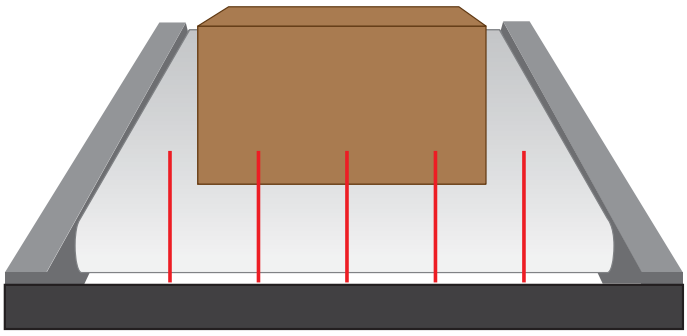
To configure a model number, please contact an engineer at 763-544-3164.

Specifications

Range	120 mm
Output Types	NPN, PNP, bimodal
Number of Beams	2 minimum, 10 maximum
Maximum Length	1500 standard
Response Time	1 ms ON/OFF
Minimum Object Detection Size	54 mm beam spacing 2" x 2" 93.1 mm beam spacing 4" x 4" 162 mm beam spacing 6" x 6"
Environmental Rating	IEC IP50
Construction	Aluminum housing

Robust Array Leading Edge Detection

- Heavy-duty design protects from impact
- Ideal for detecting items moving down a chute
- Diffuse and retroreflective modes available to accommodate a variety of applications
- Longer sensing range than TTR



SAB Sensor Array Bars

- Customizable sensor array bar—different lengths and number of sensors
- Robust aluminum housing protects array bars in challenging environments
- One M12 connector powers the entire array bar and consolidates all outputs into one
- Polarized retroreflective, long-range diffuse, or standard diffuse array bars are available
- IEC rating of IP50
- Solid-state bipolar outputs (NPN and PNP)

Beams	Supply Current	Sensing Range	Sensing Mode	Output	Models
6	150 mA	1 m when using a BRT-THG-2 reflector tape as a target 3 m when using five side-by-side BRT-92×92C reflectors or six side-by-side BRT-77×77C reflectors as targets	Polarized, retroreflective, visible red 624 nm	Dark operate, bipolar	**SAB-497RB1LP6-Q5E**
				Light operate, bipolar	**SAB-497AB1LP6-Q5E**
13				Dark operate, bipolar	**SAB-998RB1LP13-Q5E**
10					**SAB-484RB1LP10-Q5E**
6		200 mm when using a 90% white card as a target	Diffuse, infrared, 940 nm		**SAB-497RB1DS6-Q5E**
				Light operate, bipolar	**SAB-497AB1DS6-Q5E**
13	325 mA	762 mm when using a 90% white card as a target			**SAB-998AB1DXL13-Q5E**

Specifications	Polarized retro	Diffuse
Range	3 m	762 mm
Response Time	1.5 ms ON/OFF	3 ms ON/OFF
Array Length	135 mm minimum, 1219 mm maximum	
Number of Beams	2 minimum, 18 maximum	
Beam Spacing	44.4 mm minimum	
Environmental Rating	IEC IP50	
Construction	Black anodized aluminum housing	

Smarter Automation. Better Solutions.™

Banner Engineering designs and manufactures industrial automation products including sensors, smart IIoT and industrial wireless technologies, LED lights and indicators, measurement devices, machine safety equipment, as well as barcode scanners and machine vision. These solutions help make many of the things we use every day, from food and medicine to cars and electronics. A high-quality, reliable Banner product is installed somewhere around the world every two seconds. Headquartered in Minneapolis since 1966, Banner is an industry leader with more than 10,000 products, operations on five continents, and a worldwide team of more than 5,500 employees and partners. Our dedication to innovation and personable service makes Banner a trusted source of smart automation technologies to customers around the globe.

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