Leading Edge Detection Solutions

BANNER®

more sensors, more solutions

What is Leading Edge Detection?

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On equipment that moves a product, container, or package, sensors are used to detect the movement or presence of these items 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 a product.

Types of Conveyors/Equipment

There are many different types of conveyors and machines used to move goods. Some machines can use certain types of sensors while others may not.

Single-Point
Leading Edge Detection

Small and Flat Object
Leading Edge Detection

Wide-Beam
Leading Edge Detection
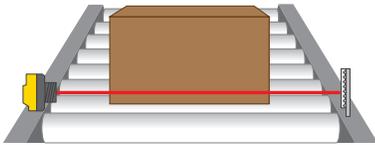

Through the Roller
Leading Edge Detection

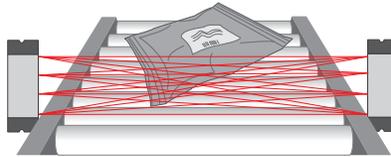

Robust Array
Leading Edge Detection

Choosing a Banner Sensor

Choosing the right sensor can reduce errors caused by product jamming, overlapping, side-by side, and irregular shaped packages.
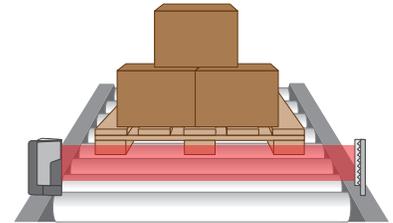
| Single-Point Leading Edge Detection	Small and Flat Object Leading Edge Detection	Wide-Beam Leading Edge Detection
QS18 or Q20	LX	Q76E
Cost-effective yet powerful, these compact sensors detect boxes, totes, and many other objects.	Short response time and large detection area creates an accurate solution for very small or flat objects.	Wide sensing beam detects items like pallets, polybags, or other irregularly shaped objects.

Through the Roller
Leading Edge Detection
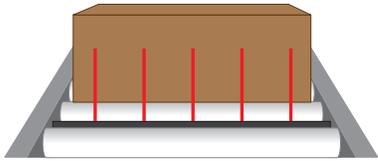
Robust Array
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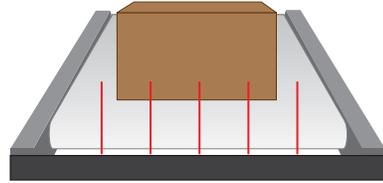
TTR

SAB

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

Heavy-duty sensor bar suitable for tough environments such as sorter chutes and roller conveyors.

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
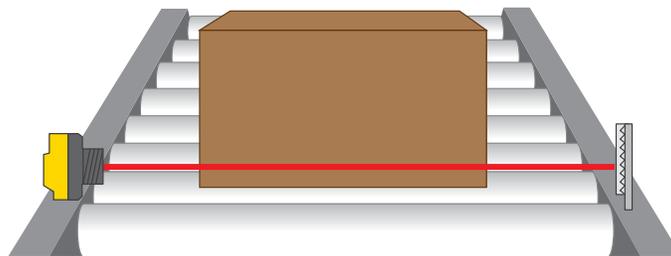
Polarized Retroreflective Sensors

- 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 visible from 360°

QS18 All-Purpose Photoelectric Sensor

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

Sensing Mode	Sensing Range	Connector	Output	Models
630 nm Visible Red	3.5 m (12 ft)	4-Pin M12 integral QD	NPN	QS18VN6LPQ8
			PNP	QS18VP6LPQ8

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

Q20 Industry Standard Global Housing

- Rectangular Housing for versatile mounting with M3 threaded inserts with 25.4 mm hole spacing

Sensing Mode	Sensing Range	Connector	Output	Models
645 nm Visible Red	4 m (13 ft) (specified using reflector BRT-84)	4-Pin M12 integral QD	PNP	Q20PLPQ7
			NPN	Q20NLPQ7

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

Specifications	QS18	Q20
Response Speed	850 µs	850 µs
Environmental Rating	IEC IP67	IEC IP67
Construction	ABS Housing	ABS Housing
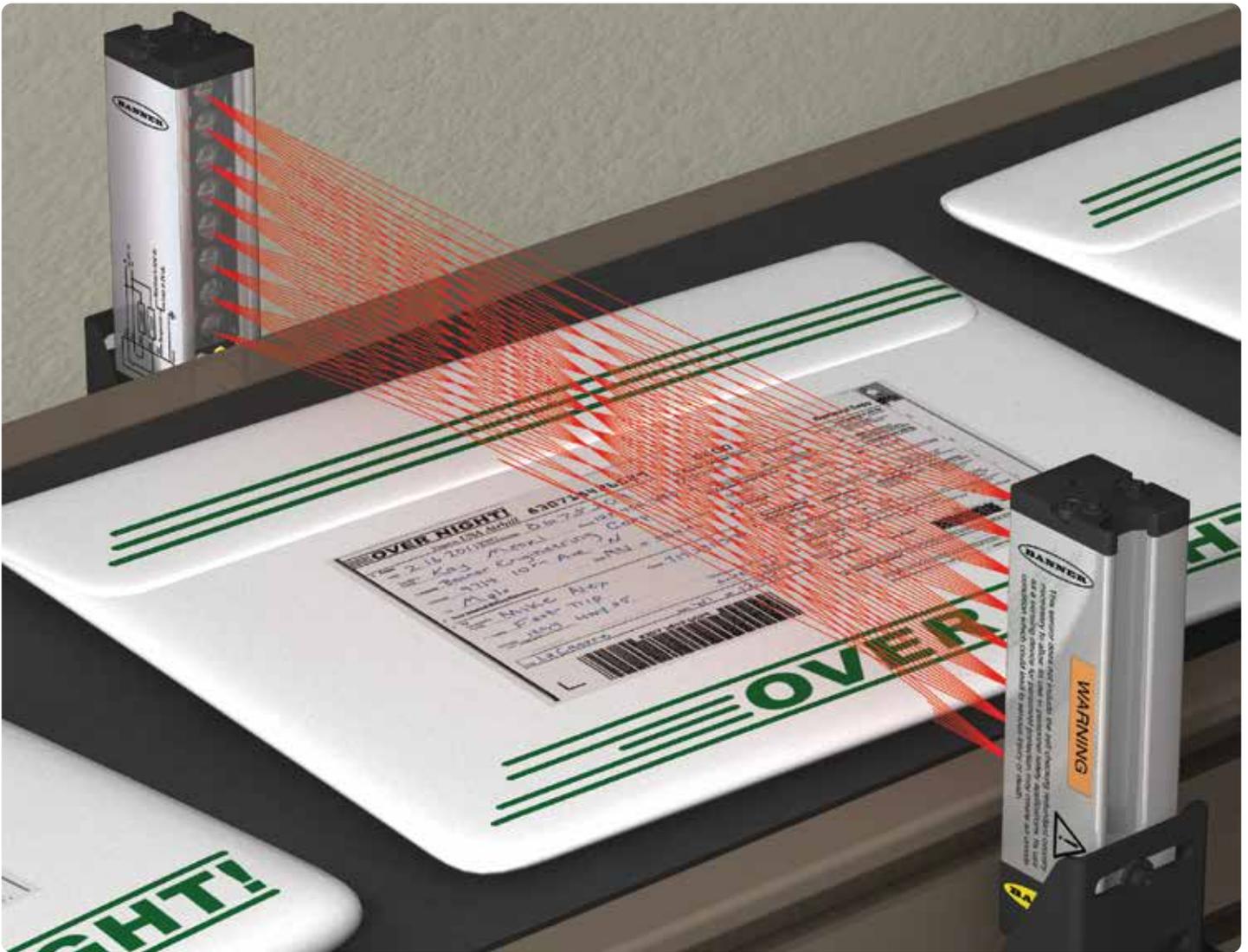
Small or Flat Leading Edge Detection

- Crosshatch beam pattern detects very small or flat packages
- Durable housing design resists damage

- High-speed, response time as fast as 0.8 milliseconds
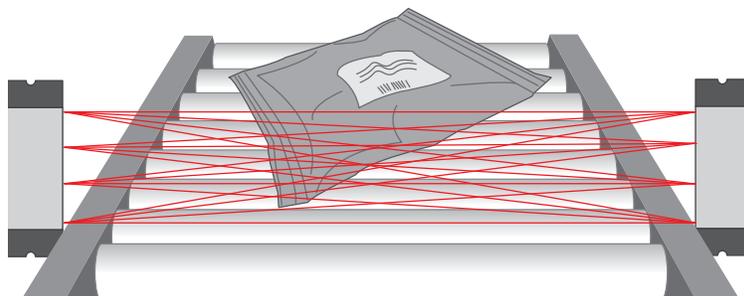
LX Small and Flat Object Detection Sensor

- Large detection area to provide consistent detection of packages where the leading edge varies
- Generates a cross hatched beam pattern that can detect an object as thin as 1 mm, depending on the width
- Response speeds as fast as 0.8 ms allows 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 (2.6 in)	Bipolar NPN/PNP	2 m (6.5 ft) 5- wire Integral cable	**LX3E** Emitter **LX3R** Receiver
1.6 ms ON-time 7 ms OFF-time (5 ms OFF-delay)	143 mm (5.6 in)			**LX6E** Emitter **LX6R** Receiver
2.4 ms ON-time 7.5 ms OFF-time (5 ms OFF-delay)	218 mm (8.6 in)			**LX9E** Emitter **LX9R** Receiver
3.2 ms ON-time 8.5 ms OFF-time (5 ms OFF-delay)	295 mm (11.6 in)			**LX12E** Emitter **LX12R** Receiver
4.0 ms ON-time 9 ms OFF-time (5 ms OFF-delay)	371 mm (14.6 in)			**LX15E** Emitter **LX15R** Receiver
4.8 ms ON-time 10 ms OFF-time (5 ms OFF-delay)	447 mm (17.6 in)			**LX18E** Emitter **LX18R** Receiver
5.6 ms ON-time 11 ms OFF-time (5 ms OFF-delay)	523 mm (20.6 in)			**LX21E** Emitter **LX21R** Receiver
6.4 ms ON-time 11.5 ms OFF-time (5 ms OFF-delay)	599 mm (23.6 in)			**LX24E** Emitter **LX24R** Receiver
7.2 ms ON-time 12 ms OFF-time (5 ms OFF-delay)	686 mm (27.0 in)			**LX27E** Emitter **LX27R** Receiver
8.0 ms ON-time 13 ms OFF-time (5 ms OFF-delay)	762 mm (30.0 in)			**LX30E** Emitter **LX30R** Receiver
8.8 ms ON-time 14 ms OFF-time (5 ms OFF-delay)	838 mm (33.0 in)			**LX33E** Emitter **LX33R** Receiver
9.6 ms ON-time 15 ms OFF-time (5 ms OFF-delay)	914 mm (35.9 in)			**LX36E** Emitter **LX36R** Receiver

*Integral cable models are listed.
- To order the 5-pin M12/Euro-style 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 (3 in to 6 in) or 100 to 200 mm (4 in to 8 in); depending on mode Standard-Range Models: 150 mm to 600 mm (6 in to 24 in) or 300 mm to 2 m (1 ft to 6.5 ft); depending on mode
Environmental Rating	Meets IEC IP65
Construction	Aluminum housing, die cast zinc with black e-coat painted endcaps, acrylic lens window

Wide-Beam Leading Edge Detection

- Detects irregular-shaped objects

- Retroreflective sensor, only requires wiring on one side
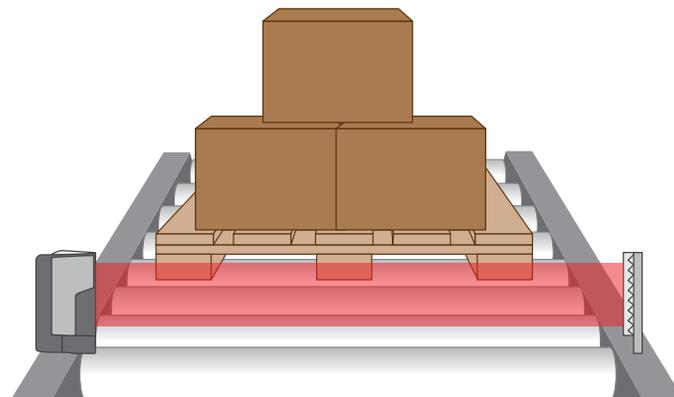
Q76E Wide Beam Retroreflective Sensor

- 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-rated for washdown applications

Range	Input	Output	Cable	Models
0.4 mm to 4.0 m (1.3 to 13.1 ft)	10 to 30 V DC	Complementary PNP	200 mm (7.5 in) 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 (6.5 ft) unterminated 3-wire PVC cable	**Q76E-VP-ZLVC-2M**
		Complementary NPN	200 mm (7.5 in) 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 (6.5 ft) unterminated 3-wire PVC cable	**Q76E-VN-ZLVC-2M**
		1 PNP/NPN Light Operate with IO-Link; 1 PNP Dark Operate	200 mm (7.5 in) 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			

Through-the-Roller Leading Edge Detection

- Designed for roller conveyors without sides for mounting sensors

- Detects irregularly shaped items
- Large items can knock sensors off sides of conveyors
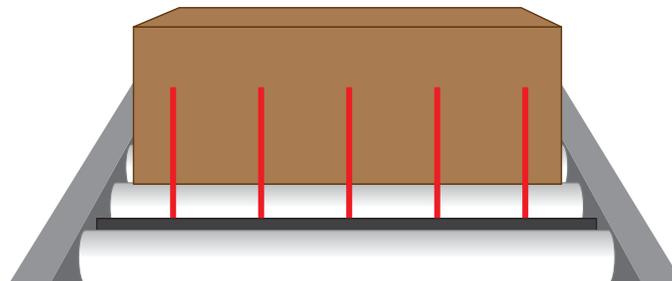
TTR Through The Roller Sensor

- Reliable leading-edge detection of letters, thin packages, poly bags, totes, boxes or other product on roller conveyors
- Mounts between conveyor roller gap to standard hex or round side rail holes with no extra hardware required or on the T-Slot with customer supplied bracket and hardware
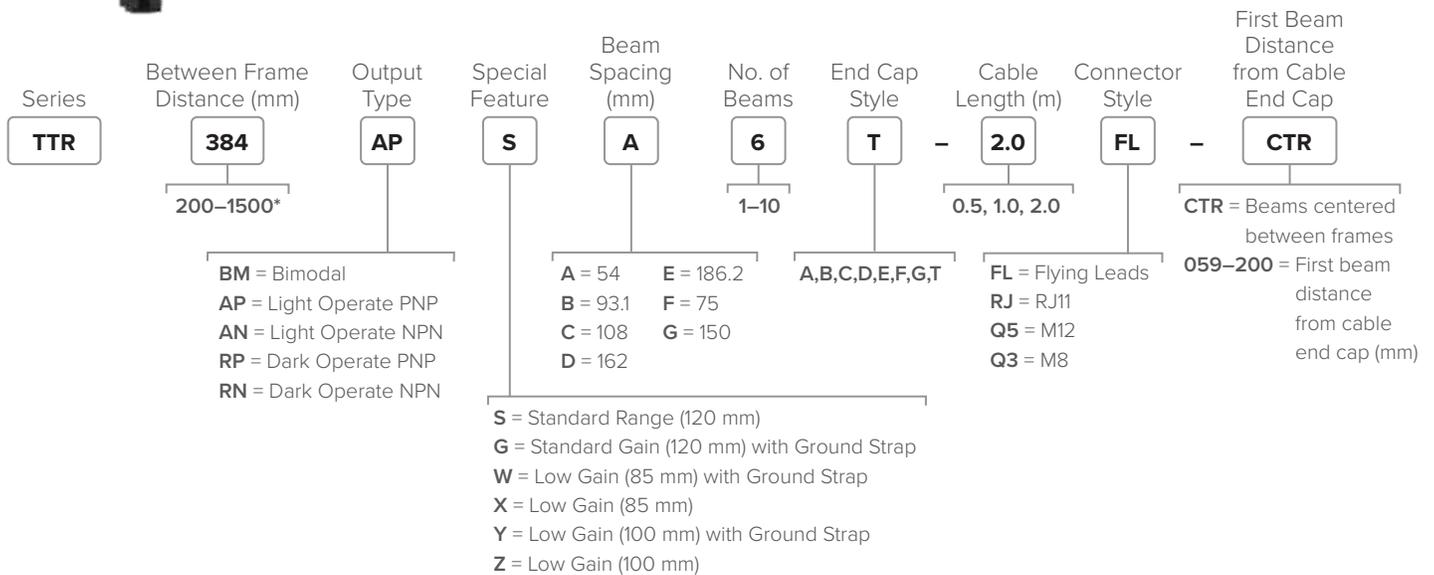- Spring loaded end caps reduce installation and alignment time for reduced labor costs
- Built to order with specified length and beam spacing: 200 to 1500 mm (8 to 59 inches) with 2 to 10 sensors for maximum flexibility
- Robust aluminum housing, ambient light and ESD resistance for enhanced durability

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

Output Type:
BM = Bimodal
AP = Light Operate PNP
AN = Light Operate NPN
RP = Dark Operate PNP
RN = Dark Operate NPN

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

End Cap Style: **A,B,C,D,E,F,G,T**

Cable/Connector:
FL = Flying Leads
RJ = RJ11
Q5 = M12
Q3 = M8

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

Special Feature:
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 A, B, D, E is 915 mm
Max length of models with end cap styles A, B, D, E is 915 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
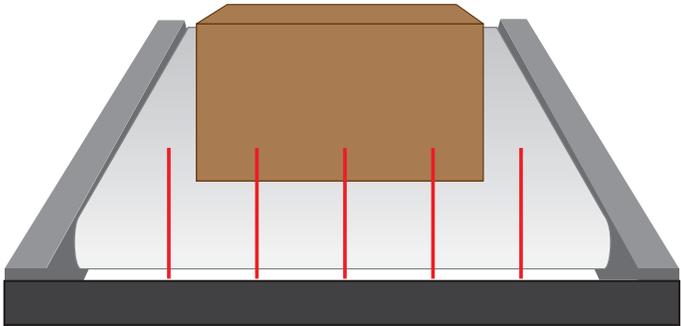
SAB Sensor Array Bar

- Customizable Sensor Array Bar — Different lengths and number of sensors
- Robust aluminum housing protects array bars from 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 (39 in) when using a BRT-THG-2 reflector tape as a target 3 m (118 in) when using 5 side-by-side BRT-92×92C reflectors or 6 side-by-side BRT-77×77C reflectors as targets	Polarized Retroreflective, Visible Red 624 nm	Dark Operate, Bipolar	SAB-497RB1LP6-Q5E
6	150 mA			Light Operate, Bipolar	SAB-497AB1LP6-Q5E
13	150 mA			Dark Operate, Bipolar	SAB-998RB1LP13-Q5E
10	150 mA			Dark Operate, Bipolar	SAB-484RB1LP10-Q5E
6	150 mA	200 mm (8 in) when using a 90% white card as a target	Diffuse, Infrared, 940 nm	Dark Operate, Bipolar	SAB-497RB1DS6-Q5E
6	150 mA			Light Operate, Bipolar	SAB-497AB1DS6-Q5E
13	325 mA	762 mm (30 in) when using a 90% white card as a target		Light Operate, Bipolar	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 (5.3") minimum, 1219 mm (48") maximum	
Number of Beams	2 minimum, 18 maximum	
Beam Spacing	44.4 mm (1.75") minimum	
Environmental Rating	IEC IP50	
Construction	Black Anodized Aluminum Housing	

Banner Engineering manufactures industrial automation products that include sensors, LED lights and indicators, machine safety components, industrial wireless devices, barcode scanners, vision sensors, industrial networks and smart i/o devices, and connectivity products. These products help produce the cars we drive, the food we eat, the medicine we take, and many of the things we touch every day. Headquartered in Minneapolis since 1966, Banner is an industry leader with over 30,000 active products, operations on six continents, and a global footprint of over 5,500 employees, factory and field representatives, and application engineers. Every 3.5 seconds a Banner product is installed somewhere in the world. From adding new capabilities to our existing products or introducing brand-new IIoT technology for smart manufacturing, Banner is your trusted partner for durable, dependable solutions.

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