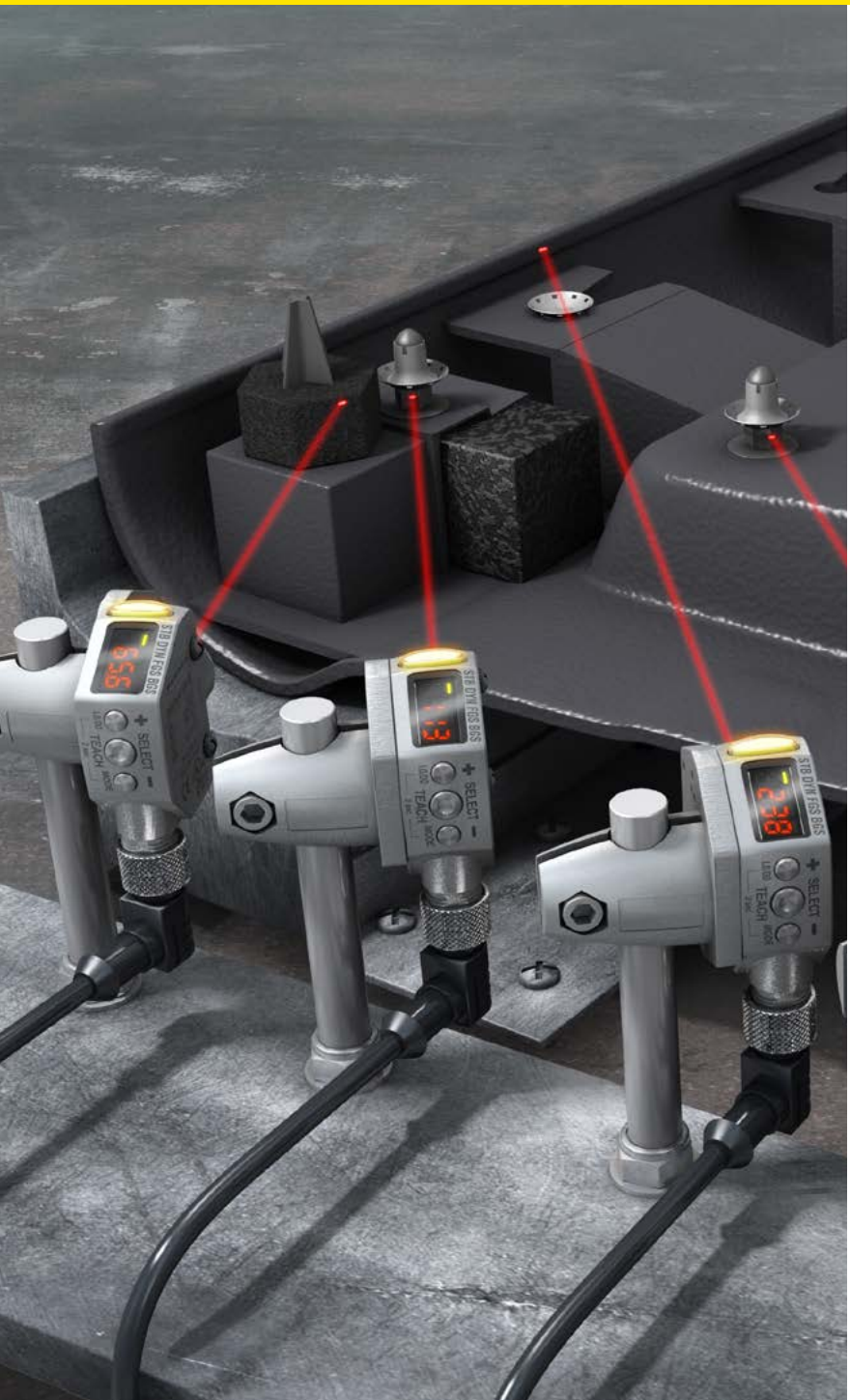
Sensor Selection Guide



Sensor Technology Overview

Photoelectrics

Photoelectric sensors emit a beam of light that detects the presence or absence of objects. When this emitted light beam is interrupted or reflected by an object, the change in light patterns is measured by a receiver and the target object or surface is recognized. Photoelectric sensors can detect most target materials including shiny, dark, clear, or multicolored. With some of the fastest response times of any sensing technology and many different sensing modes available, photoelectric sensors fit many different applications and are very common in fields such as material handling, packaging, food and beverage, medical, and many others.

Lasers

Laser measurement sensors are ideal for use in a wide variety of detection and measurement applications. These sensors can provide more information than photoelectrics by being able to not only detect the presence of a target, but also tell how far away it is. The small, visible spot size makes alignment easy, and the powerful sensing beam can detect dark and challenging targets. There are short range, high precision models for accurate measurement and long-range models for reliable diffuse sensing.

Fiber Optics

Fiber optics use an amplifier and fiber optic cables. The amplifier contains all of the electronics and the fiber optic cables act as light pipes to send the light wherever is needed. Because the fiber optic cables can be bent and routed, they can be used in space-constrained areas, harsh environments, and any other application with remote sensing requirements. The variety of sensing heads on the fiber optic cables adds to number of problems that can be solved.

Ultrasonics

Ultrasonic sensors emit a beam of high-frequency sound waves, allowing them to detect targets regardless of color, transparency, or surface finish. Ideal targets are large, flat, hard, and reflect sound efficiently. By measuring the time it takes the echo of emitted soundwaves to reflect back to the sensor's built-in receiver, an ultrasonic sensor can both detect the presence of a target and measure its position. Ultrasonic sensors excel at accurately measuring challenging targets, including transparent ones at close ranges.

Radar

Radar sensors emit microwaves to detect objects, unaffected by rain, snow, dust, steam, and other environmental conditions. This makes radar ideal for many outdoor and low-visibility indoor applications, like tank level measurement of dry goods or vehicle detection. A radar sensor's beam pattern is an important consideration in solving the challenges of specific applications. Narrow beam sensors (15° or less) are great for measuring liquid levels, while wide beam patterns provide coverage of larger areas and more reliable detection of irregularly shaped surfaces or targets presented at steep angles. Additional advantages include long sensing ranges and a very wide operating temperature range, providing a great deal of application flexibility.

Arrays

Arrays can fall into two categories: measuring arrays and detection arrays. Measuring arrays consist of many opposed pairs of photoelectric sensors in a long housing. A measurement can be found by accounting for the number of beams being blocked. Useful in product dimensioning, hole sizing, or edge tracking applications. Detection arrays cover a wider area than a single point sensor to detect the presence of a target that may not be presented at a consistent location. These are commonly used in material handling applications for leading edge detection.

3D Time of Flight

3D time of flight technology emits a signal across a wide area that reflects off objects, then analyzes this information to visually represent distances in the sensor's region of interest. This yields more information than a single sensor. It can detect and measure multiple targets within its three-dimensional field of view, making it ideal for measuring non-uniform targets over a broad area such as bin fill levels or part detection.

Vision

Vision uses imaging based technology to take and analyze a picture of an application and make a decision based on configured inspections and parameters. This is commonly used in quality applications to such as determining if a part is properly soldered or all clips and inserts are present in an assembly. Using vision can quickly and more reliably make these decisions to increase the overall throughput of a process.

Choosing a Technology

Start with Photoelectrics

If the following is needed:
- Longer diffuse range
- More precision
- Distance measurement

select Lasers

If the following are needed:
- Strong resistance to challenging environmental conditions
- Detection and measurement of a large area

select Radar

If the following are needed:
- Remote sensing for:
  - Space constrained areas
  - High temperatures
  - Harsh environments

select Fiber Optics

If the following are needed:
- Transparent object measurement
- Reliability in dusty, dirty environments

select Ultrasonics

If the following are needed:
- Wide area, multi-point inspection
- Complex quality checking

select Vision

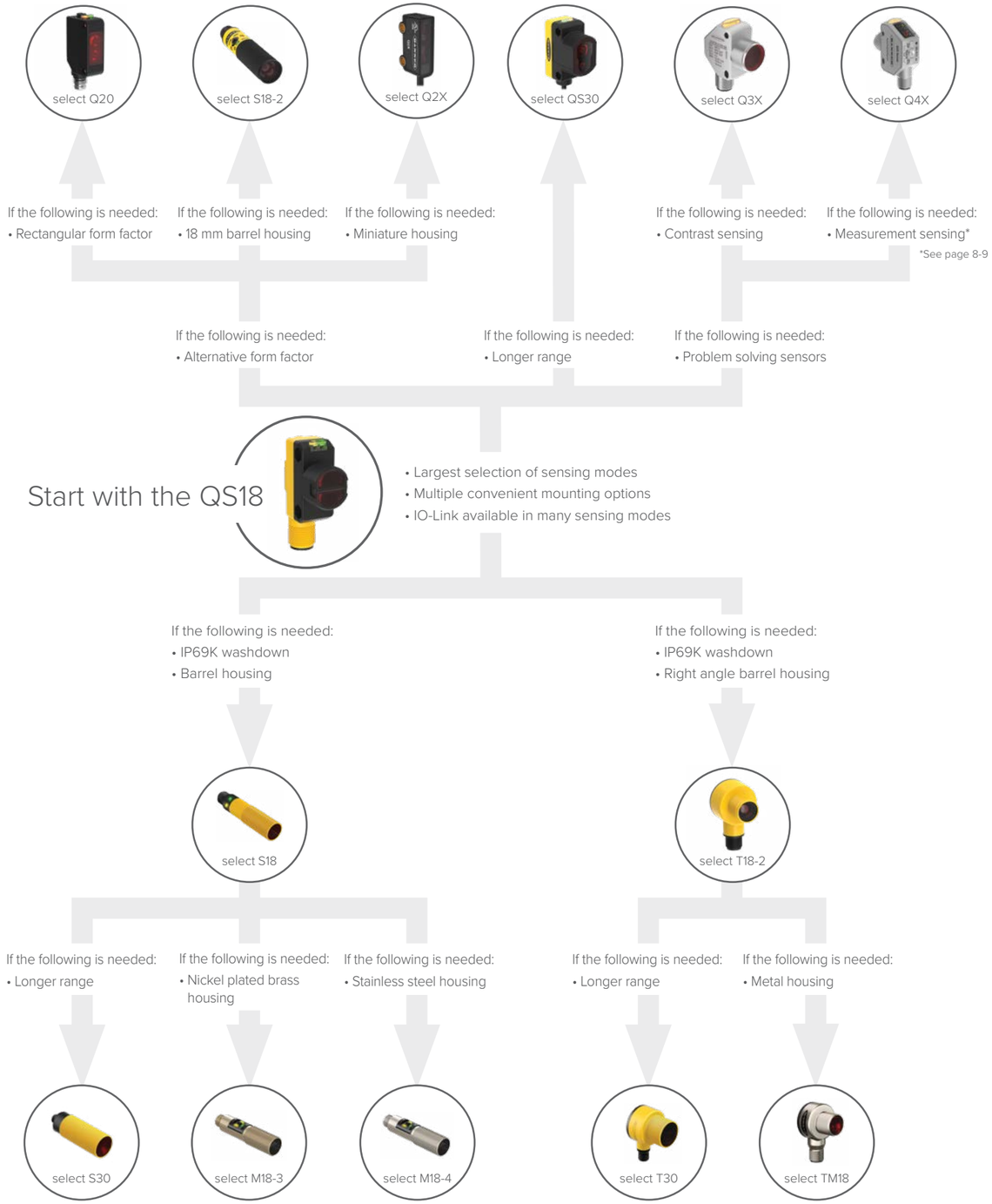
If the following are needed:
- Consistent measurement and detection over a wide area

select Arrays

If the following are needed:
- Wide inspection area
- Multiple measurements from one sensor

select 3D Time of Flight

Choosing a Banner Photoelectric Sensor



		Max Range						Type of Emitter			IP Rating					
		Opposed (m)	Polarized Retro (m)	Laser Retro (m)	Diffuse (mm)	Fixed Field (mm)	Adjustable Field (mm)	LED	Laser	Housing	IP67	IP68	IP69K	Operating Temperature	IO-Link	Clear Object Detection
	**QS18**	20	3.5	10	600	150	350	●	●	Plastic	●			-20 to +70°C	●	●
	**Q20**	20	4	–	1,500	150	400	●		Plastic	●			-20 to +60°C	●	
	**S18-2**	25	6	–	750	200	–	●		Plastic	●			-40 to +70°C		
	**Q2X**	3	3.3	–	–	50	3,000	●	●	Plastic	●			-25 to +50°C	●	●
	**QS30**	60	8	18	1,400	600	600	●	●	Plastic	●		●	-20 to +70°C		●
	**Q3X**	–	–	–	300	200	–		●	Metal	●	●	●	-10 to +50°C		
	**S18**	20	2	–	300	100	–	●		Plastic	●		●	-40 to +70°C		
	**S30**	60	6	–	–	600	–	●		Plastic			●	-40 to +70°C		
	**M18-3**	25	6	–	750	200	–	●		Metal	●		●	-40 to +70°C		
	**M18-4**	25	6	–	750	200	–	●		Metal	●	●	●	-40 to +70°C		
	**T18-2**	25	6	–	750	200	–	●		Plastic	●	●	●	-40 to +70°C		
	**T30**	60	6	–	–	600	–	●		Plastic			●	-40 to +70°C		
	**TM18**	20	5.5	–	500	200	–	●		Metal	●		●	-40 to +70°C		

Choosing a Banner Laser Sensor

Start with the Q4X

- Versatile problem solver
- Compact size with best-in-class performance
- Robust housing and reliable detection

If the following are needed:

- Longer range
- More excess gain
- Better precision beyond 100 mm

If the following are needed:

- Small housing
- Cost effective laser solution

select Q2X

select Q5X

If the following are needed:

- Longest range
- Best precision beyond 1 m

select LTF

If the following are needed:

- Better temperature stability
- Higher precision
- Larger display

select LE

If the following are needed:

- Best performance
- Highest excess gain
- Smallest spot size

select LM

		Minimum Range (mm)	Maximum Range (mm)	I/O Type: Discrete	I/O Type: Analog	I/O Type: Pulse Pro I/O	I/O Type: IO-Link	User Interface: RSD1 Support	User Interface: Display	Repeatability (mm)	Minimum Object Separation (mm)	Resolution (mm)	Linearity (mm)	Principle of Operation: Triangulation	Principle of Operation: Time of Flight	IP Rating
	**Q4X100**	25	100	●	●	●	●		●	± 0.2	0.5–1	0.15	± 0.25–1	●		IP67 IP68 IP69K
	Q4X300	25	300	●	●	●	●		●	± 0.5–3	1–13.5	0.3–1	± 0.8–9	●		IP67 IP68 IP69K
	Q4X500	25	500	●	●	●	●		●	± 0.5–6	1–45	0.3–1.75	± 0.8–25	●		IP67 IP68 IP69K
	Q4X600	25	600	●	●	●	●	●	●	± 0.5–3	1–10	0.12–3	± 0.75–28	●		IP67 IP68 IP69K
	Q5X2000	95	2,000	●		●	●	●	●	± 0.5–10	1–35	–	–	●		IP67
	**Q5X3000**	95	3,000	●	●	●	●	●	●	± 0.5–30	3–75	1–30	± 5–150	●		IP67
	Q5X5000	50	5,000	●		●	●	●	●	± 2.0	13–25	–	–		●	IP67
	Q5X10000	50	10,000	●		●	●	●	●	± 1–3	13–88	–	–		●	IP67
	**Q2X**	20	3,000	●		●	●			± 1–3	20–35	–	–		●	IP67
	**LTF12**	50	12,000	●	●	●	●	●	●	± 0.3–2.5	10–13.5	0.9–9	± 10		●	IP67
	LTF24	50	24,000	●	●	●	●	●	●	± 0.5–3.5	10–25	0.9–12	± 25		●	IP67
	**LE250**	100	400	●	●		●		●	± 0.02–0.2	0.5–1	0.02–0.2	± 0.375–0.9	●		IP67
	LE550	100	1,000	●	●		●		●	± 0.25–1	2–8	0.5–1	± 2–4.5	●		IP67
	**LM80**	40	80	●	●		●	●		± 0.001	0.04–0.06	0.002	± 0.02–0.03	●		IP67
	LM150	50	150	●	●		●	●		± 0.002	0.12–0.14	0.004	± 0.06–0.07	●		IP67

Choosing a Banner Ultrasonic Sensor

Start with the T30UX

- Temperature compensation
- Chemical resistance
- Variety of ranges and beam patterns

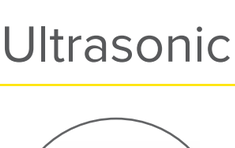
If the following is needed:
- Shorter dead zone
- Best precision

select S18U

If the following is needed:
- Longer ranges
- Wider detection areas

select Radar*

If the following is needed:
- Cost effective for short range applications



select QS18U

If the following is needed:
- Reliable opposed mode detection
- Fast Response

select T18U

If the following is needed:
- Serial interface
- NPT threading
- Wireless solution compatibility

select K50U

*see pages 12-13

If the following is needed:
- AC models
- Chemical resistance

select QT50U

If the following is needed:
- Hygienic IP69K design

select M25U

		Minimum Range (mm)	Maximum Range (mm)	I/O Type: Discrete	I/O Type: Analog	I/O Type: Serial	Repeatability (mm)	Response Speed (ms)	Chemical Resistant	DC Power Supply
	**QS18U**	50	500	●			0.7	15		DC
	**S18U**	30	300	●	●		0.5–1	2.5		DC
	**T30UX**	100	1,000	●	●		0.5–3	45		DC
		200	2,000	●	●		0.5–3			
		300	3,000	●	●		0.5–3		●	
	**K50U**	100	1,000			●	1.5–3	Depends on network polling rate		DC
		300	3,000			●	1.5–3			
	**T18U**	–	300	●			–	1		DC
		–	600	●			–			
	**M25U**	–	250	●			–	3		DC
		–	500	●			–			
	**QT50U**	200	8000	●	●		1.0	100	●	AC and DC

Choosing a Banner Radar Sensor

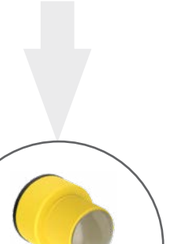
Start with the Q90R

If the following are needed:

- Consistent detection in any environment
- Configurable beam pattern
- Multi-Dimensional detection

If the following are needed:

- Narrow beam pattern
- Compact barrel mount housing



select T30R

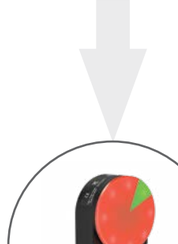
If the following are needed:

- IP69K washdown rating
- Process fittings

select T30RW

If the following are needed:

- Configurable visual feedback
- Lower cost per unit



select K50R

Complete Configuration with Banner Measurement Sensor Software

see page 18

		Frequency (GHz)	Sensing Range (m)	Configurable Sensing Zones	Beam Pattern	I/O Type: Discrete	I/O Type: Analog	I/O Type: Pulse Pro I/O	I/O Type: IO-Link	Configuration: Banner Measurement Sensor Software	Configuration: Push Buttons	Configuration: Remote Input	IP Rating
	**Q90R**	60	20	2	40° x 40° 120° x 40°	●	●	●	●	●		●	IP67, IP69K
	**T30R**	122	25	2	15° x 15° 45° x 45°	●	●	●	●	●	●	●	IP67
	**K50R**	60	5	2	40° x 30° 80° x 60°	●	●	●		●		●	IP67
	**T30RW**	122	15	2	15° x 15°	●	●	●	●	●		●	IP67, IP69K

Choosing a Banner Fiber Optic Amplifier

Start with the DF-G1

- Fundamental sensing
- Ambient light receiver

If the following are needed:

- Faster response speed
- Different color emitters
- Small object counting

select DF-G2

If the following are needed:

- Longer range
- Analog output
- Water detection

select DF-G3

		I/O Type								
		Discrete	Analog	IO-Link	LED Colors	Light Intensity Receiver	Small Object Counting	Response Speed (µs)	High Power	Water Detection
	**DF-G1**	●		●	Red	●		200		
	**DF-G2**	●		●	Red, Green, Blue, White, Infrared		●	10		
	**DF-G3**	●	●	●	Red, Infrared, Long Infrared			500	●	●

Choosing a Banner Fiber Optic Cable

A fiber optic cable is needed to complete the system. There are a few considerations to make when choosing a fiber optic cable including the type of fiber, the sensing mode, and the sensing head.

Fiber Type

Different fiber types have different advantages, depending on the needs of the application.

		Cost	Signal Strength	Flexibility	Extreme Temperatures	Corrosive or Wet Environments	Vacuum Environments	Transmit Infrared Light
	**Plastic Fibers**	$	●	●				
	**Glass Fibers**	$$			●	●	●	●

Sensing Mode

As with photoelectrics, fibers have different sensing modes too, depending on the needs of the application. Opposed fibers will have longer sensing ranges and higher excess gain and can be used in applications like web splice detection or counting. Diffuse sensors are a one-sided solution that can be used in part in place or contrast applications.

Opposed

- Longer range
- High excess gain

Diffuse

- Single-sided sensing

Sensing Head

A strength in fiber optic sensing is the wide variety of sensing heads available to fit into nearly any application. A sensing head comes in many shapes and sizes. It can be threaded, a smooth probe, or rectangular. It can be angled or straight, and some can add a lens to extend its sensing.

Inline

- Beam exits inline with fiber

Angled

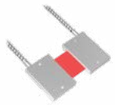
- Beam exits at 90 degrees

Specialty

- Liquid level detection
- Vacuum feed through
- Chemical resistant

Slot

- Fixtured opposed configuration



Array

- Wider beam

Choosing a Banner Sensor Array

Measuring Arrays

Measuring arrays consist of many opposed pairs of photoelectric sensors in a long housing. A measurement can be found by accounting for the number of beams being blocked. Useful in product dimensioning, hole sizing, or edge tracking applications.

		Range (m)	Array Lengths (mm)	Resolution (mm)	I/O Type: Discrete	I/O Type: Analog	I/O Type: Modbus RTU	I/O Type: IO-Link	I/O Type: RS-485	IP Rating
	**EZ Array**	4	150–2,400	5	●	●	●	●		IP65
	**Two Stick Mini Array**	6.1 17	150–1,830	9.5 19.1	●				●	IP65
	**Mini Array Basic**	2	150–1,210	25.4	●				●	IP54

Edge Measurement Sensor

The EG24 is an edge measurement sensor designed for precise measurement with a resolution of less than 0.01 millimeter and a rapid 0.65-millisecond response speed. This ensures precise material positioning, which improves downstream yield, minimizes waste, and enhances quality.

		Range (mm)	Beam Width (mm)	Output	Response (ms)	Resolution	Housing	IP Rating
	**EG24**	40	24	4–20 mA	0.65	<10 µm	Die cast zinc	IP67

Detection Arrays

Detection arrays cover a wider area than a single point sensor to detect the presence of a target that may not be presented at a consistent location. These are commonly used in material handling applications for leading edge detection.

		Sensing Mode	Range (mm)	Array Length (mm)	Minimum Object Detection (mm)	Response Speed (ms)	IO-Link	Housing	IP Rating
	**B25**	Retro	2,000	25	3	0.5	●	PC/ABS	IP67
	**Q76E**	Retro	4,000	46	8	2	●	PC-PBT	IP67 IP69
	**LX**	Opposed	2,000	113–951	< 3 mm depending on object width	0.8–9.6		Aluminum	IP65
	**TTR**	Diffuse	120	200–1,500	Depends on number of beams	1		Aluminum	IP50
	**SAB LP**	Retro	3,000	497 998	Depends on number of beams	1.5		Aluminum	IP50
	**SAB D**	Diffuse	200 762	497 998	Depends on number of beams	3		Aluminum	IP50

Choosing a Banner 3D Time of Flight Sensor

Start with the K50Z

- Multizone sensing
- Wide field of view

If the following are needed:

- Higher resolution
- Advanced configuration options
- Additional application specific solutions

select ZMX

		Sensing Range (m)	Beam Angle	Resolution	I/O Type: Discrete	I/O Type: PFM	I/O Type: IO-Link	I/O Type: Ethernet IP	I/O Type: Modbus TCP/IP	Accuracy (mm)	Response Speed (ms)
	**K50Z**	2	45° x 45°	8 x 8	●	●	●			30	44
	**ZMX**	2.5	60° x 45°	272 x 208	●	●		●	●	20	150

Banner Sensor Software

Complete Configuration with Banner Measurement Sensor Software

- Customize region of interest to detect only what is intended
- Program easily using visualization of what sensor sees
- Independently configure both outputs and use fewer sensors
- Reduce time to program multiple sensors by saving and loading configurations
- Download and use software for free
- Compatible with select radar sensors

Easily Define Sensing Conditions with Banner 3D Configuration Software

- Define the anchor point at the bottom of the container
- Define the size of the sensing region
- Choose the sensing criteria for the application: peak height or percent fill
- Download and use software for free
- Compatible with the ZMX

Choosing a Banner Vision Camera

Vision Sensor

Robust yet easy-to-use self-contained vision sensors perform automated inspections that previously required costly and complex vision systems. Set up, manage, and monitor iVu Series devices with an integrated or remote touchscreen or with a PC. All-in-one solution with camera, controller, lens, and light included in one package.

		Camera Type: Black and White	Camera Type: Color	Camera Type: Barcode	Integrated Ring Light Color	Total Inspection Time (ms)*	Imager	IP Rating	I/O Type: Discrete	I/O Type: Ethernet/IP	I/O Type: PROFINET	I/O Type: Modbus TCP	I/O Type: PCCC
	**iVu**	●	●	●	Red, Green, Blue, White, Infrared, UV	20–45	752 x 480 CMOS	IP67	●	●	●	●	●

Smart Cameras

Vision systems are easy to use and offer powerful inspection tools and capabilities to solve a broad range of applications.

		Camera Type: Black and White	Camera Type: Color	Camera Type: Barcode	Total Inspection Time (ms)*	Imager Resolution	Housing	IP Rating	I/O Type: Discrete	I/O Type: Ethernet/IP	I/O Type: PROFINET	I/O Type: Modbus TCP	I/O Type: PCCC	I/O Type: FTP	I/O Type: TCP/IP	I/O Type: RS-232
	**VE**	●		●	20–45	WVGA, 1.3 MP, 2 MP, 5 MP	Aluminum	IP67	●	●	●	●	●	●	●	●

Barcode Reader

ABR Series barcode readers offer superior decoding capability to solve the most challenging track and trace applications. They are available in two compact form factors, multiple lighting configurations, a range of resolutions, and numerous lens options.

		Integrated Lighting Color	Total Inspection Time (ms)*	Imager Resolution	Housing	IP Rating	I/O Type: Discrete	I/O Type: Ethernet/IP	I/O Type: PROFINET	I/O Type: Modbus TCP	I/O Type: TCP/IP	I/O Type: SLMP	I/O Type: RS-232	I/O Type: RS-422
	**ABR 3000**	White	17–45	WVGA, 1.2 MP	Aluminum	IP65	●	●	●	●	●	●	●	●
	**ABR 7000**	Red, White, Multicolor DPM	65–75 70–80	1.3 MP, 2 MP	Aluminum	IP67	●	●	●	●	●	●	●	●

*Approximate range. Times will vary based on the inspection settings.

Other Banner Sensing Technologies

Color Sensors

A color sensor is a photoelectric sensor that can differentiate the color of a target. These are commonly used in quality and verification applications.

		Range (mm)	Response (ms)	Emitter	IO-Link	Housing	IP Rating
	**QCM50**	150	0.18	White LED	●	Die cast zinc	IP67, IP69K

Luminescence Sensors

Luminescence sensors use UV light to activate luminescent dyes, inks, and surfaces, enabling reliable detection of labels, adhesives, and tamper resistant seals in a range of applications.

		Range (mm)	Response (ms)	Emitter	Housing	IP Rating
	**Q26**	30	0.25	UV LED	ABS	IP67
	**QL56**	50	0.25	UV LED	Aluminum	IP67

Registration Mark Sensors

Registration mark sensors identify subtle differences in color contrasts to inspect registration marks.

		Sensing Mode	Range (mm)	Response (ms)	Emitter	Housing	IP Rating
	**R58**	Diffuse	10	0.05	RGB LED	Die cast zinc	IP67
	**R55F**	Fiber optic	Depends on fiber	0.05	Red, Green, Blue, White, or Infrared	ABS polycarbonate	IP67
	**Q3X**	Diffuse laser	300	0.25	Red laser	Nickel plated zinc	IP67, IP68, IP69K
	**DF-G2**	Fiber optic	Depends on fiber	0.01	Red, Green, Blue, White, or Infrared	ABS polycarbonate	IP50

Slot Sensors

Slot sensors detect objects that pass between two arms—one with the emitter and the other with the receiver. The fixed slot width provides reliable opposed-mode sensing of objects as small as 0.30 mm. This makes slot sensors ideal for counting, sensing parts on conveyor rails and belts, detecting edges, and other applications.

		Slot Width (mm)	Slot Depth (mm)	Response (ms)	Housing	IP Rating
	**SLM**	10–220	60–120	0.5	Die cast zinc	IP67
	**SLE10**	10	45	0.15	ABS/ polycarbonate	IP67
	**SLE30**	30	45	0.15	ABS/ polycarbonate	IP67

Label Sensors

Label sensors feature slots that are just wide enough for labels to pass through. They are designed to reliably detect either the labels or their backing for use in labeling equipment.

		Slot Width (mm)	Slot Depth (mm)	Response (ms)	Sensing Technology	Housing
	**SLE5**	5	50	0.04	Photoelectric	Die cast zinc
	**SLE3**	3	50	0.035	Photoelectric	Polycarbonate
	**SLU4**	4	79	0.2	Ultrasonic	Aluminum

Banner Helps You Get the Most from Your Sensors

Complementary Products

Remote I/O

Remote I/O products optimize control system performance and simplify system design for machine builders and controls engineers. Typically, I/O blocks reduce wiring and feature onboard diagnostic LEDs, and reduce the costs of installation, integration, and maintenance. Banner I/O Blocks do all of this, but they also provide additional benefits, including greater flexibility for control system design, improved control system performance, multi-protocol support, compact designs that reduce I/O clutter and save space within your machine or cabinet, and options for customization.

Connectivity Technology

By creating products designed to fit industry applications, Banner transforms connectivity needs into seamlessly integrated solutions that set the standard for reliability and performance. Cordsets with a multitude of wiring and connector options, unique molded junction blocks that come ready right out of the box, compact converters that seamlessly integrate various signals into one system, and Snap Signal products that simplify equipment monitoring and IIoT communication all ensure you get the signal you need, where you need it, quickly and reliably.

Lighting and Indication

Offering a comprehensive range of LED lighting and indication products designed to enhance industrial automation. Their selection includes LED light fixtures, tower lights, indicators, and actuators, all engineered to provide superior illumination, clear status indication, and precise operator guidance. These products leverage LED technology to deliver benefits such as low power consumption, extended lifespan, and maintenance-free operation, making them suitable for various industrial applications.

Key Terms

Triangulation

Triangulation sensors measure the distance to a target based on the angle that the emitted beam reflects back to the receiver. This type of sensor can be very accurate close to the sensor but performance can degrade as the distance increases.

Time of Flight

Time of flight sensors calculate a distance by measuring the time it takes light to be emitted, reflect off the target and return to the receiver. This type of sensor is more coarse near the face of the sensor when compared to Triangulation sensors but will have more consistent measurement throughout its entire range.

Repeatability

Repeatability is the measurement of how reliably a sensor can repeat the same measurement in the same conditions. Repeatability is calculated by having a sensor detect a motionless, single-color target multiple times in a laboratory setting. For that reason, repeatability is a useful specification to use when comparing products, but it is not the best indicator of real-world performance.

Minimum Object Separation

Minimum Object Separation, or MOS, refers to the minimum distance a target must be from the background to be reliably detected by the sensor. MOS is the more valuable specification for discrete applications because it captures dynamic repeatability by measuring different points on the same target at the same distance, giving a much better idea of how the sensor will perform in the real world.

Resolution

The resolution of a sensor is the smallest change in the property being measured that the sensor is able to detect and indicate. The higher the resolution, the more precise the detection ability of a sensor.

Linearity

Linearity refers to the maximum difference between the actual measurement output from the ideal measurement output along a straight line over a defined range, and in constant environmental conditions. It is essential to a sensor's accuracy, as a smaller linearity indicates more consistent measurements.

IP Rating

IP ratings explain an enclosure's ability to resist the entry of dust and liquids. There are two numbers in an IP rating where the first represents protection against dust or other dry, solid objects and the second number is the ability to prevent liquids from entry. One thing to note is that higher IP ratings do not necessarily include the abilities of lower IP ratings. This means while an IP69-rated enclosure may be able to withstand high pressure water jets, it may not stand up to being submerged for any length of time and therefore would not meet IP67 or IP68 requirements.

Beam Pattern

The beam pattern represents the area of the emitted beam within which the sensor will respond to a target.

IO-Link

IO-Link is an open standard one-wire serial communication protocol that allows for the bi-directional exchange of data from IO-Link supported sensors that are also connected through a master.

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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