

Banner **Минск** т.80447584780 Viber email minsk17@tut.by  
www.fotorele.net www.tiristor.by радиодетали, электронные компоненты  
tel.+375 29 758 47 80 МТС

[каталог](#), [описание](#), [технические](#), [характеристики](#), [datasheet](#), [параметры](#), [маркировка](#), [габариты](#), [фото](#), [даташит](#), [Banner](#)

### [где и как купить в Минске?](#)

Сделать заявку или запрос можно по телефону факсу или по электронной почте

Просим Вас указывать в заявке:

- название предприятия, факс, контактный телефон, контактное лицо;
- полное наименование и количество товара;
- возможность замены или аналоги;

## Каталог Banner

Автоматизация

## **Banner в Беларуси**



2017  
2018



Sensors



Vision



Lighting &  
Indicators



Wireless



Machine  
Safety

# Who is Banner

---

Every day, thousands of times a day, in locations all around the world, products from Banner Engineering are used to solve challenging problems and achieve automation goals. We're proud of that fact.

Founded by Bob Fayfield in 1966, Banner Engineering began as a small engineering firm known for solving problems. Customers came to us for smart, well-built products, custom solutions, and personal, attentive service. With each success we increased our technical capabilities and manufacturing capacities, grew in staff and industry expertise, strengthened our relationships with customers and partners, and expanded our reach throughout the United States and the world.



From the very beginning, we have been committed to developing new and innovative solutions, delivering products of the highest quality, fulfilling the needs of each customer, and operating with honesty and integrity. These commitments continue to guide us and define us as a company.

Today Banner Engineering is a global company and a globally recognized leader in the field of process and industrial automation. Our sensors and vision sensors, LED lights and indicators, wireless and safety products are used by companies large and small, from industry leaders in the Fortune 500 to innovators just entering the market. Headquartered in Minneapolis, MN, Banner has sales offices, production facilities, and field representatives throughout North and South America, Asia, Africa, Australia, and Europe. Companies all around the world use our award winning products and solutions to increase efficiency, reduce expenses, ensure quality, monitor and control processes, safeguard equipment and protect personnel.

For five decades our customers have honored us with their business, relying on the quality and performance of our products and solutions, as well as our expertise, our experience and our integrity. We look forward to the decades to come and to many more years of providing our customers with superior service, exceptional products, innovative solutions, and helping them solve problems and achieve their goals.

# Contents

## Sensors page 23

### Photoelectric 30

Featured 30		Rectangle 74		Right Angle 105		Barrel 130			Slot & Area 142		Miniature 152		Fiber Optics 162		
Q4X	34	MINI-BEAM	76	T8	100	M12	116	M18	126	SLM	144	VSM	154	Amps	162
Q3X	38	Q25	78	T18	102	S12-2	118	M18-3	128	SL	146	VS1	156	Plastic	174
QS18	40	Q40	80	TM18	106	SB12	120	M18-4	130	LX	148	VS2	158	Glass	192
QS30	56	Q45	84	T30	110	S18-2	122	S30	138			VS3	160		
Q12	66	Q60	88			S18	124	SM30	140						
Q20	70	PicoDot	92												
		QM42/QMT42	94												

## Vision page 340

Vision Sensors 342		Smart Cameras 348		Vision Controllers 358	
iVu	342	VE	350	PresencePLUS Pro II	358
		PresencePLUS P4	354		

## Lighting & Indicators page 380

LED Lighting 384				Tower Lights 412							
WLS28-2	386	WLS27	396	WL50S	404	TL70	414	TL50C	422	CL50	430
WLS15	390	WLC60	398	WL50-2	406	TL50	418	TL50BL	426		
WLB32	392	WLC90	400								
WLB92	394	WLA	402								

## Wireless page 503

Simple Wire Replacement 504		Wireless Sensors 512	
PM2	505	Q45	512
MP8	506	Q120	514
PB2	508	QM42VT	516
Serial Data Radio	509	K50U	518
Ethernet Data Radio	510	M12F	520

## Machine Safety page 544

Light Screens 552		Safety Controllers 582		Emergency Stop Buttons 598		Emergency Stop and Stop Control 620	
EZ-SCREEN SLS	556	SC26-2	584	Illuminated 30 mm	600	RP-RM83	622
EZ-SCREEN LS	560	XS26-2	588	Illuminated Flush	601	RP-LS42	623
EZ-SCREEN LP	564	SC22-3	592	Panel mount	612	RP-QM72	624
EZ-SCREEN Grid & Points	572			Mechanical	616	RP-LM40	625
EZ-SCREEN Type 2	578					RP-QM90	626
						ED1G	636

## Accessories page 720

Brackets 722		Cordsets 758		Misc Accessories 790		International Reps 826	
--------------	--	--------------	--	----------------------	--	------------------------	--



## Measurement 200

Laser 202	Ultrasonic 216				Radar 240		Array 246		Temp & Vibration 260		Barcode Scanners 270		Registration/Color 282		Stainless Steel 296		Clear Object 310		Hazardous Area 328	
LTF 204	QT50U 218	T18U 230	Q120R 245	EZ-ARRAY 248	M18T 262	iVu BCR 272	QC50 284	QM26 298	QS18 312	MINI-BEAM 330										
LE 206	S18U 222	Q45U 232	Q240R 243	MINI-ARRAY 252	M12F 264	P4 BCR 278	Q26 286	QMH26 300	Q4X 314	Q45 336										
LH 208	T30UX 224	Q45UR 234	QT50R 244	HR MINI-ARRAY 256	QM42VT 266	TCNM 280	QL56 288	M25U 302	QS30 316	SMI30 338										
LG 210	T30U 226	QS18U 237					R58 290	SM30 304	Q26 318											
LT3 212	M25U 226						R55 294	VSM 306	OMNI-BEAM 320											
LT7 214								M18 308	MINI-BEAM 322											

## Special Purpose 268

### Vision Lighting 364

Ring Lights 366	Linear Array Backlights Lights 371	Spot Lights 374
Area Lights 378	Linear Array Lights 372	Low-Angle Ring Lights 376
Backlights 370	On-Axis Lights 373	Laser Line Generator Lights 377

### Base Mount Indicators 436

Base Mount Indicators 436		Barrel/T-Style Indicators 448		Flat Mount Indicators 456		Touch Buttons 468		Pick-to-Light 482	
K30L Gen 2 438	K90L 443	S18L 450	K80L 458	SP150 465	K30 Touch 468	K30 Touch 484	K80 PB 492		
K50L Gen 2 439	K50LD 445	S22L 451	K80 Call Light 460	SP250 465	K50 Touch 472	K50 Touch 486	VTB 494		
K50L Audible 441	K30/K50 Haz 446	T8L 454	K50FL 461	SP350 465	K70 Touch 474	K70 Touch 488	PVD 496		
K70L 442	S18L 450		K80FL 462	TL30F 466	K30/K50 Push-Button 476	K50 Optical 490	PVL 498		
			K80 Segment 464		OTB/LTB 478	K30 PB 492	PVA 500		
					VTB 480	K50 PB 492			

### Network Radios 522

DX80 Performance Series 522	Wireless Controllers 528
Multihop Modbus 524	DXM100 528
DX99 526	

### Interlock Switches 640

Interlock Switches 640	Two-Hand Control 680	Laser Scanner 692	Safety Modules 698
Magnet 642	Two Hand-Control Module 682	AG4 693	E-Stop Guard 699
Hinge 646	STB Buttons 686		Safe Speed 714
Two Piece 654	Run Bar 690		Interface Relay 716
Locking 666			Safety Mat Monitoring 708
			Muting 710
			Extension Relay 718

# New Products



## Q4X Series

Versatile, Rugged, Laser Measurement Sensor

- Save time and money with the Q4X Series which is **ready to measure right out of the box**
- A simple user experience from installation to setup
  - Bright spot for easy alignment
  - Three push buttons simplify setup
  - Intuitive menus
- Four-digit display **shows distance to target in mm**
- **FDA-grade stainless steel** is suitable for IP69K washdown environments

See page 34



# LTF Series

## 12 m Range Time-of-Flight Laser Sensor

- A powerful distance measuring sensor with **advanced functions** including:
  - Remote teach
  - High excess gain for seeing really dark targets
  - Laser power control for accurately measuring shiny targets
  - Laser inhibit
  - Cross-talk avoidance
  - Fast response speed
  - Delay timers
- Sensing range of 50 to 12,000 mm
- Durable metal housing **rated IP67**
- Superior resistance to ambient light sources

See page 204





## QS18 Clear Object Detection

### Coaxial Clear Object Detection

- Save time and simplify setup with a pushbutton teach or potentiometer
- 18 mm threads or side mount holes for easy installation
- **Small LED spot size** for tight installations
- Detect from the object to the face of the sensor with **no blind spot**

See page 40

## LE Series

### Laser Measurement Sensor

- Ready to **measure right out of the box**
- Easy alignment with a visible laser
- Multiple teach options simplifies setup for any application
- Convenient setup with a **two-line, eight-character display**

See page 206



# DF-G Series

## Advanced Fiber Optic Amplifiers

- Simple push button Teach
- Rocker switch for manual adjustment
- **Easy-to-read display** shows both the current signal strength and switching threshold
- DF-G1: Expert teach and set methods ensure optimal gain and threshold
- DF-G2: Ideal for short duration events with 10  $\mu$ s response speed
- DF-G3: Ideal for long range sensing, low contrast and precise positioning

See page 162



# Vantage Fibers

## Advanced Fiber Optic Amplifiers

Plastic fibers are typically used for more general purpose applications where they can tolerate extreme bending and be cut to length to fit in limited space setups.

See page 176





# New Products

## WLS27 Series

### Industrial LED Light Bar

- Rugged, water-resistant **IP66, IP67 and IP69K** design
- **Cascade models** for connecting multiple lights end-to-end, minimizing wiring
- Energy efficient for overall cost savings
- Optional snap clips for easy installation and repositioning
- Ability to adjust the lights to Hi/Lo/Off
- **Automatic temperature protection** built into the unit protects the life of the product
- Eight different lengths and dual-color models available

See page 396



# WLB92 Series

## 92 mm Industrial LED Light Bar

- Increase worker productivity and ergonomics with bright, high-quality, uniform light
- Durable light stands up to difficult environments with a **rugged metal housing** and shatterproof light cover
- Energy efficient for overall cost savings
- Easy installation with a variety of mounting brackets: surface, swivel, snap and hanging
- All models include built in dimmable control
- AC models are DLC qualified with a five year warranty
- Six color options available

See page 442



# New Products

## DXM Series

### Industrial Wireless Controller

- **Control wireless networks**, consolidate networks, create a network backbone
- **Programmable** to solve specific applications
- **Ethernet** and cellular connectivity
- Send alert messages
- Create local logs
- Relay register data to the cloud

See page 528





# QM42 Series

## Wireless Vibration Monitoring

- **Predictive maintenance** made easy by high accuracy vibration (RMS velocity) and temperature measurements
- Easily **monitor machine health** by sending information wirelessly
- **Detect problems earlier** to avoid machine failures and delays
- Manufactured with a robust zinc alloy housing

See page 516



# K50U Series

## Wireless Ultrasonic Monitoring

- Provides a distance measurement from the target to the sensor
- Monitor wirelessly to **avoid long cable runs**
- Built-in temperature compensation for reliable measurement
- Sensing range from 300 mm to 3 m
- Threaded housing for **easy installation**

See page 518



# New Products

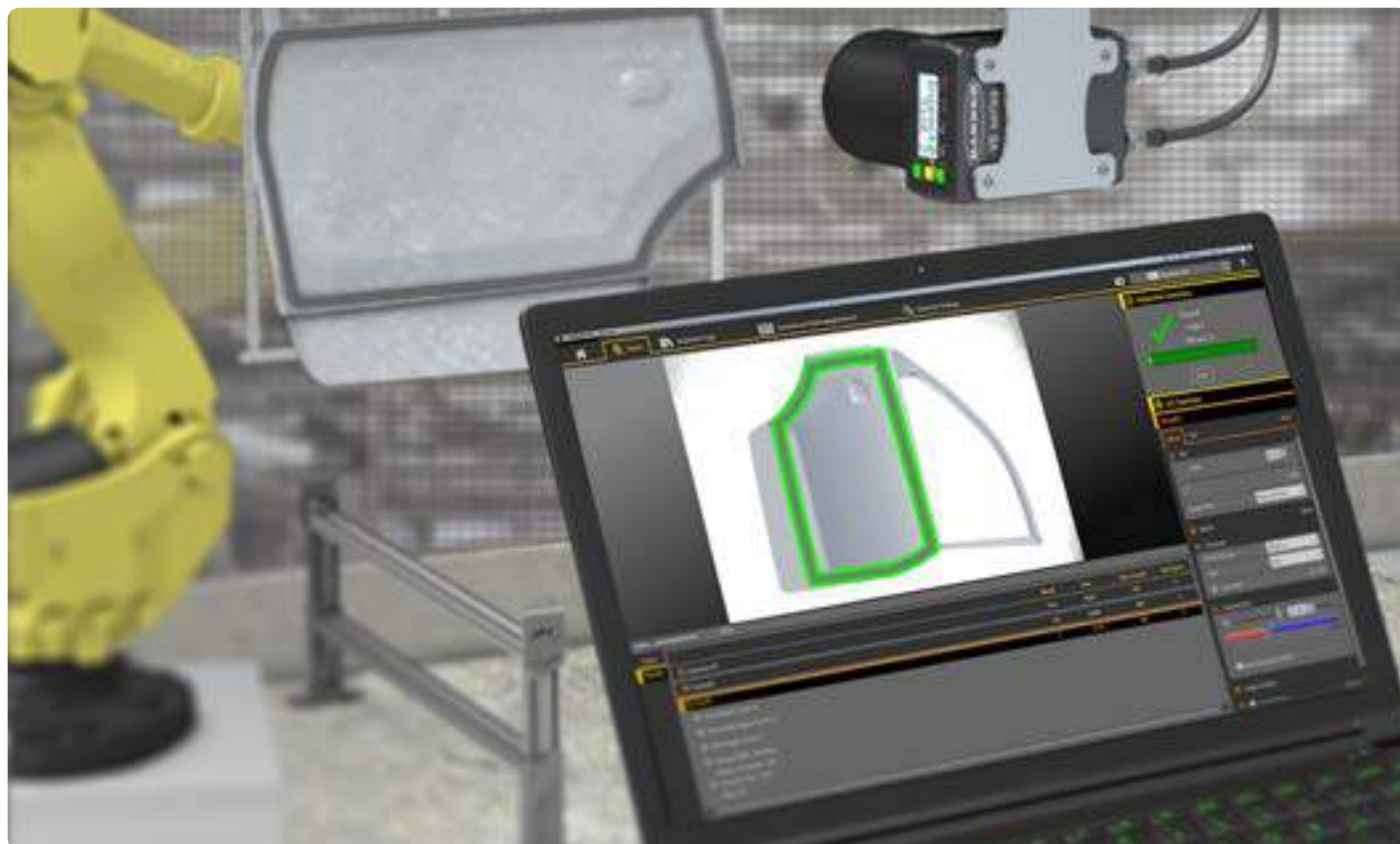


## VE Series

Compact, Durable, Versatile Smart Camera

- Two-line, eight-character display and push buttons enable troubleshooting and camera status
  - Perform product change or trigger
  - Change or view IP address, MAC address or speed
  - View firmware, focus number or status
- **Robust, aluminum housing** for harsh environments
- Ethernet connector with **GigE transfer capability**
- C-mount lens to suit a variety of applications
- Optional lens cover provides an IP67-rated solution

See page 350

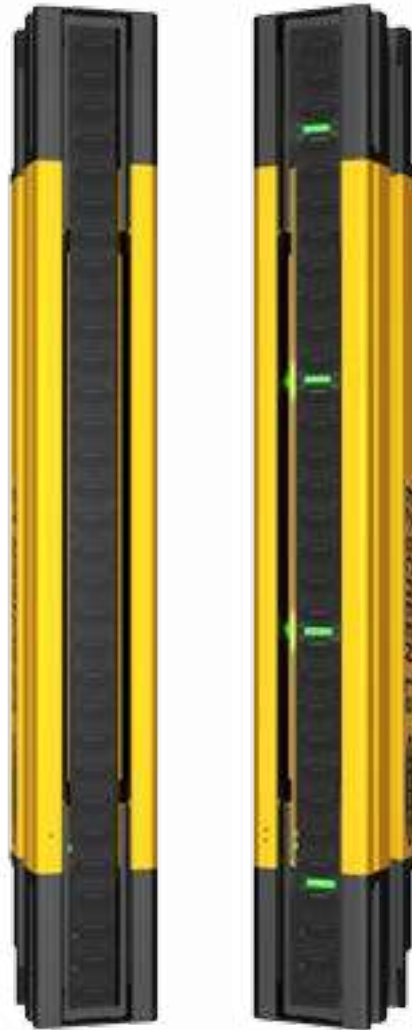


# EZ-SCREEN® LS

## Simple, Rugged Safety Light Curtains

- No blind zone design provides **end-to-end sensing** to eliminate gaps in detection
- A **12 m range** with three available resolutions: 14, 23 and 40 mm
- Standard pairs, cascade systems and extensive accessories to suit a wide variety of safeguarding configurations
- Addition of remote or integrated indication lights on cascade models provides clear communication of system status
- **Alignment indicators** are highly visible and intuitive diagnostics simplify setup, facilitate troubleshooting and streamline installation

See page 560



# XS26-2

## Expandable Safety Controller

- **Up to eight expansion I/O modules** can be added as your automation needs grow or change
- Choose from six expansion modules available to suit your application with a variety of safety inputs, solid-state safety outputs and safety relay outputs
- **Simulation mode and live display** feature allows testing and active monitoring of I/O on a PC
- **Free configuration software**
- Standard communications including EtherNet/IP, Modbus/TCP, and ProfiNet

See page 588

# New Products

## IO-Link Products

---



Designed to facilitate communication between sensors/actuators from different manufacturers and higher-level systems, the fieldbus-independent IO-Link serial communication protocol offers a uniform standard that applies to all manufacturers.



EZ-ARRAY®  
See page 246



Q4X  
See page 34



QS18 COD  
See page 40

DF-G1  
DF-G2  
DF-G3  
See page 162



LTF  
See page 204



TL50  
See page 418



LE  
See page 206



# Applications



## Automotive

The manufacturing of vehicles is a very diverse and complex process requiring participation from hundreds of Tier 1 and 2 supplier companies to deliver a finished product to the consumer. A high level of automation is used throughout the automotive supply chain, requiring a broad spectrum of controls to ensure quality, productivity and worker safety on the plant floor.

Whether it is a basic sensor for conveyor lines, safeguarding devices for operator safety or vision-based technology for error proofing, Banner Engineering offers a wide range of solutions to meet the challenges of today's automotive manufacturer.

### Sample applications



**VE** page 350

A VE Series Smart Camera, configured to use the bead tool, inspects each door panel for the presence and consistency of adhesive.



**EZ-SCREEN® LS** page 560

Banner's EZ-SCREEN® LS cascading Safety Light Curtains simplify the guarding of multiple areas with production equipment.



**Q4X** page 34

The Q4X triangulation-based laser sensor has no difficulty detecting dark targets on dark backgrounds when there is a height difference. The Q4X provides a reliable sensing solution and makes pass/fail judgments based on distance rather than color or reflectivity.



**K50** page 486

Banner provides the broadest selection of Pick-to-Light devices for bin picking applications.



## Food & Beverage

Automated processes in the food and beverage industry have ever increasing needs to address challenging applications and environments, and have a demand for tracking methods to address food contamination before human consumption. To eliminate bacteria and the risk of food borne illness, equipment must be washed down using pressurized water, high temperatures and aggressive chemicals. The components used on this equipment must be designed to stand up to harsh environmental conditions and need to meet hygienic design standards for easy cleaning.

Banner Engineering provides many products for sensing, identification, inspection, communication, safety and wireless transmission that can be applied to food and beverage applications. Banner proudly offers solutions to the industry with a variety of specifications to address customers' environmental concerns, including IP69K/IP67 ratings, ECOLAB® certification, hygienic designs and stainless steel housings.

### Sample applications



**Q4X** page 34

The rugged Q4X photoelectric sensor detects the presence of a clear glass bottle to ensure it is in the correct place before it is filled.



**T18** page 102

The T18 sensor reliably counts trays of ground meat on a conveyor.



**iVu Plus TG** page 342

Banner's iVu Plus TG vision sensor inspects trays to ensure there are six buns per tray.



**DX80** page 504

Banner's DX80 monitors the liquid level in a reservoir of a filling machine with a wireless radio instead of using a slip ring.



# Applications

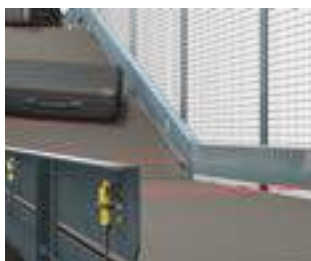


## Material Handling

Material handling is the process of handling finished goods throughout the entire cycle from finished product all the way through distribution. This includes various types of movement, including intermodal shipping, warehouse operations, conveyance, storage and distribution center operations. Other material handling operations include baggage handling, vehicle control and post-primary packaging operations.

Banner Engineering is well versed on the intricacies of the material handling industry and is synchronized with the industry's objectives of increasing manufacturing efficiencies by reducing downtime and overall manufacturing costs. Banner's vast offering, including sensor, vision, safety and lighting products, suits needs for material handling applications ranging from inception to installation. With a history of high performance, Banner provides quality products with lasting performance.

### Sample applications



**QS18** page 40

Banner's QS18 reliably detects baggage along a conveyor to ensure efficient, optimized baggage handling processes.



**PresensePlus® P4** page 354

Banner's highly reliable P4 Vision Sensor reads barcodes to detect the presence and absence of products at a distribution center.



**TL50** page 412

Banner's E-Stop Button and Signal Tower Lights with audible alarms provide highly visible and audible fault detection. The E-Stop button is setup for use in case of an emergency as a part of safety control.



**DX80** page 503

Banner Engineering's indicators and wireless products help create a safe environment for workers by providing forklift and traffic control in pick-to-light applications.





## Packaging

In the packaging industry, the package can be just as important as the product. As consumers' tastes change so does the packaging to reflect consumer preference. Today's packaging machines must be flexible for quick product changeovers and accommodate new product materials and designs while maintaining fast and efficient throughput.

Banner Engineering understands the needs of today's packagers. Whether it is safeguarding a robotic case packer, reading barcodes for track and trace systems, inspecting label position, counting bottles going into a flow wrapper, monitoring product levels or call for parts, Banner has a solution to fit your needs.

### Sample applications



**QS18** page 40

Banner's QS18LD laser sensor scans across the top of the package to see if any flaps are open.



**R58** page 282

With a 15  $\mu$ s repeatability, Banner's R58 can track the position of each label on the web to ensure the label is correctly positioned on a bottle. One sensor can be used for all label color combinations with three LED sensing colors.



**iVu BCR** page 270

After the frozen dinner is placed in the carton, Banner's iVu BCR reads a 2D code on the carton to ensure it is the correct carton to prevent packaging errors.



**WLS27** page 396

Using high-powered and long-lasting LED technology, Banner's WLS27 work lights are compact and bright enough to use in this area for optimal visibility.

# Applications



## Pharmaceutical

The manufacturing of pharmaceutical and medical products requires a high level of control to maintain product integrity, overall quality and process efficiency. Banner Engineering offers sensing expertise and solutions for a wide range of applications in pharmaceutical and medical industries, providing customers with reliable detection, accurate inspection, advanced sensing technologies and cost-effective solutions.

Banner Engineering can solve the most challenging sensing problems and can rapidly analyze an application to find the optimal solution. Banner has the expertise to provide solutions in many pharmaceutical and medical areas including pharmaceutical solid or liquid dose packaging, pharmacy automation, lab automation, clinical diagnostic automation, product identification, track-and-trace, seal integrity verification, visual indication and process/facility sensing and monitoring.

### Sample applications



**Q12 Fixed-Field** page 66

The compact Q12 fixed-field sensor is ideal for space constraint applications. The fixed-field sensing provides excellent background suppression for reliable sensing even on closely positioned conveyors in automated syringe processing equipment.



**iVu BCR** page 272

The iVu Bar Code Reader (BCR) with a remote touch screen display simplifies barcode reading of various symbologies including 1D, 2D Datamatrix, and PharmaCode. Inspection configuration can be setup easily using the touch screen without the need of a PC.



**WLA** page 402

Banner's WLA Series are LED lights designed for work cell illumination. The WLA lights are ideal as overhead lighting in visual inspection stations for pharmaceutical liquid dose packaging. These lights provide excellent intensity, uniformity and a continuous working-life of over 50,000 hours.



**DX80** page 503

Banner's SureCross® Wireless I/O Network provides an easy way to communicate and monitor I/Os where wiring is not feasible. Temperature and humidity monitoring points can be easily populated throughout a pharmaceutical manufacturing facility using the DX80 wireless network.





## Assembly & Manufacturing

Assembly and manufacturing industries are a vital component of the world's economy. Employee knowledge and innovative, reliable products ensure manufacturing and assembly industries meet productivity goals and quality standards.

Banner Engineering understands the diverse needs in manufacturing and assembly processes, which is why we provide solutions for all types of manufacturing and assembly. Whether manual or automatic processes, Banner offers safety, pick-to-light, LED lighting, sensor and vision products to help with many applications, including quality checks, production line verification, precision, assembly verification and many more with long-lasting solutions.

### Sample applications



**QS30** page 56

Keeping the feeder bowl stocked with parts is necessary to ensure the process continues without interruption.



**VE** page 350

To verify the expected number of holes exists on a small metal part, the VE Smart Camera with Multipoint Inspections can be configured for multiple regions of interest (ROIs) to ensure holes exist and were punched in the correct place.



**Q45 Push Button** page 512

Operators need a way to easily call forklift drivers for additional parts or to remove completed assemblies. Banner's wireless network and K50 indicator lights create a complete parts delivery solution for improved communication between work station operators and forklift drivers.



**30 mm E-Stop** page 635

The E-Stops run along the length of a conveyor so the operator can press it from anywhere along its length to immediately stop the conveyor.

# SENSORS

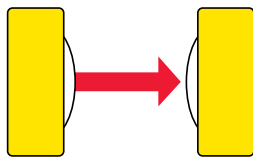


PHOTOELECTRIC page 30

MEASUREMENT page 201

SPECIAL PURPOSE page 268

# SENSOR SELECTION GUIDE




## Opposed Mode

The sensor's emitter and receiver are housed in two separate units. The emitter is placed opposite the receiver. An object is detected when it breaks the effective beam.

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 QS18	20 m	35 x 15 mm (D varies by model)	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	DC: PNP or NPN P-MOSFET N-MOSFET	40
 QS30	60 m	44 x 22 mm (D varies by model)	IP67; NEMA 6	10-30 V dc 12-250 V ac/dc 24-250 V ac/dc	DC: Bipolar NPN/PNP AC/DC: SPDT e/m relay	56
 Q12	2 m	23 x 8 x 12 mm	IP67	10-30 V dc	Bipolar NPN/PNP, PNP or NPN	66
 Q20	20 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	70
 Q45	60 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 12-250 V ac/dc 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST * AC/DC: SPDT Relay NAMUR: Constant current	84
 MINI-BEAM®	30 m	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST NAMUR: Constant current	76
 Q25	20 m	50 x 25 x 30 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	78
 Q40	60 m	70 x 40 x 46 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	80
 QM42	10 m	42 x 13 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	94
 QMT42	10 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	95
 T8	2 m	19 x 19 x 16 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	100
 T18	20 m	DC: 42 x 30 x 30 mm AC: 52 x 30 x 30 mm	IP67; NEMA 6P, IP69K	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	102
 TM18	20 m	41 x 30 x 30 mm	IP67 or IP69K	10-30 V dc	PNP or NPN	106
 T30	60 m	52 x 40 x 45 mm	IP67; NEMA 6P, IP69K	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	110

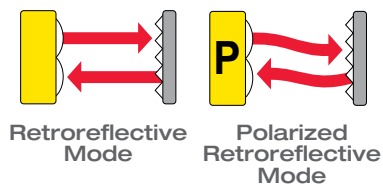
\* AC models are solid-state

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 M12	5 m	12 x 67.5 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	116
 S12-2	20 m	ø 12 x 34 mm	IP67	10-30 V dc	PNP or NPN	122
 S12	15 m	16 x 31 mm	IP65	10-30 V dc	PNP or NPN	118
 SB12/SB12T	1.5 m	15.8 x 31 mm	IP65	10-30 V dc	PNP or NPN	120
 S18	20 m	DC: ø 18 x 59 mm AC: ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	124
 M18 M18-3 M18-4	20 m 25 m 25 m	ø 18 x 59 mm ø 18 x 88 mm ø 18 x 88 mm	IP67; NEMA 6P, IP69K	10-30 V dc	PNP or NPN	126
 S30	60 m	DC: ø 30 x 69 mm AC: ø 30 x 81 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	140
 SM30	150 m	ø 30 x 99 mm	IP67; NEMA 6P	10-30 V dc 24-240 V ac	Bi-Modal PNP/NPN AC: SPST*	140
 SLM	220 mm	Max size: 12 x 252 x 140 mm	IP67	10-30 V dc	Bipolar NPN/PNP	144
 SL10	10 mm	72 x 52 x 19 mm	IP67	10-30 V dc	Bipolar NPN/PNP	147
 SL30	30 mm	72 x 52 x 19 mm	IP67	10-30 V dc	Bipolar NPN/PNP	146
 VSM	250 mm	4 x 36.8 mm	IP67	10-30 V dc	PNP or NPN	154
 VS2	3 m	25 x 12 x 4 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	158
 QM26	8.5 m	45 x 14 x 25 mm	IP67, IP69K	10-30 V dc	PNP or NPN	298












\* AC models are solid-state



# SENSOR SELECTION GUIDE






The sensor contains both the emitter and receiver elements. The effective beam is established by the size of the retroreflector. As with an opposed-mode sensor, an object is sensed when it interrupts or breaks the effective beam.

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 QS18	Retro: 6.5 m Polar Retro: 3.5 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	DC: PNP or NPN P-MOSFET N-MOSFET	40
 QS30	Retro: 12 m Polar Retro: 8 m	44 x 22 x 35 mm	IP67; NEMA 6	10-30 V dc 12-250 V ac/dc 24-250 V ac/dc	DC: Bipolar NPN/PNP AC/DC: SPDT e/m relay	56
 Q12	Retro: 1.5 m Polar Retro: 1 m	23 x 8 x 12 mm	IP67	10-30 V dc	Bipolar NPN/PNP, PNP or NPN	66
 Q20	Retro: 6 m Polar Retro: 4 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	70
 MINI-BEAM	Retro: 5 m Polar Retro: 3 m	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST* or SPDT Relay NAMUR: Constant current	76
 Q25	Polar Retro: 2 m	50 x 25 x 30 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	78
 Q40	Polar Retro: 6 m	70 x 40 x 46 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	DC: PNP or NPN AC: SPST*	80
 Q45	Retro: 9 m Polar Retro: 6 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac/dc 12-250 V ac/dc 5-15 V dc (NAMUR)	DC: Bipolar NPN/PNP AC: SPST or SPDT Relay AC/DC: SPST or SPDT Relay NAMUR: Constant current	84
 QMT42	Polar Retro: 3 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	95
 T18	Retro: 2 m Polar Retro: 2 m	DC: 42 x 30 x 30 mm AC: 52 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc 20-250 V ac	DC: PNP or NPN AC: SPST*	102
 TM18	Polar Retro: 5.5 m	41 x 30 x 30 mm	IP67 or IP69K	10-30 V dc	PNP or NPN	106

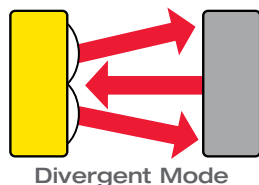
\* AC models are solid-state



Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 T30	<b>Polar Retro:</b> 6 m	52 x 40 x 45 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	<b>DC:</b> PNP or NPN <b>AC:</b> SPST*	110
 M12	<b>Retro:</b> 2.5 m <b>Polar Retro:</b> 1.5 m	12 x 67.5 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	116
 S18	<b>Retro:</b> 2 m <b>Polar Retro:</b> 2 m	<b>DC:</b> ø 18 x 59 mm <b>AC:</b> ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	<b>DC:</b> PNP or NPN <b>AC:</b> SPST*	124
 M18	<b>Retro:</b> 2 m <b>Polar Retro:</b> 2 m	ø 18 x 59 mm	IP67; NEMA 6P	10-30 V dc or	PNP or NPN	126
 S30	<b>Polar Retro:</b> 6 m	<b>DC:</b> ø 30 x 69 mm <b>AC:</b> ø 30 x 81 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	<b>DC:</b> PNP or NPN <b>AC:</b> SPST*	140
 VS3	<b>Polar Retro:</b> 250 mm	26 x 9 x 16 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	160
 QM26	<b>Polar Retro:</b> 3 m	45 x 14 x 25 mm	IP67, IP69K	10-30 V dc	PNP or NPN	298
 Q26	<b>Polar Retro:</b> 800 mm	52 x 14 x 25 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	318


\* AC models are solid-state

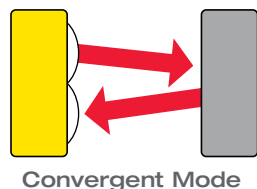
# SENSOR SELECTION GUIDE



Light from the emitter strikes a surface of an object at some arbitrary angle and is diffused from the surface at all angles. The emitted beam and receiver's field-of-view are very wide.




**Divergent Mode**

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 QS18	300 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	45
 MINI-BEAM	130 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc, 24-240 V ac, 5-15 V dc (NAMUR)	<b>DC:</b> Bipolar NPN/PNP <b>AC:</b> SPST* or SPDT Relay <b>NAMUR:</b> Constant Current	76

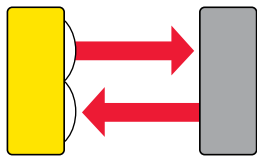


Uses additional optics to create a small, intense and well-defined spot at a fixed distance from the front of the sensor lens.

**Convergent Mode**

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 QS18	43 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	PNP or NPN	40
 Q45	100 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac/dc 12-250 V ac/dc 5-15 V dc (NAMUR)	Bipolar NPN/PNP <b>AC:</b> SPST* or SPDT Relay <b>AC/DC:</b> SPST* or SPDT Relay <b>NAMUR:</b> Constant current	84
 MINI-BEAM	49 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc 24-240 V ac 5-15 V dc (NAMUR)	<b>DC:</b> Bipolar NPN/PNP <b>AC:</b> SPST* or SPDT Relay <b>NAMUR:</b> Constant Current	76
 PICO-DOT®	305 mm	40.6 x 12.7 x 45.6 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	92
 VS1	15 mm	26 x 8 x 12 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	156
 VS2	30 mm	25 x 12 x 4 mm	IP67; NEMA 6	10-30 V dc	PNP or NPN	158

\* AC models are solid-state



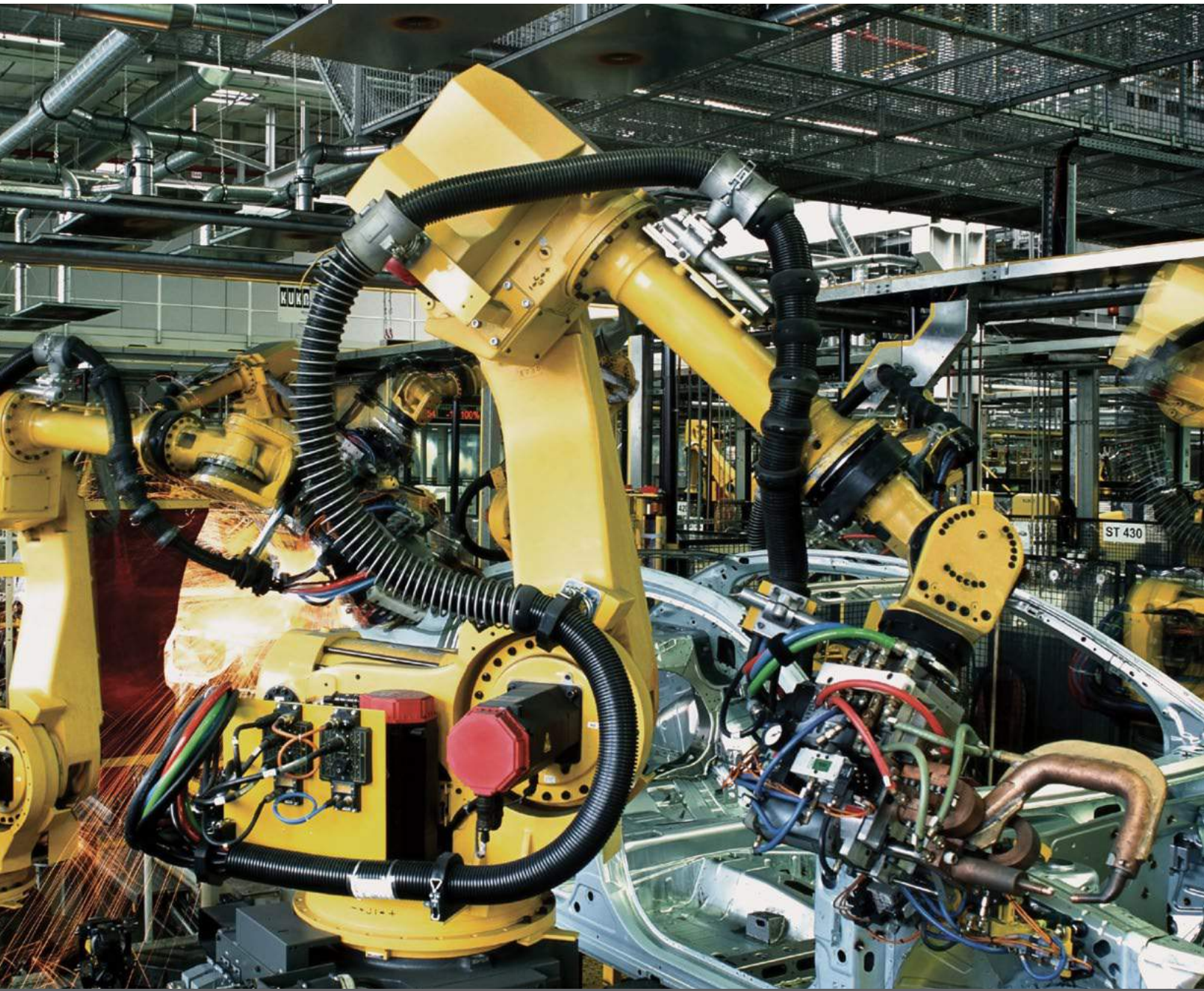
Light from the emitter strikes a surface of an object at some arbitrary angle and is diffused from the surface at all angles.

Diffuse Mode

Model	Range	Dims (H x W x D)	IP Rating	Power Supply	Output	Page #
 Q4X	600 mm	<b>Q4XT</b> 57.4 x 18 x 43.6 mm <b>Q4XF</b> 57.4 x 18 x 32.5 mm	IP67, IP68, IP69K	10-30 V dc	NPN or PNP Dual Discrete with IO-Link 4-20 mA or 0-10 V	34
 QS18	800 mm	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc 20-140 V ac/dc 20-270 V ac/dc	<b>DC:</b> PNP or NPN <b>AC/DC:</b> P-MOSFET or N-MOSFET	40
 QS30	1.4 m	44 x 22 x varies	IP67; NEMA 6	10-30 V dc	Bipolar NPN/PNP	56
 Q20	1.5 m	35 x 15 x 31 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	70
 Q45	3 m	88 x 45 x 55 mm	IP67; NEMA 6P	10-30 V dc 90-250 V ac 24-250 V ac 12-250 V dc or 5-15 V dc (NAMUR)	Bipolar NPN/PNP <b>DC:</b> SPST* or SPDT Relay <b>AC:</b> SPST* or SPDT Relay SPST or SPDT Relay <b>NAMUR:</b> Constant current	84
 MINI-BEAM	380 mm	31 x 12 x varies	IP67; NEMA 4X	10-30 V dc, 24-240 V ac, 5-15 V dc (NAMUR)	<b>DC:</b> Bipolar NPN/PNP <b>AC:</b> SPST <b>NAMUR:</b> Constant current	76
 QM42	400 mm	42 x 12.7 x 42 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	94
 QMT42	6 m	58 x 18 x 42 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	95
 T18 DC	500 mm	42 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc	NPN or PNP	102
 T18 AC	300 mm	52 x 30 x 30 mm	IP67; NEMA 6P	10-30 V dc	<b>AC:</b> SPST*	103
 TM18	500 mm	41 x 30 x 30 mm	IP67; NEMA 6P or IP69K (when QD PVC jacket is protected)	10-30 V dc	NPN or PNP	106
 S18	300 mm	<b>DC:</b> ø 18 x 59 mm <b>AC:</b> ø 18 x 85 mm	IP67; NEMA 6P	10-30 V dc or 20-250 V ac	NPN or PNP <b>AC:</b> SPST*	124
 M18	300 mm	ø 18 x 59 mm	IP67; NEMA 6P	10-30 V dc	<b>DC:</b> PNP or NPN	126
 VSM	90 mm	4 x 36.8 mm	IP67	10-30 V dc	<b>DC:</b> PNP or NPN	154

\* AC models are solid-state





## Photoelectric

A photoelectric sensor is an optical control used in a variety of automated processes. It works by detecting a visible or invisible beam of light, and responding to a change in the received light intensity. Banner supplies sensors to virtually all the manufacturing companies in the Fortune 500. Banner offers the world's most complete line of photoelectric sensors – over 12,000.

# PHOTOELECTRIC

---

FEATURED	page 34
RECTANGLE	page 74
RIGHT ANGLE	page 105
BARREL	page 130
SLOT & AREA	page 142
MINIATURE	page 152
FIBER OPTICS	page 162





## Featured

The featured sensors are the most versatile sensors available in the photoelectric line. Featured sensors have a variety of mounting styles and options, housing options, configuration modes, ranges, response speeds and many more. Start here to find solutions that meet your sensing needs.

Series	Description	Max Sensing Range	Dimensions (H x W x D)	Protection Rating	Housing Material	Power Supply
	<b>Q4X</b> The Q4X is a versatile, rugged, laser distance sensor that solves the most challenging applications. page 34	<b>Laser Adjustable-Field:</b> 25-610 mm	<b>Q4XT</b> 57.4 x 18 x 43.6 mm  <b>Q4XF</b> 57.4 x 18 x 32.5 mm	IP67 IP68 IP69K	Stainless Steel	10 to 30 V dc
	<b>Q3X</b> The Q3X is a versatile, rugged, laser contrast sensor that solves challenging applications. page 38	<b>Laser Diffuse:</b> 300 mm <b>Fixed-Field:</b> 200 mm	48.6 x 18 x 24.3 mm	IP67 IP68 IP69K	Nickel-plated Zinc	10 to 30 V dc
	<b>QS18</b> General purpose sensor to solve most applications page 40	<b>Opposed:</b> 20 m <b>Laser Emitter:</b> 15 m <b>Retro:</b> 6.5 m <b>Polarized Retro:</b> 3.5 m <b>Laser Retro Polarized:</b> 10 m <b>Convergent:</b> 43 mm <b>Diffuse:</b> 1 m <b>Laser Diffuse:</b> 300 mm <b>Fixed-Field:</b> 100 mm <b>Adjustable-Field:</b> 300 mm <b>Laser Adjustable-Field:</b> 250 mm	Varies by model	IP67 NEMA 6	ABS	10 to 30 V dc 20 to 140 V ac/dc 20 to 270 V ac/dc
	<b>QS30</b> Performance sensor page 56	<b>Opposed:</b> 213 m <b>Opposed Water Dect:</b> 8 m <b>Retro:</b> 12 m <b>Retro Clear Object:</b> 2 m <b>Polarized Retro:</b> 8 m <b>Laser Polarized Retro:</b> 18 m <b>Diffuse:</b> 1.4 m <b>Laser Diffuse:</b> 800 mm <b>Fixed-Field:</b> 600 mm <b>Adjustable-Field:</b> 600 mm	Varies by model	IP67 NEMA 6P	ABS	10 to 30 V dc 24 to 250 V ac 12 to 250 V dc
	<b>Q12</b> Self-contained miniature sensor page 66	<b>Opposed:</b> 2 m <b>Retro:</b> 1.5 m <b>Polarized Retro:</b> 1 m <b>Fixed-Field:</b> 50 mm	22 x 8 x 12.4 mm	IP67	Thermoplastic Elastomer	10 to 30 V dc
	<b>Q20</b> Universal housing page 70	<b>Opposed:</b> 20 m <b>Retro:</b> 6 m <b>Polarized Retro:</b> 4 m <b>Diffuse:</b> 1.5 m <b>Fixed-Field:</b> 150 mm	32 x 12 x 29 mm	IP67 NEMA 6	ABS	10 to 30 V dc

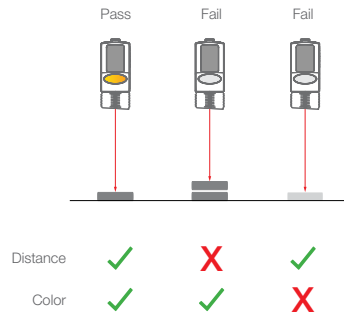
# Q4X Series

## Versatile, Rugged, Laser Measurement Sensor

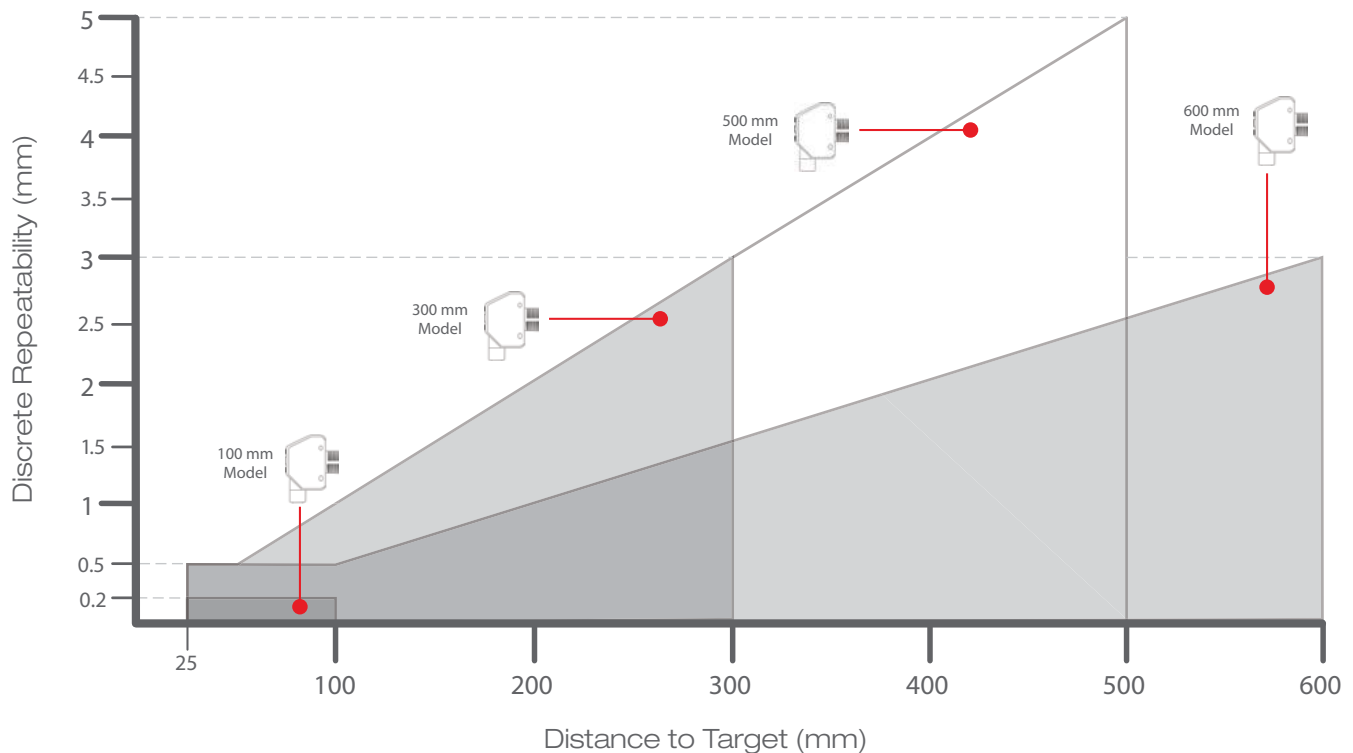
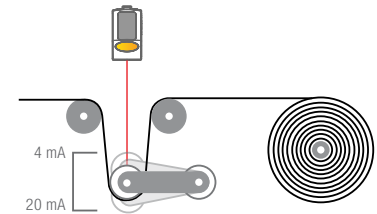


- Save time and money with the Q4X which is **ready to measure right out of the box**
- A simple user experience from installation to setup
  - Bright spot alignment
  - Three push buttons simplify setup
  - Intuitive menus
- Four-digit display **shows distance to target in mm**
- **FDA-grade stainless steel** is suitable for IP69K washdown environments

### Error-Proofing



### Measurement





## Threaded Q4XT

Example Model Number: Q4XTBLAF300-Q8

Family	Housing Style	Output	Mode	Range	Connector
<b>Q4X</b>	<b>T</b>	<b>B</b>	<b>LAF</b>	<b>300</b>	<b>Q8</b>
	T = 18 mm Threaded Barrel	B = Bipolar Discrete NPN & PNP K = Dual Discrete with IO-Link U = 0 to 10 V Analog I = 4 to 20 mA Analog	LAF = Laser Adjustable-Field	600 = 25-600 mm* 500 = 25-500 mm** 300 = 25-300 mm 100 = 25-100 mm	Q8 = Integral QD
				* Only available in Dual Discrete with IO-Link models ** Not available in Dual Discrete with IO-Link models	

## Flush Q4XF

Example Model Number: Q4XFNLAF310-Q8

Family	Housing Style	Output	Mode	Range	Connector
<b>Q4X</b>	<b>F</b>	<b>N</b>	<b>LAF</b>	<b>310</b>	<b>Q8</b>
	F = Flush face	N = NPN Discrete P = PNP Discrete K = Dual Discrete with IO-Link U = 0 to 10 V Analog I = 4 to 20 mA Analog	LAF = Laser Adjustable-Field	610 = 35-610 mm* 310 = 35-310 mm 110 = 35-110 mm	Q8 = Integral QD
				* Only available in Dual Discrete with IO-Link models	

 Connection Option: A model with a QD requires a mating cordset. See page 36.

## OTHER AVAILABLE MODELS



Clear object ONLY models

314

## Cordsets for Analog Models

0 to 10 V, 4 to 20 mA

**M12/Euro-Style with Shield**Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)

5-Pin

**MQDEC2-506**

2 m (6.5')

**MQDEC2-515**

5 m (15')

**MQDEC2-530**

9 m (30')

**M12/Euro-Style Washdown (IP68) with Shield**

Straight connector models only



5-Pin

**MQDCWD-506**

2 m (6.5')

**MQDCWD-530**

9 m (30')

Additional cordset information is available  
See page 758

## Cordsets for Other Models

Dual Discrete (4-pin) and Bipolar NPN &amp; PNP (5-pin)

**M12/Euro-Style**Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

4-Pin

**MQDC-406**

2 m (6.5')

**MQDC-415**

5 m (15')

**MQDC-430**

9 m (30')

5-Pin

**MQDC1-506**

2 m (6.5')

**MQDC1-515**

5 m (15')

**MQDC1-530**

9 m (30')

**M12/Euro-Style Washdown (IP69K)**

Straight connector models only



4-Pin

**MQDC-WDSS-0406**

2 m (6.5')

**MQDC-WDSS-0415**

5 m (15')

**MQDC-WDSS-0430**

9 m (30')

5-Pin

**MQDC-WDSS-0506**

2 m (6.5')

**MQDC-WDSS-0515**

5 m (15')

**MQDC-WDSS-0530**

9 m (30')



SMB18A



SMBAMS18P



SMBAMS18RA



SMB46L2

**SMBQ4XFA**

includes 3/8" bolt for mounting

**SMBQ4XFAM10**

includes 10 mm bolt for mounting

**SMBQ4XFAM12**

clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods




Additional bracket information is available  
See page 722

Q4XT.. models



Q4XF.. models

## Q4X Specifications

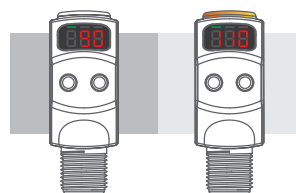
<b>Supply Voltage and Current</b>	10 to 30 V dc at less than 675 mW 12 to 30 V dc for Analog models					
<b>Laser Characteristics</b>	<b>Wavelength:</b> Class 1 Laser: 655 nm visible red					
<b>Beam Spot Size</b>	<b>Short Range Models</b>			<b>Long Range Models</b>		
	<b>Distance (mm)</b>		<b>Size (Horizontal x Vertical)</b>	<b>Distance (mm)</b>		<b>Size (Horizontal x Vertical)</b>
<b>Threaded</b>	<b>Flush</b>	<b>Threaded</b>		<b>Flush</b>		
	25	35	2.4 mm x 1.0 mm	25	35	2.6 mm x 1.0 mm
	50	60	2.3 mm x 0.9 mm	150	160	2.3 mm x 0.9 mm
	100	110	1.8 mm x 0.7 mm	300	310	2.0 mm x 0.8 mm
				600	610	1.9 mm x 1.0 mm
<b>Output Response Time</b>	<b>User selectable:</b> 50 ms, 25 ms, 10 ms, 3 ms and 1.5 ms					
<b>Excess Gain</b>	HIGH Excess Gain (STANDARD Excess Gain*)					
	<b>Response Speed (ms)</b>	<b>Excess Gain (90% white card)</b>				
		<b>Threaded at 25 mm Flush at 35 mm</b>	<b>Threaded at 100 mm Flush at 110 mm</b>	<b>Threaded at 300 mm Flush at 310 mm</b>		
	1.5	200	100	20		
	3	200	100	20		
	10	1000 (500*)	500 (250*)	100 (50*)		
	25	2500 (1000*)	1250 (500*)	250 (100*)		
	50	5000 (2500*)	2500 (1250*)	500 (250*)		
	* Std excess gain provides increased noise immunity (only available in 50 ms, 25 ms, 10 ms)					
	<b>Response Speed (ms)</b>	<b>Excess Gain (90% white card)</b>				
		<b>Threaded at 25 mm Flush at 35 mm</b>	<b>Threaded at 100 mm Flush at 110 mm</b>	<b>Threaded at 300 mm Flush at 310 mm</b>	<b>Threaded at 600 mm Flush at 610 mm</b>	
	2	280	110	25	6	
	5	280	110	25	6	
	15	1000 (360)	400 (150)	80 (30)	20 (7)	
	25	2000 (1000)	800 (400)	160 (80)	40 (20)	
	50	4000 (2000)	1600 (800)	320 (160)	80 (40)	
<b>Resolution &amp; Linearity</b>	See datasheet for more information on analog models					
<b>Construction</b>	Housing 316 L stainless steel; PMMA acrylic lens cover, Polysulfone lightpipe and display window					
<b>Ambient Light Immunity</b>	Greater than 5,000 lux at 300 mm > 2,000 lux at 500 mm					
<b>Environmental Rating</b>	IP67 per IEC60529; IP68 per IEC60529; IP69K per DIN40050-9					
<b>Operating Conditions</b>	<b>Temperature:</b> -10 °C to +50 °C <b>Humidity:</b> 35% to 95% relative humidity					
<b>Certifications</b>	   chemical compatibility on some models; contact Banner Engineering for details					

# Q3X Series

## Versatile, Rugged, Laser Contrast Sensors



- Solves contrast applications capturing **up to 2,000 events a second**
- Rugged metal, laser-marked housing for use in environments with chemical and oil exposure
- **Three-digit display** offers immediate feedback for easy setup and troubleshooting
- Bright output indicator provides high visibility of sensor operation
- Superior resistance to ambient light interference



Can detect small changes in contrast up to 300 mm

### Q3X

Example Model Number: Q3XTBLD-Q8

Family	Housing Style	Output	Mode & Range	Connector
<b>Q3X</b>	<b>T</b>	<b>B</b>	<b>LD</b>	<b>Q8</b>
	T = 18 mm Threaded Barrel	B = Bipolar (NPN & PNP)	LD = Laser Diffuse, 300 mm LD50 = Laser Diffuse, 50 mm (60 mm background suppression) LD100 = Laser Diffuse, 100 mm (120 mm background suppression) LD150 = Laser Diffuse, 150 mm (190 mm background suppression) LD200 = Laser Diffuse, 200 mm (280 mm background suppression)	Q8 = 5-pin Integral QD

 Connection Option: A model with a QD requires a mating cordset.

**M12/Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

**5-Pin**

**MQDC1-501.5**  
0.5 m (1.5')  
**MQDC1-506**  
2 m (6')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')

**SMBQ4XFA**

includes 3/8" bolt for mounting

**SMBQ4XFAM10**

includes 10 mm bolt for mounting

**SMB18A****M12/ Euro-Style Washdown (IP69K)**

Straight connector models only

**5-Pin**

**MQDC-WDSS-0506**  
2 m (6')  
**MQDC-WDSS-0515**  
5 m (15')  
**MQDC-WDSS-0530**  
9 m (30')



**SMBQ4XFAM12**

clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

*Additional bracket information is available  
See page 722*

*Additional cordset information is available  
See page 758*

**Q3X Specifications**

<b>Supply Voltage and Current</b>	10 to 30 V dc														
<b>Laser Characteristics</b>	<b>Wavelength:</b> Class 2 Laser (655 nm visible red)														
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages														
<b>Beam Spot Size</b>	For models LD, LD100, LD150, LD200 (LD50 models*) <table border="1"> <thead> <tr> <th>Distance (mm)</th> <th>Size (Horizontal x Vertical)</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>5.9 mm x 2.3 mm (4.8 mm x 2.0 mm*)</td> </tr> <tr> <td>50</td> <td>5.6 mm x 2.1 mm (3.4 mm x 1.4 mm*)</td> </tr> <tr> <td>100</td> <td>5.1 mm x 1.9 mm</td> </tr> <tr> <td>150</td> <td>4.6 mm x 1.6 mm</td> </tr> <tr> <td>200</td> <td>4.1 mm x 1.6 mm</td> </tr> <tr> <td>300</td> <td>3.0 mm x 1.2 mm</td> </tr> </tbody> </table>	Distance (mm)	Size (Horizontal x Vertical)	20	5.9 mm x 2.3 mm (4.8 mm x 2.0 mm*)	50	5.6 mm x 2.1 mm (3.4 mm x 1.4 mm*)	100	5.1 mm x 1.9 mm	150	4.6 mm x 1.6 mm	200	4.1 mm x 1.6 mm	300	3.0 mm x 1.2 mm
Distance (mm)	Size (Horizontal x Vertical)														
20	5.9 mm x 2.3 mm (4.8 mm x 2.0 mm*)														
50	5.6 mm x 2.1 mm (3.4 mm x 1.4 mm*)														
100	5.1 mm x 1.9 mm														
150	4.6 mm x 1.6 mm														
200	4.1 mm x 1.6 mm														
300	3.0 mm x 1.2 mm														
<b>Output Configuration</b>	Bipolar (1 PNP & 1 NPN) output <b>Off-state leakage current:</b> less than 10 µA <b>PNP On-state saturation voltage:</b> less than 200 mV at 10 mA load and less than 1.0 V at 100 mA <b>NPN On-state saturation voltage:</b> less than 1.0 V at 10 mA load and less than 2.0 V at 100 mA														
<b>Output Response Time</b>	<b>User selectable:</b> 250 µs, 1 ms and 5 ms														
<b>Delay at Power-up</b>	1 second														
<b>Ambient Light Immunity</b>	Greater than 5000 lux														
<b>Repeatability</b>	60 µs														
<b>Construction</b>	Housing nickel-plated zinc die-cast; PMMA acrylic lens cover														
<b>Environmental Rating</b>	IP67 per IEC60529; IP68 per IEC60529; IP69K per DIN40050-9														
<b>Connections</b>	5-pin Euro M12 Integral Connector														
<b>Performance Curves</b>	See datasheet														
<b>Operating Conditions</b>	<b>Temperature:</b> -10 °C to +55 °C <b>Humidity:</b> 35% to 95% relative humidity														
<b>Certifications</b>	  LISTED 3TJJ IND. CONT. EQ.														





# QS18 Series

## Versatile Sensor for Global Manufacturing Needs



- **All-purpose sensors** solve the widest variety of sensing applications
- Versatile sensor with **many mounting options**
- Meets **IP67** and **NEMA 6** standards for use in harsh environments
- Universal housing for global use
- Cordsets and brackets see page 51



**QS18**

page 42

The QS18 Standard Sensor requires little to no adjustment. The sensor is available in multiple sensing modes and has a wide variety of connection options.



**QS18 Expert™**

page 44

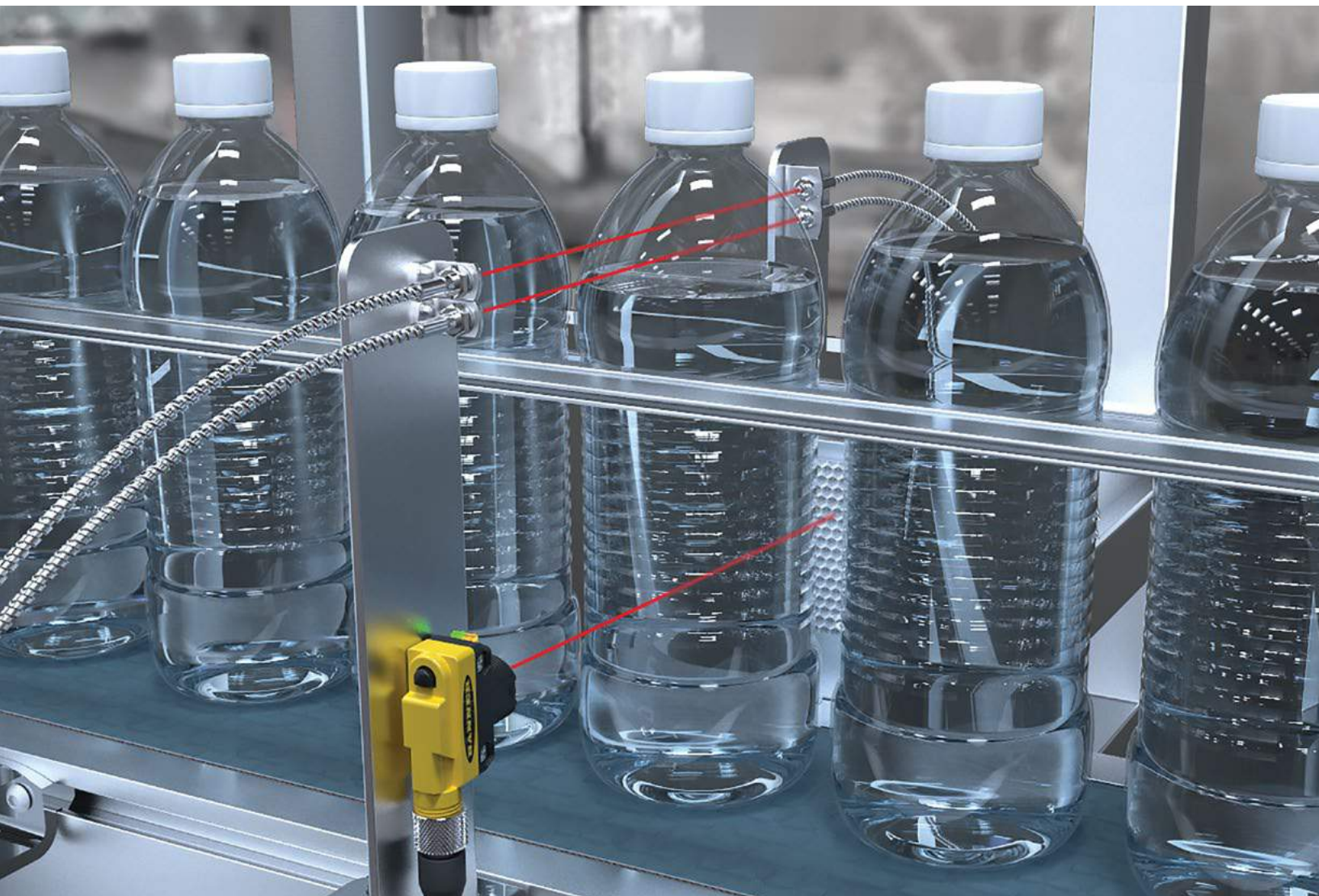
The QS18 Expert™ offers advanced sensing with single push-button programming and several sensing modes and configuration options.



**QS18 Clear Object**

page 45

The QS18 Clear Object sensor is designed for clear object detection in plastic or glass containers.



### QS18 Laser page 46

The QS18 Laser Sensor has a narrow visible beam spot for easy alignment and small object detection.



### QS18 Adjustable-Field page 48

The QS18 Adjustable-Field Sensor is ideal for background and foreground suppression. The sensor is available in long-range models for sensing up to 300 mm.



### QS18 Universal Voltage page 50

The QS18 Universal Voltage Sensor operates on ac or dc voltage and has several sensing modes available, making it an ideal sensor for many manufacturing environments.

# QS18

## DC-Operated Sensors



- All-purpose sensor solves widest variety of sensing applications
- Simple set-up with 270 degree potentiometer and fixed sensitivity models
- Versatile sensor with many mounting options
- Meets IP67 and NEMA 6 standards for use in wet environments
- Universal housing for global use
- Cordsets and brackets see page 51

### Opposed QS18

⇨ Infrared LED    → Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 OPPOSED	20 m	2 m	QS186E Emitter	
		4-pin Euro QD	QS186EQ8 Emitter	
 OPPOSED	20 m	2 m	QS18VN6R	QS18VP6R
		4-pin Euro QD	QS18VN6RQ8	QS18VP6RQ8
 OPPOSED	20 m	2 m	QS186EV Emitter	
		4-pin Euro QD	QS186EVQ8 Emitter	
 OPPOSED	3 m	2 m	QS186EB Emitter	
		4-pin Euro QD	QS186EBQ8 Emitter	
 OPPOSED	3 m	2 m	QS18VN6RB	QS18VP6RB
		4-pin Euro QD	QS18VN6RBQ8	QS18VP6RBQ8



### Box Sorting for Size

Three QS18 opposed mode sensors above the roller conveyor detect any passing object, triggering the horizontal QS18 sensor. Boxes are diverted by size as they continue forward.

### Retro & Polar Retro QS18

→ Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 RETRO	6.5 m <sup>†</sup>	2 m	QS18VN6LV	QS18VP6LV
		4-pin Euro QD	QS18VN6LVQ8	QS18VP6LVQ8
 POLAR RETRO	3.5 m <sup>†</sup>	2 m	QS18VN6LP	QS18VP6LP
		4-pin Euro QD	QS18VN6LPQ8	QS18VP6LPQ8

For more specifications see page 52.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18VN6LV W/30).

#### QD models

- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18VN6LVQ7).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18VN6LVQ5).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18VN6LVQ).



<sup>†</sup> Retroreflective range is specified using one model BRT-84 retroreflector.

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

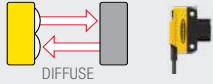



## Convergent QS18

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 CONVERGENT	16 mm	2 m	QS18VN6CV15	QS18VP6CV15
		4-pin Euro QD	QS18VN6CV15Q8	QS18VP6CV15Q8
 CONVERGENT	43 mm	2 m	QS18VN6CV45	QS18VP6CV45
		4-pin Euro QD	QS18VN6CV45Q8	QS18VP6CV45Q8



## Diffuse QS18

 Infrared LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 DIFFUSE	450 mm	2 m	QS18VN6D	QS18VP6D
		4-pin Euro QD	QS18VN6DQ8	QS18VP6DQ8
 DIFFUSE	450 mm	2 m	QS18VN6DB	QS18VP6DB
		4-pin Euro QD	QS18VN6DBQ8	QS18VP6DBQ8
 DIFFUSE	600 mm	2 m	QS18VN6DL	QS18VP6DL
		4-pin Euro QD	QS18VN6DLQ8	QS18VP6DLQ8
 DIVERGENT DIFFUSE	100 mm	2 m	QS18VN6W	QS18VP6W
		4-pin Euro QD	QS18VN6WQ8	QS18VP6WQ8

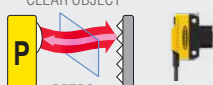
## Fixed-Field QS18

 Visible Red LED


Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 FIXED-FIELD	0-50 mm Cutoff	2 m	QS18VN6FF50	QS18VP6FF50
		4-pin Euro QD	QS18VN6FF50Q8	QS18VP6FF50Q8
 FIXED-FIELD	0-100 mm Cutoff	2 m	QS18VN6FF100	QS18VP6FF100
		4-pin Euro QD	QS18VN6FF100Q8	QS18VP6FF100Q8

## Coaxial QS18 Clear Object Detection

 Visible Red LED

Sensing Mode	Range**	Connection	Models NPN*	Models PNP*
 CLEAR OBJECT RETRO	0-3 m	2 m	QS18VN6XLP	QS18VP6XLP
		4-pin Euro QD	QS18VN6XLPQ8	QS18VP6XLPQ8

For more specifications see page 52.

 Connection options: A model with a QD requires a mating cordset (see page 51). For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18VN6LV W/30). <b>QD models</b> • For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18VN6LVQ7). • For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18VN6LVQ5). • For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18VN6LVQ). * Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options. ** For use with BRT-92X92C Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
--



# QS18 Expert™

## Sensors with Push-Button Programming

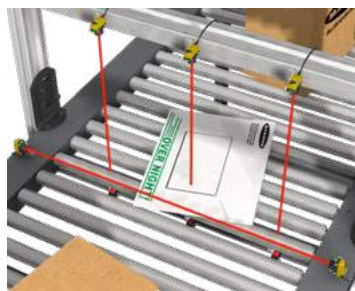


- Intuitive push-button lock out to prevent accidental configuration changes
- Bright LED status indicators visible from 360°
- Reliable detection of reflective objects
- Cordsets and brackets see page 51

### Polar Retro QS18 Expert™

Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 POLAR RETRO	3.5 m†	2 m	QS18EN6LP	QS18EP6LP
		4-pin Euro QD	QS18EN6LPQ8	QS18EP6LPQ8



### Mail Sorting for Size

Three QS18 opposed mode sensors above the roller conveyor detect any passing object, triggering the horizontal QS18 sensor. Letters pass below the horizontal QS18 undetected and are diverted to the letter conveyor. Parcels are detected and continue forward.

### Convergent QS18 Expert™

Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 CONVERGENT	16 mm	2 m	QS18EN6CV15	QS18EP6CV15
		4-pin Euro QD	QS18EN6CV15Q8	QS18EP6CV15Q8
 CONVERGENT	43 mm	2 m	QS18EN6CV45	QS18EP6CV45
		4-pin Euro QD	QS18EN6CV45Q8	QS18EP6CV45Q8

For more specifications see page 53.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6LP W/30).

QD models


- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18EN6LPQ7).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6LPQ5).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).

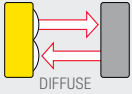
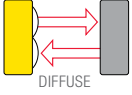
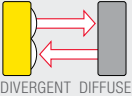
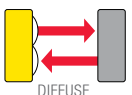
† Retroreflective range is specified using one model BRT-84 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

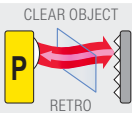
## Diffuse QS18 Expert™

 Infrared LED
  Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 DIFFUSE	800 mm	2 m	QS18EN6D	QS18EP6D
		4-pin Euro QD	QS18EN6DQ8	QS18EP6DQ8
 DIFFUSE	500 mm	2 m	QS18EN6DB	QS18EP6DB
		4-pin Euro QD	QS18EN6DBQ8	QS18EP6DBQ8
 DIVERGENT DIFFUSE	300 mm	2 m	QS18EN6W	QS18EP6W
		4-pin Euro QD	QS18EN6WQ8	QS18EP6WQ8
 DIFFUSE	600 mm	2 m	QS18EN6DV	QS18EP6DV
		4-pin Euro QD	QS18EN6DVQ8	QS18EP6DVQ8

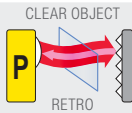
## Coaxial QS18 Expert™ Clear Object Detection

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 CLEAR OBJECT RETRO	0-3 m	2 m	QS18EN6XLPC	QS18EP6XLPC
		4-pin Euro QD	QS18EN6XLPCQ8	QS18EP6XLPCQ8

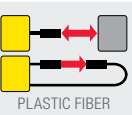
## Coaxial QS18 Expert™ Clear Object Detection with IO-Link

 Visible Red LED


Sensing Mode	Range	Connection	Models
 CLEAR OBJECT RETRO	0-3 m	2 m	QS18EK6XLPC
		4-pin Euro QD	QS18EK6XLPCQ8

## Plastic Fiber QS18 Expert™

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	QS18EN6FP	QS18EP6FP
		4-pin Euro QD	QS18EN6FPQ8	QS18EP6FPQ8

For more specifications see page 53.

 Connection options: A model with a QD requires a mating cordset (see page 51).
For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6D W/30).
<b>QD models</b> <ul style="list-style-type: none"> <li>For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18EN6DQ7).</li> <li>For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6DQ5).</li> <li>For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6DQ).</li> </ul>
Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.
* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.
** For use with BRT-92X92C

# QS18 Laser

## DC-Operated Long-Range Laser Sensors



- The QS18 Laser Emitter has a narrow visible beam spot for easy alignment and small object detection.
- Long sensing ranges
- Available in opposed, diffuse and retroreflective mode (see page 48 for adjustable-field models)
- Cordsets and brackets see page 51

### Class 1 Laser QS18



Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 CLASS 1 LASER EMITTER	15 m (4500 x excess gain)	2 m 4-pin Euro QD	QS186LE Emitter**	QS186LEQ8 Emitter**
 CLASS 1 LASER SPOT	See datasheet for more information.	2 m 4-pin Euro QD	QS186LE10	QS186LE10Q8
 CLASS 1 LASER SPOT	See datasheet for more information.	2 m 4-pin Euro QD	QS186LE11	QS186LE11Q8
 CLASS 1 LASER SPOT	See datasheet for more information.	2 m 4-pin Euro QD	QS186LE12	QS186LE12Q8
 CLASS 1 LASER SPOT	See datasheet for more information.	2 m 4-pin Euro QD	QS186LE14	QS186LE14Q8
 CLASS 1 LASER POLAR RETRO	0.1-10 m†	2 m 4-pin Euro QD	QS18VN6LLP	QS18VP6LLP
 CLASS 1 DIFFUSE LASER	300 mm	2 m 4-pin Euro QD	QS18VN6LD	QS18VP6LD
			QS18VN6LLPQ8	QS18VP6LLPQ8
			QS18VN6LDQ8	QS18VP6LDQ8



### Package Inspection Using Diffuse-Mode Laser Sensors

When packaging medical supplies, error-proofing and quality control are of the utmost importance. In this application, it's necessary to inspect each package of gauze pads to ensure that the lid has been closed and that tape has been applied to seal the package. Automating this process means greater efficiency and less chance of error.

For more specifications see page 52.

**Connection options:** A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS186LE W/30**).

#### QD models

• For 4-pin integral Euro-style QD, add suffix **Q7** (example, **QS186LEQ7**).

• For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS186LEQ5**).

• For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS186LEQ**).

† Retroreflective range is specified using one model BRT-51X51BM or BRT-TVHG-2X2 retroreflector.


Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

\*\* Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty environments; the scattered light would greatly reduce excess gain.

For use with standard QS18 opposed mode receivers

## Class 2 Laser QS18

 Visible Red Laser

Sensing Mode	Range	Connection	Models*
	15 m (7000 X excess gain)	2 m 4-pin Euro QD	QS186LE2 Emitter** QS186LE2Q8 Emitter**
	See datasheet for more information	2 m 4-pin Euro QD	QS186LE210 QS186LE210Q8
	See datasheet for more information	2 m 4-pin Euro QD	QS186LE211 QS186LE211Q8
	See datasheet for more information	2 m 4-pin Euro QD	QS186LE212 QS186LE212Q8
	See datasheet for more information	2 m 4-pin Euro QD	QS186LE214 QS186LE214Q8

## Class 1 Laser Sensors

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.  
Reference IEC 60825-1: 2001, section 8.2.

## Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.  
Reference IEC 60825-1:2001, section 8.2.

## For safe laser use (Class 1 or Class 2):

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path.
- Locate open laser beam paths either above or below eye level, where practical.

## CLASS 1 LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated 7-26-01.



Pulse Power < 5.6 mW, 650 - 670 nm, 15 kHz, 4.5 uS Pulse. Complies to 21 CFR 1040.10 & EN60825-1:2001 except for deviations pursuant to laser notice No. 50, dated 7-26-01.

**LASER LIGHT - DO NOT STARE INTO BEAM**

**CLASS 2 LASER PRODUCT**



For more specifications see page 52.

Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS186LE2 W/30).

## QD models

- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS186LE2Q).

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

\*\* Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty environments; the scattered light would greatly reduce excess gain.



# QS18 Adjustable-Field

## Foreground and Background Suppression Sensors



- The QS18 Adjustable-Field Sensor is ideal for background and foreground suppression
- The sensor is available in long-range models for sensing up to 300 mm
- Background suppression models for detection of objects when the background condition is not fixed
- Foreground suppression models for detection when background is fixed and object varies in color or shape
- Visible red LED or laser sensing beam
- Cordsets and brackets see page 51

### Adjustable-Field Foreground Suppression

Foreground suppression models for reliable detection when a fixed background is present and the object color or shape varies

- Objects detected to the face of the sensor (no dead zone).
- Simple multiturn screw adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

### Adjustable-Field Foreground QS18

➔ Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
ADJUSTABLE-FIELD FOREGROUND	Adjustable between 30-200 mm	2 m	QS18AB6AFF200 (Bipolar NPN/PNP)	
		4-pin Euro Pigtail QD	QS18AB6AFF200Q5 (Bipolar NPN/PNP)	
ADJUSTABLE-FIELD FOREGROUND	Adjustable between 15-40 mm	2 m	QS18VN6AFF200	QS18VP6AFF200
		4-pin Euro Pigtail QD	QS18VN6AFF200Q5	QS18VP6AFF200Q5
ADJUSTABLE-FIELD FOREGROUND	Adjustable between 15-40 mm	2 m	QS18AB6AFF40 (Bipolar NPN/PNP)	
		4-pin Euro Pigtail QD	QS18AB6AFF40Q5 (Bipolar NPN/PNP)	
ADJUSTABLE-FIELD FOREGROUND	Adjustable between 15-40 mm	2 m	QS18VN6AFF40	QS18VP6AFF40
		4-pin Euro Pigtail QD	QS18VN6AFF40Q5	QS18VP6AFF40Q5

For more specifications see page 52.

➔ Connection options: A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18VN6AFF200 W/30).  
QD models

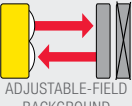
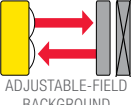
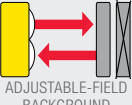
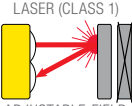
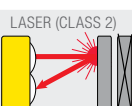
• For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

## Adjustable-Field Background Suppression QS18

→ Visible Red LED

→ Visible Red Laser

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	Adjustable between 30-300 mm	2 m	QS18AB6AF300 (Bipolar NPN/PNP)	
		4-pin Euro Pigtail QD	QS18AB6AF300Q5 (Bipolar NPN/PNP)	
		2 m	QS18VN6AF300	QS18VP6AF300
		4-pin Euro Pigtail QD	QS18VN6AF300Q5	QS18VP6AF300Q5
 ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	Adjustable between 15-40 mm	2 m	QS18AB6AF40 (Bipolar NPN/PNP)	
		4-pin Euro Pigtail QD	QS18AB6AF40Q5 (Bipolar NPN/PNP)	
		2 m	QS18VN6AF40	QS18VP6AF40
		4-pin Euro Pigtail QD	QS18VN6AF40Q5	QS18VP6AF40Q5
 ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	1 mm to cutoff point (adjustable between 20-100 mm)	2 m	QS18VN6AF100	QS18VP6AF100
		4-pin Euro Pigtail QD	QS18VN6AF100Q5	QS18VP6AF100Q5
 LASER (CLASS 1) ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	1 mm to cutoff point (adjustable between 30-150 mm)	2 m	QS18VN6LAF	QS18VP6LAF
		4-pin Euro Pigtail QD	QS18VN6LAFQ5	QS18VP6LAFQ5
 LASER (CLASS 2) ADJUSTABLE-FIELD BACKGROUND SUPPRESSION	20 mm to cutoff point (adjustable between 50-250 mm)	2 m	QS18VN6LAF250	QS18VP6LAF250
		4-pin Euro Pigtail QD	QS18VN6LAF250Q5	QS18VP6LAF250Q5

Adjustable-Field  
Background Suppression

Background suppression models for reliable detection of objects when the background condition is not controlled or fixed

- Simple multiturn screw adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

## Class 1 Laser Sensors

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Reference IEC 60825-1: 2001, section 8.2.

## Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Reference IEC 60825-1:2001, section 8.2.

## For safe laser use (Class 1 or Class 2):

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path.
- Locate open laser beam paths either above or below eye level, where practical.

## CLASS 1 LASER PRODUCT

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated 7-26-01.



Pulse Power < 5.6 mW, 650 - 670 nm, 15 kHz, 4.5 uS Pulse. Complies to 21 CFR 1040.10 & EN60825-1:2001 except for deviations pursuant to laser notice No. 50, dated 7-26-01.  
**LASER LIGHT - DO NOT STARE INTO BEAM**  
CLASS 2 LASER PRODUCT



For more specifications see page 52.

**Connection options:** A model with a QD requires a mating cordset (see page 51).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18EN6LP W/30).  
QD models

- For 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, QS18EN6LPQ5).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, QS18EN6LPQ).

\* Contact factory at 1-888-373-6767 for Bipolar NPN/PNP output model options.

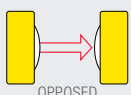
# QS18 Universal Voltage

## Versatile Sensors Operate on AC or DC Voltage


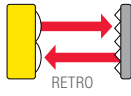


- The QS18 Universal Voltage Sensor operates on ac or dc voltage
- Versatile sensor with many mounting options
- Ready to hook up out of the box
- Cordsets and brackets see page 51

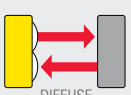
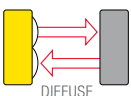
### Opposed QS18 Universal Voltage, 20-140 V AC/DC or 20-270 V AC/DC Infrared LED

Sensing Mode	Range	Output <sup>††</sup>	Models Light Operate	Models Dark Operate
	20 m	— N-MOSFET (Sinking) P-MOSFET (Sourcing)	QS18WE Emitter	
			QS18ANWR QS18APWR	QS18RNWR QS18RPWR

### Polar Retro & Retro QS18 Universal Voltage, 20-140 V AC/DC or 20-270 V AC/DC Visible Red LED

Sensing Mode	Range	Output <sup>††</sup>	Models Light Operate	Models Dark Operate
	3.5 m <sup>†</sup>	N-MOSFET (Sinking) P-MOSFET (Sourcing)	QS18ANWLP QS18APWLP	QS18RNWLP QS18RPWLP
	6.5 m <sup>†</sup>	N-MOSFET (Sinking) P-MOSFET (Sourcing)	QS18ANWLV QS18APWLV	QS18RNWLV QS18RPWLV

### Diffuse QS18 Universal Voltage, 20-140 V AC/DC or 20-270 V AC/DC Visible Red LED Infrared LED

Sensing Mode	Range	Output <sup>††</sup>	Models Light Operate	Models Dark Operate
	450 mm	N-MOSFET (Sinking) P-MOSFET (Sourcing)	QS18ANWDL QS18APWDL	QS18RNWDL QS18RPWDL
	1 m	N-MOSFET (Sinking) P-MOSFET (Sourcing)	QS18ANWDXL QS18APWDXL	QS18RNWDXL QS18RPWDXL

For more specifications see page 53.

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18WE W/30).

**QD models**

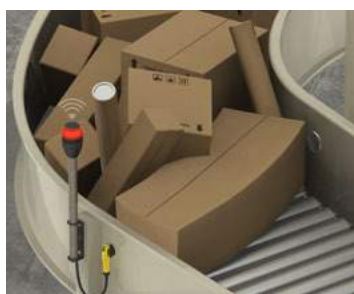
• For 4-pin 150 mm Micro-style pigtail QD, add suffix Q2 to the model number (example, QS18WEQ2).

• 600 V cable models: Standard models are supplied with 300 V cable. For a 600 V cable, add suffix C1 to the 2 m model number (example, QS18WEC1).

<sup>†</sup> Retroreflective range is specified using one model BRT-B4 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

<sup>††</sup>MOSFET: Metal oxide semiconductor field-effect transistor.

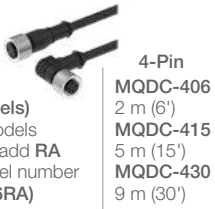


### Conveyor Jam Detection Using Opposed-Mode Sensors

When an object is lodged in front of the sensor an output is triggered, alerting personnel to the presence of the jam. QS18 Universal Voltage sensors can be connected to either ac or dc power, allowing them to operate in applications already using ac power without requiring a separate power supply.

SLOT & AREA | MINIATURE | FIBER OPTIC

**Euro QD**  
(for ..Q8 or ..Q5 models)  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-406RA**)



**Pico QD**  
(for Q7 models)  
Straight snap-on connector

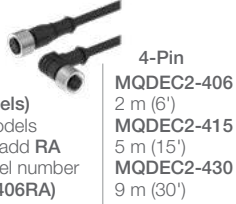
**Pico QD (for Q7 models)**  
Right-angle snap-on connector



**Micro QD**  
(for ..Q2 models)  
Straight connector models listed



**Euro QD with Shield**  
(for ..Q8 or ..Q5 models)  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-406RA**)



**Pico QD with Shield**  
(for Q7 models)  
Straight snap-on connector

**Pico QD (for Q7 models)**  
Right-angle snap-on connector



Additional cordset information is available  
See page 758



Additional bracket information is available  
See page 722

**Reflectors**



Additional information is available  
See page 790

**Apertures**



Additional information is available  
See page 816



Opposed, Retroreflective, Laser Retroreflective, Convergent, Diffuse, Laser Diffuse and Fixed-Field Models  
Suffix E, R, LV, LP, LLP, CV15, CV45, D, DV, LD, LE and FF



Opposed, Diffuse and Divergent Diffuse Models  
Suffix EB, RB, DB and W



Adjustable-Field Models  
Suffix AFF, AF and LAF



Opposed, Retroreflective, Polar Retroreflective and Diffuse Models  
Suffix E, R, LP, LV, DL and XL



Plastic Fiber Models  
Suffix FP



Glass Fiber Models  
Suffix F




## QS18, DC, Laser, Adjustable-Field Specifications


Supply Voltage and Current	<b>Retroreflective, Diffuse and Adjustable-Field Laser:</b> 10 to 30 V dc (10% max. ripple) at less than 15 mA, exclusive of load <b>Laser Emitters:</b> 10 to 30 V dc (10% max. ripple) at less than 35 mA <b>Adjustable-Field (40, 200 &amp; 300 mm):</b> 10 to 30 V dc (10% max. ripple) at less than 27 mA <b>All Others:</b> 10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load			
Laser Characteristics (Laser models only)	<b>Wavelength:</b> <b>Class 1:</b> 650 nm visible red <b>Class 2:</b> Adjustable-Field—658 nm visible red Laser Emitter—650 nm visible red			
Supply Protection Circuitry	Protected against reverse polarity and transient voltages			
Laser Control (Emitters only)	Apply 0 V dc to white wire to enable beam Apply +10 to 30 V dc to white wire to inhibit beam <b>Enable Time:</b> Class 1—240 ms      Class 2—8 ms <b>Disable time:</b> Class 1—100 ms      Class 2—1 ms			
Output Configuration*	<b>Solid-state complementary:</b> NPN (current sinking), PNP (current sourcing), or bipolar (both sinking and sourcing) depending on model <b>Rating:</b> 100 mA total output current <b>OFF-state leakage current:</b> Adjustable-Field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser: <b>NPN:</b> less than 200 $\mu$ A @ 30 V dc (see Application Note 1) <b>PNP:</b> less than 10 $\mu$ A @ 30 V dc <b>Fixed-Field:</b> less than 200 $\mu$ A @ 30 V dc <b>All others:</b> less than 50 $\mu$ A @ 30 V dc <b>ON-state saturation voltage:</b> Adjustable-Field LED (40, 200 & 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser: <b>NPN:</b> less than 1.6 V @ 100 mA <b>PNP:</b> less than 3.0 V @ 100 mA <b>All others:</b> less than 1 V @ 10 mA; less than 1.5 V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit of outputs			
Output Response Time*	<b>Opposed:</b> 750 microseconds ON; 375 microseconds OFF <b>Retroreflective Laser, Diffuse Laser and Adjustable-Field (100, 150 &amp; 250 mm):</b> 700 microseconds ON/OFF <b>Adjustable-Field (40, 200 &amp; 300 mm):</b> 2.8 milliseconds ON/OFF <b>Fixed-Field:</b> 850 microseconds ON/OFF <b>All others:</b> 600 microseconds ON/OFF			
Delay at Power-up	<b>Laser Emitters:</b> Class 1—250 milliseconds Class 2—10 milliseconds <b>Adjustable-Field LED (40, 200 &amp; 300 mm), Retroreflective, Diffuse and Adjustable-Field Laser:</b> 200 milliseconds; outputs do not conduct during this time. <b>All others:</b> 100 milliseconds; outputs do not conduct during this time.			
Repeatability*	<b>Opposed:</b> 100 microseconds <b>Retroreflective Laser, Diffuse Laser and Adjustable-Field Laser:</b> 130 microseconds <b>Adjustable-Field LED (100 mm):</b> 175 microseconds <b>Adjustable-Field LED (40, 200 &amp; 300 mm):</b> 250 microseconds <b>Fixed-Field:</b> 160 microseconds <b>All Others:</b> 150 microseconds			
Adjustments*	<b>Retro, Retro Laser, Convergent, Diffuse, Diffuse Laser and Glass &amp; Plastic Fiber Optic:</b> Single-turn sensitivity (Gain) adjustment potentiometer <b>Adjustable-Field:</b> Five-turn adjustment screw sets cutoff distance between min. and max. position			
Indicators	<b>Laser Emitters:</b> Green LED: Power applied <b>All others, 2 LED indicators:</b> (Green: Power ON    Yellow: Light sensed) See datasheet for detailed information			
Construction	ABS housing; acrylic lens cover (Laser Emitter models have PMMA window) 2.5 mm (adjustable-field only) and 3 mm mounting hardware included			
Environmental Rating	Rated IEC IP67; NEMA 6; UL Type 1			
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (Q), or 4-pin 150 mm pigtail Euro-style QD (Q5), or 4-pin Integral Pico-style QD (Q7), or 4-pin Integral Euro-style QD (Q8), depending on model. QD cordsets are ordered separately. See page 51.			
Operating Conditions	<b>Lasers</b>	<b>Adjustable-Field LED (100 mm)</b>	<b>Adjustable-Field LED (40, 200 &amp; 300 mm)</b>	<b>All others</b>
	<b>Temperature:</b>	-10° to +50° C	0° to +55° C	-20° to +70° C
	<b>Relative humidity:</b>	90% @ 50° C (non-condensing)	95% @ 50° C (non-condensing)	95% @ 50° C (non-condensing)
Laser Classification (Laser models only)	Class 1 and Class 2 laser product; complies with IEC 60825-1: 2001 and 21 CFR 1040.10, except deviations pursuant to Laser Notice 50, dated 7-26-01.			
Application Notes	<b>AF models:</b> NPN off-state leakage current is < 200 $\mu$ A for load resistances > 3 k $\Omega$ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current			
Certifications	All others:   Laser Emitters: 			

\* Does not apply to laser emitter models.

## QS18 Expert™ Specifications and Clear Object Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24 V dc @ greater than 55° C	
Supply Protection Circuitry	Protected against reverse polarity and transient voltages	
Output Configuration	Solid-state NPN (current sinking) or PNP (current sourcing), depending on model Light (LO) or Dark Operate (DO) selectable Selectable 30 millisecond output OFF-delay <b>Rating:</b> 100 mA max. <b>OFF-state leakage current:</b> less than 50 µA @ 30 V dc <b>ON-state saturation voltage:</b> less than 1.5 V (2 m cable); 1.7 V (9 m cable) Protected against false pulse on power-up and continuous overload or short circuit of output	
Output Response Time	<b>Expert:</b> 600 microseconds ON/OFF	<b>Clear Object Detection:</b> 400 microseconds ON/OFF
Delay at Power-up	Momentary delay on power-up; outputs do not conduct during this time	
Repeatability	<b>Expert:</b> 75 microseconds	<b>Clear Object Detection:</b> 100 microseconds
Adjustments	<b>Thresholds:</b> Push-button/remote-wire configurable <b>Expert™-style TEACH and SET options:</b> <b>Light/Dark Operate:</b> selectable by programming order (load output follows the first taught target condition) <b>Push-button enable/disable:</b> remote wire only See datasheet for detailed information	
Indicators	<b>2 LED indicators: Green:</b> RUN mode, output short-circuit <b>Yellow:</b> Output ON/marginal, TEACH mode	
Construction	ABS housing	
Environmental Rating	Meets NEMA 6; IEC IP67; UL Type 1	
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD ( <b>Q</b> ), or 4-pin 150 mm pigtail Euro-style QD ( <b>Q5</b> ), or 4-pin Integral Pico-style QD ( <b>Q7</b> ), or 4-pin Integral Euro-style QD ( <b>Q8</b> ). QD cordsets are ordered separately. See page 51.	
Operating Conditions	<b>Temperature:</b> -20° to +70° C	<b>Relative humidity:</b> 90% @ 50° C (non-condensing)
Certifications		

## QS18 Universal Voltage Specifications

Supply Voltage	<b>P-MOSFET Models:</b> 20 to 140 V ac/dc @ < 10 mA, exclusive of load <b>N-MOSFET Models:</b> 20 to 270 V ac/dc @ < 10 mA, exclusive of load	
Supply Protection Circuitry	Protected against reverse polarity and transient over-voltages	
Output Configuration	Single Discrete Output, 100 mA load rating <b>N-MOSFET or P-MOSFET</b> , depending on model number Light Operate or Dark Operate, depending on model number	
Output Rating	<b>P-MOSFET models</b> 100 mA with short circuit protection <b>OFF-state leakage current:</b> < 400 µA <b>ON-state saturation voltage:</b> 2.75 V	<b>N-MOSFET models</b> 100 mA with short circuit protection <b>OFF-state leakage current:</b> < 400 µA <b>ON-state saturation voltage:</b> 2.5 V
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up. Latching short-circuit protection; reset by cycling power	
Delay at Power-up	100 milliseconds max. dc, 300 milliseconds max. ac; outputs do not conduct during this time	
Repeatability	1.5 milliseconds	
Output Response Time	<b>Opposed mode:</b> 16.6 milliseconds (1 cycle at 60 Hz)	<b>All other modes:</b> 8.3 milliseconds (½ cycle at 60 Hz)
Adjustments	<b>Diffuse, Retroreflective and Polarized Retroreflective models only:</b> 1-turn potentiometer Sensitivity (Gain) adjustment	
Indicators	<b>Green:</b> Power ON	<b>Yellow:</b> Light Sensed
Construction	<b>Housing:</b> ABS	<b>Lenses:</b> PMMA <b>Gain Adjuster:</b> Acetal
Environmental Rating	IEC IP67 (NEMA 6); 1200 PSI washdown NEMA ICS5, Annex F-2002 (PW12); UL Type 1	
Connections	2 m 3-conductor, 22 AWG PVC cable (300 V ac), or 150 mm pigtail PVC cable with 4-pin threaded Micro-style connector; <b>C1 suffix models:</b> 2 m 3-conductor, 22 AWG PVC cable (600 V ac)	
Operating Conditions	<b>Temperature:</b> <b>Less than 140 V ac/dc:</b> -25° to +70° C (N-MOSFET and P-MOSFET models) <b>140 V ac/dc or greater:</b> -25° to +55° C (N-MOSFET models only) <b>Max. Relative Humidity:</b> 95% @ 55° C (non-condensing)	
Certifications		

# QS30 Series

## High-Performance, Long-Range Sensors



- Right-angle, barrel- and side-mount sensors
- Specialized models for reliable detection of water or liquids containing water
- Specialized photoelectric sensors that have the ability to differentiate colors in low contrast applications
- Cordsets and brackets see page 62



**QS30**

**page 56**

Eight sensing modes for solving most applications: opposed, retroreflective, convergent, diffuse, plastic and glass fiber optic, and adjustable-field and fixed-field. High-performance sensing with visible, long-range Class 1 and 2 lasers with narrow effective beam for small object detection and precise position control.



**QS30 Water Detection**

**page 58**

The QS30 Water Sensors have an infrared wavelength that is tuned to the absorption band of water.



**QS30 Expert™**

**page 59**

Single push-button programming with five advanced sensing options for reliable detection of reflective objects.



**QS30 Adjustable-Field**      page 60

Background suppression models for detection of objects when the background condition is not fixed, and foreground suppression models for detection when background is fixed and object varies in color or shape.



**QS30 Universal Voltage**      page 61

Compact ac or dc powered sensor can be used in almost any mounting configuration, including 18 mm barrel, base or side mounting.



# QS30

## DC-Operated Long-Range Sensors



- The QS30 DC sensor is a specialized photoelectric sensor that has high performance and long range with a consistent voltage source.
- Ability to work reliably in low contrast applications
- Ability to detect liquid in translucent and opaque bottles
- Rated to IP67 for use in harsh environments
- Cordsets and brackets see page 62

### Opposed QS30

Infrared LED

Sensing Mode	Range	Connection	Output Type	Model
 OPPOSED	60 m	2 m	Bipolar NPN/PNP	QS30E Emitter*
		5-pin Euro QD		QS30EQ Emitter*
 HIGH-POWERED OPPOSED	213 m	2 m	Bipolar NPN/PNP	QS30EX Emitter
		5-pin Euro QD		QS30EXQ Emitter
		2 m	DO	QS30ARX
		5-pin Euro QD		QS30ARXQ
 HIGH-POWERED OPPOSED	213 m	2 m	DO	QS30RRX
		5-pin Euro QD		QS30RRXQ



### Case Entry Detection Using Polar Retroreflective Sensors

The QS30LP verifies that there is a box present to be picked up before being sent to the palletizer. Shrink wrap is placed around the boxes on the pallet before being shipped.

### Retro & Polar Retro QS30

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Model
 RETRO	12 m†	2 m	Bipolar NPN/PNP	QS30LV
		5-pin Euro QD		QS30LVQ
 POLAR RETRO	8 m†	2 m	Bipolar NPN/PNP	QS30LP
		5-pin Euro QD		QS30LPQ

For more specifications see page 63.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30R W/30).

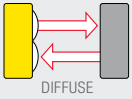
\* Standard emitters will only work with standard receivers.

† Retroreflective range is specified using one model BRT-84 retroreflector.



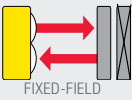
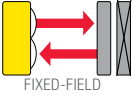
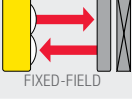
## Diffuse QS30

 Infrared LED

Sensing Mode	Range	Connection	Output Type	Model
 DIFFUSE	1 m	2 m	Bipolar NPN/PNP	QS30D
		5-pin Euro QD		QS30DQ

## Fixed-Field QS30

 Visible Red LED

Sensing Mode	Range	Connection	Output Type	Model
 FIXED-FIELD	200 mm Cutoff	2 m	Bipolar NPN/PNP	QS30FF200
		5-pin Euro QD		QS30FF200Q
 FIXED-FIELD	400 mm Cutoff	2 m	Bipolar NPN/PNP	QS30FF400
		5-pin Euro QD		QS30FF400Q
 FIXED-FIELD	600 mm Cutoff	2 m	Bipolar NPN/PNP	QS30FF600
		5-pin Euro QD		QS30FF600Q

For more specifications see page 63.

 Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30D W/30).

\* Super High-Power emitters will only work with Super High-Power receivers.

† Sensors can be used at ranges greater than listed for applications that require less excess gain. Please consult the factory for assistance on your long-range applications. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

# QS30 Water Detection

## DC-Operated Long-Range Sensors

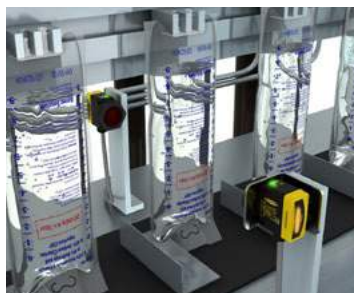


- Ability to work reliably in low contrast applications
- Ability to detect liquid in translucent and opaque bottles
- Cordsets and brackets see page 62

### Opposed Water Detection QS30

Infrared LED

Sensing Mode	Range	Connection	Output Type	Model
 OPPOSED WATER DETECTION	4 m†	2 m	—	QS30EXH2O Emitter*
		5-pin Euro Pigtail QD	—	QS30EXH2OQ5 Emitter*
		2 m	Bipolar NPN/PNP	QS30ARXH2O
		5-pin Euro Pigtail QD	LO	QS30ARXH2OQ5
		2 m	Bipolar NPN/PNP	QS30RRXH2O
		5-pin Euro Pigtail QD	DO	QS30RRXH2OQ5
 OPPOSED WATER DETECTION	2 m†	2 m	Bipolar NPN/PNP	QS30ARH2O
		5-pin Euro Pigtail QD	LO	QS30ARH2OQ5
		2 m	Bipolar NPN/PNP	QS30RRH2O
		5-pin Euro Pigtail QD	DO	QS30RRH2OQ5
 SUPER HIGH-POWER OPPOSED WATER DETECTION	8 m†	2 m	—	QS30EXSH2O Emitter*
		5-pin Euro Pigtail QD	—	QS30EXSH2OQ5 Emitter*
		2 m	Bipolar NPN/PNP	QS30ARXSH2O
		5-pin Euro Pigtail QD	LO	QS30ARXSH2OQ5
		2 m	Bipolar NPN/PNP	QS30RRXSH2O
5-pin Euro Pigtail QD	DO	QS30RRXSH2OQ5		



### Detection of Clear Liquids in Transparent Packaging

The QS30H2O effectively and accurately detects the presence or absence of water inside clear IV bags.

For more specifications see page 63.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30D W/30).

\* Super High-Power emitters will only work with Super High-Power receivers.

† Sensors can be used at ranges greater than listed for applications that require less excess gain. Please consult the factory for assistance on your long-range applications. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

# QS30 Expert™

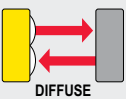
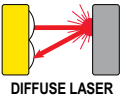
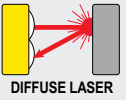
## DC-Operation with Push-Button Programming



- The QS30 Expert™ has high-performance sensing for challenging applications and is easy to align with an 8-segment LED bargraph.
- Available in laser retroreflective, diffuse, laser diffuse and retroreflective sensing modes
- Visible red LED or laser for easy alignment
- Models available for small object detection and precision control
- Cordsets and brackets see page 62

### Diffuse QS30 Expert™

➔ Visible Red LED    ✨ Visible Red Laser

Sensing Mode	Laser Class	Range	Connection	Model
 DIFFUSE	—	High-Speed: 1100 mm Normal: 1400 mm	2 m 5-pin Euro QD	QS30EDV QS30EDVQ
 DIFFUSE LASER	Class 1	400 mm	2 m 5-pin Euro QD	QS30LD QS30LDQ
 DIFFUSE LASER	Class 2	800 mm	2 m 5-pin Euro QD	QS30LDL QS30LDLQ



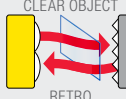
### TEACH Mode

Sensors can be configured via any of five TEACH or SET options (by push button or the remote wire) to define the sensing limits. Sensing limit configuration options include:

- **Static TEACH:** one switching threshold, determined by two taught conditions
- **Dynamic (on-the-fly) TEACH:** one switching threshold, determined by multiple sampled conditions
- **Light SET and Dark SET:** one switching threshold, offset from a single sensing condition (the “dark” condition or the “light” condition)
- **Window SET:** a sensing window, centered around a single sensing condition

### Laser Retro & Polar Retro QS30 Expert™

➔ Visible Red LED    ✨ Visible Red Laser

Sensing Mode	Laser Class	Range	Connection	Model
 LASER POLAR RETRO	Class 1	0.2-18 m†	2 m 5-pin Euro QD	QS30LLP QS30LLPQ
 LASER POLAR RETRO	Class 1 (low contrast)	0.2-18 m†	2 m 5-pin Euro QD	QS30LLPC QS30LLPCQ
 CLEAR OBJECT RETRO	—	100 mm to 2 m††	2 m 5-pin Euro QD	QS30ELVC QS30ELVCQ

For more specifications see page 64.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30EDV W/30).

# QS30 Adjustable-Field

## Background and Foreground Suppression



- Foreground suppression models for detection when background is fixed and the object varies in color or shape
- Background suppression models for detection of objects when the background condition is not fixed
- Fluorescent light and crosstalk avoidance for reliable sensing
- Long range for reliable sensing up to 600 mm
- Cordsets and brackets see page 62

### Adjustable-Field Foreground Suppression

- Foreground suppression models for reliable detection when a fixed background is present and the object color or shape varies
- Objects detected to the face of the sensor (no dead zone)
- Simple multiturn screw adjustment of the cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

### Adjustable-Field Background Suppression

- Background suppression models detect objects of various color, and ignores objects beyond their cutoff range
- Simple multiturn screw adjustment of the cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

### Foreground Suppression QS30

Sensing Mode	Range	Connection	Output Type	Model
	Adjustable between 50-400 mm	2 m	Bipolar NPN/PNP	QS30AFF400
		5-pin Euro QD		QS30AFF400Q

### Background Suppression QS30 Adjustable-Field

Sensing Mode	Range	Connection	Output Type	Model
	Adjustable between 50-300 mm	2 m	Bipolar NPN/PNP	QS30AF
		5-pin Euro QD		QS30AFQ
	Adjustable between 50-600 mm	2 m	Bipolar NPN/PNP	QS30AF600
		5-pin Euro QD		QS30AF600Q

For more specifications see page 65.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30AFF400 W/30).

# QS30 Universal Voltage

## Versatile Sensors Operate on AC or DC Voltage



- The QS30 Universal Sensor is a versatile, specialized sensor for use in many environments regardless of supply voltage
- Right-angle, barrel- and side-mount sensors
- Cordsets and brackets see page 62

### Opposed QS30, 12-250 V DC or 24-250 V AC

Infrared LED

Sensing Mode	Range	Connection	Output Type	Model
 OPPOSED	60 m	2 m	—	QS303E Emitter
		2 m	SPDT e/m Relay	QS30VR3R

### Polar Retro QS30, 12-250 V DC or 24-250 V AC

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Model
 POLAR RETRO	8 m <sup>†</sup>	2 m	SPDT e/m Relay	QS30VR3LP

### Fixed-Field QS30, 12-250 V DC or 24-250 V AC

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Model
 FIXED-FIELD	200 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF200
	400 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF400
	600 mm Cutoff	2 m	SPDT e/m Relay	QS30VR3FF600

For more specifications see page 64.

Connection options: A model with a QD requires a mating cordset (see page 62).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS303E W/30).

QD models: Available with modified specification, contact factory at 1-888-373-6767.

<sup>†</sup> Retroreflective range is specified using one model BRT-84 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



**Euro QD  
(for Q models)**  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-506RA**)



**5-Pin**  
**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')

Additional cordset information is available  
See page 758

**Reflectors**



Additional information is available  
See page 790

**Apertures**



Additional information is available  
See page 816



SMBQS30L



SMBQS30Y



SMBQS30YL



SMB30A

Additional bracket information is available  
See page 722



Opposed, Retroreflective, Diffuse,  
Fixed-Field and Expert Models  
Suffix E, R, LP, LV, D, AF, FF, LLP, LLPC,  
LVC, EDV, LD and LDL



Opposed High-Power Models  
Suffix EX and RX




Adjustable-Field, Fixed-Field and  
Universal Voltage Models  
Suffix AFF, FF, R, E, LP



## QS30 Specifications

Supply Voltage and Current	<b>Emitters (High-Power):</b> 10 to 30 V dc (10% max. ripple) at less than 70 mA <b>Receivers (High-Power):</b> 10 to 30 V dc (10% max. ripple) at less than 22 mA <b>Analog Receivers (water):</b> 15 to 30 V dc (10% max. ripple) at less than 65 mA <b>All others:</b> 10 to 30 V dc (10% max. ripple) at 40 mA, (exclusive of load)	<b>Emitters (Water):</b> 10 to 30 V dc (10% max. ripple) at less than 80 mA <b>Receivers (Water):</b> 10 to 30 V dc (10% max. ripple) at less than 65 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages	
Output Configuration	<b>Bipolar:</b> One PNP (current sourcing) and one NPN (current sinking); Light Operate (LO) or Dark Operate (DO) selectable or configurable (depending on model)	
Output Response Time	<b>Opposed:</b> 5 milliseconds ON/OFF <b>Opposed (High-Power):</b> 30 milliseconds ON/OFF <b>Opposed (Water):</b> 10 x excess gain or more– Standard: 1 millisecond ON/OFF <b>2x to 10x excess gain– Standard:</b> 3 milliseconds ON/OFF <b>All others:</b> 2 milliseconds ON/OFF	<b>Super High-Power:</b> 10 milliseconds ON/OFF <b>Super High-Power:</b> 30 milliseconds ON/OFF
Delay at Power-Up	100 milliseconds; outputs do not conduct during this time (except Opposed High-Powered and Water)	
Repeatability	<b>Opposed:</b> not applicable <b>Opposed (High-Power):</b> 5 milliseconds <b>Opposed (Water):</b> 10 x excess gain or more– Standard: 500 microseconds <b>2x to 10x excess gain– Standard:</b> 2.5 milliseconds <b>All others:</b> 500 microseconds	<b>Super High-Power:</b> 5 milliseconds <b>Super High-Power:</b> 25 milliseconds
Adjustments	<b>Opposed (High-Power and Water):</b> Light Operate/Dark Operate–dependent on model selected <b>Frequency via gray wire:</b> A: Gray (+) B: Gray (-) <b>Emitter only:</b> LED inhibit, via white wire White (-) turns emitter LED OFF (to allow verification of sensor operation) <b>Opposed, Retroreflective, and Polarized Retroreflective:</b> Selectable Light/Dark Operate is achieved via the gray wire <b>Light Operate:</b> Low (0 to 3 V)* <b>Dark Operate:</b> High (open or 5 to 30 V)* <b>Diffuse:</b> Selectable Light/Dark Operate is achieved via the gray wire <b>Light Operate:</b> High (open or 5 to 30 V)* <b>Dark Operate:</b> Low (0 to 3 V)* <b>Diffuse, Retroreflective, and Polarized Retroreflective (only):</b> Single-turn sensitivity (Gain) adjustment potentiometer  * Input impedance 10 kΩ See datasheet for more detailed information	
Indicators	<b>Opposed (High-Power):</b> 4-LED Signal Strength light bar <b>Green LED:</b> Power ON <b>Frequency indicator:</b> (A or B) <b>Receiver only: Yellow LED:</b> Output conducting  <b>All others (except emitters):</b> Large, oval LED indicator on sensor back <b>Yellow:</b> Output conducting Small indicator on back (adjustable-field only) <b>Blue/Red:</b> End of travel (EOT) LED 2 indicators on top <b>Green:</b> Power ON <b>Yellow:</b> Light sensed	
Construction	ABS plastic housing; acrylic lens cover <b>Opposed High-Power Lenses:</b> Impact resistant lens material	
Environmental Rating	<b>Opposed (High-Power): Cabled:</b> IP67; NEMA 6P <b>Opposed (High-Power) QD:</b> IP69K per DIN 40050-9 <b>Opposed (Water):</b> IEC IP67 (nema 6); PW12 1200 PSI washdown per NEMA PW12 <b>All others:</b> IP67; NEMA 6	
Connections	5-conductor 2 m or 9 m PVC cable, or 5-pin 150 mm pigtail or integral Euro-style quick-disconnect fitting, depending on model. QD cordsets are ordered separately. See page 62.	
Operating Conditions	<b>Opposed (Water), Opposed (High-Power):</b> -20° to +60° C <b>All others:</b> -20° to +70° C	<b>Relative humidity:</b> 90% (non-condensing) <b>Relative humidity:</b> 90% (non-condensing)
Certifications		


## QS30 Expert™ Specifications

Supply Voltage and Current	<b>Diffuse LED and Retroreflective LED:</b> 10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load <b>Diffuse Laser and Retroreflective Laser:</b> 10 to 30 V dc (10% max. ripple @ 10% duty cycle) @ 35 mA max current, exclusive of load
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages and false pulse on power-up
Sensing Beam	<b>LED models:</b> 660 nm visible Red <b>Laser models: Class 1:</b> 650 nm visible Red <b>Class 2:</b> 658 nm visible Red
Beam Size at Aperture	<b>Diffuse Laser:</b> Approx. 2 mm <b>Retroreflective Laser:</b> Approx. 3 mm
Output Configuration	<b>Bipolar:</b> One NPN (current sinking) and one PNP (current sourcing); Light Operate (LO) or Dark Operate (DO) configurable
Output Response Time	<b>Diffuse LED: High-speed mode:</b> 300 microseconds <b>Normal mode:</b> 1.8 milliseconds <b>Diffuse Laser, Retroreflective Laser and Retroreflective LED:</b> 500 microseconds
Delay at Power-up	<b>Diffuse LED and Retroreflective LED:</b> 250 milliseconds; outputs do not conduct during this time <b>Diffuse Laser and Retroreflective Laser:</b> 1 second max.; outputs do not conduct during this time
Repeatability	<b>Diffuse LED: High-speed mode:</b> 100 microseconds <b>Normal mode:</b> 150 microseconds <b>Retroreflective LED:</b> 150 microseconds <b>Diffuse Laser and Retroreflective Laser:</b> 70 microseconds
Adjustments	2 push buttons and remote wire for TEACH programming and configuration See datasheet for detailed information
Indicators	<b>2 LEDs: Green:</b> Power ON <b>Yellow:</b> Output conducting See datasheets for more detailed information
Construction	PC/ABS housing with acrylic lens cover
Environmental Rating	<b>Retroreflective LED:</b> IEC IP67 (NEMA 6); PW12 1200 PSI washdown <b>All others:</b> IP67; NEMA 6
Connections	5-conductor 2 m or 9 m attached PVC cable, or 5-pin Euro-style quick-disconnect fitting. QD cordset are ordered separately. See page 62.
Operating Conditions	<b>Diffuse LED and Retroreflective LED:</b> <b>Temperature:</b> -10° to +55° C <b>Relative humidity:</b> 95% @ 55° C (non-condensing) <b>Diffuse Laser and Retroreflective Laser:</b> <b>Temperature:</b> -10° to +50° C <b>Relative humidity:</b> 95% @ 50° C (non-condensing)
Application Note	<b>QS30ELVC models:</b> If supply voltage is > 24 V dc, derate maximum output current 1 mA/°C above 25°C
Certification	

## QS30 Universal Voltage Specifications

Supply Voltage	24 to 250 V ac, 50/60 Hz or 12 to 250 V dc (1.0 watt max.)
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPDT (Single-Pole Double-Throw) electromechanical relay output (all models except emitters)
Output Response Time	15 milliseconds ON/OFF
Delay at Power-Up	100 millisecond delay; output does not conduct during this time
Indicators	<b>2 LED indicators on sensor top:</b> <b>Green:</b> Power ON <b>Yellow:</b> Light sensed  <b>Large, oval LED indicator on sensor back (except emitters):</b> <b>Yellow:</b> Output conducting See datasheet for detailed information
Construction	ABS housing; acrylic lens cover
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m 5-wire PVC cable
Operating Conditions	<b>Temperature:</b> -20° to +70° C <b>Relative humidity:</b> 95% @ 50° C (non-condensing)
Certifications	 

## QS30 Adjustable-Field Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple); current consumption: <b>AF600 &amp; AFF400 models:</b> Less than 80 mA at 10 V dc, less than 40 mA at 30 V dc <b>AF models:</b> 45 mA max current
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Delay at Power-Up	<b>AF600 &amp; AFF400 models:</b> 200 milliseconds; outputs do not conduct during this time <b>AF models:</b> 250 milliseconds; outputs do not conduct during this time
Output Configuration	<b>Bipolar:</b> One PNP (current sourcing) and one NPN (current sinking)
Output Rating	<b>AF600 &amp; AFF400 models:</b> 100 mA total output current (derate 1 mA per °C above 30° C) <b>OFF-state leakage current:</b> less than 5 µA @ 30 V dc <b>ON-state saturation voltage:</b> <b>NPN:</b> less than 1.5 V @ 100 mA <b>PNP:</b> less than 2.0 V @ 100 mA <b>AF models:</b> 150 mA total output current (derate 1 mA per °C above 25° C) <b>OFF-state leakage current:</b> less than 50 µA @ 30 V dc <b>ON-state saturation voltage:</b> <b>NPN:</b> less than 200 mV @ 10 mA; less than 1 V @ 150 mA <b>PNP:</b> less than 1.25 V @ 10 mA; less than 2 V @ 150 mA
Output Protection	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	<b>AF600 &amp; AFF400 models:</b> 5 milliseconds ON/OFF <b>AF models:</b> 1 millisecond ON/OFF
Repeatability	<b>AF600 &amp; AFF400 models:</b> 750 microseconds <b>AF models:</b> 170 microseconds
Adjustments	<b>AF600 &amp; AFF400 models:</b> Four-turn adjustment screw sets cutoff distance between min. and max. positions, clutched at both ends of travel <b>AF models:</b> 2 push buttons and remote wire <ul style="list-style-type: none"> <li>• Easy push-button configuration</li> <li>• Manually adjust (+/-) cutoff (push buttons only)</li> <li>• N.O./N.C. and OFF-delay configuration options (push buttons only)</li> <li>• Push-button lockout (from remote wire only)</li> </ul> 2 push buttons or LO/DO adjustment
Indicators	<b>AF600 &amp; AFF400 models:</b> Large, oval LED indicator on sensor back <b>Yellow:</b> Output conducting Small indicator on back <b>Blue/Red:</b> End of travel (EOT) LED 2 indicators on top <b>Green:</b> Power ON <b>Yellow:</b> Light sensed <b>AF models:</b> <b>8-segment red bargraph:</b> Distance relative to cutoff point <b>Green LED:</b> Power ON <b>Yellow LED:</b> Output conducting
Construction	ABS plastic housing; acrylic lens cover
Environmental Rating	IEC IP67; NEMA 6
Connections	5-conductor 2 m or 9 m PVC cable, or 5-pin 150 mm pigtail or integral Euro-style quick-disconnect fitting, depending on model. QD cordsets are ordered separately. See page 62.
Operating Conditions	<b>AF600 &amp; AFF400 models:</b> -20° to +60° C; 95% relative humidity @ 50° C (non-condensing) <b>AF models:</b> -10° to +55° C; 90% relative humidity @ 55° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60 Hz max. double amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.
Certifications	

# Q12 Series

## Miniature Self-Contained Sensors



- The Q12 sensor is a small sensor with high performance for powerful sensing in confined spaces.
- Overmolded housing
- Short-range background suppression
- Cordsets and brackets see page 68

### Opposed Q12

Visible Red LED

Sensing Mode	Range	Connection	Output	Models LO*	Models DO*
 OPPOSED	2 m	2 m	–	Q126E Emitter	
		4-Pin Pico Pigtail QD	–	Q126EQ Emitter	
		3-Pin Pico Pigtail QD	–	Q126EQ3 Emitter	
 OPPOSED	2 m	2 m	Bipolar NPN/PNP	Q12AB6R	Q12RB6R
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6RQ	Q12RB6RQ
		3-Pin Pico Pigtail QD	PNP	Q12AP6RQ3	Q12RP6RQ3
		3-Pin Pico Pigtail QD	NPN	Q12AN6RQ3	Q12RN6RQ3

### Retro & Polar Retro Q12

Visible Red LED

Sensing Mode	Range	Connection	Output	Models LO*	Models DO*
 RETRO	1.5 m†	2 m	Bipolar NPN/PNP	Q12AB6LV	Q12RB6LV
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6LVQ	Q12RB6LVQ
		3-Pin Pico Pigtail QD	PNP	Q12AP6LVQ3	Q12RP6LVQ3
		3-Pin Pico Pigtail QD	NPN	Q12AN6LVQ3	Q12RN6LVQ3
 POLAR RETRO	1 m†	2 m	Bipolar NPN/PNP	Q12AB6LP	Q12RB6LP
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6LPQ	Q12RB6LPQ
		3-Pin Pico Pigtail QD	PNP	Q12AP6LPQ3	Q12RP6LPQ3
		3-Pin Pico Pigtail QD	NPN	Q12AN6LPQ3	Q12RN6LPQ3

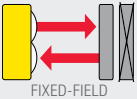
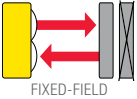
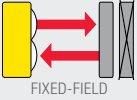
For more specifications see page 69.

Connection options:
<p><b>Bipolar Models Only:</b> For 9 m cable, add suffix W/30 to the 2 m model number (example, Q126E W/30).</p> <p><b>QD models:</b> A model with a QD requires a mating cordset (see page 68).</p> <p>For 4-pin 150 mm Euro-style QD, add suffix Q5 (example, Q126EQ5).</p> <p>* For black housing, add prefix D to the model number, for example, DQ12AB6R</p> <p>† Retroreflective range is specified using a BRT-60X40C retroreflector.</p> <p>Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.</p>



## Fixed-Field Q12

→ Visible Red LED

Sensing Mode	Range	Connection	Output	Models LO*	Models DO*
 FIXED-FIELD	15 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF15	Q12RB6FF15
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF15Q	Q12RB6FF15Q
		3-Pin Pico Pigtail QD	PNP	Q12AP6FF15Q3	Q12RP6FF15Q3
		3-Pin Pico Pigtail QD	NPN	Q12AN6FF15Q3	Q12RN6FF15Q3
 FIXED-FIELD	30 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF30	Q12RB6FF30
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF30Q	Q12RB6FF30Q
		3-Pin Pico Pigtail QD	PNP	Q12AP6FF30Q3	Q12RP6FF30Q3
		3-Pin Pico Pigtail QD	NPN	Q12AN6FF30Q3	Q12RN6FF30Q3
 FIXED-FIELD	50 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF50	Q12RB6FF50
		4-Pin Pico Pigtail QD	Bipolar NPN/PNP	Q12AB6FF50Q	Q12RB6FF50Q
		3-Pin Pico Pigtail QD	PNP	Q12AP6FF50Q3	Q12RP6FF50Q3
		3-Pin Pico Pigtail QD	NPN	Q12AN6FF50Q3	Q12RN6FF50Q3

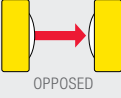
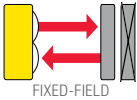
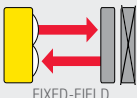
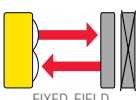


## Bottle Cap Detection Using Fixed-Field Sensors

As bottle caps pass below the fixed-field beam identifies bottle caps regardless of color and rejects bottles missing caps.

## PFA-Jacketed Q12

→ Visible Red LED

Sensing Mode	Range	Connection	Output	Models LO	Models DO
 OPPOSED	1.5 m	2 m	Bipolar NPN/PNP	Q12AB6RCR	Q12RB6RCR
 FIXED-FIELD	12 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF15CR	Q12RB6FF15CR
				Q12AP6FF15Q3	Q12RP6FF15Q3
 FIXED-FIELD	28 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF30CR	Q12RB6FF30CR
 FIXED-FIELD	48 mm Cutoff	2 m	Bipolar NPN/PNP	Q12AB6FF50CR	Q12RB6FF50CR

For more specifications see page 69.

 Connection options:

**Bipolar Models Only:** For 9 m cable, add suffix W/30 to the 2 m model number (example, Q12RB6FF15 W/30).

**QD models:** A model with a QD requires a mating cordset (see page 68).

For 4-pin 150 mm Euro-style QD, add suffix Q5 (example, Q12RB6FF15Q5).

\* For black housing, add prefix D to the model number, for example, DQ12AB6R

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

# PHOTOELECTRIC

# FEATURED

# RECTANGLE

# RIGHT ANGLE

# BARREL



**Euro QD (for Q5 models)**  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-406RA**)

**4-Pin**  
**MQDC-406**  
2 m (6')  
**MQDC-415**  
5 m (15')  
**MQDC-430**  
9 m (30')

**Pico QD (for Q and Q3 models)**  
Straight connector models listed; for right-angle, **W** replaces **G** in the model number. (example, **PKW4M-2**)



<b>3-Pin</b>	<b>4-Pin</b>
<b>PKG3M-2</b> 2 m (6.5')	<b>PKG4M-2</b> 2 m (6.5')
<b>PKG3M-5</b> 5 m (15')	<b>PKG4M-5</b> 5 m (15')
<b>PKG3M-7</b> 7 m (23')	-
<b>PKG3M-9</b> 9 m (30')	<b>PKG4M-9</b> 9 m (30')
<b>PKG3M-10</b> 10 m (32')	-

Additional cordset information is available  
See page 758



SMBQ12T



SMBQ12A

Additional bracket information is available  
See page 722

## Reflectors



Additional information is available  
See page 790

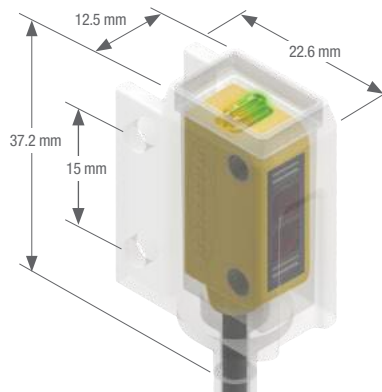
## Apertures



Additional information is available  
See page 816




Opposed, Retroreflective and Fixed-Field Models  
Suffix E, R, LV and FF



Chemical-Resistant Models  
Suffix CR

## Q12 Specifications

Sensing Beam	640 nm visible red
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) @ 20 mA max. current
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>Bipolar:</b> 1 NPN (current sinking) and 1 PNP (current sourcing); Light Operate (LO) or Dark Operate (DO), depending on model <b>Single-output:</b> 1 NPN or 1 PNP; Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	50 mA total across both outputs with overload and short circuit protection <b>OFF-state leakage current:</b> <b>ON-state saturation voltage:</b> NPN: 200 $\mu$ A                      NPN: 1.25 V @ 50 mA PNP: 10 $\mu$ A                         PNP: 1.45 V @ 50 mA
Output Protection Circuitry	Protected against false pulse on power-up; short-circuit protected
Output Response Time	<b>Opposed:</b> 1.3 milliseconds ON; 900 microseconds OFF <b>All others:</b> 700 microseconds ON/OFF
Delay at Power-up	120 milliseconds; outputs do not conduct during this time
Repeatability	175 microseconds
Switching Frequency	<b>Opposed models:</b> 385 Hz <b>All other models:</b> 715 Hz
Indicators	<b>2 LED indicators (Emitters-Green only):</b> Green — Power ON Yellow — Light sensed
Construction	<b>Polarized Retroreflective:</b> Thermoplastic elastomer housing with glass lens <b>Standard:</b> Thermoplastic elastomer housing with polycarbonate lens <b>Chemical-resistant:</b> Housing encased in PFA jacket; cable encased in 3/16" O.D. PFA tubing
Environmental Rating	<b>Standard:</b> IEC IP67 <b>Chemical-resistant:</b> IEC IP67 (NEMA 6) and PW12 1200 psi washdown per NEMA ICS 5, Annex F-2002
Connections	<b>Bipolar:</b> 2 m or 9 m attached PVC cable, or 150 mm pigtail with 4-pin Pico-style ( <b>Q</b> ) or 4-pin Euro-style ( <b>Q5</b> ) quick-disconnect fitting. QD cordsets are ordered separately. See page 68. <b>Single output:</b> 150 mm pigtail with 3-pin Pico-style ( <b>Q3</b> ) quick-disconnect fitting. QD cordsets are ordered separately. See page 68. <b>Chemical-resistant:</b> 2 m attached cable encased in 3/16" O.D. PFA tubing
Operating Conditions	<b>Temperature:</b> -20° to +55° C <b>Storage temperature:</b> -30° to +75° C <b>Relative humidity:</b> 95% max. @ 50° C (non-condensing)
Certifications	

# Q20 Series

## Industry Standard Global Housing



- The Q20 is a versatile sensor with a universal rectangular housing and multiple mounting options, making it ideal for global manufacturing
- Rated to 1200 psi for use in washdown environments
- Enhanced design for noise immunity and crosstalk avoidance
- Visible red beam for easy alignment on most models
- Cordsets and brackets see page 68

### Opposed Q20

⇨ Infrared LED    → Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 OPPOSED	12 m	2 m	Q20E Emitter	
		4-pin Euro Pigtail QD	Q20EQ5 Emitter	
 OPPOSED	20 m	2 m	Q20NR	Q20PR
		4-pin Euro Pigtail QD	Q20NRQ5	Q20PRQ5
 OPPOSED	20 m	2 m	Q20EL Emitter	
		4-pin Euro Pigtail QD	Q20ELQ5 Emitter	
 OPPOSED	20 m	2 m	Q20NRL	Q20PRL
		4-pin Euro Pigtail QD	Q20NRLQ5	Q20PRLQ5



### Unfinished Can Detection Using Polar Retro Sensors

When the unfinished cans pass between the sensor and the retroreflector, the light reflected off the cans has a different polarization than the light returned by the retroreflector. As a result, the beam will be blocked by the cans and the output will be triggered.

### Retro & Polar Retro Q20

→ Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
 RETRO	6 m <sup>†</sup>	2 m	Q20NLV	Q20PLV
		4-pin Euro Pigtail QD	Q20NLVQ5	Q20PLVQ5
 POLAR RETRO	4 m <sup>†</sup>	2 m	Q20NLP	Q20PLP
		4-pin Euro Pigtail QD	Q20NLPQ5	Q20PLPQ5

For more specifications see page 73.

Connection options: A model with a QD requires a mating cordset (see page 72).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q20E W/30).


QD models:

- For a 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, Q20NDQ).
- For a 4-pin integral Pico-style QD, add suffix Q7 (example, Q20EQ7).

\* Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.

<sup>†</sup> Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

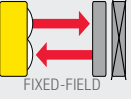
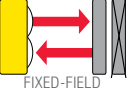
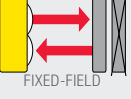
## Diffuse Q20

 Infrared LED
  Visible Red LED


Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	250 mm	2 m 4-pin Euro Pigtail QD	Q20ND Q20NDQ5	Q20PD Q20PDQ5
	800 mm	2 m 4-pin Euro Pigtail QD	Q20NDL Q20NDLQ5	Q20PDL Q20PDLQ5
	1500 mm	2 m 4-pin Euro Pigtail QD	Q20NDXL Q20NDXLQ5	Q20PDXL Q20PDXLQ5

## Fixed-Field Q20

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN*	Models PNP*
	0-50 mm Cutoff	2 m 4-pin Euro Pigtail QD	Q20NFF50 Q20NFF50Q5	Q20PFF50 Q20PFF50Q5
	0-100 mm Cutoff	2 m 4-pin Euro Pigtail QD	Q20NFF100 Q20NFF100Q5	Q20PFF100 Q20PFF100Q5
	0-150 mm Cutoff	2 m 4-pin Euro Pigtail QD	Q20NFF150 Q20NFF150Q5	Q20PFF150 Q20PFF150Q5

For more specifications see page 73.

 <p>Connection options: A model with a QD requires a mating cordset (see page 72).</p> <p>For 9 m cable, add suffix W/30 to the 2 m model number (example, Q20ND W/30).</p> <p>QD models:</p> <ul style="list-style-type: none"> <li>• For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, Q20NDQ5).</li> <li>• For a 4-pin 150 mm Pico-style pigtail QD, add suffix Q (example, Q20NDQ).</li> <li>• For a 4-pin integral Pico-style QD, add suffix Q7 (example, Q20NDQ7).</li> </ul> <p>* Available with health or alarm mode output; contact factory at 1-888-373-6767 for details.</p>
---



**PHOTOELECTRIC**

**FEATURED**

**RECTANGLE**

**RIGHT ANGLE**

**BARREL**



4-Pin

**Euro QD (for Q5 models)**  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-406RA**)

**MQDC-406**  
2 m (6')  
**MQDC-415**  
5 m (15')  
**MQDC-430**  
9 m (30')



4-Pin

**Pico QD (for Q models)**  
Straight connector models listed; for right-angle, **W** replaces **G** in the model number. (example, **PKG4M-2**)

**PKG4M-2**  
2 m (6')  
**PKG4M-5**  
5 m (15')  
**PKG4M-9**  
9 m (30')



4-Pin

**Pico QD (for Q7 models)**  
Straight snap-on connector model

**Pico QD (for Q7 models)**  
Right-angle snap-on connector model

**PKG4-2**  
2 m (6')  
**PKW4Z-2**  
2 m (6')

Additional cordset information is available  
See page 758



**SMBQ20H**    **SMBQ20LV**    **SMBQ20L**    **SMBQ20U**

Additional bracket information is available  
See page 722

**Reflectors**



Additional information is available  
See page 790

**Apertures**




Additional information is available  
See page 816



Opposed, Retroreflective, Fixed-Field and Diffuse Models  
Suffix E, EL, R, RL, LP, LV, D, DL, DXL and FF








## Q20 Specifications

Supply Voltage and Current	<b>Fixed-field:</b> 10 to 30 V dc (10% maximum ripple) at less than 25 mA, exclusive of load <b>All others:</b> 10 to 30 V dc (10% maximum ripple) at less than 18 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; PNP (sourcing) or NPN (sinking), depending on model
Output Rating	100 mA with short circuit protection <b>OFF-state leakage current:</b> <b>NPN:</b> less than 200 µA sinking <b>PNP:</b> less than 10 µA sourcing <b>ON-state saturation voltage:</b> <b>NPN:</b> less than 1.6 V @ 100 mA <b>PNP:</b> less than 3.0 V @ 100 mA
Output Response Time	<b>Opposed:</b> 1 ms ON/600 ms OFF <b>Fixed-field:</b> 3 ms ON/1.5 ms OFF <b>All others:</b> 800 ms ON/OFF
Delay at Power-up	100 milliseconds; outputs do not conduct during this time
Repeatability	<b>Opposed:</b> 140 microseconds <b>Fixed-field:</b> 182 microseconds <b>All others:</b> 155 microseconds
Adjustments	<b>Diffuse, Retroreflective and Polarized Retroreflective:</b> single-turn sensitivity (Gain) adjustment potentiometer
Indicators	<b>Emitters:</b> Green power ON only <b>All others: Two LED Indicators: Green:</b> Power ON <b>Yellow:</b> Black (LO) wire conducting
Construction	<b>Housing:</b> ABS <b>Lenses:</b> PMMA <b>Gain Adjuster(retro and diffuse models only):</b> PBT
Connections	2 m or 9 m 4-wire PVC cable, 4-pin 150 mm pigtail Pico-style QD ( <b>Q</b> ), or 4-pin 150 mm pigtail Euro-style QD ( <b>Q5</b> ), or 4-pin integral Pico-style QD ( <b>Q7</b> ), depending on model. QD cordsets are ordered separately. See page 72.
Operating Conditions	<b>Temperature:</b> -20° to +60° C <b>Relative humidity:</b> 95% @ 50° C (non-condensing)
Environmental Rating	IEC IP67; NEMA 6
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2: 30G 11 ms duration, half sine wave
Application Note	1. Opposed mode sensor spacing can be reduced by alternating emitters and receivers or by applying crosstalk filters (visible red models only). 2. NPN OFF-state leakage current is < 200 µA for load resistances > 3 kΩ or optically isolated loads. For load currents of 100 mA, leakage is < 1% of load current.
Certification	



## Rectangle

Rectangular sensors have a large rugged housing. The rectangle housing style offers side and barrel mounting options.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>MINI-BEAM®</b> Comprehensive sensor line with a series of LED colors, gain pots/TEACH modes and ac/dc models. Page 76	<b>Opposed:</b> 30 m <b>Clear Plastic:</b> 300 mm <b>Retro:</b> 5 m <b>Retro Polarized:</b> 3 m <b>Convergent:</b> 43 mm <b>Diffuse:</b> 380 mm <b>Glass/Plastic Fiber:</b> Varies	Varies by model	IP67	Thermoplastic Polyester	10 to 30 V dc 24 to 240 V ac 5 to 15 V dc
	<b>Q25</b> Completely epoxy-encapsulated for use in harsh sensing environments, including food and beverage applications. Page 78	<b>Opposed:</b> 20 m <b>Retro Polarized:</b> 2 m <b>Fixed-Field:</b> 100 mm	50.2 x 25 x 30 mm	IP67 NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 240 V ac
	<b>Q40</b> Completely epoxy-encapsulated long-range sensor available in ac or dc supply voltages. Page 80	<b>Opposed:</b> 60 m <b>Retro Polarized:</b> 6 m <b>Fixed-Field:</b> 600 mm	69.8 x 41 x 46 mm	<b>QD models:</b> IP69K  <b>Other models:</b> IP67 NEMA 6P	Thermoplastic Polyester	10 to 30 V dc 20 to 245 V ac
	<b>Q45</b> Advanced one-piece, rugged sensor with outstanding optical performance. page 84	<b>Opposed:</b> 60 m <b>Retro:</b> 9 m <b>Polarized Retro:</b> 6 m <b>Laser Polarized Retro:</b> 40 m <b>Diffuse:</b> 3 m <b>Convergent:</b> 100 m	87.6 x 44.5 x 54.1 mm	IP67 NEMA 6P	Thermoplastic Polyester	10 to 30 V dc 90 to 250 V ac 24 to 250 V ac 12 to 250 V dc
	<b>Q60</b> Laser or LED sensor for low reflectivity targets, regardless of background. page 88	<b>Adjustable-Field:</b> 2 m <b>Laser Adjustable-Field:</b> 2 m	75 x 25 x 60 mm	IP67 NEMA 6	ABS	10 to 30 V dc 12 to 250 V dc 24 to 250 V ac
	<b>PicoDot®</b> The PicoDot® is a convergent-mode laser sensor with extreme precision. Page 92	<b>Laser Polarized Retro:</b> 10.6 m <b>Laser Convergent:</b> 305 mm	<b>PD45:</b> 40.6 x 45.6 x 12.7 mm  <b>PD49:</b> 42.7 x 49.1 x 15.2 mm	<b>PD45:</b> IP54 <b>PD49:</b> IP67	ABS	10 to 30 V dc
	<b>QM42 &amp; QMT42</b> Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles. Page 94	<b>QM42</b> <b>Opposed:</b> 10 m <b>Retro Polarized:</b> 3 m <b>Diffuse:</b> 400 mm <b>Adjustable-Field:</b> 150 mm <b>Plastic Fiber:</b> Varies  <b>QMT42</b> <b>Diffuse:</b> 6 m <b>Fixed-Field:</b> 2 m <b>Adjustable-Field:</b> 400 mm	<b>QM42:</b> 42 x 12.7 x 42 mm  <b>QMT42:</b> 58 x 18 x 42 mm	IP67 NEMA 6	Die-cast Zinc Alloy	10 to 30 V dc

# MINI-BEAM® Series

## Complete Line of Industry Standard Sensors



- AC, DC or universal models available
- Infrared or visible red, green, blue or white sensing beam
- Industry standard mounting holes
- Easy push-button TEACH-mode setup available



### Euro-Style

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

### 4-Pin

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

### 5-Pin

**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')



### Micro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-306RA**)

### 3-Pin

**MQDC-306**  
2 m (6.5')  
**MQDC-315**  
5 m (15')  
**MQDC-330**  
9 m (30')



### NAMUR Euro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQD9-406RA**)

### 4-Pin

**MQD9-406**  
2 m (6.5')  
**MQD9-415**  
5 m (15')

Additional cordset information is available  
See page 758



SMB18A



SMB18FA..



SMB18SF



SMB312B



SMB3018SC

Additional bracket information is available  
See page 722

### Reflectors



### Apertures



Additional information is available  
See page 790

Additional information is available  
See page 816



## MINI-BEAM® Specifications

Visit [Bannerengineering.com](http://Bannerengineering.com) for more information on this and other products



**MINI-BEAM DC**  
Opposed, Retroreflective,  
Diffuse and Convergent Models  
Suffix E, R, EPD, RPD, D, LV, LP, C, C2,  
CV, CV2, CVB, CV2B, CVG and CV2G



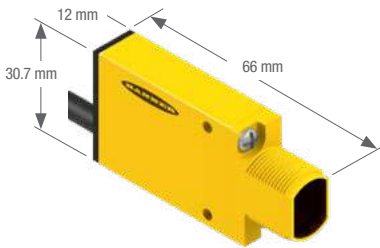
**MINI-BEAM DC**  
Diffuse Models  
Suffix DBZ and W



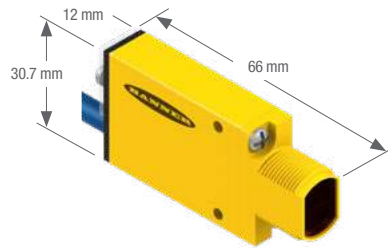
**MINI-BEAM DC**  
Glass Fiber Models  
Suffix F, FV, FVG and FVB



**MINI-BEAM DC**  
Plastic Fiber Models  
Suffix FP, FPG and FPB



**MINI-BEAM AC & Expert**  
Opposed, Retroreflective,  
Diffuse and Convergent Models  
Suffix E, R, EPD, RPD, D, DV, LV, LP, C,  
CV, CV2, CVG, CVB and CWW



**MINI-BEAM NAMUR**  
Retroreflective, Diffuse, Opposed and  
Convergent Models  
Suffix E, R, LV, D and CV



**MINI-BEAM AC, Expert & NAMUR**  
Diffuse Models  
Suffix DBZ and W



**MINI-BEAM AC, Expert & NAMUR**  
Glass Fiber Models  
Suffix F and FV



**MINI-BEAM AC, Expert & NAMUR**  
Plastic Fiber Models  
Suffix FP

# Q25 Series

## Right-Angle Base-Mount Rectangular Sensors



- Completely epoxy-encapsulated for use in harsh sensing environments
- Available in opposed, retroreflective and fixed-field modes
- Available in 10-30 V dc or 20-250 V ac
- Wide operating range from -40° to +70° C
- Models rated to IP67 and IP69K to withstand harsh washdown environments



**Euro-Style**  
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')



**Micro-Style**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDC-306RA**)

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

*Additional cordset information is available  
See page 758*



SMB18A



SMB18FA..




SMB18SF

*Additional bracket information is available  
See page 722*




Q25 Opposed, Retroreflective and  
Fixed-Field Models  
Suffix E, R, LP, and FF

## Q25 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflective:</b> 30 mA <b>Fixed-Field:</b> 35 mA
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
Output Response Time	<b>Opposed:</b> 3 milliseconds ON, 1.5 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs do not conduct during this time
Repeatability	<b>Opposed:</b> 375 microseconds <b>Polarized Retroreflective and Fixed-Field:</b> 750 microseconds Repeatability and response are independent of signal strength
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Green:</b> Power ON <b>Green Flashing:</b> output overload <b>Yellow:</b> Light Operate (LO) output energized <b>Yellow Flashing:</b> marginal gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	 ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

## Q25 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz) <b>Average current:</b> 20 mA <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Output Configuration	Solid-state ac switch; three-wire hookup; Choose Light Operate (LO) or Dark Operate (DO), depending on model <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) Fixed-Field: derate 5 mA/° C above +50° C <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive <b>OFF-state leakage current:</b> less than 100 $\mu$ A <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac
Output Response Time	<b>Opposed:</b> 16 milliseconds ON, 8 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	<b>Opposed:</b> 2 milliseconds; Polarized Retroreflective and Fixed-Field: 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Solid Green:</b> Power ON <b>Solid Yellow:</b> Light sensed <b>Yellow Flashing:</b> marginal gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	

# Q40 Series

## Long-Range Sensors



- Reliable sensing without adjustments
- Completely epoxy-encapsulated for superior durability
- Long-range sensing in harsh environments
- Available in 10-30 V dc or 20-250 V ac
- Available in opposed, retroreflective and fixed-field modes
- Cordsets and brackets see page 82

### Opposed Q40, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	60 m	2 m 4-Pin Euro QD	Q406E Emitter Q406EQ Emitter	
	60 m	2 m 4-Pin Euro QD	Q40SN6R Q40SN6RQ	Q40SP6R Q40SP6RQ

### Polar Retro Q40, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 POLAR RETRO	6 m†	2 m	Q40SN6LP	Q40SP6LP
	6 m	4-Pin Euro QD	Q40SN6LPQ	Q40SP6LPQ

### Fixed-Field Q40, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	0 - 200 mm Cutoff	2 m 4-Pin Euro QD	Q40SN6FF200 Q40SN6FF200Q	Q40SP6FF200 Q40SP6FF200Q
	0 - 400 mm Cutoff	2 m 4-Pin Euro QD	Q40SN6FF400 Q40SN6FF400Q	Q40SP6FF400 Q40SP6FF400Q
	0 - 600 mm Cutoff	2 m 4-Pin Euro QD	Q40SN6FF600 Q40SN6FF600Q	Q40SP6FF600 Q40SP6FF600Q

For more specifications see page 82.

Connection options: A model with a QD requires a mating cordset (see page 82).

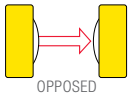
For 9 m cable, add suffix W/30 to the 2 m model number (example, Q40SN6R W/30).

† Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.


## Opposed Q40, 20-250 V AC

 Infrared LED

Sensing Mode	Range	Connection	Models LO	Models DO
	60 m	2 m	Q403E Emitter	
		4-Pin Micro QD	Q403EQ1 Emitter	
	60 m	2 m	Q40AW3R	Q40RW3R
		4-Pin Micro QD	Q40AW3RQ1	Q40RW3RQ1

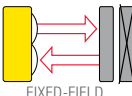
## Polar Retro Q40, 20-250 V AC

 Visible Red LED

Sensing Mode	Range	Connection	Models LO	Models DO
	6 m <sup>†</sup>	2 m	Q40AW3LP	Q40RW3LP
		4-Pin Micro QD	Q40AW3LPQ1	Q40RW3LPQ1

## Fixed-Field Q40, 20-250 V AC

 Infrared LED

Sensing Mode	Range	Connection	Models LO	Models DO
	0 - 200 mm	2 m	Q40AW3FF200	Q40RW3FF200
	Cutoff	4-Pin Micro QD	Q40AW3FF200Q1	Q40RW3FF200Q1
	0 - 400 mm	2 m	Q40AW3FF400	Q40RW3FF400
	Cutoff	4-Pin Micro QD	Q40AW3FF400Q1	Q40RW3FF400Q1
	0 - 600 mm	2 m	Q40AW3FF600	Q40RW3FF600
	Cutoff	4-Pin Micro QD	Q40AW3FF600Q1	Q40RW3FF600Q1

For more specifications see page 82.

 Connection options: A model with a QD requires a mating cordset (see page 82).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q40SN6R W/30).

<sup>†</sup> Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



## PHOTOELECTRIC

## FEATURED

## RECTANGLE

## RIGHT ANGLE

## BARREL



## 4-Pin

## Euro-Style

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')

## Micro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-306RA**)



## 4-Pin

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

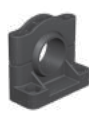
Additional cordset information is available  
See page 758



SMB30A



SMB30FA..



SMB30SC



SMBAMS30P

Additional bracket information is available  
See page 722



Opposed,  
Polarized Retroreflective  
and Fixed-Field Models  
Suffix E, R, LP and FF

## Reflectors






## Apertures






Additional information is available  
See page 790

Additional information is available  
See page 816

## Q40 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflective:</b> 30 mA <b>Fixed-Field:</b> 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	<b>Opposed:</b> 3 milliseconds ON; 1.5 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	<b>Opposed:</b> 375 microseconds <b>Polarized Retroreflective and Fixed-Field:</b> 750 microseconds Repeatability and response are independent of signal strength
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Solid Green:</b> Power ON <b>Solid Yellow:</b> Light Operate (LO) output energized See datasheet for detailed information <b>Flashing Green:</b> Output over loaded <b>Flashing Yellow:</b> Marginal excess gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 82.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	   ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

## Q40 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz) <b>Average current:</b> 20 mA <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) <b>Fixed-Field:</b> derate 5 mA/° C above +50° C <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive <b>OFF-state leakage current:</b> less than 100 µA <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	<b>Opposed:</b> 16 milliseconds ON; 8 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	<b>Opposed:</b> 2 milliseconds <b>Polarized Retroreflective and Fixed-Field:</b> 4 milliseconds Repeatability and response are independent of signal strength
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Solid Green:</b> Power ON <b>Solid Yellow:</b> Light sensed <b>Flashing Yellow:</b> marginal excess gain See datasheet for detailed information
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 82.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	   ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

# Q45 Series

## Adjustable Output Timing Logic



- The Q45 Standard sensor is available in multiple sensing modes to suit many application needs.
- Opposed, retroreflective, diffuse, convergent, laser and glass and plastic fiber optic modes
- Electromechanical or solid-state options
- Rugged design rated to IP67 to withstand 1200 psi washdown



### Euro-Style

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

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

**5-Pin**  
**MQDC1-506**  
 2 m (6.5')  
**MQDC1-515**  
 5 m (15')  
**MQDC1-530**  
 9 m (30')



### Micro-Style

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

**4-Pin**  
**MQAC-406**  
 2 m (6.5')  
**MQAC-415**  
 5 m (15')  
**MQAC-430**  
 9 m (30')



### Mini-Style

Straight connector models only

**3-Pin**  
**MBCC-306**  
 2 m (6.5')  
**MBCC-315**  
 5 m (15')  
**MBCC-330**  
 9 m (30')

**4-Pin**  
**MBCC-406**  
 2 m (6.5')  
**MBCC-415**  
 5 m (15')  
**MBCC-430**  
 9 m (30')

**5-Pin**  
**MBCC-506**  
 2 m (6.5')  
**MBCC-515**  
 5 m (15')  
**MBCC-530**  
 9 m (30')



### NAMUR

#### Euro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQD9-406RA**)

**4-Pin**  
**MQD9-406**  
 2 m (6.5')  
**MQD9-415**  
 5 m (15')

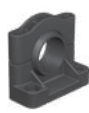
Additional cordset information is available  
 See page 758



SMB30A



SMB30FA..



SMB30SC

Additional bracket information is available  
 See page 722

### Reflectors



Additional information is available  
 See page 790

### Apertures



Additional information is available  
 See page 816

### Q45 Specifications

Visit [Bannerengineering.com](http://Bannerengineering.com) for more information on this and other products



Opposed, Retroreflective and Diffuse Models  
Suffix E, R, D, DL, DX, LV and LP



Convergent Models  
Suffix CV and CV4



Retroreflective Laser Models  
Suffix LL and LLP

### OTHER AVAILABLE MODELS



Wireless Q45 page 512



Plastic Fiber Q45 see website



Glass Fiber Q45 see website

# Q45 Wireless

## Self-Contained Wireless Solution



- Improve efficiency by monitoring and coordinating multiple machines and processes without pulling cables
- 1 km line-of-sight
- Built-in antenna
- 2.4 GHz unlicensed frequency
- Used exclusively with Banner's DX80 Gateway (see page 512)

### Retroflective Q45 Wireless

Visible Red LED

Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
 POLAR RETRO	6 m	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45LP

### Diffuse Q45 Wireless

Visible Red LED

Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
 DIFFUSE	300 mm	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45D

### Convergent Q45 Wireless

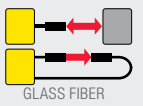
Visible Red LED

Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
 CONVERGENT	38 mm	1,000 m (with line of sight)	Discrete output via Gateway	DX80N2Q45CV



## Fiber Optic Q45 Wireless

 Visible Red LED

Sensing Mode	Sensing Range	Wireless Communication Range	Output	Models
 GLASS FIBER	varies by selected fiber	1,000 m (with line of sight)	Discrete output via gateway	DX80N2Q45F

## Q45 Wireless Specifications

Visit [Bannerengineering.com](http://Bannerengineering.com) for more information on this and other products



Opposed, Retroreflective  
and Diffuse Models  
Suffix E, R, D, DL, DX, LV and LP

## OTHER AVAILABLE MODELS



Q45 page 84



Plastic Fiber Q45 see website



Glass Fiber Q45 see website

# Q60 Series

## Long-Range, Adjustable-Field Sensors



- Detects objects with a defined sensing field, ignoring objects located beyond the sensing point
- Output timing ON/OFF
- Available in 10-30 V dc, 12-250 V dc or 24-250 V ac
- Features two-turn, logarithmic adjustment of sensing field cutoff point from 0.2 to 2 m
- Easy push-button or remote programming of output timing
- Cordsets and brackets see page 90

### Adjustable-Field Q60, 10-30 V DC

Infrared LED

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models
 ADJUSTABLE-FIELD	<b>Min.:</b> 65 - 130 mm <sup>†</sup> <b>Cutoff:</b> 200 - 1000 mm	2 m	Bipolar NPN/PNP	Q60BB6AFV1000
		5-Pin Euro QD		Q60BB6AFV1000Q
 ADJUSTABLE-FIELD	<b>Min.:</b> 50 - 125 mm <sup>†</sup> <b>Cutoff:</b> 200 - 2000 mm	2 m	Bipolar NPN/PNP	Q60BB6AF2000
		5-Pin Euro QD		Q60BB6AF2000Q

### Laser Adjustable-Field Q60, 10-30 V DC

Visible Red Laser

Sensing Mode	Range	Connection	Output Type	Models
 CLASS 1 LASER LASER ADJUSTABLE-FIELD	<b>Min.:</b> 100 - 260 mm <sup>†</sup> <b>Cutoff:</b> 200 - 1400 mm	2 m	Bipolar NPN/PNP	Q60BB6LAF1400
		5-Pin Euro QD		Q60BB6LAF1400Q
 CLASS 2 LASER LASER ADJUSTABLE-FIELD	<b>Min.:</b> 75 - 240 mm <sup>†</sup> <b>Cutoff:</b> 200 - 2000 mm	2 m	Bipolar NPN/PNP	Q60BB6LAF2000
		5-Pin Euro QD		Q60BB6LAF2000Q

For more specifications see page 91.

Connection options: A model with a QD requires a mating cordset (see page 90).

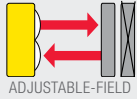
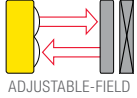
For 9 m cable, add suffix W/30 to the 2 m model number (example, Q60BB6AF2000 W/30).

<sup>†</sup> Minimum range varies by established cutoff point (see excess gain curves, page 142 and cutoff point deviation curves, page 143).

## Adjustable-Field Q60, 12-250 V DC or 24-250 V AC

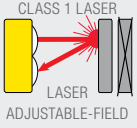
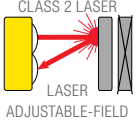
⇒ Infrared LED

→ Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models
 ADJUSTABLE-FIELD	<b>Min.:</b> 65 - 130 mm <sup>†</sup> <b>Cutoff:</b> 200 - 1000 mm	2 m	SPDT e/m Relay	Q60VR3AFV1000
		4-Pin Micro QD	SPDT e/m Relay	Q60VR3AFV1000Q1
 ADJUSTABLE-FIELD	<b>Min.:</b> 50 - 125 mm <sup>†</sup> <b>Cutoff:</b> 200 - 2000 mm	2 m	SPDT e/m Relay	Q60VR3AF2000
		4-Pin Micro QD	SPDT e/m Relay	Q60VR3AF2000Q1

## Laser Adjustable-Field Q60, 12-250 V DC or 24-250 V AC

→ Visible Red Laser

Sensing Mode	Range	Connection	Output Type	Models
 ADJUSTABLE-FIELD	<b>Min.:</b> 100 - 260 mm <sup>†</sup> <b>Cutoff:</b> 200 - 1400 mm	2 m	SPDT e/m Relay	Q60VR3LAF1400
		4-Pin Micro QD	SPDT e/m Relay	Q60VR3LAF1400Q1
 ADJUSTABLE-FIELD	<b>Min.:</b> 75 - 240 mm <sup>†</sup> <b>Cutoff:</b> 200 - 2000 mm	2 m	SPDT e/m Relay	Q60VR3LAF2000
		4-Pin Micro QD	SPDT e/m Relay	Q60VR3LAF2000Q1

For more specifications see page 91.

 Connection options: A model with a QD requires a mating cordset (see page 90).

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q60VR3AFV1000 W/30).

† Minimum range varies by established cutoff point (see excess gain curves, page 142 and cutoff point deviation curves, page 143).

**5-Pin**

**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')

**Euro-Style**

Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDC1-506RA**)

**4-Pin**

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

**Micro-Style**

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

Additional cordset information is available  
See page page 758



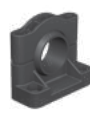
Adjustable-Field Models  
Suffix AF, AFV and LAF



SMBAMSQ60IP



SMBAMSQ60P



SMBQ60

Additional bracket information is available  
See page page 722

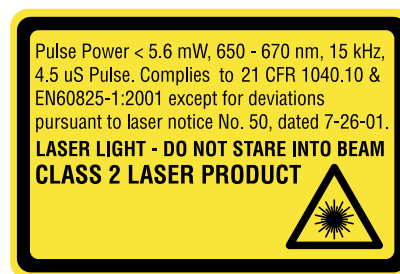


### Class 1 Lasers

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

#### For safe laser use:

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- Locate open laser beam paths either above or below eye level, where practical





### Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

#### For safe laser use:

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- Locate open laser beam paths either above or below eye level, where practical

## Q60 Specifications

Supply Voltage and Current	Q60BB6AF and Q60BB6AFV models: 10 to 30 V dc (10% max. ripple) at less than 50 mA exclusive of load Q60BB6LAF models: 10 to 30 V dc (10% max. ripple) at less than 35 mA exclusive of load Q60VR3LAF and Q60VR3AFV Universal models: 12 to 250 V dc or 24 to 250 V ac, 50/60 Hz Input power 1.5 W max.	
Supply Protection Circuitry	Protected against reverse polarity and transient voltages (Q60VR3 model's dc hookup is without regard to polarity)	
Output Configuration	Q60BB6AF, Q60BB6AFV and Q60BB6LAF models: Bipolar: one NPN (current sinking) and one PNP (current sourcing) open-collector transistor Q60VR3AF, Q60VR3LAF and Q60VR3AFV cabled models: E/M Relay (SPDT), normally closed and normally open contacts Q60VR3AFQ1, Q60VR3AFVQ1 and Q60VR3LAFQ1 (QD) models: E/M Relay (SPST), normally open contact	
Output Rating	DC models: 150 mA max. each output @ 25 °C OFF-state leakage current: less than 5 µA @ 30 V dc Output saturation NPN: less than 200 mV @ 10 mA; less than 1 V @ 150 mA Output saturation PNP: less than 1 V at 10 mA; less than 1.5 V at 150 mA  Universal Voltage models: Min. voltage and current: 5 V dc, 10 mA Mechanical life of relay: 50,000,000 operations Electrical life of relay at full resistive load: 100,000 operations Max. switching power (resistive load): Cabled models: 1250 VA, 150 W QD models: 750 VA, 90 W Max. switching voltage (resistive load): Cabled models: 250 V ac, 125 V dc QD models: 250 V ac, 125 V dc Max. switching current (resistive load): Cabled models: 5 A @ 250 V ac, 5 A @ 30 V dc derated to 200 mA @ 125 V dc QD models: 3 A @ 250 V ac, 3 A @ 30 V dc derated to 200 mA @ 125 V dc	
Output Protection Circuitry	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: Protected against continuous overload or short circuit of outputs All models: Protected against false pulse on power-up	
Output Response Time	Q60BB6AF, Q60BB6LAF and Q60BB6AFV models: 2 milliseconds ON/OFF Q60VR3AF, Q60VR3LAF and Q60VR3AFV Universal models: 15 milliseconds ON/OFF	
Delay at Power-up	150 milliseconds (Q60BB6LAF has 1 second max.); outputs do not conduct during this time	
Repeatability	500 microseconds	
Sensing Hysteresis	2000 mm cutoff - less than 3% of set cutoff distance 1600 mm cutoff - less than 2.25% of set cutoff distance 1200 mm cutoff - less than 1.30% of set cutoff distance	800 mm cutoff - less than 0.5% of set cutoff distance 400 mm cutoff - less than 0.25% of set cutoff distance
Adjustments	2 momentary push buttons: ON-delay and OFF-delay ON Delay select: 8 milliseconds to 16 seconds LO/DO select OFF Delay select: 8 milliseconds to 16 seconds Push-button lockout: for security Slotted, geared, 2-turn, cutoff range adjustment screw (mechanical stops on both ends of travel)	
Indicators	Q60AF, Q60AFV and Q60LAF models: ON-Delay Green ON Steady: Run mode, ON-delay is active Green Flashing: ON-delay Selection mode is active OFF-Delay Green ON Steady: Run mode, OFF-delay is active Green Flashing: OFF-delay Selection mode is active  5-Segment Light Bar*: Indicates relative delay time during ON/OFF-delay Selection modes Output Amber ON Steady: Outputs are conducting Green ON Steady: During ON/OFF-delay Selection modes Dark Operate Green ON Steady: Dark Operate is selected Lockout Green ON Steady: Buttons are locked out Light Operate Green ON Steady: Light Operate is selected Signal Green ON Steady: Sensor is receiving signal Green Flashing: Marginal signal (1.0 to 2.25 excess gain)	
NOTE: Outputs are active during on/off timing selection mode.	*Output, Dark Operate, Lockout, Light Operate and Signal indicators function as 5-Segment Light Bar during ON/OFF-delay Selection modes	
Laser Characteristics	Spot Size: approximately 4 x 2 mm throughout range (collimated beam) Angle of Divergence: 5 milliradians NOTE: Contact factory for custom laser spot size.	
Construction	Housing: ABS polycarbonate blend	Lens: acrylic Cover: Clear ABS
Environmental Rating	IEC IP67; NEMA 6	
Connections	2 m or 9 m integral cable. DC models offer a 5-pin Euro-style QD fitting. AC models offer 4-pin Micro-style QD fitting. QD cordsets are ordered separately. See page 90.	
Operating Conditions	Temperature: Q60BB6LAF (DC) models: -10° to +50° C Q60VR3LAF Universal models: -10° to +45° C All others: -20° to +55° C Relative humidity: 90% at 50° C (non-condensing)	
Certifications	 	



# PicoDot®

## Laser Precision Sensors



- Convergent-mode laser sensor delivers precise position detection, inspection and counting
- Powerful retroreflective models offer long-range retroreflective sensing and have a precise, narrow beam to sense small objects at close range or larger objects at 10.6 m
- Convergent models have precise 0.25 mm beam width and ignore objects beyond the maximum sensing distance
- All models have a gain sensitivity potentiometer for fine tuning sensor performance
- Models available with environmentally sealed housing

### Laser Polar Retro PicoDot®, 10-30 V DC

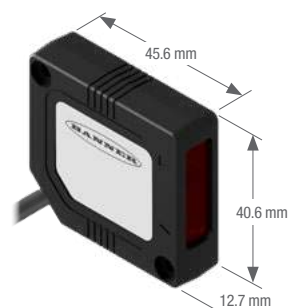
➔ Visible Red LED

Sensing Mode	Range/Focus	Connection	Housing Rating	Models NPN	Models PNP
CLASS 2 LASER POLAR RETRO	0.2 m - 10.6 m†	2 m	IP54, NEMA 3	PD45VN6LLP	PD45VP6LLP
		5-pin Euro Pigtail QD		PD45VN6LLPQ	PD45VP6LLPQ
CLASS 2 LASER POLAR RETRO	0.2 m - 10.6 m†	2 m	IP67, NEMA 6	PD49VN6LLP	PD49VP6LLP
		5-pin Euro Pigtail QD		PD49VN6LLPQ	PD49VP6LLPQ

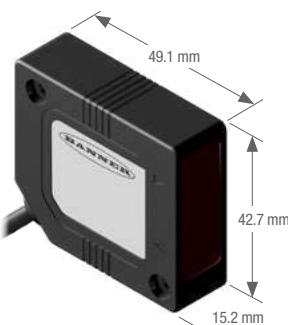
### Laser Convergent PicoDot®, 10-30 V DC

➔ Visible Red LED

Sensing Mode	Range/Focus	Connection	Housing Rating	Models NPN	Models PNP
CLASS 2 LASER CONVERGENT	50 mm	2 m	IP54, NEMA 3	PD45VN6C50	PD45VP6C50
		5-pin Euro Pigtail QD		PD45VN6C50Q	PD45VP6C50Q
		2 m	IP67, NEMA 6	PD49VN6C50	PD49VP6C50
		5-pin Euro Pigtail QD		PD49VN6C50Q	PD49VP6C50Q
CLASS 2 LASER CONVERGENT	102 mm	2 m	IP54, NEMA 3	PD45VN6C100	PD45VP6C100
		5-pin Euro Pigtail QD		PD45VN6C100Q	PD45VP6C100Q
		2 m	IP67, NEMA 6	PD49VN6C100	PD49VP6C100
		5-pin Euro Pigtail QD		PD49VN6C100Q	PD49VP6C100Q
CLASS 2 LASER CONVERGENT	203 mm	2 m	IP54, NEMA 3	PD45VN6C200	PD45VP6C200
		5-pin Euro Pigtail QD		PD45VN6C200Q	PD45VP6C200Q
		2 m	IP67, NEMA 6	PD49VN6C200	PD49VP6C200
		5-pin Euro Pigtail QD		PD49VN6C200Q	PD49VP6C200Q
CLASS 2 LASER CONVERGENT	305 mm	2 m	IP54, NEMA 3	PD45VN6C300	PD45VP6C300
		5-pin Euro Pigtail QD		PD45VN6C300Q	PD45VP6C300Q
		2 m	IP67, NEMA 6	PD49VN6C300	PD49VP6C300
		5-pin Euro Pigtail QD		PD49VN6C300Q	PD49VP6C300Q



PD45 models  
Laser Polarized Retroreflective  
and Laser Convergent Models  
Suffix LLP and C..



PD49 models  
Laser Polarized Retroreflective  
and Laser Convergent Models  
Suffix LLP and C..

➔ Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, PD45VN6LLP W/30).

† Tested using a BRT-51X51BM retro target (included with each sensor). Actual range depends on the efficiency and size of the retroreflective target. Some targets have produced ranges up to 40 m.

**Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

**5-Pin**

**MDDC-501.5**  
1.5 m (1.6')  
**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')



SMB46A



SMB46S



SMB46L



SMB46U

Additional cordset information is available  
See page page 758

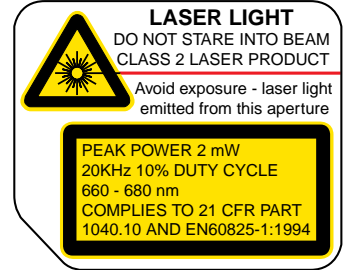
Additional bracket information is available  
See page page 723

**Class 2 Laser Safety Notes**

Low-power lasers are by definition incapable of causing eye injury within the duration of the blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 - 700 nm). Therefore, an ocular hazard can exist only if an individual overcomes their natural aversion to bright light and stares directly into the laser beam.

**For safe laser use:**

- Do not permit a person to stare at the laser from within the beam
- Do not point the laser at a person's eye at close range
- The beam emitted by a Class 2 laser product should be terminated at the end of its useful path. Open laser beam paths should be located above or below eye level where practical.

**PicoDot® Specifications**

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max ripple) at less than 20 mA, exclusive of load
<b>Beam Size at Aperture</b>	3.75 x 1.85 mm (Retroreflective Models)
<b>Beam Divergence</b>	Approx. 1 milliradian (Retroreflective Models)
<b>Laser Classification</b>	Class 2 safety (CDRH (FDA) 1040.10 and IEC 60875-1)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity, over voltage, and transient voltages
<b>Delay at Power-up</b>	< 1 second
<b>Output Configuration</b>	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models
<b>Output Rating</b>	150 mA max. (each output) <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 0.3 V at 10 mA dc; less than 0.8 V at 150 mA dc
<b>Output Protection</b>	Protected against continuous overload or short-circuit of outputs; Overload trip point $\geq$ 220 milliamps
<b>Output Response Time</b>	0.2 milliseconds (200 microseconds) ON/OFF
<b>Repeatability</b>	50 microseconds; Rep Rate 20 KHz
<b>Spot Size at Focus</b>	0.25 mm
<b>Range</b>	<b>C50 models:</b> 25 to 58 mm; focus at 50 mm $\pm$ 5 mm <b>C100 models:</b> 25 to 115 mm; focus at 102 mm $\pm$ 5 mm <b>C200 models:</b> 25 to 216 mm; focus at 203 mm $\pm$ 5 mm <b>C300 models:</b> 25 to 317 mm; focus at 305 mm $\pm$ 5 mm <b>LLP models:</b> 0.2 to 10.6 m, using supplied retroreflective target
<b>Adjustments</b>	12-turn slotted brass Gain (sensitivity) adjustment potentiometer
<b>Extinguishing Wire</b>	Gray wire held "low" for laser operation; "high" to turn laser OFF; Low $\leq$ 1.0 V dc; High $\geq$ Vsupply -4.0 V dc (< 30 V dc) or disconnect wire; 100 milliseconds delay upon enable
<b>Indicators</b>	<b>Two LEDs:</b> <b>Solid Green:</b> Power ON <b>Flashing Green:</b> output overloaded <b>Solid Yellow:</b> Light sensed; Light Operate (LO) output conducting <b>Flashing Yellow:</b> marginal excess gain See datasheet for detailed information
<b>Construction</b>	<b>PD45:</b> Housings are heat-resistant ABS, UL94-VO rated; acrylic lens cover <b>PD49:</b> Housings are sealed, heat resistant ABS/polycarbonate alloy, UL94-VO rated, acrylic lens cover
<b>Environmental Rating</b>	<b>PD45:</b> IP54; NEMA 3 <b>PD49:</b> IP67; NEMA 6
<b>Connections</b>	2 m or 9 m attached cable, or 5-pin Euro-style 150 mm pigtail quick-disconnect fitting; mating cordsets for QD models are ordered separately.
<b>Operating Conditions</b>	<b>Temperature:</b> -10° to +45° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
<b>Weight</b>	<b>PD45: Sensor only:</b> 22 g <b>PD49: Sensor only:</b> 28 g <b>Sensor plus 2 m cable:</b> 62 g <b>Sensor plus 2 m cable:</b> 68 g
<b>Application Notes</b>	False pulse may occur less than 1 second after power-up



# QM42 Series

## Rectangle Sensor with Mounting Versatility



- Versatile sensor with several mounting options
- Meets IP67 and NEMA 6 standards for harsh environment
- Universal housing design
- Cordsets and brackets see page 96

### Opposed QM42, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	10 m	2 m	QM426E Emitter	
		4-Pin Euro QD	QM426EQ Emitter	
		2 m	QM42VN6R	QM42VP6R
		4-Pin Euro QD	QM42VN6RQ	QM42VP6RQ

### Polar Retro QM42, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 POLAR RETRO	3 m†	2 m	QM42VN6LP	QM42VP6LP
		4-Pin Euro QD	QM42VN6LPQ	QM42VP6LPQ

### Diffuse QM42, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	400 mm	2 m	QM42VN6D	QM42VP6D
		4-Pin Euro QD	QM42VN6DQ	QM42VP6DQ

### Adjustable-Field QM42, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 ADJUSTABLE-FIELD	5 mm to Cutoff point (adjustable from 50 to 150 mm)	2 m	QM42VN6AFV150	QM42VP6AFV150
		4-Pin Euro QD	QM42VN6AFV150Q	QM42VP6AFV150Q



QM42 Opposed, Retroreflective, Short-range Diffuse, and Short-range Adjustable-Field Model Suffix E, R, LP, D, AFV150 and FP

For more specifications see page 97.

Connection options: A model with a QD requires a mating cordset (see page 96).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QM42VN6 LP W/30).

† Tested using a BRT-3 retroreflector. Actual range depends on the efficiency and reflective area of the retroreflector in use. See Accessories for more information.

# QMT42 Series

## Rectangle Sensor with Mounting Versatility



- Versatile sensor with several mounting options
- Meets IP67 and NEMA 6 standards for harsh environment
- Universal housing design
- All-purpose, go-to sensor for many application needs
- Cordsets and brackets see page 96

### Diffuse QMT42, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	10 mm - 6 m	2 m	QMT42VN6DX	QMT42VP6DX
		4-Pin Euro QD	QMT42VN6DXQ	QMT42VP6DXQ

### Fixed-Field QMT42, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	50 - 500 mm Cutoff	2 m	QMT42VN6FF500	QMT42VP6FF500
		4-Pin Euro QD	QMT42VN6FF500Q	QMT42VP6FF500Q
 FIXED-FIELD	50 - 750 mm Cutoff	2 m	QMT42VN6FF750	QMT42VP6FF750
		4-Pin Euro QD	QMT42VN6FF750Q	QMT42VP6FF750Q
 FIXED-FIELD	50 - 1000 mm Cutoff	2 m	QMT42VN6FF1000	QMT42VP6FF1000
		4-Pin Euro QD	QMT42VN6FF1000Q	QMT42VP6FF1000Q
 FIXED-FIELD	50 - 1500 mm Cutoff	2 m	QMT42VN6FF1500	QMT42VP6FF1500
		4-Pin Euro QD	QMT42VN6FF1500Q	QMT42VP6FF1500Q
 FIXED-FIELD	50 - 2000 mm Cutoff	2 m	QMT42VN6FF2000	QMT42VP6FF2000
		4-Pin Euro QD	QMT42VN6FF2000Q	QMT42VP6FF2000Q

### Adjustable-Field QMT42, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 LONG RANGE FIXED-FIELD	25 mm to Cutoff point (adjustable from 125 to 400 mm)	2 m	QMT42VN6AFV400	QMT42VP6AFV400
		4-Pin Euro QD	QMT42VN6AFV400Q	QMT42VP6AFV400Q

For more specifications see page 97.

Connection options: A model with a QD requires a mating cordset (see page 96).

For 9 m cable, add suffix W/30 to the 2 m model number (example, QM42VN6LP W/30).



QMT42 Long-range Diffuse, Fixed-Field and Adjustable-Field Model Suffix DX, FF and AFV400



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

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



**SMB30SK**



**SMB46S**



**SMB46L**

*Additional cordset information is available  
See page page 758*

*Additional bracket information is available  
See page page 723*

**Reflectors**




*Additional information is available  
See page page 790*

**Apertures**



*Additional information is available  
See page page 816*

## QM42 and QMT42 Specifications





Sensing Beam	<b>Opposed, Diffuse, Retroreflective, Fixed-Field and Fiber Optic:</b> Infrared, 880 nm; Visible Red, 660 nm <b>Adjustable-Field:</b> Visible Red, 680 nm
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than: <b>Opposed:</b> 30 mA (emitter), 10 mA (receiver) <b>Short-range diffuse and retroreflective:</b> 20 mA <b>Fiber optic:</b> 30 mA <b>Adjustable-Field:</b> 50 mA <b>Fixed -Field and long-range diffuse:</b> 40 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models
Output Rating	100 mA max. (each output) <b>OFF-state leakage current:</b> less than 5 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 100 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq$ 150 mA, typical at 20° C
Output Response Time	<b>Opposed:</b> 1 millisecond ON; 0.5 millisecond OFF <b>Diffuse, Retroreflective, Adjustable-Field and Fixed-Field:</b> 1 millisecond ON/OFF <b>Plastic Fiber Optic:</b> 0.25 millisecond ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	<b>Opposed:</b> 120 microseconds <b>Diffuse, Retroreflective, Adjustable-Field and Fixed-Field:</b> 250 microseconds <b>Fiber Optic:</b> 60 microseconds. Repeatability and response are independent of signal strength
Sensing Hysteresis	<b>Long-range diffuse:</b> less than 20% of set sensing distance <b>Adjustable-Field:</b> less than 7% of set cutoff distance <b>Fixed-Field:</b> 2000 mm models – less than 5% of set cutoff distance 1500 mm models – less than 4% of set cutoff distance 1000 mm models – less than 3% of set cutoff distance 750 mm models – less than 2% of set cutoff distance 500 mm models – less than 1% of set cutoff distance
Cutoff Point Tolerance	<b>Fixed-Field:</b> $\pm$ 10% of nominal cutoff distance
Adjustments	All models (except emitters, <b>Adjustable-Field, Fixed-Field and Long-range Diffuse</b> ): 15-turn slotted brass GAIN (sensitivity) adjustment potentiometer <b>150 mm Adjustable-Field:</b> 12-turn slotted brass cutoff distance adjustment potentiometer <b>400 mm Adjustable-Field:</b> 15-turn slotted brass cutoff distance adjustment potentiometer <b>Long-range diffuse:</b> 4-turn slotted GAIN (sensitivity) adjustment potentiometer <b>Fixed-Field:</b> No adjustments See datasheet for detailed information
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Solid Green:</b> Power ON; Opposed emitters: Green power ON <b>Green Flashing:</b> output overloaded <b>Solid Yellow:</b> Light sensed; Light Operate (LO) <b>Yellow Flashing:</b> marginal excess gain See datasheet for detailed information
Construction	Housings are die-cast zinc alloy with black acrylic polyurethane finish; lenses are acrylic
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 96.
Operating Conditions	<b>Temperature:</b> <b>Long-range Diffuse, Adjustable-Field and Fixed-Field:</b> -20° to +55° C <b>All others:</b> -20° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Certifications	





## Right Angle

Right angle sensors offer industry standard 8, 18 and 30 mm barrel mounting options. The right angle housing allows mounting in confined areas, and easy viewing of LED indicators.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>T8</b> Compact sensor provides reliable sensing without adjustments. Page 100	<b>Opposed:</b> 2 m <b>Diffuse:</b> 100 mm	19 x 16.3 x 15.8 mm	IP67; NEMA 6	ABS	10 to 30 V dc
	<b>T18</b> Epoxy-encapsulated right-angle barrel sensors provide reliable sensing without adjustments. Page 102	<b>Opposed:</b> 20 m <b>Retro:</b> 2 m <b>Polarized Retro:</b> 2 m <b>Diffuse:</b> 500 mm <b>Fixed-Field:</b> 100 mm	Varies by model	<b>QD models:</b> IP6K <b>Other models:</b> IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc, 20 to 250 V ac
	<b>TM18</b> Robust die-cast metal sensors provide reliable sensing without adjustments in high-pressure washdown environments. Page 106	<b>Opposed:</b> 20 m <b>Polarized Retro:</b> 5.5 m <b>Diffuse:</b> 500 mm <b>Fixed-Field:</b> 100 mm	41 x 30 x 30 mm	<b>QD models:</b> IP6K <b>Other models:</b> IP67; NEMA 6	Zinc die-cast with nickel plating	10 to 30 V dc
	<b>T30</b> Compact sensor provides reliable sensing without adjustments. Page 110	<b>Opposed:</b> 60 m <b>Polarized Retro:</b> 6 m <b>Fixed-Field:</b> 600 mm	51.5 x 40 x 44.8 mm	<b>QD models:</b> IP6K <b>Other models:</b> IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc, 20 to 250 V ac

## OTHER AVAILABLE MODELS



Q4X page 34



Q3X page 38



QS18 page 40



QS30 page 56

# T8 Series

## Self-Contained, Right-Angle Barrel-Mount



- Powerful optics
- Short-range background suppression
- Highly visible red sensing beam for easy alignment
- Easily replaces range-limited 8 mm inductive proximity sensors

### Opposed T8

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
 OPPOSED	2 m	2 m	—	T86EV Emitter	
		3-Pin Pico Pigtail QD		T86EVQ Emitter	
		2 m	LO	T8AN6R	T8AP6R
		3-Pin Pico Pigtail QD		T8AN6RQ	T8AP6RQ
2 m	DO	T8RN6R	T8RP6R		
3-Pin Pico Pigtail QD		T8RN6RQ	T8RP6RQ		

### Diffuse T8

Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
 DIFFUSE	50 mm	2 m	LO	T8AN6D50	T8AP6D50
		3-Pin Pico Pigtail QD		T8AN6D50Q	T8AP6D50Q
		2 m	DO	T8RN6D50	T8RP6D50
		3-Pin Pico Pigtail QD		T8RN6D50Q	T8RP6D50Q
 DIFFUSE	100 mm	2 m	LO	T8AN6D100	T8AP6D100
		3-Pin Pico Pigtail QD		T8AN6D100Q	T8AP6D100Q
		2 m	DO	T8RN6D100	T8RP6D100
		3-Pin Pico Pigtail QD		T8RN6D100Q	T8RP6D100Q

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T8AN6D50 W/30).

**Pico-Style**

Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**PKG3M-2RA**)

**4-Pin**

**PKG3M-2**  
2 m (6.5')  
**PKG3M-5**  
5 m (16.4')  
**PKG3M-7**  
7 m (22.9')

**PKG3M-9**  
9 m (29.5')  
**PKG3M-10**  
10 m (32.8')

**SMB8MM**

Additional bracket information is available  
See page 723

Additional cordset information is available  
See page 758



Opposed and Diffuse Models  
Suffix E, R and D

## T8 Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model. Light Operate (LO) or Dark Operate (DO), depending on model
<b>Output Rating</b>	50 mA max. <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 24 V dc <b>ON-state saturation voltage:</b> less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq$ 100 mA
<b>Output Response Time</b>	1 millisecond ON; 0.5 milliseconds OFF
<b>Delay at Power-up</b>	Maximum 100 milliseconds (150 milliseconds for Diffuse); output does not conduct during this time
<b>Repeatability</b>	<b>Opposed:</b> 100 microseconds <b>Diffuse:</b> 160 microseconds
<b>Indicators</b>	<b>Opposed:</b> Receiver has Green and Red LED Emitter has one Green LED <b>Solid Green:</b> power ON <b>Solid Red:</b> light sensed <b>Flashing green:</b> output overloaded <b>Yellow flashing:</b> marginal excess gain <b>Diffuse:</b> <b>Red:</b> light is sensed
<b>Construction</b>	Reinforced polycarbonate/ABS alloy housing, acrylic window with 8 mm ABS nut
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Operating Conditions</b>	<b>Temperature:</b> -20° to +55° C <b>Relative humidity:</b> 80% at 50° C (non-condensing)
<b>Vibration and Mechanical Shock</b>	<b>Vibration:</b> All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak <b>Shock:</b> All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
<b>Certifications</b>	<b>CE</b>

# T18 Series

## Self-Contained Sensors



- Completely epoxy-encapsulated barrel-mount sensors
- Design rated NEMA 6P, IP67
- Wide operating range from -40° C to +70° C
- Advanced diagnostics warn of marginal sensing conditions or output overload
- Cordsets and brackets see page 104

### Opposed T18, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	20 m	2 m	T186E Emitter	
		4-pin Euro QD	T186EQ Emitter	
		2 m	T18SN6R	T18SP6R
		4-pin Euro QD	T18SN6RQ	T18SP6RQ

### Retro & Polar Retro T18, 10-30 V DC

Infrared LED    Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 RETRO	2 m†	2 m	T18SN6L	T18SP6L
		4-pin Euro QD	T18SN6LQ	T18SP6LQ
 POLAR RETRO	2 m†	2 m	T18SN6LP	T18SP6LP
		4-pin Euro QD	T18SN6LPQ	T18SP6LPQ

### Diffuse T18, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	500 mm	2 m	T18SN6D	T18SP6D
		4-pin Euro QD	T18SN6DQ	T18SP6DQ

### Fixed-Field T18, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	T18SN6FF25	T18SP6FF25
		4-pin Euro QD	T18SN6FF25Q	T18SP6FF25Q
 FIXED-FIELD	0 - 50 mm Cutoff	2 m	T18SN6FF50	T18SP6FF50
		4-pin Euro QD	T18SN6FF50Q	T18SP6FF50Q
 FIXED-FIELD	0 - 100 mm Cutoff	2 m	T18SN6FF100	T18SP6FF100
		4-pin Euro QD	T18SN6FF100Q	T18SP6FF100Q

For more specifications see page 105.

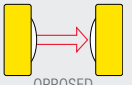
Connection options: A model with a QD requires a mating cordset (see page 104).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T18SN6L W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

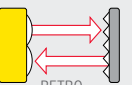

## Opposed T18, 20-250 V AC

⇒ Infrared LED

Sensing Mode	Range	Connection	Models LO	Models DO
 OPPOSED	20 m	2 m 4-pin Micro QD 2 m 4-pin Micro QD	T183E Emitter T183EQ1 Emitter T18AW3R T18AW3RQ1	T18RW3R T18RW3RQ1

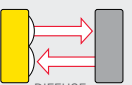
## Retro &amp; Polar Retro T18, 20-250 V AC

⇒ Infrared LED → Visible Red LED

Sensing Mode	Range	Connection	Models LO	Models DO
 RETRO	2 m <sup>†</sup>	2 m 4-pin Micro QD	T18AW3L T18AW3LQ1	T18RW3L T18RW3LQ1
 POLAR RETRO	2 m <sup>†</sup>	2 m 4-pin Micro QD	T18AW3LP T18AW3LPQ1	T18RW3LP T18RW3LPQ1

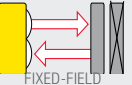
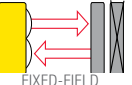
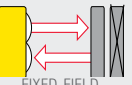
## Diffuse T18, 20-250 V AC

⇒ Infrared LED

Sensing Mode	Range	Connection	Models LO	Models DO
 DIFFUSE	300 mm	2 m 4-pin Micro QD	T18AW3D T18AW3DQ1	T18RW3D T18RW3DQ1

## T18, 20-250 V AC

⇒ Infrared LED

Sensing Mode	Range	Connection	Models LO	Models DO
 FIXED-FIELD	0 - 25 mm Cutoff	2 m 4-pin Micro QD	T18AW3FF25 T18AW3FF25Q1	T18RW3FF25 T18RW3FF25Q1
 FIXED-FIELD	0 - 50 mm Cutoff	2 m 4-pin Micro QD	T18AW3FF50 T18AW3FF50Q1	T18RW3FF50 T18RW3FF50Q1
 FIXED-FIELD	0 - 100 mm Cutoff	2 m 4-pin Micro QD	T18AW3FF100 T18AW3FF100Q1	T18RW3FF100 T18RW3FF100Q1

For more specifications see page 106.

 Connection options: A model with a QD requires a mating cordset (see page 104).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T18SN6L W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.



**PHOTOELECTRIC**

**FEATURED**

**RECTANGLE**

**RIGHT ANGLE**

**BARREL**



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

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



**Micro-Style**  
 Straight connector models listed;  
 for right-angle, add **RA** to the end  
 of the model number (example,  
**MQDC-306RA**)

**4-Pin**  
**MQAC-406**  
 2 m (6.5')  
**MQAC-415**  
 5 m (15')  
**MQAC-430**  
 9 m (30')

*Additional cordset information is available  
 See page 758*



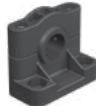
DC Sensors (all models)



SMB18A



SMBAMS18P



SMB1815SF



SMB18FM

*Additional bracket information is available  
 See page 723*



AC Sensors (all models)

**Reflectors**



*Additional information is available  
 See page 790*

**Apertures**



*Additional information is available  
 See page 816*

## T18 Specifications

<b>Supply Voltage and Current</b>	<p>T18 DC 10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current):  <b>Opposed Emitters:</b> 25 mA                      <b>Opposed Receivers:</b> 20 mA  <b>Polarized Retroreflective:</b> 30 mA            <b>Non-polarized Retroreflective:</b> 25 mA  <b>Diffuse:</b> 25 mA                                      <b>Fixed-Field:</b> 35 mA</p> <p>T18AC 20 to 250 V ac (50/60 Hz)    <b>Average current:</b> 20 mA    <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac</p>
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	<p>T18 DC Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.</p> <p>T18AC Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model  <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light  <b>Dark Operate:</b> Output conducts when sensor sees dark</p>
<b>Output Rating</b>	<p>T18 DC 150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA.  <b>OFF-state leakage current:</b> less than 1 <math>\mu</math>A at 30 V dc  <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc</p> <p>T18 AC 300 mA max. (continuous) <b>Fixed-Field:</b> derate 5 mA/<math>^{\circ}</math> C above +50<math>^{\circ}</math> C  <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive  <b>OFF-state leakage current:</b> less than 100 <math>\mu</math>A  <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac</p>
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs
<b>Output Response Time</b>	<p>T18 DC <b>Opposed:</b> 3 milliseconds ON, 1.5 milliseconds OFF  <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 3 milliseconds ON/OFF</p> <p>T18 AC <b>Opposed:</b> 16 milliseconds ON, 8 milliseconds OFF  <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 16 milliseconds ON/OFF</p>
<b>Delay at Power-up</b>	100 milliseconds; outputs are non-conducting during this time
<b>Adjustments</b>	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn SENSITIVITY control for adjustment of system gain
<b>Repeatability</b>	<p>T18 DC <b>Opposed:</b> 375 microseconds  <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 750 microseconds  Repeatability and response are independent of signal strength</p> <p>T18 AC <b>Opposed:</b> 2 milliseconds    <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 4 milliseconds  Repeatability and response are independent of signal strength.</p>
<b>Indicators</b>	<p><b>Two LEDs: Solid Green:</b> Power ON                      <b>Flashing Green:</b> output overloaded  <b>Solid Yellow:</b> Light Operate (LO) output energized    <b>Flashing Yellow:</b> marginal excess gain</p>
<b>Construction</b>	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
<b>Environmental Rating</b>	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9
<b>Connections</b>	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 104.
<b>Operating Conditions</b>	<b>Temperature:</b> -40 $^{\circ}$ to +70 $^{\circ}$ C <b>Relative humidity:</b> 90% at 50 $^{\circ}$ C (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
<b>Certifications</b>	 <p>ECOLAB<sup>®</sup> chemical compatibility pending on some models; contact Banner Engineering for details</p>

# TM18 Series

## Heavy-Duty, Right Angle, Metal Sensors



- Robust die-cast metal sensors provide reliable sensing without adjustments
- Extremely bright LED red sensing beam for easy alignment
- Quick-disconnect models available
- Fixed-field models have enhanced immunity to fluorescent lights
- Polarized/fixed-field models have crosstalk avoidance so two sensors can be in close proximity
- Cordsets and brackets see page 90

### Opposed TM18

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
	20 m	2 m 4-pin Euro QD	—	TM186E Emitter TM186EQ8 Emitter	
		2 m 4-pin Euro QD	LO	TM18AN6R TM18AN6RQ8	TM18AP6R TM18AP6RQ8
		2 m 4-pin Euro QD	DO	TM18RN6R TM18RN6RQ8	TM18RP6R TM18RP6RQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6R TM18VN6RQ8	TM18VP6R TM18VP6RQ8

### Polar Retro TM18

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
	5.5 m†	2 m 4-pin Euro QD	LO	TM18AN6LP TM18AN6LPQ8	TM18AP6LP TM18AP6LPQ8
		2 m 4-pin Euro QD	DO	TM18RN6LP TM18RN6LPQ8	TM18RP6LP TM18RP6LPQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6LP TM18VN6LPQ8	TM18VP6LP TM18VP6LPQ8

For more specifications see page 109.

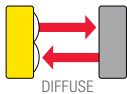
Connection options: A model with a QD requires a mating cordset (see page 108).

For 9 m cable, add suffix W/30 to the 2 m model number (example, TM186E W/30).

QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 to the 2 m model number (example, TM186EQ5).

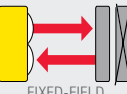
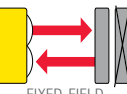
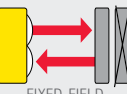
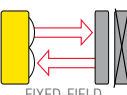
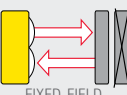
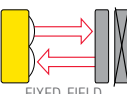
## Diffuse TM18

 Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
 DIFFUSE	500 mm	2 m 4-pin Euro QD	LO	TM18AN6DV TM18AN6DVQ8	TM18AP6DV TM18AP6DVQ8
		2 m 4-pin Euro QD	DO	TM18RN6DV TM18RN6DVQ8	TM18RP6DV TM18RP6DVQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6DV TM18VN6DVQ8	TM18VP6DV TM18VP6DVQ8

## Fixed-Field TM18

 Visible Red LED
  Infrared LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
 FIXED-FIELD	25 mm	2 m 4-pin Euro QD	LO	TM18AN6FF25 TM18AN6FF25Q8	TM18AP6FF25 TM18AP6FF25Q8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF25 TM18VN6FF25Q8	TM18VP6FF25 TM18VP6FF25Q8
 FIXED-FIELD	50 mm	2 m 4-pin Euro QD	LO	TM18AN6FF50 TM18AN6FF50Q8	TM18AP6FF50 TM18AP6FF50Q8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF50 TM18VN6FF50Q8	TM18VP6FF50 TM18VP6FF50Q8
 FIXED-FIELD	100 mm	2 m 4-pin Euro QD	LO	TM18AN6FF100 TM18AN6FF100Q8	TM18AP6FF100 TM18AP6FF100Q8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF100 TM18VN6FF100Q8	TM18VP6FF100 TM18VP6FF100Q8
 FIXED-FIELD	25 mm	2 m 4-pin Euro QD	LO	TM18AN6FF25IR TM18AN6FF25IRQ8	TM18AP6FF25IR TM18AP6FF25IRQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF25IR TM18VN6FF25IRQ8	TM18VP6FF25IR TM18VP6FF25IRQ8
 FIXED-FIELD	50 mm	2 m 4-pin Euro QD	LO	TM18AN6FF50IR TM18AN6FF50IRQ8	TM18AP6FF50IR TM18AP6FF50IRQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF50IR TM18VN6FF50IRQ8	TM18VP6FF50IR TM18VP6FF50IRQ8
 FIXED-FIELD	100 mm	2 m 4-pin Euro QD	LO	TM18AN6FF100IR TM18AN6FF100IRQ8	TM18AP6FF100IR TM18AP6FF100IRQ8
		2 m 4-pin Euro QD	LO/DO	TM18VN6FF100IR TM18VN6FF100IRQ8	TM18VP6FF100IR TM18VP6FF100IRQ8

For more specifications see page 109.

 Connection options: A model with a QD requires a mating cordset (see page 108).

For 9 m cable, add suffix W/30 to the 2 m model number (example, TM18AP6FF25 W/30).

QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 to the 2 m model number (example, TM18AP6FF25Q5).



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

**Euro-Style**

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

Additional cordset information is available  
 See page 758



Opposed, Polar Retroreflective, Diffuse and Fixed-Field Models  
 Suffix E, R, LP, DV and FF



SMB18A



SMBAMS18P



SMBT18Y

Additional bracket information is available  
 See page 723

**Reflectors**





Additional information is available  
 See page 790

**Apertures**



Additional information is available  
 See page 816

## TM18 Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple within specified limits); supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflector:</b> 20 mA <b>Diffuse and Fixed-Field:</b> 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state dc switch; NPN (current sinking) or PNP (current sourcing), depending on model <b>Light Operate:</b> Output conducts when sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor does not see its own (or the emitter's) modulated light
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate about 1 mA per °C) <b>OFF-state leakage current:</b> less than 1 µA @ 30 V dc <b>ON-state saturation voltage:</b> less than 1 V @ 10 mA dc; less than 1.5 V @ 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	<b>Opposed:</b> 1.5 milliseconds ON, 0.75 milliseconds OFF <b>Polarized Retroreflective:</b> 1 milliseconds ON/OFF <b>Diffuse and Fixed-Field:</b> 3 milliseconds ON, 1.5 milliseconds OFF
Delay at Power-up	100 milliseconds Outputs do not conduct during this time
Repeatability	<b>Opposed:</b> 190 microseconds <b>Polarized Retroreflective:</b> 585 microseconds <b>Diffuse and Fixed-Field:</b> 185 microseconds
Adjustments	<b>Diffuse models only:</b> single turn rear panel sensitivity control
Indicators	<b>4-wire</b> <b>Two LEDs:</b> Solid Green: Power ON <b>Flashing Green:</b> output overloaded Solid Yellow: Output energized <b>Flashing Yellow:</b> marginal excess gain <b>3-wire</b> <b>Two LEDs:</b> Solid Green: Power ON Solid Yellow: Output energized
Construction	<b>Housing:</b> Zinc die-cast with nickel plating <b>Lens:</b> PC or PMMA <b>Black Cover:</b> PBT polyester housing; polycarbonate (opposed mode) or acrylic lens
Environmental Rating	Leakproof design rated NEMA 6; IP67, IP69K QD models and cable models when PVC jacket is protected
Connections	2 m or 9 m attached cable, or 4-pin Euro-style integral or pigtail QD, depending on model. QD cordsets are ordered separately. See page 108.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% @ 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06" acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	 LISTED (class 2 supply required) 



# T30 Series

## Long-Range with Superior Durability



- Epoxy-encapsulated sensors provide reliable sensing without adjustments.
- Features 30 mm plastic threaded barrel
- Available in opposed, retroreflective and fixed-field modes
- Designed for use in harsh sensing environments
- Advanced diagnostics warn of marginal sensing conditions or output overload
- Cordsets and brackets see page 112

### Opposed T30, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	60 m	2 m	T306E Emitter	
		4-Pin Euro QD	T306EQ Emitter	
		2 m	T30SN6R	T30SP6R
		4-Pin Euro QD	T30SN6RQ	T30SP6RQ

### Polar Retro T30, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 POLAR RETRO	6 m <sup>†</sup>	2 m	T30SN6LP	T30SP6LP
		4-Pin Euro QD	T30SN6LPQ	T30SP6LPQ

### Fixed-Field T30, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	T30SN6FF200	T30SP6FF200
		4-Pin Euro QD	T30SN6FF200Q	T30SP6FF200Q
 FIXED-FIELD	0 - 400 mm Cutoff	2 m	T30SN6FF400	T30SP6FF400
		4-Pin Euro QD	T30SN6FF400Q	T30SP6FF400Q
 FIXED-FIELD	0 - 600 mm Cutoff	2 m	T30SN6FF600	T30SP6FF600
		4-Pin Euro QD	T30SN6FF600Q	T30SP6FF600Q

For more specifications see page 112.

Connection options: A model with a QD requires a mating cordset (see page 112).

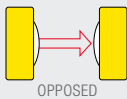
For 9 m cable, add suffix W/30 to the 2 m model number (example, T30SN6LP W/30).

<sup>†</sup> Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.


## Opposed T30, 20-250 V AC

⇒ Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 OPPOSED	60 m	2 m 4-Pin Micro QD 2 m 4-Pin Micro QD	T303E Emitter T303EQ1 Emitter T30AW3R T30AW3RQ1	T30RW3R T30RW3RQ1

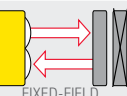
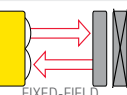
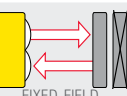
## Polar Retro T30, 20-250 V AC

⇒ Visible Red LED


Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 POLAR RETRO	6 m†	2 m 4-Pin Micro QD	T30AW3LP T30AW3LPQ1	T30RW3LP T30RW3LPQ1

## Fixed-Field T30, 20-250 V AC

⇒ Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 FIXED-FIELD	0 - 200 mm Cutoff	2 m 4-Pin Euro QD	T30AW3FF200 T30AW3FF200Q1	T30RW3FF200 T30RW3FF200Q1
 FIXED-FIELD	0 - 400 mm Cutoff	2 m 4-Pin Euro QD	T30AW3FF400 T30AW3FF400Q1	T30RW3FF400 T30RW3FF400Q1
 FIXED-FIELD	0 - 600 mm Cutoff	2 m 4-Pin Euro QD	T30AW3FF600 T30AW3FF600Q1	T30RW3FF600 T30RW3FF600Q1

For more specifications see page 112.

 Connection options: A model with a QD requires a mating cordset (see page 112).

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30AW3LP W/30).

† Retroreflective range is specified using a BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

## PHOTOELECTRIC

## FEATURED

## RECTANGLE

## RIGHT ANGLE

## BARREL



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

**4-Pin**

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



**Micro-Style**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDC-306RA**)

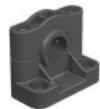
**4-Pin**

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



**Opposed, Polarized Retroreflective and  
Fixed-field Models**  
Suffix E, R, LP and FF

Additional cordset information is available  
See page 758

**SMB30A****SMBAMS30P****SMB1815SF****SMB30FA..**

Additional bracket information is available  
See page 723



**Reflectors**

Additional information is available  
See page 790


**Apertures**

Additional information is available  
See page 816

## T30 DC Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflective:</b> 30 mA <b>Fixed-Field:</b> 35 mA
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state dc switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
<b>Output Rating</b>	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs
<b>Output Response Time</b>	<b>Opposed:</b> 3 milliseconds ON; 1.5 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 3 milliseconds ON/OFF
<b>Delay at Power-up</b>	100 milliseconds; outputs are non-conducting during this time
<b>Repeatability</b>	<b>Opposed:</b> 375 microseconds <b>Polarized Retroreflective and Fixed-Field</b> 750 microseconds Repeatability and response are independent of signal strength.
<b>Indicators</b>	<b>Two LEDs:</b> <b>Solid Green:</b> Power ON <b>Flashing Green:</b> output overload <b>Solid Yellow:</b> Light operate (LO) output energized <b>Flashing Yellow:</b> marginal excess gain
<b>Construction</b>	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
<b>Environmental Rating</b>	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
<b>Connections</b>	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 112.
<b>Operating Conditions</b>	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
<b>Certifications</b>	  ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

## T30 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). <b>Average current:</b> 20 mA <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) <b>Fixed-Field:</b> derate 5 mA/° C above +50° C <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive <b>OFF-state leakage current:</b> less than 100 µA <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	<b>Opposed:</b> 16 milliseconds ON; 8 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	<b>Opposed:</b> 2 milliseconds <b>Polarized Retroreflective and Fixed-Field:</b> 4 milliseconds Repeatability and response are independent of signal strength
Indicators	<b>Two LEDs:</b> <b>Solid Green:</b> Power ON <b>Solid Yellow:</b> Light sensed <b>Flashing Yellow:</b> marginal excess gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 112.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	



## Barrel Sensors

Barrel sensors are available in industry standard 12, 18 and 30 mm barrel mounting options. The compact barrel size allows for easy replacement and easy viewing of LED indicators.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>M12</b> Rugged, threaded metal sensor with fully encapsulated electronics. Page 116	<b>Opposed:</b> 5 m <b>Retro:</b> 2.5 m <b>Polarized Retro:</b> 1.5 m <b>Diffuse:</b> 400 mm <b>Fixed-Field:</b> 75 mm	12 ø x 67.5 mm	IEC IP67; NEMA 6, IEC IP68 and 1200 PSI washdown	Nickel-plated brass	10 to 30 V dc
	<b>S12-2/S12</b> Barrel sensors provide reliable sensing without adjustments. Page 118	<b>Opposed:</b> 20 m	<b>S12-2:</b> 30.4 x ø 12 mm <b>S12:</b> 64 x ø 12 mm	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	<b>SB12/SB12T</b> Economical sensors provide reliable sensing without adjustments. Page 120	<b>Opposed:</b> 1.5 m	<b>SB12:</b> 15.8 ø x 31 mm <b>SB12T:</b> 15.8 ø x 30.4 mm	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	<b>S18</b> Epoxy-encapsulated barrel sensors operate on dc voltage and provide reliable sensing without adjustments. Page 124	<b>Opposed:</b> 20 m <b>Retro:</b> 2 m <b>Polarized Retro:</b> 2 m <b>Diffuse:</b> 300 mm <b>Fixed-Field:</b> 100 mm	ø 18 x 58.8 mm	<b>QD models:</b> IP69K <b>Other models:</b> IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 250 V ac
	<b>S18-2</b> A self-contained powerful sensor with bright visible red emitter beam for easy alignment and set-up. Page 122	<b>Opposed:</b> 25 m <b>Polarized Retro:</b> 6 m <b>Retro:</b> 7.5 m <b>Diffuse:</b> 750 mm <b>Fixed-Field:</b> 200 mm	Varies by model	IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc
	<b>M18</b> Epoxy-encapsulated metal barrel sensors provide reliable sensing without adjustments. Page 126	<b>Opposed:</b> 20 m <b>Retro:</b> 2 m <b>Polarized Retro:</b> 2 m <b>Diffuse:</b> 300 mm <b>Fixed-Field:</b> 100 mm	18 ø x 59.2 mm	<b>QD models:</b> IP69K <b>Other models:</b> IEC IP67; NEMA 6	Stainless steel	10 to 30 V dc
	<b>M18-3</b> Nickel plated brass housing is well protected against industrial fluids and mechanical damage. Page 128	<b>Opposed:</b> 25 m <b>Retro:</b> 6 m <b>Polarized Retro:</b> 7.5 m <b>Diffuse:</b> 750 mm <b>Fixed-Field:</b> 200 mm	18 ø x 63.5 mm	IEC IP67 and IP69K	Nickel-plated	10 to 30 V dc
	<b>M18-4</b> Epoxy-encapsulated metal barrel sensors provide reliable sensing without adjustments. Page 130	<b>Opposed:</b> 25 m <b>Retro:</b> 6 m <b>Polarized Retro:</b> 7.5 m <b>Diffuse:</b> 750 mm <b>Fixed-Field:</b> 200 mm	18 ø x 63.5 mm	IEC IP67, IP68 and IP69K	Stainless steel	10 to 30 V dc
	<b>S30</b> Epoxy-encapsulated sensors provide superior durability and reliable sensing over a long range. Page 138	<b>Opposed:</b> 60 m <b>Polarized Retro:</b> 6 m <b>Fixed-Field:</b> 600 mm	Varies by model	<b>QD models:</b> IP69K <b>Other models:</b> IEC IP67; NEMA 6	Thermoplastic Polyester	10 to 30 V dc 20 to 250 V ac
	<b>SM30</b> Powerful epoxy-encapsulated sensor with a long range and the stainless steel model can be used in abusive environments. Page 140	<b>Opposed:</b> 150 m	30 ø x 102 mm	IEC IP67; NEMA 6	Thermoplastic Polyester or Stainless steel	10 to 30 V dc 24 to 240 V ac



# M12 Series

## Metal Barrel-Mount Sensors



- Metal sensor with fully encapsulated electronics.
- Easily replaces inductive sensors when target is too close to the sensor
- Available in NEMA 6P, IP67, IP69K and up to 1200 psi washdown depending on model
- Highly visible red sensing beam for easy alignment

### Opposed M12

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	5 m	2 m 4-Pin Euro QD	M12E (Emitter)	
	5 m	2 m 4-Pin Euro QD	M12NR M12NRQ8	M12PR M12PRQ8
			M12EQ8 (Emitter)	

### Retro & Polar Retro M12

Sensing Mode	Range	Connection	Models NPN	Models PNP
 RETRO	2.5 m <sup>†</sup>	2 m 4-Pin Euro QD	M12NLV M12NLVQ8	M12PLV M12PLVQ8
	 POLAR RETRO	1.5 m <sup>†</sup>	2 m	M12NLP
4-Pin Euro QD			M12NLPQ8	M12PLPQ8

### Fixed-Field M12

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	25 mm Cutoff	2 m	M12NFF25	M12PFF25
		4-Pin Euro QD	M12NFF25Q8	M12PFF25Q8
 FIXED-FIELD	50 mm Cutoff	2 m	M12NFF50	M12PFF50
		4-Pin Euro QD	M12NFF50Q8	M12PFF50Q8
 FIXED-FIELD	75 mm Cutoff	2 m	M12NFF75	M12PFF75
		4-Pin Euro QD	M12NFF75Q8	M12PFF75Q8

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, M12PD W/30).

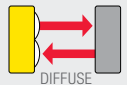
QD models: For a 4-pin 150 mm Euro-style pigtail QD, add suffix Q5 (example, M12PDQ5).

<sup>†</sup> Retroreflective range is specified using a BRT-84 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

## Diffuse M12

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	400 mm	2 m	M12ND	M12PD
		4-Pin Euro QD	M12NDQ8	M12PDQ8

## Euro QD (for Q5 models)

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



4-Pin  
**MQDC-406**  
 2 m (6.')

**MQDC-415**  
 5 m (15')

**MQDC-430**  
 9 m (30')



**SMBQS12PD**  
 12-ga. stainless steel

Additional bracket information is available  
 See page 758

Additional bracket information is available  
 See page 723



Opposed, Retroreflective  
 Diffuse and Fixed-Field Models  
 Suffix E, R, LP, LV, D and FF

## Reflectors



Additional information is available  
 See page 790

## Apertures



Additional information is available  
 See page 816

## M12 Specifications

Sensing Beam	<b>Fixed-Field:</b> 680 nm visible red <b>All others:</b> 660 nm visible red
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) @ 20 mA max current (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Complementary (1 normally open and 1 normally closed) solid-state, NPN or PNP, depending on model
Output Ratings	100 mA total across both outputs with overload and short circuit protection <b>OFF-state leakage current:</b> <b>NPN:</b> less than 200 µA @ 30 V dc (see Application Note) <b>PNP:</b> less than 10 µA @ 30 V dc <b>ON-state saturation voltage:</b> <b>NPN:</b> less than 1.6 V @ 100 mA <b>PNP:</b> less than 3.0 V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up, short-circuit protected
Output Response Time	<b>Opposed:</b> 625 microsecond ON/375 microseconds OFF <b>All others:</b> 500 microseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs do not conduct during this time
Repeatability	<b>Opposed:</b> 85 microseconds <b>All others:</b> 95 microseconds
Indicators	<b>2 LED indicators:</b> <b>Solid Green:</b> power ON <b>Flashing Green:</b> output overloaded <b>Yellow:</b> light sensed <b>Flashing Yellow:</b> marginal excess gain
Adjustments	<b>Fixed-Field:</b> none <b>All others:</b> single-turn Gain (sensitivity) potentiometer
Construction	<b>Housing:</b> Nickel-plated brass <b>Lenses:</b> PMMA <b>Cable endcap and Gain potentiometer adjuster:</b> PBT
Environmental Rating	IEC IP67; NEMA 6, IEC IP68 and 1200 PSI washdown, NEMA 1CS 5 Annex F-2002
Connections	2 m or 9 m 4-wire PVC-jacketed cable, 4-pin integral Euro-style QD ( <b>Q8</b> ), or 150 mm pigtail with 4-pin Euro-style quick-disconnect fitting ( <b>Q5</b> ), depending on model. QD cordsets ordered separately.
Operating Conditions	<b>Operating temperature:</b> -20° to +60° C <b>Relative humidity:</b> 90% max @ +50° C
Application Notes	NPN off-state leakage current is < 200 µA for load resistances > 3 kΩ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current
Certifications	<b>CE</b>

# S12 Series

## Plastic Barrel-Mount Sensors



- Housing rated to IP67 for heavy-duty industrial sensing
- Sensing range up to 20 m
- Wide beam pattern makes sensor alignment easy at long ranges
- Available in opposed mode

### Opposed S12

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	15 m	2 m	S126E Emitter	
			S12SN6R	S12SP6R

### Opposed S12-2

Infrared LED

Sensing Mode	Range	Input	Connection	Models NPN	Models PNP
	20 m	–	2 m	S12-2NAEL-2M Emitter	
		Beam Inhibit		S12-2NAEJ-2M Emitter	
		–		S12-2ANRL-2M	S12-2APRL-2M
		–		S12-2RNRL-2M	S12-2RPRL-2M



Connection options: A model with a QD requires a mating cordset.

QD models: For a 4-pin 150 mm Pico-style pigtail QD, add suffix QP (example, S12SN6RQP).



**Pico QD (for Q models)**  
Straight connector models listed;  
for right-angle, **W** replaces **G** in  
the model number.  
(example, **PKW4M-2**)

**4-Pin**  
**PKG4M-2**  
2 m (6')  
**PKG4M-5**  
5 m (15')  
**PKG4M-9**  
9 m (30')



**Pico QD (for Q7 models)**  
Straight snap-on connector model

**Pico QD (for Q7 models)**  
Right Angle' snap-on connector model

**4-Pin**  
**PKG4-2**  
2 m (6')  
**PKW4Z-2**  
2 m (6')



**S12**  
Opposed Models

Additional cordset information is available  
See page 758



**SMB12MM**

Additional bracket information is available  
See page 723

#### Reflectors



Additional information is available  
See page 790

#### Apertures



Additional information is available  
See page 816



**S12-2**  
Opposed Models

## S12 & S12-2 Specifications

<b>Supply Voltage and Current</b>	<b>S12:</b> 10 to 30 V dc (10% max. ripple); 25 mA (emitters) or 20 mA (receivers) exclusive of load <b>S12-2:</b> 10 to 30 V dc; < 25 mA (emitters) or 15 mA (receivers) exclusive of load
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	<b>S12:</b> Complementary solid-state dc switch; choose NPN (current sinking) or PNP (current sourcing) models <b>Light Operate:</b> N.O. output conducts when the sensor sees the emitter's modulated light <b>Dark Operate:</b> N.C. output conducts when the sensor sees dark; The N.C. (normally closed) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply <b>S12-2:</b> One solid state output, NPN (sinking) or PNP (sourcing), depending on model
<b>Output Ratings</b>	100 mA maximum (each) in standard hookup; when wired for alarm output, the total load may not exceed 100 mA <b>OFF-state leakage current:</b> less than 1 $\mu$ A @ 30 V dc <b>ON-state saturation voltage:</b> less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs
<b>Output Response Time</b>	<b>S12:</b> 3 milliseconds ON, 1.5 milliseconds OFF <b>S12-2:</b> 11 milliseconds ON, 7 milliseconds OFF
<b>Delay at Power-up</b>	<b>S12:</b> 100 millisecond; outputs are non-conducting during this time <b>S12-2:</b> 1 second; outputs are non-conducting during this time
<b>Repeatability</b>	<b>S12:</b> 375 microseconds <b>S12-2:</b> 1.5 milliseconds
<b>Indicators</b>	<b>Green LED (emitter and receiver):</b> power ON <b>Amber LED (receiver only):</b> light sensed
<b>Construction</b>	Housings are reinforced thermoplastic polyester; lenses are Lexan®; Polyurethane end cap
<b>Environmental Rating</b>	Leakproof design rated NEMA 6P (IEC IP67)
<b>Connections</b>	<b>S12:</b> 2 m or 9 m cable, or a 150 mm pigtail with 4-pin Pico-style QD <b>S12-2:</b> 2 m or 9 m cable, or a 150 mm pigtail with 3-pin Pico-style QD QD cordset ordered separately.
<b>Operating Conditions</b>	<b>S12:</b> Temperature: -40° to +70° C Maximum relative humidity: 90% at 50°C (non-condensing) <b>S12-2:</b> Temperature: -25° to +50° C Maximum relative humidity: 90% at 50°C (non-condensing)
<b>Vibration and Mechanical Shock</b>	Meets Mil. Std. 202F requirements. Method 201A (Vibration: frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation).
<b>Certifications</b>	

Lexan® is a registered trademark of General Electric Co.

# SB12 & SB12T

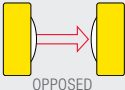
## Plastic Barrel-Mount Sensors



- Narrow beam for precise leading edge detection
- Ideal for compact areas
- No adjustment necessary
- SB12T has a threaded housing for robust monitoring in applications with vibration, rough handling or vandalism

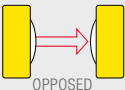
### Opposed SB12



Sensing Mode	Range	Connection	Output	Models NPN	Models PNP
 OPPOSED	1.5 m	2 m	-	SB12E1 Emitter	
			LO	SB12ANR	SB12APR
			DO	SB12RNR	SB12RPR

### Opposed SB12T



Sensing Mode	Range	Connection	Output	Models NPN	Models PNP
 OPPOSED	1.5 m	2 m	-	SB12TE1 Emitter	
			LO	SB12TANR	SB12TAPR
			DO	SB12TRNR	SB12TRPR



Connection options: A model with a QD requires a mating cordset

QD models: For a 3-pin 150 mm Pico-style pigtail QD, add suffix Q3 (example, SB12E1Q3).



4-Pin

**Pico QD (for Q models)**  
Straight connector models listed;  
for right-angle, **W** replaces **G** in  
the model number.  
(example, **PKW4M-2**)

**PKG4M-2**  
2 m (6')  
**PKG4M-5**  
5 m (15')  
**PKG4M-9**  
9 m (30')



4-Pin

**Pico QD (for Q7 models)**  
Straight snap-on connector model

**Pico QD (for Q7 models)**  
Right Angle snap-on connector model

**PKG4-2**  
2 m (6')  
**PKW4Z-2**  
2 m (6')

Additional cordset information is available  
See page 758



SMB12MM

Additional bracket information is available  
See page 723

SB12  
Opposed ModelsSB12T  
Opposed Models

## SB12/SB12T Specifications

Supply Voltage and Current	10 to 30 V dc; less than 15 mA max exclusive of load	
Supply Protection Circuitry	Protected against reverse polarity and transient voltages	
Output Configuration	One solid state output, NPN (sinking) or PNP (sourcing), depending on model	
Output Ratings	<b>SB12/SB12T:</b> 100 mA <b>OFF-state leakage current:</b> < 10 $\mu$ A <b>ON-state saturation voltage:</b> < 0.2 V @ 10 mA; < 0.6 V @ 100 mA	
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs	
Output Response Time	2.5 milliseconds ON, 1.75 milliseconds OFF	
Delay at Power-up	Less than 1 second	
Repeatability	350 microseconds	
Switching Frequency	235 Hz	
Indicators	<b>Solid Green (emitter and receiver):</b> power ON <b>Solid Amber (receiver only):</b> light sensed	<b>Flashing Green (emitter and receiver):</b> output short circuited <b>Flashing Amber (receiver only):</b> marginal excess gain
Construction	<b>Housing:</b> ABS <b>Lens:</b> Polycarbonate; epoxy encapsulant <b>Cable:</b> PVC-jacketed	
Environmental Rating	<b>SB12:</b> IP65	<b>SB12T:</b> IP67
Connections	2 m cable or 150 mm pigtail with 3-pin Pico-style QD. QD cordset ordered separately.	
Operating Conditions	<b>Temperature:</b> -20° to +50° C <b>Maximum relative humidity:</b> 90% at 50° C (non-condensing)	

Certifications





# S18-2 Series

## Plastic Barrel-Mount Sensors



- Bright visible red emitter beam for easy alignment and set-up
- Available in multiple operating modes
- Wide operating range from  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- High performance sensing
- Beam inhibit or gain adjustment on select models
- Cordsets and brackets see page 132

### Opposed S18-2

Sensing Mode	Range	Connection	Models NPN	Models PNP	
 OPPOSED	25 m	Emitter	2 m	S18-2NAEL-2M	
			4-pin Euro QD	S18-2NAEL-Q8	
			2 m	S18-2NAEJ-2M (with Beam inhibit)	
			4-pin Euro QD	S18-2NAEJ-Q8 (with Beam inhibit)	
			2 m	S18-2NAES-2M (with Adjustment)	
			4-pin Euro QD	S18-2NAEJ-Q8 (with Adjustment)	
 OPPOSED	25 m	Receiver	2 m	S18-2VNLP-2M	S18-2VPLP-2M
			4-pin Euro QD	S18-2VNLP-Q8	S18-2VPLP-Q8
			2 m	M18-3VNRS-2M (with Adjustment)	M18-3VPRS-2M (with Adjustment)
			4-pin Euro QD	M18-3VNRS-Q8 (with Adjustment)	M18-3VPRS-Q8 (with Adjustment)

### Polar Retro S18-2

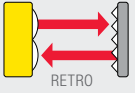
Sensing Mode	Range*	Connection	Models NPN	Models PNP
 POLAR RETRO	6 m	2 m	S18-2VNLP-2M	S18-2VPLP-2M
		4-pin Euro QD	S18-2VNLP-Q8	S18-2VPLP-Q8
		2 m	S18-2VNLPC-2M (with Adjustment)	S18-2VPLPC-2M (with Adjustment)
		4-pin Euro QD	S18-2VNLPC-Q8 (with Adjustment)	S18-2VPLPC-Q8 (with Adjustment)

For more specifications see page 133.

Connection options: A model with a QD requires a mating cordset (see page 132).  
 For a 9 m cable, add suffix 9M to the 2 m model number (example, S18-2NAEL-9M).  
 For a 4-pin Euro M12 pigtail QD, add suffix Q5 to the model number (example, S18-2VNRL-Q5).  
 For a 4-pin Pico M8 pigtail QD, add suffix Q3 to the model number (example, S18-2VNRL-Q3).  
 \* Range specified with BRT-84 reflector

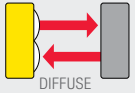
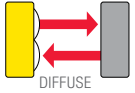
## Retro S18-2

 Visible Red LED

Sensing Mode	Range*	Connection	Models NPN	Models PNP
	7.5 m	2 m	S18-2VNLV-2M (with Adjustment)	S18-2VPLV-2M (with Adjustment)
		4-pin Euro QD	S18-2VNLV-Q8 (with Adjustment)	S18-2VPLV-Q8 (with Adjustment)

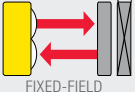
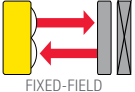
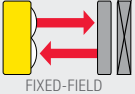
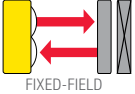
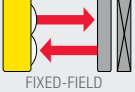
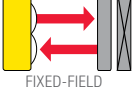
## Diffuse S18-2

 Visible Red LED


Sensing Mode	Range*	Connection	Models NPN	Models PNP
	750 mm	2 m	S18-2VNLD-2M (with Adjustment)	S18-2VPDL-2M (with Adjustment)
		4-pin Euro QD	S18-2VNLD-Q8 (with Adjustment)	S18-2VPDL-Q8 (with Adjustment)
	300 mm	2 m	S18-2VNDS-2M (with Adjustment)	S18-2VPDS-2M (with Adjustment)
		4-pin Euro QD	S18-2VNDS-Q8 (with Adjustment)	S18-2VPDS-Q8 (with Adjustment)

## Fixed-Field S18-2

 Visible Red LED

Sensing Mode	Range*	Connection	Models NPN	Models PNP
	30 mm	2 m	S18-2VNFF30-2M	S18-2VPFF30-2M
		4-pin Euro QD	S18-2VNFF30-Q8	S18-2VPFF30-Q8
	50 mm	2 m	S18-2VNFF50-2M	S18-2VPFF50-2M
		4-pin Euro QD	S18-2VNFF50-Q8	S18-2VPFF50-Q8
	75 mm	2 m	S18-2VNFF75-2M	S18-2VPFF75-2M
		4-pin Euro QD	S18-2VNFF75-Q8	S18-2VPFF75-Q8
	100 mm	2 m	S18-2VNFF100-2M	S18-2VPFF100-2M
		4-pin Euro QD	S18-2VNFF100-Q8	S18-2VPFF100-Q8
	150 mm	2 m	S18-2VNFF150-2M	S18-2VPFF150-2M
		4-pin Euro QD	S18-2VNFF150-Q8	S18-2VPFF150-Q8
	200 mm	2 m	S18-2VNFF200-2M	S18-2VPFF200-2M
		4-pin Euro QD	S18-2VNFF200-Q8	S18-2VPFF200-Q8

For more specifications see page 133.

 Connection options: A model with a QD requires a mating cordset (see page 132).

For a 9 m cable, add suffix 9M to the 2 m model number (example, S18-2NAEL-9M).

For a 4-pin Euro M12 pigtail QD, add suffix Q5 to the model number (example, S18-2VNRL-Q5)

For a 4-pin Pico M8 pigtail QD, add suffix Q3 to the model number (example, S18-2VNRL-Q3)

\* Range specified with BRT-84 reflector

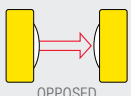
# S18 Series

## Plastic Barrel-Mount Sensors

- Epoxy-encapsulated barrel sensors
- Available in multiple operating modes
- Meets IP69K standards
- Wide operating range from -40° C to +70° C
- Cordsets and brackets see page 132

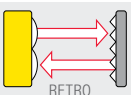

### Opposed S18, 10-30 V DC

 Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	20 m	2 m	S18SN6R S18SN6RQ	S186E Emitter S186EQ Emitter S18SP6R S18SP6RQ
		4-pin Euro QD		

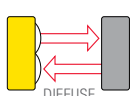
### Retro and Polar Retro S18, 10-30 V DC

 Infrared LED
  Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 RETRO	2 m*	2 m	S18SN6L	S18SP6L
		4-pin Euro QD	S18SN6LQ	S18SP6LQ
 POLAR RETRO	2 m*	2 m	S18SN6LP	S18SP6LP
		4-pin Euro QD	S18SN6LPQ	S18SP6LPQ

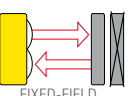
### Diffuse S18, 10-30 V DC

 Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	100 mm	2 m	S18SN6D	S18SP6D
		4-pin Euro QD	S18SN6DQ	S18SP6DQ
	300 mm	2 m	S18SN6DL	S18SP6DL
		4-pin Euro QD	S18SN6DLQ	S18SP6DLQ

### Fixed-Field S18, 10-30 V DC

 Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	S18SN6FF25	S18SP6FF25
		4-pin Euro QD	S18SN6FF25Q	S18SP6FF25Q
	0 - 50 mm Cutoff	2 m	S18SN6FF50	S18SP6FF50
		4-pin Euro QD	S18SN6FF50Q	S18SP6FF50Q
	0 - 100 mm Cutoff	2 m	S18SN6FF100	S18SP6FF100
		4-pin Euro QD	S18SN6FF100Q	S18SP6FF100Q

For more specifications see page 133.

 Connection options: A model with a QD requires a mating cordset (see page 132).

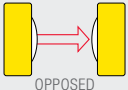
For 9 m cable, add suffix W/30 to the 2 m model number (example, S18SP6R W/30).

\* Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

## Opposed S18, 20-250 V AC

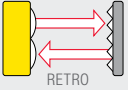

Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 OPPOSED	20 m	2 m	S183E Emitter	
		4-pin Micro QD	S183EQ1 Emitter	
		2 m	S18AW3R	S18RW3R
		4-pin Micro QD	S18AW3RQ1	S18RW3RQ1

## Retro &amp; Polar Retro S18, 20-250 V AC

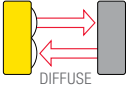
Infrared LED

Visible Red LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 RETRO	2 m <sup>†</sup>	2 m	S18AW3L	S18RW3L
		4-pin Micro QD	S18AW3LQ1	S18RW3LQ1
 POLAR RETRO	2 m <sup>†</sup>	2 m	S18AW3LP	S18RW3LP
		4-pin Micro QD	S18AW3LPQ1	S18RW3LPQ1

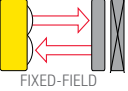
## Diffuse S18, 20-250 V AC

Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 DIFFUSE	100 mm	2 m	S18AW3D	S18RW3D
		4-pin Micro QD	S18AW3DQ1	S18RW3DQ1
	300 mm	2 m	S18AW3DL	S18RW3DL
		4-pin Micro QD	S18AW3DLQ1	S18RW3DLQ1

## Fixed-Field S18, 20-250 V AC

Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	S18AW3FF25	S18RW3FF25
		4-pin Micro QD	S18AW3FF25Q1	S18RW3FF25Q1
	0 - 50 mm Cutoff	2 m	S18AW3FF50	S18RW3FF50
		4-pin Micro QD	S18AW3FF50Q1	S18RW3FF50Q1
	0 - 100 mm Cutoff	2 m	S18AW3FF100	S18RW3FF100
		4-pin Micro QD	S18AW3FF100Q1	S18RW3FF100Q1

For more specifications see page 134.

Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S183E W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

# M18 Series

## Metal Barrel-Mount Sensors



- Epoxy-encapsulated metal barrel sensors
- Available in multiple operating modes
- Meets IP69K standards
- Wide operating range from -40 to +70° C
- High performance sensing
- Cordsets and brackets see page 132

### Opposed M18

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	20 m	2 m	M186E Emitter	
		4-pin Euro QD	M186EQ Emitter	
		2 m	M18SN6R	M18SP6R
		4-pin Euro QD	M18SN6RQ	M18SP6RQ

### Retro & Polar Retro M18

Infrared LED

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	2 m <sup>†</sup>	2 m	M18SN6L	M18SP6L
		4-pin Euro QD	M18SN6LQ	M18SP6LQ
	2 m <sup>†</sup>	2 m	M18SN6LP	M18SP6LP
		4-pin Euro QD	M18SN6LPQ	M18SP6LPQ

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

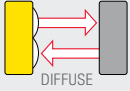
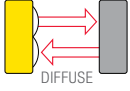
For 9 m cable, add suffix W/30 to the 2 m model number (example, M18SP6D W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

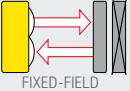
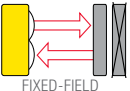
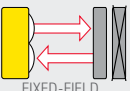
## Diffuse M18

 Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	100 mm	2 m	M18SN6D-2M	M18SP6D-2M
		4-pin Euro QD	M18SN6DQ-Q8	M18SP6DQ-Q8
 DIFFUSE	300 mm	2 m	M18SN6DL-2M	M18SP6DL-2M
		4-pin Euro QD	M18SN6DLQ-Q8	M18SP6DLQ

## Fixed-Field M18

 Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	M18SN6FF25	M18SP6FF25
		4-pin Euro QD	M18SN6FF25Q	M18SP6FF25Q
 FIXED-FIELD	0 - 50 mm Cutoff	2 m	M18SN6FF50	M18SP6FF50
		4-pin Euro QD	M18SN6FF50Q	M18SP6FF50Q
 FIXED-FIELD	0 - 100 mm Cutoff	2 m	M18SN6FF100	M18SP6FF100
		4-pin Euro QD	M18SN6FF100Q	M18SP6FF100Q

For more specifications see page 135.

 Connection options: A model with a QD requires a mating cordset (see page 132).

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18SP6D W/30).



# M18-3 Series

## Heavy-Duty Metal Barrel-Mount Sensors



- Economical photoelectric sensors for cost sensitive and high volume installations
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Advanced ASIC technology is resistant to optical and electrical noise source
- Robust 250° adjustment potentiometer on select models
- Cordsets and brackets see page 132

### Opposed M18-3

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP	
	25 m	Emitter	2 m	M186-3NAEL-2M	
			4-pin Euro QD	M186-3NAEL-Q8	
			2 m	M186-3NAEJ-2M (with Beam inhibit)	
			4-pin Euro QD	M186-3NAEJ-Q8 (with Beam inhibit)	
			2 m	M186-3NAES-2M (with Adjustment)	
	25 m	Receiver	4-pin Euro QD	M186-3NAES-Q8 (with Adjustment)	
			2 m	M18-3VNRL-2M	M18-3VPRL-2M
			4-pin Euro QD	M18-3VNRL-Q8	M18-3VPRL-Q8
			2 m	M18-3VNRS-2M (with Adjustment)	M18-3VPRS-2M (with Adjustment)
			4-pin Euro QD	M18-3VNRS-Q8 (with Adjustment)	M18-3VPRS-Q8 (with Adjustment)

### Retro & Polar Retro M18-3

Infrared LED

Visible Red LED

Sensing Mode	Range †	Connection	Models NPN	Models PNP
	7.5 m	2 m	M18-3VNLV-2M (with Adjustment)	M18-3VPLV-2M (with Adjustment)
		4-pin Euro QD	M18-3VNLV-Q8 (with Adjustment)	M18-3VPLV-Q8 (with Adjustment)
	2 m	2 m	M18-3VNLP-2M	M18-3VPLP-2M
		4-pin Euro QD	M18-3VNLP-Q8	M18-3VPLP-Q8
		2 m	M18-3VNLPC-2M (with Adjustment)	M18-3VPLPC-2M (with Adjustment)
		4-pin Euro QD	M18-3VNLPC-Q8 (with Adjustment)	M18-3VPLPC-Q8 (with Adjustment)

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

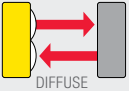
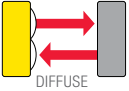
For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNRLQ5.

† Retroreflective range is specified using one model BRT-84.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

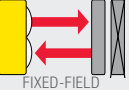
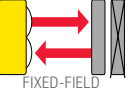
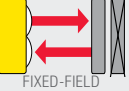
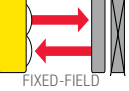
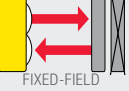
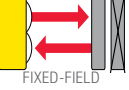
## Diffuse M18-3

 Visible Red LED


Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	750 mm	2 m	M18-3VNDL-2M (Adjustment)	M18-3VPDL-2M (Adjustment)
		4-pin Euro QD	M18-3VNDL-Q8 (Adjustment)	M18-3VPDL-Q8 (Adjustment)
 DIFFUSE	300 mm	2 m	M18-3VNDS-2M (Adjustment)	M18-3VPDS-2M (Adjustment)
		4-pin Euro QD	M18-3VNDS-Q8 (Adjustment)	M18-3VPDS-Q8 (Adjustment)

## Fixed-Field M18-3

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	30 mm	2 m	M18-3VNFF30-2M	M18-3VPFF30-2M
		4-pin Euro QD	M18-3VNFF30-Q8	M18-3VPFF30-Q8
 FIXED-FIELD	50 mm	2 m	M18-3VNFF50-2M	M18-3VPFF50-2M
		4-pin Euro QD	M18-3VNFF50-Q8	M18-3VPFF50-Q8
 FIXED-FIELD	75 mm	2 m	M18-3VNFF75-2M	M18-3VPFF75-2M
		4-pin Euro QD	M18-3VNFF75-Q8	M18-3VPFF75-Q8
 FIXED-FIELD	100 mm	2 m	M18-3VNFF100-2M	M18-3VPFF100-2M
		4-pin Euro QD	M18-3VNFF100-Q8	M18-3VPFF100-Q8
 FIXED-FIELD	150 mm	2 m	M18-3VNFF150-2M	M18-3VPFF150-2M
		4-pin Euro QD	M18-3VNFF150-Q8	M18-3VPFF150-Q8
 FIXED-FIELD	200 mm	2 m	M18-3VNFF200-2M	M18-3VPFF200-2M
		4-pin Euro QD	M18-3VNFF200-Q8	M18-3VPFF200-Q8

For more specifications see page 135.

 Connection options: A model with a QD requires a mating cordset (see page 132).

For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNDL-Q5.

# M18-4 Series

## Metal Barrel-Mount Sensors



- Chemically robust stainless steel sensors for wash-down applications
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Advanced ASIC technology is resistant to optical and electrical noise source
- Robust 250° adjustment potentiometer on select models
- Cordsets and brackets see page 132

### Opposed M18-4

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	25 m	2 m	M18-4NAEL-2M Emitter	
		4-pin Euro QD	M18-4NAEL-Q8 Emitter	
		2 m	M18-4NAEJ-2M Emitter (Beam inhibit)	
		4-pin Euro QD	M18-4NAEJ-Q8 Emitter (Beam inhibit)	
	25 m	2 m	M18-4NAES-2M Emitter (Adjustment)	
		4-pin Euro QD	M18-4NAES-Q8 Emitter (Adjustment)	
		2 m	M18-4VNRL-2M	M18-4VPRL-2M
		4-pin Euro QD	M18-4VNRL-Q8	M18-4VPRL-Q8
	25 m	2 m	M18-4VNRS-2M (Adjustment)	M18-4VPRS-2M (Adjustment)
		4-pin Euro QD	M18-4VNRS-Q8 (Adjustment)	M18-4VPRS-Q8 (Adjustment)

### Retro & Polar Retro M18-4

Infrared LED Visible Red LED

Sensing Mode	Range †	Connection	Models NPN	Models PNP
	7.5 m	2 m	M18-4VNLV-2M (Adjustment)	M18-4VPLV-2M (Adjustment)
		4-pin Euro QD	M18-4VNLV-Q8 (Adjustment)	M18-4VPLV-Q8 (Adjustment)
	2 m	2 m	M18-4VNLP-2M	M18-4VPLP-2M
		4-pin Euro QD	M18-4VNLP-Q8	M18-4VPLP-Q8
		2 m	M18-4VNLPC-2M (Adjustment)	M18-4VPLPC-2M (Adjustment)
		4-pin Euro QD	M18-4VNLPC-Q8 (Adjustment)	M18-4VPLPC-Q8 (Adjustment)

For more specifications see page 135.

Connection options: A model with a QD requires a mating cordset (see page 132).

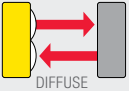
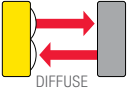
For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-4VNRL-Q5.

† Retroreflective range is specified using one model BRT-84.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

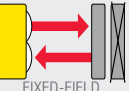
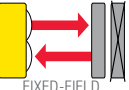
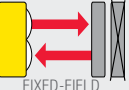
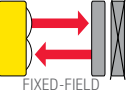
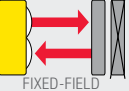
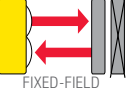
## Diffuse M18-4

 Visible Red LED


Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE	750 mm	2 m	M18-4VNDL-2M (Adjustment)	M18-4VPDL-2M (Adjustment)
		4-pin Euro QD	M18-4VNDL-Q8 (Adjustment)	M18-4VPDL-Q8 (Adjustment)
 DIFFUSE	300 mm	2 m	M18-4VNDS-2M (Adjustment)	M18-4VPDS-2M (Adjustment)
		4-pin Euro QD	M18-4VNDS-Q8 (Adjustment)	M18-4VPDS-Q8 (Adjustment)

## Fixed-Field M18-4

 Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 FIXED-FIELD	30 mm	2 m	M18-4VNFF30-2M	M18-4VPFF30-2M
		4-pin Euro QD	M18-4VNFF30-Q8	M18-4VPFF30-Q8
 FIXED-FIELD	50 mm	2 m	M18-4VNFF50-2M	M18-4VPFF50-2M
		4-pin Euro QD	M18-4VNFF50-Q8	M18-4VPFF50-Q8
 FIXED-FIELD	75 mm	2 m	M18-4VNFF75-2M	M18-4VPFF75-2M
		4-pin Euro QD	M18-4VNFF75-Q8	M18-4VPFF75-Q8
 FIXED-FIELD	100 mm	2 m	M18-4VNFF100-2M	M18-4VPFF100-2M
		4-pin Euro QD	M18-4VNFF100-Q8	M18-4VPFF100-Q8
 FIXED-FIELD	150 mm	2 m	M18-4VNFF150-2M	M18-4VPFF150-2M
		4-pin Euro QD	M18-4VNFF150-Q8	M18-4VPFF150-Q8
 FIXED-FIELD	200 mm	2 m	M18-4VNFF200-2M	M18-4VPFF200-2M
		4-pin Euro QD	M18-4VNFF200-Q8	M18-4VPFF200-Q8

For more specifications see page 135.

 Connection options: A model with a QD requires a mating cordset (see page 132).

For 150 mm cable with a 4-pin M12/Euro-style quick disconnect model, add the suffix "Q5". For example, M18-3VNDL-Q5.

**PHOTOELECTRIC**

**FEATURED**

**RECTANGLE**

**RIGHT ANGLE**

**BARREL**



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

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

*Additional cordset information is available  
 See page 758*



**4-Pin**  
**MQAC-406**  
 2 m (6.5')  
**MQAC-415**  
 5 m (15')  
**MQAC-430**  
 9 m (30')

**Micro-Style**  
 Straight connector models listed;  
 for right-angle, add **RA** to the end  
 of the model number (example,  
**MQDC-306RA**)

**Reflectors**



*Additional information is available  
 See page 790*

**Apertures**



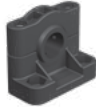
*Additional information is available  
 See page 816*



**SMB18A**



**SMBAMS18P**



**SMB3018SC**



**SMB18FAM12**

*Additional bracket information is available  
 See page 723*



**S18-2 dc Polarized Retroreflective  
 and Fixed-Field Models**  
 Suffix LP and FF



**S18 dc Opposed, Non-polarized  
 Retroreflective and Diffuse Models**  
 Suffix E, R, L and D



**S18 ac Opposed, Retroreflective,  
 Polarized Retroreflective, Diffuse and  
 Fixed-Field Models**  
 Suffix E, R, L, LP, D and FF



**M18 Opposed, Non-polarized  
 Retroreflective and Diffuse Models**  
 Suffix E, R, L, D and DL






**M18-3 Opposed, Retroreflective,  
 Polarized Retroreflective, Fixed-Field and Diffuse Models**  
 Suffix E, R, L, D and DL




**M18-4 Opposed, Retroreflective,  
 Polarized Retroreflective, Fixed-Field and Diffuse Models**  
 Suffix E, R, L, D and DL

## S18-2 and S18 DC Specifications


Supply Voltage and Current	<p><b>S18:</b> 10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current):  <b>S18-2:</b> 10 to 30 V dc ≤ 55° C; 10 to 24 V dc &gt; 55° C (10% max. ripple); Supply current (exclusive of load current):</p> <p><b>S18-2:</b>   <b>Opposed Emitters:</b> 17 mA           <b>S18:</b> Opposed Emitters: 25 mA                <b>Opposed Receivers:</b> 8 mA       <b>Opposed Receivers:</b> 20 mA                <b>Polarized Retroreflective:</b> 16 mA   <b>Polarized Retroreflective:</b> 30 mA                <b>Diffuse:</b> 16 mA                       <b>Non-polarized Retroreflective:</b> 25 mA    <b>Fixed-Field:</b> 35 mA    <b>Diffuse:</b> 25 mA</p>
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model <b>S18:</b> The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply
Output Rating	<p><b>S18:</b> 150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA  <b>S18-2:</b> Less than or equal to 100 mA total current through both outputs at less than or at 55 °C  Less than or equal to 50 mA total current for ambient temperatures greater than 55 °C  <b>OFF-state leakage current: S18-2:</b> less than 50 µA at 30 V dc    <b>S18:</b> less than 1 µA at 30 V dc  <b>ON-state saturation voltage: S18-2:</b> less than 1.5 V at 10 mA dc; less than 2.75 V at 100 mA dc    <b>S18:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc</p>
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	<p><b>S18-2: Opposed:</b> 1.5 milliseconds ON, 1.0 milliseconds OFF                    <b>Retro, Polarized Retroreflective and Diffuse:</b> 1.5 milliseconds ON, 0.75 milliseconds OFF  <b>S18: Opposed:</b> 3 milliseconds ON, 1.5 milliseconds OFF                    <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 3 milliseconds ON/OFF</p>
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	<p><b>S18-2: Opposed:</b> 170 microseconds                    <b>Polarized Retroreflective and Diffuse:</b> 100 microseconds  <b>S18: Opposed:</b> 375 microseconds                    <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 750 microseconds. Repeatability and response are independent of signal strength.</p>
Adjustments	<p><b>Diffuse (DL), Emitter (ES), Receiver (RS), Polarized Retroreflective (LPC), Retroreflective (LV) models:</b> Single turn sensitivity (gain) adjustment potentiometer  <b>Emitter Beam Inhibit (EJ) models:</b> Tie black wire to 10 to 30 V dc for beam inhibit</p>
Indicators	<p><b>S18-2: Three LED's: Green:</b> Power is ON       <b>Green Flashing:</b> Marginal sensing signal       <b>Yellow:</b> Pin 4 (black wire) output conducting  <b>S18: Two LEDs: Green:</b> Power is ON       <b>Green Flashing:</b> Output overloaded               <b>Yellow:</b> Light Operate (LO) output is energized</p>
Construction	<p><b>S18-2 models:</b> ABS housing  <b>S18 models:</b> thermoplastic polyester housing  Lenses are polycarbonate or acrylic; S18 models come with two jam nuts</p>
Environmental Rating	<p><b>S18-2:</b> IEC 60529 IP67  <b>S18:</b> Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.</p>
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity: S18:</b> 90% at 50° C (non-condensing) <b>S18-2:</b> 95% @ 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	<p>S18-2, S18 models:  S18 models:   <b>ECOLAB®</b> chemical compatibility pending on some models; contact Banner Engineering for details</p>



## S18 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). <b>Average current:</b> 20 mA. <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) <b>Fixed-Field:</b> derate 5 mA/° C above +50° C <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive <b>OFF-state leakage current:</b> less than 100 µA <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	<b>Opposed:</b> 16 milliseconds ON, 8 milliseconds OFF <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	<b>Opposed:</b> 2 milliseconds <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	<b>Two LEDs:</b> <b>Green:</b> Power ON <b>Yellow:</b> Light sensed <b>Yellow Flashing:</b> Marginal excess gain
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	   ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

## M18 DC Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflective:</b> 30 mA <b>Non-polarized Retroreflective:</b> 25 mA <b>Fixed-Field:</b> 35 mA <b>Diffuse:</b> 25 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	<b>Opposed:</b> 3 milliseconds ON, 1.5 milliseconds OFF <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 3 milliseconds ON/OFF
Delay at Power-up	100 milliseconds; outputs are non-conducting during this time
Repeatability	<b>Opposed:</b> 375 microseconds <b>Polarized Retroreflective, Non-polarized Retroreflective, Fixed-Field and Diffuse:</b> 750 microseconds. Repeatability and response are independent of signal strength.
Indicators	<b>Two LEDs: Green:</b> Power is ON <b>Yellow:</b> Light Operate (LO) output is energized <b>Green Flashing:</b> Output overloaded <b>Yellow Flashing:</b> Marginal excess gain
Construction	Stainless steel housing Lenses are polycarbonate or acrylic; come with two jam nuts
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	

# S30 Series

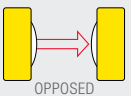
## Plastic Barrel-Mount Sensors



- Long-range opposed mode
- Features 30 mm plastic threaded barrel
- Available in 10-30 V dc or 20-250 V ac
- Ideal for use in harsh sensing environments
- Cordsets and brackets see page 138

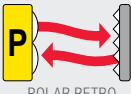
### Opposed S30, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	60 m	2 m 4-Pin Euro QD 2 m 4-Pin Euro QD	S30SN6R S30SN6RQ	S30SP6R S30SP6RQ
			S306E Emitter S306EQ Emitter	

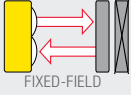
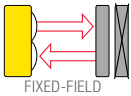
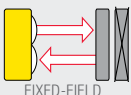
### Polar Retro S30, 10-30 V DC

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	6 m <sup>†</sup>	2 m 4-Pin Euro QD	S30SN6LP S30SN6LPQ	S30SP6LP S30SP6LPQ

### Fixed-Field S30, 10-30 V DC

Infrared LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
	0 - 200 mm Cutoff	2 m 4-Pin Euro QD	S30SN6FF200 S30SN6FF200Q	S30SP6FF200 S30SP6FF200Q
	0 - 400 mm Cutoff	2 m 4-Pin Euro QD	S30SN6FF400 S30SN6FF400Q	S30SP6FF400 S30SP6FF400Q
	0 - 600 mm Cutoff	2 m 4-Pin Euro QD	S30SN6FF600 S30SN6FF600Q	S30SP6FF600 S30SP6FF600Q

For more specifications see page 138.

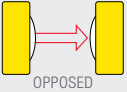
Connection options: A model with a QD requires a mating cordset (see page 138).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S30SP6LP W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-3 retroreflector.  
Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.


## Opposed S30, 20-250 V AC

 Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 OPPOSED	60 m	2 m	S303E Emitter	
		4-Pin Micro QD	S303EQ1 Emitter	
		2 m	S30AW3R	S30RW3R
		4-Pin Micro QD	S30AW3RQ1	S30RW3RQ1

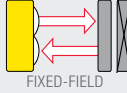
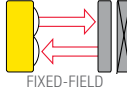
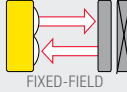
## Polar Retro S30, 20-250 V AC

 Visible Red LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 POLAR RETRO	6 m <sup>†</sup>	2 m	S30AW3LP	S30RW3LP
		4-Pin Micro QD	S30AW3LPQ1	S30RW3LPQ1

## Fixed-Field S30, 20-250 V AC

 Infrared LED

Sensing Mode	Range	Connection	Models Light Operate	Models Dark Operate
 FIXED-FIELD	0 - 200 mm Cutoff	2 m	S30AW3FF200	S30RW3FF200
		4-Pin Micro QD	S30AW3FF200Q1	S30RW3FF200Q1
 FIXED-FIELD	0 - 400 mm Cutoff	2 m	S30AW3FF400	S30RW3FF400
		4-Pin Micro QD	S30AW3FF400Q1	S30RW3FF400Q1
 FIXED-FIELD	0 - 600 mm Cutoff	2 m	S30AW3FF600	S30RW3FF600
		4-Pin Micro QD	S30AW3FF600Q1	S30RW3FF600Q1

For more specifications see page 139.

 Connection options: A model with a QD requires a mating cordset (see page 138).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S30SP6LP W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-3 retroreflector.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.



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

4-Pin

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



**Micro-Style**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
MQDC-306RA)

4-Pin

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



S30 DC Opposed, Polarized Retroreflective  
and Fixed-Field Models  
Suffix E, R, LP and FF



S30 AC Opposed, Polarized Retroreflective  
and Fixed-Field Models  
Suffix E, R, LP and FF

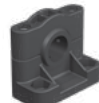
Additional cordset information is available  
See page 758



SMB18A



SMBAMS18P



SMB3018SC



SMB18FA..

Additional bracket information is available  
See page 724

#### Reflectors






#### Apertures






Additional information is available  
See page 790

Additional information is available  
See page 816

## S30 DC Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple); Supply current (exclusive of load current): <b>Opposed Emitters:</b> 25 mA <b>Opposed Receivers:</b> 20 mA <b>Polarized Retroreflective:</b> 30 mA <b>Fixed-Field:</b> 35 mA
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
<b>Output Rating</b>	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA <b>OFF-state leakage current:</b> less than 1 µA at 30 V dc <b>ON-state saturation voltage:</b> less than 1 V at 10 mA dc; less than 1.5 V at 150 mA dc
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs
<b>Output Response Time</b>	<b>Opposed:</b> 3 milliseconds ON; 1.5 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 3 milliseconds ON/OFF
<b>Delay at Power-up</b>	100 milliseconds; outputs are non-conducting during this time
<b>Repeatability</b>	<b>Opposed:</b> 375 microseconds <b>Polarized Retroreflective and Fixed-Field:</b> 750 microseconds Repeatability and response are independent of signal strength
<b>Indicators</b>	<b>Two LEDs:</b> <b>Solid Green:</b> Power ON <b>Flashing Green:</b> output over loaded <b>Solid Yellow:</b> Light Operate (LO) energized <b>Flashing Yellow:</b> marginal excess gain See datasheet for detailed information
<b>Construction</b>	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.
<b>Environmental Rating</b>	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9.
<b>Connections</b>	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately.
<b>Operating Conditions</b>	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
<b>Certifications</b>	   ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details

## S30 AC Specifications

Supply Voltage and Current	20 to 250 V ac (50/60 Hz). Average current: 20 mA <b>Peak current:</b> 200 mA at 20 V ac, 500 mA at 120 V ac, 750 mA at 250 V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose Light Operate (LO) or Dark Operate (DO) models; <b>Light Operate:</b> Output conducts when the sensor sees its own (or the emitter's) modulated light <b>Dark Operate:</b> Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) <b>Fixed-Field:</b> derate 5 mA/° C above +50° C <b>Inrush capability:</b> 1 amp for 20 milliseconds, non-repetitive <b>OFF-state leakage current:</b> less than 100 µA <b>ON-state voltage drop:</b> 3 V at 300 mA ac; 2 V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	<b>Opposed:</b> 16 milliseconds ON; 8 milliseconds OFF <b>Polarized Retroreflective and Fixed-Field:</b> 16 milliseconds ON/OFF
Delay at Power-up	100 milliseconds
Repeatability	<b>Opposed:</b> 2 milliseconds <b>Polarized Retroreflective and Fixed-Field:</b> 4 milliseconds Repeatability and response are independent of signal strength
Indicators	<b>Two LEDs:</b> <b>Solid Green:</b> Power ON <b>Solid Yellow:</b> Light Operate (LO) energized <b>Flashing Yellow:</b> marginal excess gain See datasheet for detailed information
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included
Environmental Rating	Leakproof design rated NEMA 6P, IP67. QD models rated IP69K per DIN 40050-9
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation).
Certifications	   ECOLAB® chemical compatibility pending on some models; contact Banner Engineering for details



# SM30 Series

## Long-Range, Opposed-Mode Barrel Sensors



- Available with ac or dc supply voltages
- Ideal in equipment washdown environments
- Epoxy-encapsulated
- Sensing range up to 200 m

### Opposed SM30 Emitters, 10-30 V DC or 12-240 V AC, Frequency A<sup>†</sup>

Infrared LED

Sensing Mode	Housing	Range	Connection	Output Type	Models
 OPPOSED	Plastic	150 m	2 m 3-Pin Mini QD	N/A	SMA30PEL SMA30PELQD
	Stainless Steel	150 m	2 m 3-Pin Mini QD	N/A	SMA30SEL SMA30SELQD

### Opposed SM30 Receivers, 10-30 V DC Frequency A<sup>†</sup>

Infrared LED

Sensing Mode	Housing	Range	Connection	Output Type	Models
 OPPOSED	Plastic	150 m	2 m 4-Pin Mini QD	Bi-Modal™ NPN or PNP	SM30PRL SM30PRLQD
	Stainless Steel	150 m	2 m 4-Pin Mini QD	Bi-Modal™ NPN or PNP	SM30SRL SM30SRLQD

### Opposed SM30 Receivers, 24-240 V AC, Frequency A<sup>†</sup>

Infrared LED

Sensing Mode	Housing	Range	Connection	Output Type	Models
 OPPOSED	Plastic	150 m	2 m	LO	SM2A30PRL
			3-Pin Mini QD		SM2A30PRLQD
	Stainless Steel	150 m	2 m	LO	SM2A30SRL
			3-Pin Mini QD		SM2A30SRLQD
Plastic	150 m	2 m	DO	SM2A30PRLNC	
		3-Pin Mini QD		SM2A30PRLNCQD	
Stainless Steel	150 m	2 m	DO	SM2A30SRLNC	
		3-Pin Mini QD		SM2A30SRLNCQD	

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, SMA30PEL W/30).

<sup>†</sup> Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" at the end of the standard model number (example, SMA30PELB or SMA30PELC).

Mini QD  
Threaded straight



3-Pin

**SM30CC-306**  
1.8 m (5.9')  
**SM30CC-312**  
3.6 m (11.8')

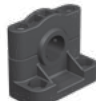
Additional cordset information is available  
See page 758



SMB30A



SMBAMS30P



SMB3030SC



SMB30FA..

Additional bracket information is available  
See page 724



Opposed Models—All Frequencies  
Suffix E and R  
(Metal Housing Shown)



(Plastic Housing Shown)

## SM30 Specifications

Supply Voltage and Current	<b>Emitters:</b> 12 to 240 V ac (50/60 Hz) or 10 to 30 V dc (10% max. ripple) at 20 mA <b>DC Receivers:</b> 10 to 30 V dc (10% max. ripple) at 10 mA max, exclusive of load <b>AC Receivers:</b> 24 to 240 V ac (50/60 Hz)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>DC Receivers:</b> Bi-Modal™ output (PNP sourcing or NPN sinking). Selection of sourcing or sinking configuration depends upon receiver's power supply hookup polarity. Once wired, the unit performs as a solid-state switch. <b>AC Receivers:</b> Solid-state switch offer Light Operate (LO) or Dark Operate (DO) by model
Output Rating	<b>DC Receivers:</b> 250 mA continuous <b>Output saturation voltage:</b> (PNP & NPN configuration) less than 1 volt at 10 mA; less than 2 volts at 250 mA <b>OFF-state leakage current:</b> less than 10 µA <b>AC Receivers:</b> Max. steady-state load capability is 500 mA <b>Inrush capability:</b> 10 amps for 1 second (non-repeating) <b>OFF-state leakage:</b> current less than 1.7 mA rms <b>ON-state voltage drop:</b> less than 3.5 volts rms across a 500 mA load; less than 5 volts rms across a 15 mA load
Output Protection Circuitry	Outputs of dc receivers are short circuit protected
Output Response Time	10 milliseconds ON/OFF
Repeatability	<b>"A" frequency units:</b> 1 millisecond <b>"B" frequency units:</b> 1.5 milliseconds <b>"C" frequency units:</b> 2.3 milliseconds
Indicators	Internal Red LED, visible through the lens or from side of the sensor. <b>Emitters:</b> Red "Power ON" indicator LED <b>DC Receivers:</b> Lights whenever receiver sees its modulated light source <b>AC Receivers:</b> Lights whenever receiver's output is conducting
Construction	Fully epoxy-encapsulated tubular threaded housing, positive sealed at both ends, quad-ring sealed acrylic lens <b>Plastic models:</b> 30 mm diameter thermoplastic polyester housing and jam nuts <b>Stainless Steel models:</b> 30 mm diameter 303 stainless steel housing and jam nuts
Environmental Rating	Exceeds NEMA 6P; IEC IP67 standards
Connections	PVC-jacketed 2 m or 9 m cables or Mini-style quick-disconnect (QD) fitting are available. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)




Certifications





## Slot & Area

Slot sensors, also known as fork sensors, provide easy and reliable opposed-mode sensing of objects as small as 0.3 mm. Slot sensors are offered in a wide variety of sizes to meet your application needs.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>SLM</b> Easy to mount, focus-beamed sensors with powerful optics. Page 144	<b>Opposed:</b> 220 mm	Varies by model	IP67; NEMA 6	Die-cast zinc	10 to 30 V dc
	<b>SL30 &amp; SL10</b> A fixed-distance slot sensor with a slot that offers high speed sensing with expert push-button TEACH options. Page 146	<b>Opposed:</b> 30 mm	72 x 52 x 18.8 mm	IP67; NEMA 6	ABS/polycarbonate	10 to 30 V dc
	<b>LX</b> Part-Sensing Arrays provides wide area detection used for detecting small parts on conveyors, part ejection verification and leading edge detection. Page 148	<b>Opposed:</b> 2 m	Varies by model	IP65	Aluminum housing, die-cast zinc with black e-coated painted endcaps	10 to 30 V dc

# SLM Series

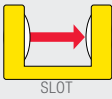
## Rugged, Nickel-Plated, Fixed-Distance Slot Sensors



- Easy to mount, focus-beamed sensors with powerful optics.
- Powerful optics for detecting between sheets of plastic
- Requires no alignment, with easy and economical mounting that uses molded in-beam guides to simplify beam placement
- Rugged metal housing rated to IP67

### SLM Nickel-Plated

Visible Red LED

Sensing Mode	Slot Width/ Depth	Width (W)	Depth (D)	Connection	Response	Models NPN	Models PNP
 SLOT	10 mm/ 60.8 mm	42 mm	80 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM10B6 (Bipolar NPN/PNP) SLM10B6QPMA (Bipolar NPN/PNP) SLM10N6Q	SLM10P6Q
 SLOT	20 mm/ 60.8 mm	52 mm	80 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM20B6 (Bipolar NPN/PNP) SLM20B6QPMA (Bipolar NPN/PNP) SLM20N6Q	SLM20P6Q
 SLOT	30 mm/ 60.8 mm	62 mm	80 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM30B6 (Bipolar NPN/PNP) SLM30B6QPMA (Bipolar NPN/PNP) SLM30N6Q	SLM30P6Q
 SLOT	50 mm/ 60.8 mm	82 mm	80 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM50B6 (Bipolar NPN/PNP) SLM50B6QPMA (Bipolar NPN/PNP) SLM50N6Q	SLM50P6Q
 SLOT	80 mm/ 60.8 mm	112 mm	80 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM80B6 (Bipolar NPN/PNP) SLM80B6QPMA (Bipolar NPN/PNP) SLM80N6Q	SLM80P6Q
 SLOT	120 mm/ 120.7 mm	152 mm	140 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM120B6 (Bipolar NPN/PNP) SLM120B6QPMA (Bipolar NPN/PNP) SLM120N6Q	SLM120P6Q
 SLOT	180 mm/ 120.7 mm	202 mm	140 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM180B6 (Bipolar NPN/PNP) SLM180B6QPMA (Bipolar NPN/PNP) SLM180N6Q	SLM180P6Q
 SLOT	220 mm/ 120.7 mm	252 mm	140 mm	2 m 4-Pin Euro Pigtail QD 3-Pin Pico QD	500 $\mu$ s	SLM220B6 (Bipolar NPN/PNP) SLM220B6QPMA (Bipolar NPN/PNP) SLM220N6Q	SLM220P6Q

Connection options: A model with a QD requires a mating cordset

For 9 m cable, add suffix W/30 to the 2 m model number (example, SLM10B6 W/30).



**Euro QD**  
(for ..Q8 or ..Q5 models)  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-406RA**)

**4-Pin**

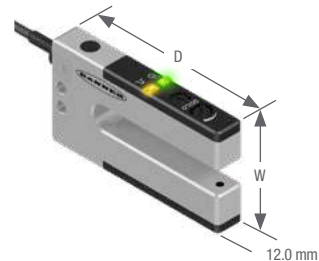
**MQDC-406**  
2 m (6')  
**MQDC-415**  
5 m (15')  
**MQDC-430**  
9 m (30')



**Pico QD (for Q models)**  
Straight connector models listed; for right-angle, **W** replaces **G** in the model number.  
(example, **PKW3M-5**)  
\*There are no PKW3M-7, or PKW3M-10 models available

**3-Pin**

**PKG3M-2**  
2 m (6.5')  
**PKG3M-5**  
5 m (15')  
**PKG3M-7**  
7 m (23')  
**PKG3M-9**  
9 m (30')  
**PKG3M-10**  
10 m



Additional cordset information is available  
See page 758

## SLM Specifications

<b>Slot Opening</b>	10, 20, 30, 50, 80, 120, 180 or 220 mm (depending on model); beam is 5 mm from outer edge							
<b>Supply Voltage and Current</b>	10 to 30 V dc (10% ripple) @ less than 25 mA, exclusive of load							
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages							
<b>Output Configuration</b>	<b>Cabled and Euro-style QD models: Bipolar:</b> One current sourcing ( <b>PNP</b> ) and one current sinking ( <b>NPN</b> ) <b>Pico-style QD models:</b> Current sourcing ( <b>PNP</b> ) or current sinking ( <b>NPN</b> ), depending on model							
<b>Output Rating</b>	100 mA with short circuit protection <b>OFF-state leakage current:</b> less than 10 $\mu$ A sourcing; less than 200 $\mu$ A sinking <b>ON-state saturation voltage:</b> <b>NPN:</b> 1.6 V @ 100 mA <b>PNP:</b> 2.0 V @ 100 mA							
<b>Output Protection Circuitry</b>	Protected against output short-circuit and false pulse on power up. 100 milliseconds max. delay at power up; outputs do not conduct during this time.							
<b>Minimum Object Detection* at Max. Gain</b>	<b>SLM10...</b>	<b>SLM20...</b>	<b>SLM30...</b>	<b>SLM50...</b>	<b>SLM80...</b>	<b>SLM120...</b>	<b>SLM180...</b>	<b>SLM220...</b>
	1.00 mm	1.25 mm	1.50 mm	1.65 mm	1.80 mm	1.80 mm	1.80 mm	2.40 mm
<b>Minimum Object Detection* at 2X Excess Gain</b>	0.30 mm	0.30 mm	0.40 mm	0.60 mm	0.75 mm	0.90 mm	0.90 mm	1.00 mm
<b>Hysteresis**</b>	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.20 mm	0.20 mm	0.20 mm	0.20 mm
<b>Repeatability†</b>	0.02 mm	0.02 mm	0.02 mm	0.04 mm	0.06 mm	0.08 mm	0.08 mm	0.08 mm
<b>Output Response Time</b>	500 microseconds							
<b>Repeatability</b>	95 microseconds							
<b>Adjustments</b>	1-turn potentiometer Sensitivity adjustment Light Operate / Dark Operate Selection switch							
<b>Indicators</b>	<b>Two LED Indicators:</b> <b>Solid Green:</b> Power ON <b>Flashing Green:</b> output short circuit <b>Solid Yellow:</b> Output activated See datasheet for detailed information							
<b>Construction</b>	<b>Housing:</b> Die-cast zinc <b>Endcaps:</b> ABS <b>Optic windows:</b> Acrylic							
<b>Environmental Rating</b>	IEC IP67; NEMA 6							
<b>Connections</b>	<b>Cabled models:</b> 2 m or 9 m 4-conductor, PVC-jacketed cable <b>Pico-style QD models:</b> 3-pin, threaded <b>Euro-style QD models:</b> 4-pin, threaded 150 mm pigtail with polyurethane (PUR) cable							
<b>Operating Conditions</b>	<b>Temperature:</b> -20° to +60° C <b>Relative humidity:</b> 95% @ 55° C (non-condensing)							
<b>Certifications</b>								

\* **Minimum Object Detection:** Smallest diameter rod that can be detected when passed slowly through sensing beam.

**NOTE:** Minimum object detection is measured midway between the emitter and receiver. For best results, objects to be detected should be placed in the midway position when possible.  
The minimum object detection size may increase if the object is very close to the receiver side.

\*\* **Hysteresis:** Distance an object must move to toggle between output OFF and output ON conditions.

† **Repeatability:** Variation in switching distance for a standard target at controlled sensing conditions.



# SL30 Series

## Fixed-Distance Slot Sensors



- Uses molded in-beam guides to simplify beam placement
- Provides easy-to-use self-contained opposed-mode sensor pair in rugged U-shaped housing
- Features manual sensitivity adjustment or easy push-button TEACH-mode setup, depending on model
- Cordsets and brackets see page 148

### SL30

Visible Red LED

Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	1 ms	250 $\mu$ s	SL30VB6V SL30VB6VQ
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	300 $\mu$ s	75 $\mu$ s	SL30VB6VY SL30VB6VYQ

### SLO30

Infrared LED

Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	1 ms	250 $\mu$ s	SLO30VB6 SLO30VB6Q
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	300 $\mu$ s	75 $\mu$ s	SLO30VB6Y SLO30VB6YQ

### SLE30 Expert™

Visible Red LED

Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	500 $\mu$ s	100 $\mu$ s	SLE30B6V SLE30B6VQ
SLOT	30 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	150 $\mu$ s	75 $\mu$ s	SLE30B6VY SLE30B6VYQ

For more specifications see page 148.

Connection options: A model with a QD requires a mating cordset (see page 148).

For 9 m cable, add suffix W/30 to the 2 m model number (example, SL30VB6V W/30).

# SL10 Series

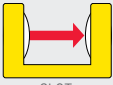
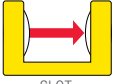
## Fixed-Distance Slot Sensors



- Uses molded in-beam guides to simplify beam placement
- Provides easy-to-use self-contained opposed-mode sensor pair
- Features manual sensitivity adjustment or easy push-button TEACH-mode setup, depending on model
- Cordsets and brackets see page 148

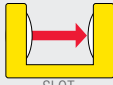
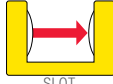
### SL10

➔ Visible Red LED

Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
	10 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	1 ms	250 $\mu$ s	SL10VB6V SL10VB6VQ
	10 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	300 $\mu$ s	75 $\mu$ s	SL10VB6VY SL10VB6VYQ

### SLE10 Expert™

➔ Visible Red LED

Sensing Mode	Slot Width	Connection	Output Type	Response	Repeatability	Models
	10 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	500 $\mu$ s	100 $\mu$ s	SLE10B6V SLE10B6VQ
	10 mm	2 m 5-Pin Euro QD	Bipolar NPN/PNP	150 $\mu$ s	75 $\mu$ s	SLE10B6VY SLE10B6VYQ

For more specifications see page 148.

 Connection options: A model with a QD requires a mating cordset (see page 148).

For 9 m cable, add suffix W/30 to the 2 m model number (example, SL10VB6V W/30).

**Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

**5-Pin**

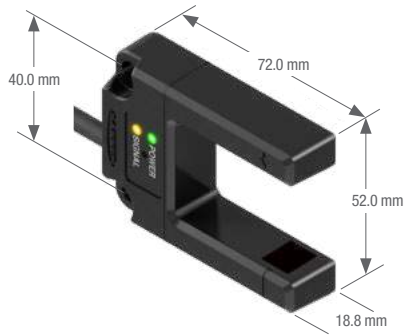
**MQDC1-501.5**  
0.5 m (1.6')  
**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')

**SMBSL**

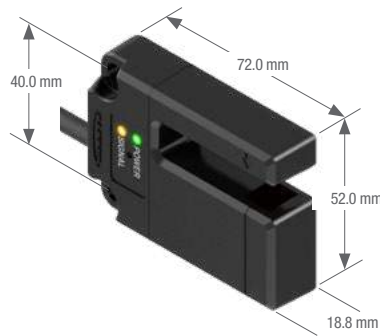
12-ga. stainless steel

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 724




SL30, SLO30 and SLE30 Models




SL10 and SLE10 Models

## SL30, SL10 and SLO30 Specifications

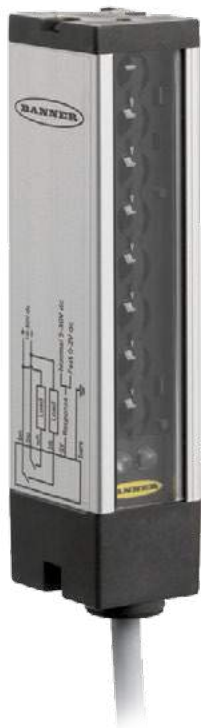
Supply Voltage and Current	10 to 30 V dc, 30 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>Bipolar:</b> One current sinking (NPN) and one current sourcing (PNP) open-collector transistor
Output Rating	150 mA, each output
Output Protection Circuitry	Protected against false pulse on power-up and short-circuit of outputs
Output Response Time	1 millisecond or 300 microseconds, depending on model
Repeatability	250 microseconds or 75 microseconds, depending on model
Adjustments	<b>SL30 and SL10:</b> 4-turn clutched potentiometer sensitivity adjustment <b>SLO30:</b> None
Indicators	<b>Green:</b> Power ON/OFF indicator <b>Yellow:</b> Signal condition indicator
Construction	<b>Housing:</b> ABS/polycarbonate <b>Lenses:</b> Acrylic
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m 5-conductor PVC-jacketed attached cable, or 5-pin Euro-style quick-disconnect (QD) fitting. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -40° to +70° C <b>Relative humidity:</b> 90% @ 50° C (non-condensing)
Certifications	

## SLE30 and SLE10 Expert™ Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>Bipolar:</b> One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈1 mA per ° C) <b>OFF-state leakage current:</b> less than 5 µA @ 30 V dc <b>ON-state saturation current:</b> less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 500 microseconds (or 150 microseconds, depending on model) or longer duration, 1 kHz max
Delay at Power-up	1 second; outputs are non-conducting during this time
Repeatability	100 microseconds or 75 microseconds, depending on model
Adjustments	Pushbutton TEACH-mode sensitivity setting; remote TEACH-mode input
Indicators	<b>Two LEDs:</b> Yellow and Bicolor Green/Red <b>Green (RUN Mode):</b> ON when power is applied Flashes when received light level approaches the switching threshold <b>Red (TEACH Mode):</b> OFF when no signal is received. Pulses to indicate signal strength (received light level). Rate is proportional to signal strength (the stronger the signal, the faster the pulse rate). This is a function of Banner's Alignment Indicating Device (AID™). <b>Alternating Red/Green:</b> Microprocessor memory error <b>Flashing</b> <b>Yellow (Static TEACH):</b> ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition <b>Yellow (Dynamic TEACH):</b> Pulses at 0.5 Hz when ready to sample ON to indicate Dynamic TEACH sampling OFF to indicate sampling was accepted <b>Yellow (RUN Mode):</b> ON when outputs are conducting
Construction	<b>Housing:</b> ABS/polycarbonate <b>Lenses:</b> Acrylic
Environmental Rating	IEC IP67; NEMA 6
Connections	PVC-jacketed 5-conductor 2 m or 9 m unterminated cable, or 5-pin Euro-style quick-disconnect (QD) fitting. QD cordsets are ordered separately.
Operating Conditions	<b>Temperature:</b> -20° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)
Application Notes	The first condition presented during TEACH mode becomes the output ON condition
Certifications	

## LX

## High-Speed Part-Sensing Array



- Detects objects as small as 5.6 mm and extremely flat objects passing anywhere through the screen
- Responds in 0.8 to 6.5 milliseconds, faster than comparable products even at the slowest speed
- Features rugged silver anodized housing rated to IP65
- Uses integrated T-slot mounting channel for unique mounting flexibility

## LX Light Screens Short-Range (75-200 mm)

Sensing Array Length	Connection	Output Type	Min object detection size: 5.6 mm dia.	
			Emitters	Receivers
67 mm	2 m	Bipolar NPN/PNP	LX3ESR	LX3RSR
143 mm	2 m	Bipolar NPN/PNP	LX6ESR	LX6RSR
295 mm	2 m	Bipolar NPN/PNP	LX12ESR	LX12RSR

## LX Light Screens Standard Range (150 mm-2 m)

Sensing Array Length	Connection	Output Type	Min object detection size: 9.5 mm dia.	
			Emitters	Receivers
67 mm	2 m	Bipolar NPN/PNP	LX3E	LX3R
143 mm	2 m	Bipolar NPN/PNP	LX6E	LX6R
218 mm	2 m	Bipolar NPN/PNP	LX9E	LX9R
295 mm	2 m	Bipolar NPN/PNP	LX12E	LX12R
371 mm	2 m	Bipolar NPN/PNP	LX15E	LX15R
447 mm	2 m	Bipolar NPN/PNP	LX18E	LX18R
523 mm	2 m	Bipolar NPN/PNP	LX21E	LX21R
599 mm	2 m	Bipolar NPN/PNP	LX24E	LX24R

 Connection options: A model with a QD requires a mating cordset.

For 5-pin 150 mm Euro-style Pigtail QD, add suffix **Q** to the 2 m model number (example, LX3ESRQ).

## Euro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDC1-506RA)



## 5-Pin

MQDEC2-506  
2 m (6.5')  
MQDEC2-515  
5 m (15')  
MQDEC2-530  
9 m (30')



SMBLX



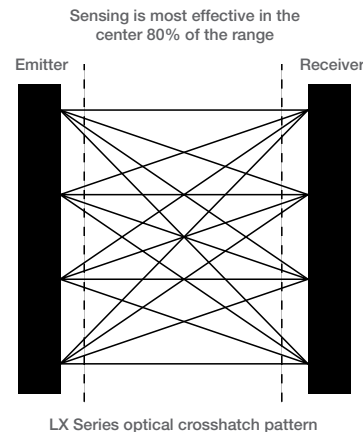
SMBLXR

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 724



Models	Length (L)
LX3	113.4 mm
LX6	189.6 mm
LX9	265.8 mm
LX12	342.0 mm
LX15	418.2 mm
LX18	494.4 mm
LX21	570.6 mm
LX24	646.8 mm



## LX Specifications

Sensing Range	<b>Normal (see hookups)</b>	<b>Reduced</b>
	<b>Short-range models:</b> 100 to 200 mm	75 to 150 mm
	<b>Standard-range models:</b> 300 mm to 2 m	150 to 600 mm
Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at less than 1 watt each for emitter and receiver (exclusive of load)	
Supply Protection Circuitry	Protected against reverse polarity and transient voltages	
Output Configuration	<b>Bipolar:</b> One current sourcing (PNP) and one current sinking (NPN) open-collector transistor	
Output Rating	125 mA max. each output <b>OFF-state leakage current:</b> less than 5 $\mu$ A <b>Output saturation voltage (PNP output):</b> less than 1 volt at 10 mA and less than 1.5 volts at 100 mA <b>Output saturation voltage (NPN output):</b> less than 0.5 volts at 10 mA and less than 0.6 volts at 100 mA	
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs	
Output Response Time	<b>LX3:</b> 0.8 milliseconds ON-time; 6 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX6:</b> 1.6 milliseconds ON-time; 7 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX9:</b> 2.4 milliseconds ON-time; 7.5 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX12:</b> 3.2 milliseconds ON-time; 8.5 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX15:</b> 4.0 milliseconds ON-time; 9 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX18:</b> 4.8 milliseconds ON-time; 10 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX21:</b> 5.6 milliseconds ON-time; 11 milliseconds OFF-time (5 milliseconds OFF-delay) <b>LX24:</b> 6.4 milliseconds ON-time; 11.5 milliseconds OFF-time (5 milliseconds OFF-delay)	
Minimum Object Detection Size	<b>Smallest diameter rod that can be detected in sensing range:</b> 5.6 mm (short-range) or 9.5 mm (standard-range), depending on model	
Indicators	<b>Emitter:</b> <b>LED1 (Green)</b> <b>ON:</b> Power ON, good sensor <b>OFF:</b> Reduced Range	<b>LED2 (Red)</b> <b>ON:</b> Reduced range <b>OFF:</b> Normal range <b>Flashing:</b> Emitter hardware failure
	<b>Receiver:</b> <b>LED1 (Yellow)</b> <b>ON:</b> Output conducting <b>Green:</b> Normal range <b>OFF:</b> Output not conducting	<b>LED2 (Bicolor Green/Red)</b> <b>Red:</b> Reduced range <b>Flashing Red:</b> Receiver hardware failure
Construction	Aluminum housing, die-cast zinc with black e-coated painted encaps, acrylic lens window	
Environmental Rating	IEC IP65	
Connections	2 m 5-conductor (with drain) PVC-jacketed cable or 150 mm pigtail with 5-pin Euro-style quick-disconnect fitting, depending on model. Cordsets are ordered separately.	
Operating Conditions	<b>Temperature:</b> -20° to +70° C <b>Relative humidity:</b> 90% at 50° C (non-condensing)	
Application Notes	1. The best sensing resolution occurs within the center 80% of the sensing range 2. Low-profile packages can be reliably detected 3. Outputs are active while the light screen is interrupted 4. For reliable detection, successive parts must be spaced up to the total of ON-time plus OFF-time apart. (i.e., 12 milliseconds for the LX12)	

Certifications











## Miniature

Miniature photoelectric sensors are extremely compact, conveniently fitting into limited spaces with barrel and right angle housings.

Sensors have high-power performance for close range detection. Six sensing modes are available with an opposed mode sensing range up to 3 meters.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>VSM Series</b> Heavy-duty metal sensors that are compact and ideal for use in confined areas. Page 154	<b>Opposed:</b> 250 mm <b>Diffuse:</b> 200 mm	Varies by model	IP67; NEMA 6P	Stainless steel	10 to 30 V dc
	<b>VS1</b> Small, high performance sensor can easily be embedded into the application. Page 156	<b>Convergent:</b> 15 mm	25.7 x 8.3 x 11.6 mm	IP54, NEMA3	ABS/ polycarbonate	10 to 30 V dc
	<b>VS2</b> Ultra-thin VS2 miniature sensors are suited to work well in confined areas while providing high performance. Page 158	<b>Opposed:</b> 3 m <b>Convergent:</b> 30 mm	25.1 x 12 x 4.3 mm	IP67; NEMA 6P	ABS	10 to 30 V dc
	<b>VS3</b> Provides coaxial optics for close-range retro detection of the sensor. Page 160	<b>Coaxial Retro:</b> 250 mm <b>Coaxial Polar Retro:</b> 250 mm	25.4 x 9 x 15.6 mm	IP67; NEMA 6P	ABS	10 to 30 V dc

## OTHER AVAILABLE MODELS



Q12 page 66

# VSM Series

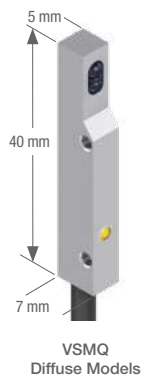
## Self-Contained Metal Sensors



- Heavy-duty, compact, metal sensors that are ideal for use in confined areas.
- Sapphire lens
- Tough 300 series stainless steel body withstands a wide variety of chemicals and cutting fluids
- Smooth barrel models are ideal for hygienic applications that require frequent cleaning
- Advanced optical design provides high performance with repeatable sensing

### VSMQ (Flat-Pack, Side-Looker)

Infrared LED



Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
DIFFUSE	20-50 mm	2 m	LO	VSMQAN6CV20	VSMQAP6CV20
DIFFUSE	50-140 mm	2 m	LO	VSMQAN6CV50	VSMQAP6CV50
DIFFUSE	90-200 mm	2 m	LO	VSMQAN6CV90	VSMQAP6CV90

### VSM4 (4 mm Smooth Barrel)

Infrared LED

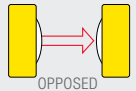
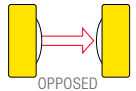
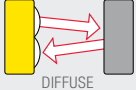
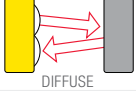
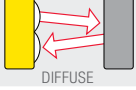


Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
OPPOSED	250 mm	2 m	—	VSM46E Emitter	
	250 mm	3-Pin Pico QD	—	VSM46EQ7 Emitter	
OPPOSED	250 mm	2 m	DO	VSM4RN6R	VSM4RP6R
	250 mm	3-Pin Pico QD	DO	VSM4RN6RQ7	VSM4RP6RQ7
DIFFUSE	10-30 mm	2 m	LO	VSM4AN6CV10	VSM4AP6CV10
	10-30 mm	3-Pin Pico QD	LO	VSM4AN6CV10Q7	VSM4AP6CV10Q7
DIFFUSE	20-50 mm	2 m	LO	VSM4AN6CV20	VSM4AP6CV20
	20-50 mm	3-Pin Pico QD	LO	VSM4AN6CV20Q7	VSM4AP6CV20Q7
DIFFUSE	50-140 mm	2 m	LO	VSM4AN6CV50	VSM4AP6CV50
	50-140 mm	3-Pin Pico QD	LO	VSM4AN6CV50Q7	VSM4AP6CV50Q7

Connection options: A model with a QD requires a mating cordset.

## VSM5 (5 mm Threaded Barrel)

⇒ Infrared LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
 OPPOSED	250 mm	2 m 3-Pin Pico QD	—	VSM56E Emitter VSM56EQ7 Emitter	
 OPPOSED	250 mm	2 m 3-Pin Pico QD	DO	VSM5RN6R VSM5RN6RQ7	VSM5RP6R VSM5RP6RQ7
 DIFFUSE	10-30 mm	2 m 3-Pin Pico QD	LO	VSM5AN6CV10 VSM5AN6CV10Q7	VSM5AP6CV10 VSM5AP6CV10Q7
 DIFFUSE	20-50 mm	2 m 3-Pin Pico QD	LO	VSM5AN6CV20 VSM5AN6CV20Q7	VSM5AP6CV20 VSM5AP6CV20Q7
 DIFFUSE	50-140 mm	2 m 3-Pin Pico QD	LO	VSM5AN6CV50 VSM5AN6CV50Q7	VSM5AP6CV50 VSM5AP6CV50Q7



 Connection options: A model with a QD requires a mating cordset.



3-Pin

## Pico QD (for Q models)

Straight connector models listed;  
for right-angle, **W** replaces **G** in  
the model number.  
(example, **PKW3M-2**)

**PKG3M-2**  
2 m (6')  
**PKG3M-5**  
5 m (15')  
**PKG3M-9**  
9 m (30')



SMBVSM4

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 722

## VSM Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>Single-output:</b> 1 NPN or 1 PNP, Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	100 mA max. <b>OFF-state leakage current:</b> less than 1 $\mu$ A <b>ON-state saturation voltage:</b> less than 2 V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq$ 100 mA
Response Time	2.5 milliseconds
Delay at Power-up	20 milliseconds
Repeatability	1 millisecond
Indicators	<b>Yellow LED:</b> light sensed
Construction	300 series stainless steel with PVC cable <b>CV10 &amp; CV20:</b> sapphire lens <b>CV50 &amp; Opposed:</b> Glass lens
Environmental Rating	IP67
Connections	2 m PVC-jacketed cable or 3-pin Pico-style integral QD (Q7), depending on model. QD cordsets ordered separately.
Operating Conditions	Operating temperature: 0° to +55° C
Certification	



# VS1 Series

## Miniature Self-Contained Sensors



- Small housing for powerful sensing performance in confined areas
- Available with 10 or 15 mm focal length
- Reliable sensing without adjustments

### Convergent VS1

→ Red LED    ⇨ Infrared LED

Sensing Mode	Range	Connection	Output Type	Models NPN	Models PNP
	10 mm focus	2 m	LO	VS1AN5CV10	VS1AP5CV10
		3-Pin Pico Pigtail QD		VS1AN5CV10Q	VS1AP5CV10Q
		2 m	DO	VS1RN5CV10	VS1RP5CV10
		3-Pin Pico Pigtail QD		VS1RN5CV10Q	VS1RP5CV10Q
	15 mm focus	2 m	LO	VS1AN5CV20	VS1AP5CV20
		3-Pin Pico Pigtail QD		VS1AN5CV20Q	VS1AP5CV20Q
		2 m	DO	VS1RN5CV20	VS1RP5CV20
		3-Pin Pico Pigtail QD		VS1RN5CV20Q	VS1RP5CV20Q
	10 mm focus	2 m	LO	VS1AN5C10	VS1AP5C10
		3-Pin Pico Pigtail QD		VS1AN5C10Q	VS1AP5C10Q
		2 m	DO	VS1RN5C10	VS1RP5C10
		3-Pin Pico Pigtail QD		VS1RN5C10Q	VS1RP5C10Q
	15 mm focus	2 m	LO	VS1AN5C20	VS1AP5C20
		3-Pin Pico Pigtail QD		VS1AN5C20Q	VS1AP5C20Q
		2 m	DO	VS1RN5C20	VS1RP5C20
		3-Pin Pico Pigtail QD		VS1RN5C20Q	VS1RP5C20Q

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS1AN5CV10 W/30).

**Pico QD (for Q models)**

Straight connector models listed; for right-angle, **W** replaces **G** in the model number. (example, **PKW3M-2**)

**3-Pin**

**PKG3M-2**  
2 m (6')  
**PKG3M-5**  
5 m (15')  
**PKG3M-9**  
9 m (30')

**Reflectors**

Additional information is available  
See page 790

Additional cordset information is available  
See page 758

**SMBVS1T****SMBVS1TC****SMBVS1S****SMBVS1SC**

Additional bracket information is available  
See page 724

**VS1 Specifications**

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO) models
<b>Output Rating</b>	50 mA max. <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 24 V dc <b>ON-state saturation voltage:</b> less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq$ 100 mA
<b>Output Response Time</b>	1 millisecond ON/OFF
<b>Repeatability</b>	250 microseconds
<b>Indicators</b>	<b>Two LEDs: Solid Green:</b> power ON <b>Solid Yellow:</b> light sensed <b>Flashing Green:</b> output over loaded <b>Flashing Yellow:</b> marginal excess gain
<b>Construction</b>	Black ABS/polycarbonate housing with clear acrylic lens
<b>Environmental Rating</b>	IP54; NEMA 3
<b>Connections</b>	2 m or 9 m attached cable, or 150 mm pigtail with 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately.
<b>Operating Conditions</b>	<b>Temperature:</b> -20° to +55° C <b>Relative humidity:</b> 80% at 50° C (non-condensing)
<b>Application Notes</b>	M2 stainless steel mounting hardware is included. Optional mounting brackets are available.

**Certifications**





# VS2 Series

## Flat Pack Miniature Sensors



- Offers flat-front mounting or optional bracket
- Reliable sensing without adjustments
- Models available in opposed or convergent modes

### Opposed VS2

➔ Visible Red LED   ➔ Infrared LED

Sensing Mode	Range	Connection	Output Type	Models NPN <sup>†</sup>	Models PNP <sup>†</sup>	
 OPPOSED	Optimum up to 600 mm, 1.2 m max.	2 m	—	VS25EV Emitter		
		3-Pin Pico Pigtail QD		LO	VS25EVQ Emitter	
		2 m			VS2AN5R	VS2AP5R
		3-Pin Pico Pigtail QD			VS2AN5RQ	VS2AP5RQ
2 m	VS2RN5R	VS2RP5R				
 OPPOSED	3.0 m	3-Pin Pico Pigtail QD	DO	VS2RN5RQ	VS2RP5RQ	
		2 m		VS25E Emitter		
		3-Pin Pico Pigtail QD		VS25EQ Emitter		
		2 m		VS2AN5R	VS2AP5R	
 OPPOSED	3.0 m	3-Pin Pico Pigtail QD	LO	VS2AN5RQ	VS2AP5RQ	
		2 m		VS2RN5R	VS2RP5R	
		3-Pin Pico Pigtail QD		DO	VS2RN5RQ	VS2RP5RQ
		2 m				

### Convergent VS2

➔ Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models NPN <sup>†</sup>	Models PNP <sup>†</sup>	
 CONVERGENT	15 mm ±5 mm	2 m	LO	VS2AN5CV15	VS2AP5CV15	
		3-Pin Pico Pigtail QD		VS2AN5CV15Q	VS2AP5CV15Q	
		2 m		DO	VS2RN5CV15	VS2RP5CV15
		3-Pin Pico Pigtail QD			VS2RN5CV15Q	VS2RP5CV15Q
 CONVERGENT	30 mm ±10 mm	2 m	LO	VS2AN5CV30	VS2AP5CV30	
		3-Pin Pico Pigtail QD		VS2AN5CV30Q	VS2AP5CV30Q	
		2 m		DO	VS2RN5CV30	VS2RP5CV30
		3-Pin Pico Pigtail QD			VS2RN5CV30Q	VS2RP5CV30Q

➔ Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS2RP5R W/30).

<sup>†</sup> Opposed-mode models also sold as pairs. Contact factory for more information 1-888-373-6767.



**3-Pin**  
**PKG3M-2**  
 2 m (6')  
**PKG3M-5**  
 5 m (15')  
**PKG3M-9**  
 9 m (30')

**Pico QD (for Q models)**  
 Straight connector models listed;  
 for right-angle, **W** replaces **G** in  
 the model number.  
 (example, **PKW3M-2**)

Additional cordset information is available  
 See page 758

#### Reflectors



Additional information is available  
 See page 790

#### Appartures



Additional information is available  
 See page 816



**SMBVS2RA**

Additional bracket information is available  
 See page 724



**Opposed Models**  
 Suffix E and R



**Convergent Models**  
 Suffix C

## VS2 Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple) <b>Emitter:</b> 25 mA (visible red); 30 mA (infrared) <b>Receiver (Convergent):</b> at less than 25 mA (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
<b>Output Rating</b>	50 mA max. <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 24 V dc <b>ON-state saturation voltage:</b> less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq$ 100 mA
<b>Output Response Time</b>	<b>Opposed:</b> 1 millisecond ON; 0.5 millisecond OFF <b>Convergent:</b> 1 millisecond ON; OFF
<b>Delay at Power-up</b>	Maximum 100 millisecond (opposed) and 150 millisecond (convergent); output does not conduct during this time
<b>Repeatability</b>	<b>Opposed:</b> 100 microseconds <b>Convergent:</b> 160 microseconds
<b>Indicators</b>	Two LEDs: <b>Solid Green:</b> power ON <b>Flashing Green:</b> output overload <b>Solid Yellow:</b> light sensed <b>Flashing Yellow (opposed mode only):</b> marginal excess gain
<b>Construction</b>	<b>Opposed:</b> Black ABS housing with clear MABS lens <b>Convergent:</b> Black ABS housing with acrylic lens
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Connections</b>	2 m or 9 m attached cable or 150 mm pigtail with 3-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately.
<b>Operating Conditions</b>	<b>Temperature:</b> -20° to +55° C <b>Relative humidity:</b> 80% at 50° C (non-condensing)
<b>Vibration and Mechanical Shock</b>	<b>Vibration:</b> All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
<b>Application Notes</b>	M2 stainless steel mounting hardware is included. Optional mounting brackets are available.
<b>Certifications</b>	

# VS3 Series

## Miniature Sensors with Advanced Optics



- Reliable sensing without adjustments
- Uses coaxial optics to eliminate blind areas at close range
- Accurately detects shiny objects
- Visible sensing beam for easy alignment

### Coaxial & Coaxial Polar Retro VS3

Sensing Mode	Range <sup>†</sup>	Connection	Output Type	Models NPN	Models PNP
 COAXIAL RETRO	250 mm	2 m	LO	VS3AN5XLV	VS3AP5XLV
		3-Pin Pico QD		VS3AN5XLVQ	VS3AP5XLVQ
		2 m	DO	VS3RN5XLV	VS3RP5XLV
		3-Pin Pico QD		VS3RN5XLVQ	VS3RP5XLVQ
 COAXIAL POLAR RETRO	250 mm	2 m	LO	VS3AN5XLP	VS3AP5XLP
		3-Pin Pico QD		VS3AN5XLPQ	VS3AP5XLPQ
		2 m	DO	VS3RN5XLP	VS3RP5XLP
		3-Pin Pico QD		VS3RN5XLPQ	VS3RP5XLPQ

Connection options: A model with a QD requires a mating cordset .

For 9 m cable, add suffix W/30 to the 2 m model number (example, VS3AN5XLV W/30).

<sup>†</sup> Retroreflective range is specified using one model BRT-32X20AM retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See accessories for more information.



3-Pin

**Pico QD (for Q models)**  
Straight connector models listed;  
for right-angle, **W** replaces **G** in  
the model number.  
(example, **PKW3M-2**)

**PKG3M-2**  
2 m (6')  
**PKG3M-5**  
5 m (15')  
**PKG3M-9**  
9 m (30')

Additional cordset information is available  
See page 758

Reflectors



Additional information is available  
See page 790

Non-Polarized Retroreflective Models  
Suffix LV

SMBVS3S



SMBVS3T

Additional bracket information is available  
See page 724

## VS3 Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple) at less than 25 mA (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point $\geq 100$ mA
<b>Output Rating</b>	50 mA max. <b>OFF-state leakage current:</b> less than 1 $\mu$ A at 24 V dc <b>ON-state saturation voltage:</b> less than 0.25 V at 10 mA dc; less than 0.5 V at 50 mA dc
<b>Output Response Time</b>	1 millisecond ON/OFF
<b>Delay at Power-up</b>	150 millisecond; output does not conduct during this time
<b>Repeatability</b>	160 microseconds
<b>Indicators</b>	<b>Two LEDs:</b> <b>Solid Green:</b> power ON <b>Flashing Green:</b> output over loaded <b>Solid Yellow:</b> light sensed
<b>Construction</b>	<b>Non-polarized Retroreflective:</b> Black ABS housing with acrylic lens <b>Polarized Retroreflective:</b> Black ABS housing with glass lens and acrylic cover
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Connections</b>	2 m or 9 m attached cable, or 3-pin Pico-style quick-disconnect fitting. QD cordsets are ordered separately.
<b>Operating Conditions</b>	<b>Temperature:</b> -20° to +55° C <b>Relative humidity:</b> 80% at 50° C (non-condensing)
<b>Vibration and Mechanical Shock</b>	<b>Vibration:</b> All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak <b>Shock:</b> All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
<b>Application Notes</b>	M3 stainless steel mounting hardware is included. Optional mounting brackets are available.
<b>Certifications</b>	



## Fiber Optics

Fiber optic cables are ideal for harsh conditions including high vibration, extreme heat, noisy, wet, corrosive or explosive environments. Fiber optic sensors have thin profiles, allowing for close mounting of multiple units and mounting in confined areas. Sensors can be positioned precisely where needed with flexible fibers.

Series	Description	Output Response Time	Dimensions H x W x D	Housing Material	Power Supply
	<b>DF-G3</b> Long-range easy to read dual display fiber amplifier page 164	500 $\mu$ s varies by model	33.0 x 72.0 x 10.0 mm	Thermoplastic	<b>NPN/PNP models:</b> 10 to 30 V dc <b>IO-Link models:</b> 18 to 30 V dc
	<b>DF-G2</b> High-speed easy to read dual display fiber amplifier page 166	10 $\mu$ s (varies by model)	33.0 x 72.0 x 10.0 mm	Thermoplastic	<b>NPN/PNP models:</b> 10 to 30 V dc <b>IO-Link models:</b> 18 to 30 V dc
	<b>DF-G1</b> Easy to read dual display fiber amplifier page 168	<b>High Speed:</b> 200 $\mu$ s <b>Long Range:</b> 2 ms <b>Extra Long Range:</b> 5 ms	33.0 x 72.0 x 10.0 mm	Thermoplastic	<b>NPN/PNP models:</b> 10 to 30 V dc <b>IO-Link models:</b> 18 to 30 V dc
	<b>D10</b> Advanced fiber optic amplifier page 172	varies by model	35.9 x 68.1 x 10.0 mm	Thermoplastic	12 to 24 V dc
	Plastic Fibers page 174				
	Glass Fibers page 192				

## OTHER AVAILABLE MODELS



R55F see website

# DF-G3 Series

## Long-range Fiber Optic Amplifiers



- World-class long-range sensing capability, more than 3 m (10 ft) with opposed mode fibers
- Easy to read dual digital displays show both signal level and threshold simultaneously
- Cross-talk avoidance function allows seven inspections in dense sensing point applications
- Models with IO-Link enable a point-to-point communication link between a master device and a sensor, facilitating remote monitoring, teaching, and configuration
- Operator control of the sensitivity (hysteresis) provides additional detection sensitivity, or a stabilized output depending on the application details

### IO-Link DF-G3

Sensing Beam Color	Range*	Connection	Output	Models
Visible Red, 635 nm	3,000 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G3-KD-2M
Infrared, 850 nm**	6,000 mm	2 m	Channel1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G3IR-KD-2M

### Single Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Visible Red	3,000 mm	2 m	DF-G3-NS-2M	DF-G3-PS-2M
Infrared, 850 nm**	6,000 mm	2 m	DF-G3IR-NS-2M	DF-G3IR-PS-2M

### Dual Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Visible Red	3,000 mm	2 m	DF-G3-ND-2M	DF-G3-PD-2M
Infrared, 850 nm**	6,000 mm	2 m	DF-G3IR-ND-2M	DF-G3IR-PD-2M

### Analog DF-G3

Sensing Beam Color	Range*	Connection	Supply Voltage	NPN Models	PNP Models
Visible Red	3,000 mm	2 m	Voltage: 12-30 V DC	DF-G3-NU-2M	DF-G3-PU-2M
			Current: 10-30 V DC	DF-G3-NI-2M	DF-G3-PI-2M
Infrared, 850 nm**	6,000 mm	2 m	Voltage: 12-30 V DC	DF-G3IR-NU-2M	DF-G3IR-PU-2M
			Current: 10-30 V DC	DF-G3IR-NI-2M	DF-G3IR-PI-2M

For more specifications see page 169

 Connection Option: A model with a QD requires a mating cordset. (see page 169)

\* Excess gain = 1, Long Range response speed, opposed mode sensing.

\*\* IR models require T5 terminated glass fiber optic cables



# DF-G3 Series

## Water Detection Fiber Optic Amplifiers



- 1450 nm infrared wavelength to enhance contrast of clear liquids
- Reliable detection of presence or absence of water-based liquids
- Easy to read dual digital displays show both signal level and threshold simultaneously
- Cross-talk avoidance function allows seven inspections in dense sensing point applications
- Models with IO-Link enable a point-to-point communication link between a master device and a sensor, facilitating remote monitoring, teaching, and configuration
- Cordsets and brackets see page 169

### Single Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	2 m	DF-G3LIR-NS-2M	DF-G3LIR-PS-2M

### Dual Output DF-G3

Sensing Beam Color	Range*	Connection	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	2 m	DF-G3LIR-ND-2M	DF-G3LIR-PD-2M

### Analog DF-G3

Sensing Beam Color	Range*	Connection	Supply Voltage	NPN Models	PNP Models
Long Infrared, 1450 nm**	900 mm	2 m	Voltage: 12-30 V DC	DF-G3LIR-NU-2M	DF-G3LIR-PU-2M
			Current: 10-30 V DC	DF-G3LIR-NI-2M	DF-G3LIR-PI-2M

For more specifications see page 169

 Connection Option: A model with a QD requires a mating cordset. (see page 169)

\* Excess gain = 1, Long Range response speed, opposed mode sensing.

\*\* IR models require T5 terminated glass fiber optic cables

# DF-G2 Series

## High-Speed *Expert*™ Fiber Optic Amplifiers



- The high speed DF-G2 fiber amplifiers now offer several LED colors to maximize contrast in challenging low-contrast applications
- Best in Class response time
- Programming via displays and switches/buttons or remote input teach wire
- *Expert* TEACH and SET methods ensure optimal gain and threshold for all applications, especially low contrast applications
- Cross talk avoidance algorithm allows two sensors to operate in close proximity for many applications

### IO-Link DF-G2

Sensing Beam Color	Range	Connection	Output	Models
Visible Red, 635 nm	1,100 mm	2 m	Channel 1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G2-KD-2M
Infrared, 850 nm*	2,100 mm	2 m	Channel 1: IO-Link, push/pull Channel 2: PNP only output, or input	DF-G2IR-KD-2M

### DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Visible Red	Range varies by response speed and fiber optics used	2 m	DF-G2-NS-2M	DF-G2-PS-2M

### Multiple Color DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Broad Spectrum White	50% of Visible Red Range	2 m	DF-G2W-NS-2M	DF-G2W-PS-2M
Visible Green	60% of Visible Red Range	2 m	DF-G2G-NS-2M	DF-G2G-PS-2M
Visible Blue	70% of Visible Red Range	2 m	DF-G2B-NS-2M	DF-G2B-PS-2M
Infrared*	190% of Visible Red Range	2 m	DF-G2IR-NS-2M	DF-G2IR-PS-2M



#### DF-G2 Multiple color

Multiple LED color options available.

For more specifications see page 170.

Connection options: A model with a QD requires a mating cordset (see page 169).

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G2-NS-9M).

For M8 pico pigtail, change the suffix 2M to Q3 in the 2 m model number (example, DF-G2-NS-Q3).

For M12 euro pigtail, change the suffix 2M to Q5 in the 2 m model number (example, DF-G2-NS-Q5).

\* IR models require T5 terminated glass fiber optic cables

# DF-G2 Series

## Small Object Fiber Optic Amplifiers



- The DF-G2 Series uses Banner's unique firmware designed to achieve accurate, high speed, low contrast performance for small object detection applications
- Percent-based threshold selectable from 2% to 50% for sensitivity adjustment
- Automatic Gain Compensation (AGC) algorithm compensates for dust build-up on fiber optics to extend counting cycle and maintain count accuracy
- Intelligent Dynamic Event Stretcher (DES) minimizing chance for double-counting, even with non-uniform objects (i.e. gel caps, washers, etc.)

### DF-G2

Sensing Beam Color	Range	Connection	NPN Models	PNP Models
Visible Red, 635 nm	Range varies by response speed and fiber optics used	2 m	DF-G2-NC-2M	DF-G2-PC-2M

### Fiber Optic Arrays for DF-G2

Sensing Beam Color	Window Size	Fiber Exit	Minimum Object Size	Model
Visible Red, 635 nm	10 x 25 mm	Side Exit	1.5 mm	PFCVA-10X25-S
		End Exit		PFCVA-10X25-E
Visible Red, 635 nm	25 x 25 mm	Side Exit	3 mm	PFCVA-25X25-S
		End Exit		PFCVA-25X25-E
Visible Red, 635 nm	34 x 25 mm	Side Exit	4 mm	PFCVA-34X25-S
		End Exit		PFCVA-34X25-E



DF-G2 and array fibers

Multiple array fiber models available.

For more specifications see page 170.

Connection options: A model with a QD requires a mating cordset (see page 169)

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G2-NC-9M).

# DF-G1 Series

## Expert™ Dual-Display Fiber Optic Amplifiers



- The DF-G1 Series has a simple user interface to ensure easy sensor set-up and programming via displays and switches/buttons, remote input teach wire or IO-Link
- End user has full control over operating parameters, including Light/Dark Operate, output timing functions, gain level and response speed
- Cross talk avoidance algorithm allows multiple sensors to operate in close proximity
- Light receiver models detect light emission from a wide variety of sources

### IO-Link DF-G1

Sensing Beam Color	Range	Connection	Output	Models
Visible Red, 660 nm	Range varies by Speed Selection used and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	Channel1: IO-Link, push/pul Channel 2: PNP only output, or input	DF-G1-KS-2M

### DF-G1

Sensing Beam Color	Range	Connection	NPN Models	PNP Model
Visible Red, 660 nm	Range varies by Speed Selection used and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	DF-G1-NS-2M	DF-G1-PS-2M

### Light Receiver DF-G1

Sensing Beam Color	Range	Connection	NPN Models	PNP Model
Visible Red, 660 nm	Range varies by response speed used, gain setting, target light source intensity, ambient light level and with fiber optics used. See fibers section on page 174 or reference website for range information.	2 m	DF-G1-NR-2M	DF-G1-PR-2M

 Connection options: A model with a QD requires a mating cordset

For 9 m cable, change the suffix 2M to 9M in the 2 m model number (example, DF-G1-NS-9M).  
For M8 Pico pigtail change the suffix 2M to Q3 in the 2 m model number (example, DF-G1-NS-Q3).  
For M12 Euro pigtail change the suffix 2M to Q5 in the 2 m model number (example, DF-G1-NS-Q5).

**Euro QD**  
(for ..Q8 or ..Q5 models)  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC-406RA**)



**4-Pin**  
**MQDC-406**  
2 m (6')  
**MQDC-415**  
5 m (15')  
**MQDC-430**  
9 m (30')

**Pico QD**  
(for Q7 models)  
Straight snap-on connector

**Pico QD (for Q7 models)**  
Right-angle snap-on connector



**4-Pin**  
**PKG4-2**  
2 m (6')  
**PKW4Z-2**  
2 m (6')

Additional cordset information is available  
See page 758



DIN-35..



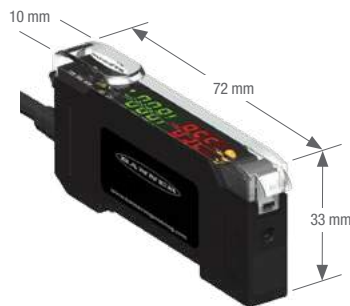
SA-DIN-BRACKET

Mounting Clamp






SA-DIN-CLAMP



Additional bracket information is available  
See page 730






## DF-G1 Specifications

<b>Supply Voltage and Current</b>	<b>NPN/PNP Models:</b> 10 to 30 V dc (10% max ripple) <b>Standard Mode:</b> 960 mW, Current consumption < 40 mA @ 24 V dc	<b>IO-Link Models:</b> 18 to 30 V dc (10% max ripple) <b>ECO Display Mode:</b> 720 mW, Current consumption < 30 mA @ 24 V dc
<b>Supply Protection Circuitry</b>	Protected against reverse polarity, over voltage, and transient voltages	
<b>Output Configuration</b>	<b>NPN/PNP Models:</b> 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model <b>IO-Link Models:</b> 1 push-pull and 1 PNP (complementary outputs)	
<b>Output Rating</b>	100 mA max. load (derate 1 mA per °C above 30 °C) <b>OFF-state leakage current:</b> NPN/PNP: < 5 µA at 30 V dc IO-Link: < 50 µA at 30 V dc <b>ON-state saturation voltage:</b> NPN: < 1.5 V PNP: < 2 V IO-Link: < 2 V	
<b>Output Protection Circuitry</b>	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up	
<b>Output Response Time</b>	<b>High Speed:</b> 200 us <b>Long Range:</b> 2 ms <b>Light receiver models:</b> 50 ms, 150 ms	<b>Standard:</b> 500 us <b>Extra Long Range:</b> 5 ms
<b>Delay at Power-up</b>	500 milliseconds max.; outputs do not conduct during this time	
<b>Adjustments</b>	3-way RUN/PRG/ADJ Mode Switch 2-way LO/DO Switch 3-way +/SET/- Rocker Button See datasheet for detailed information	
<b>Indicators</b>	<b>Red 4-digit Display:</b> Signal Level <b>Green 4-digit Display:</b> Threshold <b>Yellow LED:</b> Output conducting (In Program Mode, Red and Green displays are used for programming menus)	
<b>Construction</b>	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover	
<b>Environmental Rating</b>	IEC IP50, NEMA 1	
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +55 °C	<b>Storage:</b> -20 to +85 °C <b>Relative Humidity:</b> 90% @ 60 °C (non-condensing)
<b>Certifications</b>	  	

## DF-G2 Specifications

Supply Voltage and Current	10 to 30 V dc (10% max ripple)		
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages <b>Standard display mode:</b> 960 mW, Current consumption less than 40 mA at 24 V dc <b>ECO display mode:</b> 720 mW, Current consumption less than 30 mA at 24 V dc		
Output Configuration	<b>NPN/PNP Models:</b> 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model, plus 1 Health Mode output		
Output Rating	100 mA max. load (derate 1 mA per °C above 30 °C) <b>OFF-state leakage current:</b> NPN/PNP: < 5 µA at 30 V dc <b>ON-state saturation voltage:</b> NPN: < 1.5 V PNP: < 2 V		
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up		
Sensing Beam	<b>DF-G2:</b> Visible red, 635 nm <b>DF-G2W:</b> Broad spectrum white, 450 to 650 nm <b>DF-G2B:</b> Visible blue, 470 nm <b>DF-G2G:</b> Visible green, 525 nm <b>DF-G2IR:</b> Infrared, 850 nm		
Output Response Time	<b>Super High Speed:</b> 10 µs <b>Fast:</b> 50 µs <b>Medium Range:</b> 500 µs <b>Long Range with immunity to Energy Efficient Lights:</b> 2000 µs  <b>Super High Speed:</b> 10 µs <b>Fast:</b> 50 µs <b>Medium Range:</b> 500 µs	<b>High Speed:</b> 15 µs <b>Standard:</b> 250 µs <b>Long Range:</b> 1000 µs  <b>High Speed:</b> 15 µs <b>Standard:</b> 250 µs <b>Long Range:</b> 1000 µs  <b>DF-G2 Small Object Counter:</b> 25 µs 50 µs 150 µs 250 µs 500 µs	
Repeatability	<b>Super High Speed:</b> 5 µs <b>Fast:</b> 12 µs <b>Medium Range:</b> 80 µs <b>Long Range with immunity to Energy Efficient Lights:</b> 165 µs  <b>DF-G2 Small Object Counter:</b> 12 µs 12 µs 30 µs 50 µs 80 µs	<b>High Speed:</b> 5 µs <b>Standard:</b> 50 µs <b>Long Range:</b> 165 µs	
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover		
Environmental Rating	IEC IP50, NEMA 1		
Operating Conditions	<b>Temperature:</b> -10 to +55 °C	<b>Storage:</b> -20 to +85 °C	<b>Relative Humidity:</b> 90% @ 60 °C (non-condensing)
Certifications	 		

## DF-G3 Specifications

Supply Voltage and Current	<b>NPN/PNP Models:</b> 10 to 30 V dc (10% max ripple) <b>Voltage output models:</b> 12 to 30 V dc (10% max ripple) <b>Standard Mode:</b> 960 mW, Current consumption < 40 mA @ 24 V dc	<b>IO-Link Models:</b> 18 to 30 V dc (10% max ripple) <b>Current output models:</b> 10 to 30 V dc (10% max ripple) <b>ECO Display Mode:</b> 720 mW, Current consumption < 30 mA @ 24 V dc
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages	
Sensing Beam	<b>DF-G3:</b> Visible red, 635 nm <b>DF-G3IR:</b> Infrared, 850 nm <b>DF-G3LIR:</b> Long Infrared, 1450 nm	
Output Configuration	<b>NPN/PNP Models:</b> 1 current sourcing (PNP) or 1 current sinking (NPN) output, depending on model <b>IO-Link Models:</b> 1 push-pull and 1 PNP (complementary outputs) <b>Voltage output models:</b> 1 analog voltage output (user configurable as 1 V to 5 V or 0 V to 10 V) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output <b>Current output models:</b> 1 analog current output (4 mA to 20 mA) with 1 current sinking (NPN) or 1 current sourcing (PNP) discrete output	
Output Rating	100 mA max. load (derate 1 mA per °C above 30 °C) <b>OFF-state leakage current:</b> <b>NPN/PNP/current:</b> < 5 µA at 30 V dc <b>IO-Link:</b> < 50 µA at 30 V dc  <b>ON-state saturation voltage:</b> <b>NPN:</b> < 1.5 V <b>PNP:</b> < 2 V <b>IO-Link:</b> < 2 V	
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power up	
Output Response Time	<b>High Speed:</b> 500 us <b>Fast:</b> 1000 us <b>Standard:</b> 2 ms <b>Long Range:</b> 8 ms <b>Extra Long Range:</b> 24 ms	
Delay at Power-up	500 milliseconds max.; outputs do not conduct during this time	
Indicators	<b>Red 4-digit Display:</b> Signal Level <b>Green 4-digit Display:</b> Threshold <b>Yellow LED:</b> Output conducting (In Program Mode, Red and Green displays are used for programming menus)	
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover	
Environmental Rating	IEC IP50, NEMA 1	
Operating Conditions	<b>Temperature:</b> -10 to +55 °C <b>Storage:</b> -20 to +85 °C	<b>Relative Humidity:</b> 50% @ +50 °C (non-condensing)
Certifications	  	



# D10 Series

## High-Speed *Expert*™ Fiber Optic Amplifiers



- Available with visible red or green beam
- Available in Light or Dark Operate
- Includes specially designed models for reliable detection of objects as small as 1.5 mm
- Features bussable models for side-by-side mounting and simplified wiring of up to 16 sensors
- Features thin 10 mm housing for standard 35 mm DIN-rail mounting

### D10

Sensing Beam Color	Range	Connection	Output Type	Response Speed	Models
Visible Red	Range varies by Power Level/Speed Selection used and with fiber optics used. See fibers section on page 174 or reference datasheet for range information.	2 m	Bipolar NPN/PNP	500 ms	D10AFP
Visible Green		2 m		500 ms	D10AFPG
Visible Red		2 m		200 ms	D10AFPY
Visible Green		2 m		200 ms	D10AFPGY



Connection options: A model with a QD requires a mating cordset

For 4-pin Snap-on Pico QD cable, add suffix Q to the 2 m model number (example, D10AFPQ).

**Pico QD**  
(for Q7 models)  
Straight snap-on connector

**Pico QD (for Q7 models)**  
Right-angle snap-on connector



**4-Pin**  
PKG4-2  
2 m (6')

PKW4Z-2  
2 m (6')

**6-Pin**  
PKG6Z-2  
2 m (6')

PKW6Z-2  
2 m (6')



DIN-35..



SMBR55F01



SMBR55FRA

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 730



## D10—Discrete Specifications

Required Fiber Optic Cable	Banner P-Series plastic fibers (See Plastic Fiber Optic section, page 174)
Supply Voltage & Current	10 to 30 V dc (10% max. ripple) @ less than 25 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltage
Output Configuration	<b>Bipolar:</b> 1 current sourcing (PNP) and 1 current sinking (NPN)
Output Rating	100 mA per output with short circuit protection <b>OFF-state leakage current:</b> less than 10 $\mu$ A sourcing; 200 $\mu$ A sinking <b>ON-state saturation voltage:</b> NPN: 1.6 V @ 100 mA PNP: 2.0 V @ 100 mA
Output Protection Circuitry	Protected against output short-circuit and false pulse on power up
Delay at Power-up	Max. 100 milliseconds; outputs do not conduct during this time
Output Response Time	<b>Standard models (with crosstalk avoidance circuitry):</b> 500 microseconds <b>High-speed models:</b> 200 microseconds
Repeatability	<b>Standard models:</b> 95 microseconds <b>High-speed models:</b> 50 microseconds
Adjustments	12-turn Sensitivity potentiometer with relative position indicator; LO/DO Selection switch; 0 or 40 milliseconds OFF-delay switch NOTE: Use proper ESD techniques while making adjustments under cover
Indicators	<b>Two LEDs:</b> Green and Yellow <b>Green:</b> Power ON <b>Yellow:</b> Light Sensed Signal strength indicator See datasheet for detailed information
Construction	Black ABS/polycarbonate alloy (UL94 V-0 rated) housing, clear polycarbonate cover
Environmental Rating	IEC IP50; NEMA 1
Operating Conditions	<b>Temperature:</b> -10 to +55 °C <b>Storage:</b> -20 to +85 °C <b>Relative humidity:</b> 90% @ 55 °C (non-condensing)

Certifications





# Plastic Fiber Optics

Provide an economical alternative to glass fiber optics for piping photoelectric sensing light to and from confined areas with suitable environments

- Ideal for detecting small objects
- Withstand repeated flexing and bending
- Available in individual or bifurcated styles
- Available with core diameters of 0.25, 0.50, 0.75, 1.0 and 1.5 mm

## Choosing Plastic or Glass

Plastic fibers are for general purpose use. They tolerate severe flexing, can be cut to length in the field and cost less than glass fibers. Glass fibers are the best choice for challenging environments such as high temperatures, corrosive materials and moisture.



### Fiber Construction

- Core:** Thin glass or plastic center of the fiber through which light travels
- Cladding:** Outer optical material surrounding the core that reflects light back into the core
- Jacket/Sheath:** Protective layer to protect fiber from damage and moisture



### Plastic fibers page 174

- Inexpensive and easily cut to length during installation
- Bend for a precise fit
- Available in high-flex models to withstand flexing
- Offered with special jackets that withstand corrosion, impact and abrasion
- Available for applications requiring articulated or reciprocating motion
- Available in diameters of 0.25, 0.5, 1.0 Or 1.5 mm
- Can be quickly custom designed and built for your unique applications



### Glass fibers page 192

- Solve numerous challenging sensing requirements
- Ideal for hostile environments such as high temperatures to 480° C, corrosive materials and extreme moisture
- Withstand high levels of shock and vibration
- Inherently immune to extreme electrical noise
- Available with choice of sheathings: standard stainless-steel flexible conduit, PVC or other flexible tubing
- Can be quickly custom designed

## Model Key



### PLASTIC FIBER FAMILY

Same for all plastic fibers

### ASSEMBLY STYLE

I = Individual fiber\*  
DI = Dual Individual fiber\*  
B = Bifurcated fiber

### SENSING END

A = 90° Angle	PF = Probe Ferrule
AT = 90° Angle/Thread	PMSB = Probe Miniature Side-view Bendable
CF = Coaxial Ferrule	PS = Probe Side-view
CT = Coaxial Thread	PSB = Probe Side-view Bendable
E = Encapsulated	PSM = Probe Side-view Miniature
EFP = Extended Ferrule Probe	R = Rectangular
F = Ferrule	RS = Rectangular Side-view
FM = Ferrule Miniature	T = Thread
FMP = Ferrule Miniature Probe	TA = Thread/90° Angle
L = Lensed	TP = Thread/Probe
P = Probe	

### MODIFICATIONS†

MFR = Flex relief  
MSW = Slot width  
MTA = Tight angle  
MTL = Thread length  
MAL = Array length  
MPL = Probe length  
MFL = Ferrule length

### CONTROL END

U = Unterminated straight cable\*\*  
UC = Unterminated Coiled cable  
UHF = Unterminated DURA-BEND™  
multi-core cable  
T5 = Terminated  
TMB5 = SteelSkin™ braiding over  
monocoil reinforcement

### FIBER LENGTH

3 = 1 m (1000 mm)	30 = 9 m (9,000 mm)
6 = 2 m (2000 mm)	100 = 30 m (30,000 mm)
15 = 5 m (5000 mm)	

### FIBER CORE DIAMETER

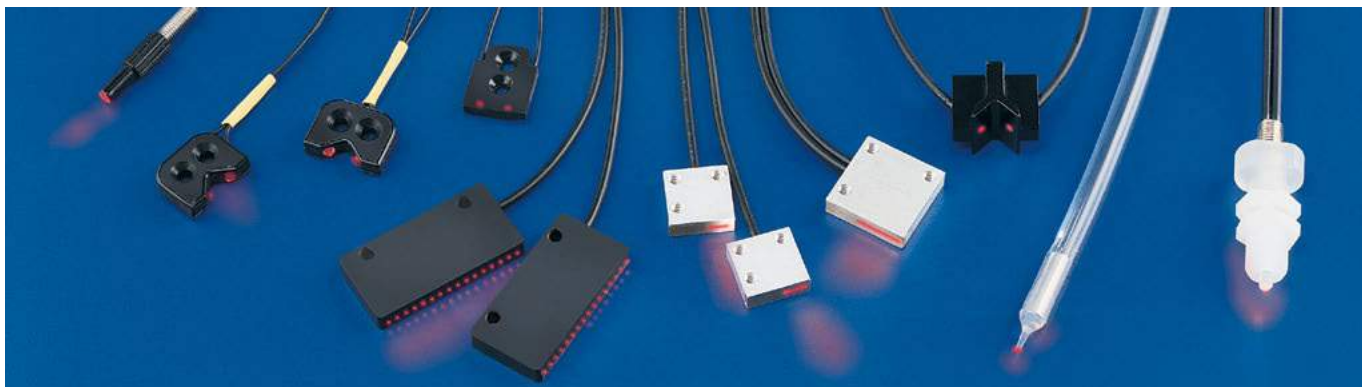
1 = 0.25 mm	1x4 = 4 x 0.25 mm
2 = 0.50 mm	1x16 = 16 x 0.265 mm
3 = 0.75 mm	1x32 = 32 x 0.265 mm
4 = 1.00 mm	
6 = 1.50 mm	

\* All individual plastic fiber optics are sold and used in pairs. Bifurcated fibers are two-way fibers with a single sensing end that both emits and receives light and with dual-control sensor ends that attach separately to the sensor's LED and photodetector.

\*\* Plastic fibers with "U" in the suffix of the model numbers have unterminated control ends; cut them to the required length using the supplied cutter.

† Not all modifications can be applied to all fiber assemblies. Please consult factory for verification of modifications.

## Specialty fibers for specific sensing applications



DURA-BEND™  
for extremely tight  
radius bends



Fluoropolymer  
encapsulated fibers



Focused beam  
fibers



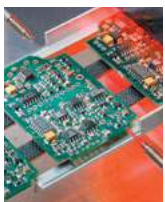
Convergent beam  
fibers



Linear array fibers



Liquid level  
detection fibers



High temperature  
fibers



SteelSkin™ for  
impact and abrasion

# Vantage Line Plastic Fibers

- OEM friendly packaging
- No fiber cutter included
- Opposed models come as a pair

## Opposed Vantage Line Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	M6 threaded tip and integrated lens with flex relief 20 mm spot size at 100 mm	15 mm	0.5 mm		DF-G3 2000† DF-G2 2000 DF-G1 2000	PITL23UM6-VL*
	M4 threaded tip and integrated lens with flex relief 30 mm spot size at 100 mm	15 mm	0.5 mm		DF-G3 2000† DF-G2 2000 DF-G1 1680	PITL23UM4-VL*
	M4 & M2.6 threaded tip with flex relief	25 mm	1 mm		DF-G3 2000† DF-G2 1460 DF-G1 900	PIT43U-VL*
	M4 threaded tip with flex relief	25 mm	0.5 mm		DF-G3 1980 DF-G2 410 DF-G1 255	PIT23UM4-VL*
	M3 threaded tip with flex relief	25 mm	1 mm		DF-G3 2000† DF-G2 1450 DF-G1 895	PIT43UM3-VL*
	M3 threaded tip with flex relief	25 mm	0.5 mm		DF-G3 2000† DF-G2 440 DF-G1 270	PIT23U-VL*
	M4 & M2.6 threaded tip with flex relief 90° angle/thread	25 mm	1 mm		DF-G3 2000† DF-G2 1250 DF-G1 770	PIAT43UTA-VL*
	M4 & M2.6 threaded tip with flex relief 90° angle/thread	2 mm	1 mm		DF-G3 2000† DF-G2 1200 DF-G1 740	PIAT43UHFTA-VL*
	Rectangular housing with front exit 14.5 mm array	60 mm	32 x 0.25 mm	–	DF-G3 2000† DF-G2 1510 DF-G1 930	PIR1X323T-VL*
	M4 & M2.6 threaded tip with stainless protective jacket	25 mm	1 mm	–	DF-G3 2000† DF-G2 1700 DF-G1 1060	PIT43TSL5-VL*
	M4 & M2.6 threaded tip with stainless protective jacket 90° angle/thread	25 mm	1 mm	–	DF-G3 2000† DF-G2 1170 DF-G1 720	PIAT43TSL5TA-VL*

\* For two meter cable lengths replace ...3., with 6 in the model number (example, PIT46U-VL)

† Max range determined by cable length 1 m = 2,000 mm

## Diffuse Vantage Line Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)		Models
	M6 threaded tip with flex relief	25 mm	1 mm		DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 455 280	PBT43U-VL*
	M3 threaded tip with flex relief	25 mm	0.5 mm		DF-G3 DF-G2 DF-G1	855 180 110	PBT23U-VL*
	M4 & M2.6 thread non-bendable tip	25 mm	0.5 mm		DF-G3 DF-G2 DF-G1	815 170 105	PBT23UM4-VL*
	M6 threaded tip with flex relief 90° angle/thread	25 mm	1 mm		DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 390 240	PBAT43UTA-VL*
	M6 threaded tip with flex relief 90° angle/thread	2 mm	1 mm		DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 365 225	PBAT43UHFTA-VL*
	Rectangular housing with front exit 14.5 mm array	25 mm	32 x 0.25 mm		DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 350 215	PBR1X323U-VL*
	M6 threaded tip with stainless protective jacket	25 mm	1 mm	-	DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 500 310	PBT43TSL5-VL*
	M6 threaded tip with stainless protective jacket 90° angle/thread	25 mm	1 mm	-	DF-G3 DF-G2 DF-G1	2000 <sup>†</sup> 435 270	PBAT43TSL5TA-VL*

\* For two meter cable lengths replace ...3.. with 6 in the model number (example, PBT46U-VL)

<sup>†</sup> Max range determined by cable length 1 m = 2,000 mm (does not apply to diffuse models)



PFC-4  
PF-C-4-100 (qty 100)



# Array and Slot Fibers

Array and Slot fibers are customizable for a simple setup and provide an optimal solution for small part counting applications. Array fibers are ideal for broad spectrum detection and slot fibers are pre-aligned and easy to install.

- Quick and easy setup and alignment
- Small part counting applications
- Multiple beams can be customized for different array lengths
- Wide area detection
- Ideal for tracking applications, profiling parts, edge guiding, finding the edge of objects
- Opposed models come as a pair



## Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Ultra-compact head 5.25 mm straight exit Aluminium	5 mm	16 x 0.25 mm		DF-G3 4000† DF-G2 1040 DF-G1 640 D10A 260	PIRS1X166U
	Ultra-compact head 5.25 mm side exit Aluminium	5 mm	16 x 0.25 mm		DF-G3 4000† DF-G2 1040 DF-G1 640 D10A 260	PIRS1X166U
	Compact head 10 mm side exit Aluminium	5 mm	16 x 0.25 mm		DF-G3 4000† DF-G2 1230 DF-G1 760 D10A 260	PIRS1X166UM.4
	19 mm side exit Plastic	5 mm	16 x 0.25 mm		DF-G3 4000† DF-G2 1245 DF-G1 770 D10A 270	PIRS1X166UMPM.75
	34 mm side exit Plastic	5 mm	16 x 0.25 mm		DF-G3 4000† DF-G2 1100 DF-G1 680 D10A 260	PIRS1X166UMPMAL
	Easy mount "fork" head Plastic	5 mm	1 mm		DF-G3 12 DF-G2 12 DF-G1 12 D10A 12	PDIS46UM12
	10 x 25 mm coverage Side (...S) or end exit (...E) Min. object detection of 1.5 mm	5 mm	16 x 0.25 mm	–	DF-G3 25 DF-G2 25 DF-G1 25 D10A 25	PFCVA-10X25-S PFCVA-10X25-E
	25 x 25 mm coverage Side (...S) or end exit (...E) Min. object detection of 3 mm	5 mm	16 x 0.25 mm	–	DF-G3 25 DF-G2 25 DF-G1 25 D10A 25	PFCVA-25X25-S PFCVA-25X25-E
	34 x 25 mm coverage Side (...S) or end exit (...E) Min. object detection of 4 mm	5 mm	16 x 0.25 mm	–	DF-G3 34 DF-G2 34 DF-G1 34 D10A 34	PFCVA-34X25-S PFCVA-34X25-E

† Max range determined by cable length 2 m = 4,000



# STEELSKIN™ Fibers

SteelSkin™ rugged fiber models resist kinking, cutting and snagging and have a low profile to easily embed in machines. Ideal for busy assembly stations, embedded in stations, part presence or places where equipment is constantly moved on and off a production line.

- Abrasion resistant while maintaining flexibility
- Bend to tighter radius and thinner than standard plastic fiber optics
- Superior resistance to wear, chemicals and other environmental conditions
- Assembly stations, part presence, busy assembly cells
- Opposed models come as a pair



## Opposed Fibers



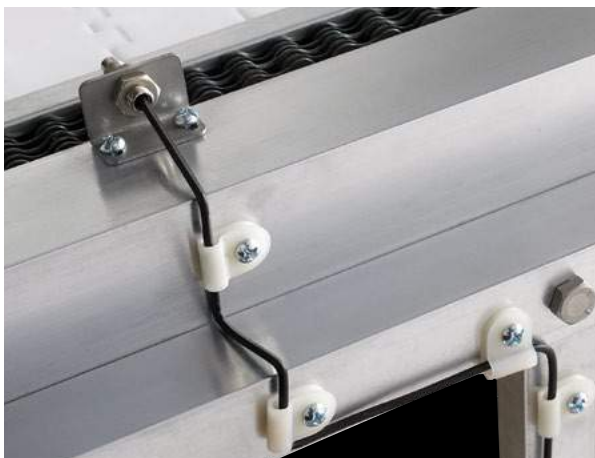
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Probe Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 2000 <sup>†</sup> DF-G2 1200 DF-G1 740 D10A 350	PIFP43TMB5
	Ferrule Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 2000 <sup>†</sup> DF-G2 1200 DF-G1 740 D10A 350	PIF43TMB5
	Thread Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 2000 <sup>†</sup> DF-G2 1200 DF-G1 740 D10A 350	PIT43TMB5

## Diffuse Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Thread Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 1780 DF-G2 370 DF-G1 230 D10A 80	PBT43TMB5
	Coaxial Thread Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 855 DF-G2 180 DF-G1 110 D10A 40	PBCT23TMB5
	Coaxial Threaded right angle Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 620 DF-G2 130 DF-G1 80 D10A 30	PBCT23TMB5MTA
	Coaxial Thread Stainless Steel Braid over monocoil	12 mm	1 x 0.5 & 9 x 0.25 mm	-	DF-G3 855 DF-G2 180 DF-G1 110 D10A 40	PBCT23TMB5M4
	Threaded right angle Stainless Steel Braid over monocoil	12 mm	1 mm	-	DF-G3 1630 DF-G2 340 DF-G1 210 D10A 80	PBAT43TMB5MTA

<sup>†</sup> Max range determined by cable length 1 m = 2,000 (does not apply to diffuse models)



# DURA-BEND™ Fibers

DURA-BEND™ fiber models provide improved flexibility for limited space setups and difficult-to-access locations. These fibers are best for use when fibers need to be integrated into a small fixture where a great deal of bending in tight spaces is needed.

- Minimal transmission loss under extreme bend radius
- Maintains performance regardless of flexing
- Multicore assemblies available
- Can almost kink fiber without affecting performance
- Works well in constant flexing applications
- Opposed models come as a pair

## Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	M4 x 0.7 and M2.5 x 0.45 Thread	2 mm	1 mm		DF-G3 3420 DF-G2 715 DF-G1 440 D10A 230	PIF46UHF
	Smooth ferrule	2 mm	1 mm		DF-G3 3420 DF-G2 715 DF-G1 440 D10A 230	PIF46UHF
	Thread	1 mm	0.5 mm		DF-G3 930 DF-G2 195 DF-G1 120 D10A 65	PIT26UHF
	Smooth ferrule	2 mm	1 mm		DF-G3 3420 DF-G2 710 DF-G1 440 D10A 230	PIFM46UHF
	Right angle Low profile	2 mm	1 mm		DF-G3 3110 DF-G2 650 DF-G1 400 D10A 200	PIA46UHFBMPMS
	Right angle Threaded	2 mm	1 mm		DF-G3 3420 DF-G2 710 DF-G1 440 D10A 330	PIAT46UHFMFTA

## Diffuse Fibers

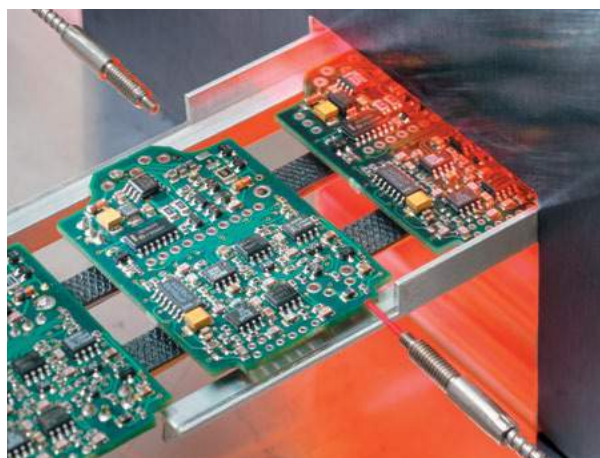


End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Thread	1 mm	0.5 mm		DF-G3 310 DF-G2 65 DF-G1 40 D10A 18	PBT26UHF
	Thread	2 mm	1 mm		DF-G3 1090 DF-G2 230 DF-G1 140 D10A 70	PBT46UHF
	Right Angle Threaded	2 mm	1 mm		DF-G3 930 DF-G2 195 DF-G1 120 D10A 70	PBAT46UHFMFTA

# High Temp Fibers

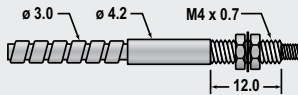
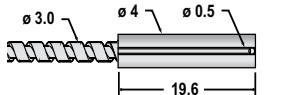
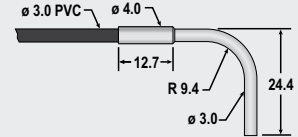
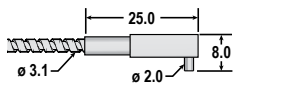
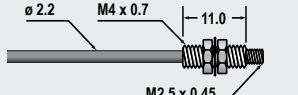

High temp fiber optics are used in situations where the temperature is above a certain limit for most plastic fibers. These are usually used in thermal process applications and Banner offers the widest selection of plastic and glass fibers for high temperature situations.

- For high temp applications above 100° C
- Thermal process applications
- For sensing near manufacturing ovens
- Manufacturing of solar panels, colored glass and ceramics
- Widest selection of plastic and glass fibers for high temp applications



## Opposed Fibers

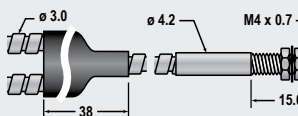
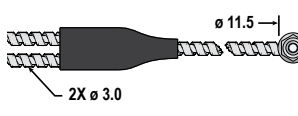
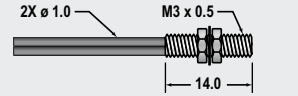


End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	M2.5 x 0.45 thread Stainless Steel Sheath End tip withstands 315° C	19 mm	1.2 mm	–	DF-G3 4000 <sup>†</sup> DF-G2 1260 DF-G1 775 D10A 325	IMT.756.6S-HT
	Smooth ferrule Side exit Stainless steel 250° C	19 mm	0.5 mm	–	DF-G3 1320 DF-G2 275 DF-G1 170 D10A 53	IA.31.7ST5ETA
	Smooth ferrule 90° angle Stainless steel tip End tip withstands 105° C	19 mm	1.3 mm	–	DF-G3 4000 <sup>†</sup> DF-G2 1310 DF-G1 810 D10A 310	IA.82.5PT5
	Smooth ferrule Side exit Stainless steel 480° C	19 mm	1.3 mm	–	DF-G3 4000 <sup>†</sup> DF-G2 1310 DF-G1 810 D10A 300	IA.83.3ST5ETA
	Thread End tip withstands 105° C	15 mm	1 mm		DF-G3 4000 <sup>†</sup> DF-G2 960 DF-G1 600 D10A 210	PIT46UHT1

<sup>†</sup> Max range determined by cable length 2 m = 4,000

## Diffuse Fibers

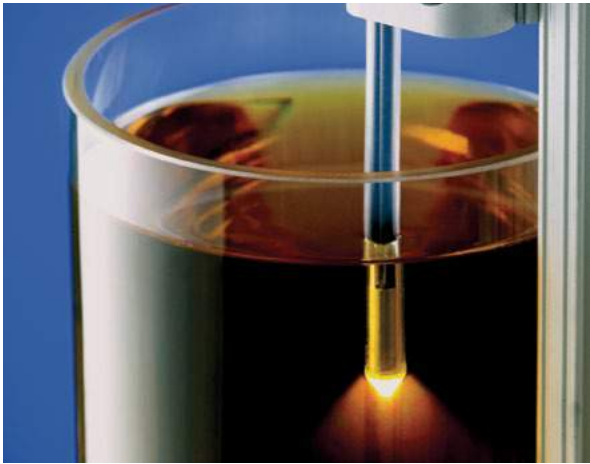


End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Miniature thread Stainless Steel Sheathing End tip withstands 315° C	19 mm	1.6 mm	–	DF-G3 390 DF-G2 80 DF-G1 50 D10A 15	BMT16.6S-HT
	Thread right angle Stainless Steel Sheathing End tip withstands 250° C	12 mm	1.6 mm	–	DF-G3 2100 DF-G2 440 DF-G1 270 D10A NA	BAT16.6ST5MTA
	Thread End tip withstands 105° C	15 mm	0.5 mm		DF-G3 390 DF-G2 80 DF-G1 50 D10A 20	PBT26UHT2

# Specialty Fibers

Specialty and custom fibers are designed for specific sensing applications. Many of the standard fibers can be customized and ready for use in days, not weeks. Banner excels in customization and will work with you to find the right solution.

- Chemical resistance
- Extreme environments
- Liquid level detection
- Customize bifurcations, material, lengths and other fiber features



## Liquid Level Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Fluoropolymer encapsulated Sensor switches when tip of fiber is immersed in liquid	25 mm	1 mm	✂	DF-G3 DF-G2 DF-G1 D10A	NA       <b>PBE46UTMLLP</b>
	Fluoropolymer encapsulated Sensor switches when tip of fiber is immersed in liquid End tip withstands 105° C	15 mm	1 mm	✂	DF-G3 DF-G2 DF-G1 D10A	NA       <b>PBE46UTMLLPHT1</b>
	Clear tube mount, 2 to 25 mm diameter	2 mm	1 mm	✂	Sensor switches when liquid meniscus reaches optical axis	       <b>PDI46U-LLD</b>

## Diffuse Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Coaxial ferrule probe Non-metallic end tip	25 mm	1 x 1.0 & 16 x 0.25 mm	✂	DF-G3 1710 DF-G2 360 DF-G1 220 D10A 120	       <b>PBCFP46UMLR</b>
	Fluoropolymer encapsulated tip	25 mm	1 mm	✂	DF-G3 1710 DF-G2 360 DF-G1 220 D10A 12	       <b>PBE46UTMNL</b>
	Dual bifurcated Light "OR" or Dark "AND" logic	15 mm	0.5 mm	-	DF-G3 DF-G2 DF-G1 D10A	NA       <b>PDBF26T5</b>

## Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Specialty slot sensor 90° angle; compact "fork" head	2 mm	1 mm		DF-G3 5 DF-G2 5 DF-G1 5 D10A 5	PDISM46UM5MA
	Sold as a pair Fluoropolymer encapsulated; lens	25 mm	1 mm		DF-G3 4000† DF-G2 3080 DF-G1 1900 D10A 1600	PIE46UT
	Sold as a pair Fluoropolymer encapsulated; lens	40 mm	1.5 mm		DF-G3 4000† DF-G2 1540 DF-G1 950 D10A 300	PIE66UTMNL
	Sold as a pair Fluoropolymer encapsulated; Side-view prism	25 mm	1 mm		DF-G3 400 DF-G2 280 DF-G1 280 D10A 280	PIES46UT
	Sold as a pair Flat sides for easy alignment Brass housing	40 mm	1.5 mm		DF-G3 4000† DF-G2 1100 DF-G1 680 D10A 350	PIPS66UMSQMAP

## Vacuum Applications

End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Vacuum compatible No epoxy	19 mm	1.6 mm	-	Varies by feed through and amp used	BMT13SMVF
	Aluminum Vacuum feed through	-	-	-	DF-G3 DF-G2 NA DF-G1 D10A	DVFT-2.ONWQ50
	Miniature thread No epoxy used For use on vacuum side Entire cable withstands 480 °C	19 mm	1.2 mm	-	Varies by feed through and amp used	IMT.753SMVF
	For use with Vacuum feed through on ambient side Opposed mode sold as a pair	40 mm	1.5 mm		DF-G3 4000† DF-G2 2140 DF-G1 1320 D10A 350	PIF66UMVFA
	Stainless steel Vacuum feed through	-	-	-	DF-G3 DF-G2 NA DF-G1 D10A	VFT-M8MVS

† Max range determined by cable length 2 m = 4,000

# Standard Fibers

Standard fiber optics come in a variety of materials with standard fiber tips in various sizes. If a standard fiber does not meet your application requirements, modifications can be made to give you a customized solution.

- Plastic individual fibers ideal for use in small, confined areas
- Available in side view/right angles
- Available in bifurcated models
- Opposed models come as a pair



## Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Smooth ferrule Stainless steel tip	15 mm	0.5 mm		DF-G3 1710 DF-G2 355 DF-G1 220 D10A 75	PIF26U
	Smooth ferrule Stainless steel tip	25 mm	1 mm		DF-G3 4000† DF-G2 1330 DF-G1 820 D10A 300	PIF46U
	Smooth ferrule Stainless steel tip	40 mm	1.5 mm		DF-G3 4000† DF-G2 2140 DF-G1 1320 D10A 525	PIF66U
	Stainless steel tip Best for repetitive flexing (1,000s of cycles)	5 mm	4 x 0.25 mm		DF-G3 1940 DF-G2 405 DF-G1 250 D10A 70	PIFM1X46U
	Smooth ferrule Stainless steel tip	25 mm	1 mm		DF-G3 4000† DF-G2 1330 DF-G1 820 D10A 300	PIFM46U
	Smooth ferrule Stainless steel tip	5 mm	0.25 mm		DF-G3 505 DF-G2 105 DF-G1 65 D10A 20	PIF16U
	Smooth ferrule Stainless steel tip Thick jacket (ø 2.2 mm)	15 mm	0.5 mm		DF-G3 1710 DF-G2 355 DF-G1 220 D10A 80	PIF26UMLS
	Smooth ferrule Stainless steel tip 90° angle sideview	25 mm	1 mm		DF-G3 2720 DF-G2 565 DF-G1 350 D10A 160	PIPS46U
	Smooth ferrule Stainless steel tip 90° angle sideview	40 mm	1.5 mm		DF-G3 2950 DF-G2 615 DF-G1 380 D10A 350	PIPS66U
	Probe Stainless steel tip	5 mm	0.5 mm		DF-G3 505 DF-G2 105 DF-G1 65 D10A 20	PIP16U

† Max range determined by cable length 2 m = 4,000



## Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Probe Stainless steel tip	15 mm	0.5 mm	✂	DF-G3 1825 DF-G2 380 DF-G1 235 D10A 80	PIP26U
	Probe Stainless steel tip	25 mm	1 mm	✂	DF-G3 4000† DF-G2 1230 DF-G1 760 D10A 265	PIP46U
	Stainless steel threaded tip	5 mm	0.25 mm	✂	DF-G3 465 DF-G2 100 DF-G1 60 D10A 15	PIT16U
	Nickel plated brass threaded tip	15 mm	0.5 mm	✂	DF-G3 1710 DF-G2 220 DF-G1 75 D10A	PIT26U
	Nickel plated brass threaded tip	25 mm	1 mm	✂	DF-G3 4000† DF-G2 1120 DF-G1 690 D10A 240	PIT415U
	Nickel plated brass threaded tip	25 mm	1 mm	✂	DF-G3 4000† DF-G2 1330 DF-G1 820 D10A 300	PIT46U
	Nickel plated brass threaded tip	40 mm	1.5 mm	✂	DF-G3 4000† DF-G2 2140 DF-G1 1320 D10A 525	PIT66U
	Nickel plated brass threaded tip	40 mm	1.5 mm	✂	DF-G3 4000 DF-G2 1815 DF-G1 1120 D10A 450	PIT615U
	Stainless steel 90° angle tip	5 mm	0.25 mm	✂	DF-G3 230 DF-G2 50 DF-G1 30 D10A 15	PIA16U
	Stainless steel 90° angle tip	15 mm	0.5 mm	✂	DF-G3 930 DF-G2 195 DF-G1 120 D10A 50	PIA26U
	Nickel plated brass threaded 90° angle tip	5 mm	0.25 mm	✂	DF-G3 465 DF-G2 100 DF-G1 60 D10A 10	PIAT16U
	Nickel plated brass threaded 90° angle tip	15 mm	0.5 mm	✂	DF-G3 1555 DF-G2 325 DF-G1 200 D10A 50	PIAT26U

† Max range determined by cable length 2 m = 4,000



Opposed Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Stainless steel threaded 90° angle tip	25 mm	1 mm	✂	DF-G3 4000† DF-G2 1360 DF-G1 840 D10A 275	PIAT46U
	Stainless steel threaded 90° angle tip	40 mm	1.5 mm	✂	DF-G3 4000† DF-G2 2075 DF-G1 1280 D10A 350	PIAT66U
	Stainless steel threaded 90° angle tip	25 mm	1 mm	✂	DF-G3 4000† DF-G2 1360 DF-G1 840 D10A 275	PIAT46UM.4X.4MT
	Stainless steel threaded 90° angle tip	2 mm	1 mm	✂	DF-G3 4000† DF-G2 970 DF-G1 600 D10A 210	PIAT46UHF
	Delrin side exit	2 mm	1 mm	✂	DF-G3 2000† DF-G2 710 DF-G1 440 D10A 230	PIA46UHFMB8X12

† Max range determined by cable length 2 m = 4,000

## Diffuse Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Smooth ferrule Stainless steel tip	15 mm	0.5 mm		DF-G3 620 DF-G2 130 DF-G1 80 D10A 25	PBF26U
	Smooth ferrule Stainless steel tip	25 mm	1 mm		DF-G3 1710 DF-G2 355 DF-G1 220 D10A 85	PBF46U
	Smooth ferrule Stainless steel tip Thin jacket (ø 1.3)	25 mm	1 mm		DF-G3 1710 DF-G2 355 DF-G1 220 D10A 85	PBF46UM3MJ1.3
	Smooth ferrule Stainless steel tip	40 mm	1.5 mm		DF-G3 2410 DF-G2 500 DF-G1 310 D10A 170	PBF66U
	Smooth ferrule Stainless steel tip	2 mm	1 mm		DF-G3 1445 DF-G2 300 DF-G1 186 D10A 65	PBF46UHF
	Smooth ferrule Stainless steel tip Coaxial	5 mm	1 x 1.0 and 16 x 0.25 mm		DF-G3 2140 DF-G2 445 DF-G1 275 D10A 96	PBCF46U
	Smooth ferrule Stainless steel tip	15 mm	0.5 mm		DF-G3 175 DF-G2 160 DF-G1 100 D10A 35	PBEFP26U
	Smooth ferrule Stainless steel tip	25 mm	1 mm		DF-G3 1980 DF-G2 410 DF-G1 255 D10A 90	PBFM46U
	Smooth ferrule Stainless steel tip	2 mm	1 mm		DF-G3 1440 DF-G2 300 DF-G1 185 D10A 65	PBFM46UHF
	Smooth ferrule Stainless steel tip	5 mm	0.25 mm		DF-G3 4000 <sup>†</sup> DF-G2 1120 DF-G1 690 D10A 240	PBFMP16UMP.2
	Smooth ferrule Stainless steel tip 90° angle sideview	15 mm	0.5 mm		DF-G3 230 DF-G2 50 DF-G1 30 D10A 15	PBPS26U
	Smooth ferrule Stainless steel tip 90° angle sideview	25 mm	1 mm		DF-G3 275 DF-G2 160 DF-G1 100 D10A 50	PBPS46U
	Probe ferrule Stainless steel tip	15 mm	0.5 mm		DF-G3 545 DF-G2 115 DF-G1 70 D10A 30	PBPF215U
	Probe ferrule Bendable stainless steel tip	15 mm	0.5 mm		DF-G3 620 DF-G2 130 DF-G1 80 D10A 25	PBP26U

## Diffuse Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Probe ferrule Bendable stainless steel tip	25 mm	1 mm	✂	DF-G3 1710 DF-G2 355 DF-G1 220 D10A 85	PBP46U
	Probe ferrule Stainless steel tip	5 mm	0.25 mm	✂	DF-G3 155 DF-G2 30 DF-G1 20 D10A 10	PBFM16U
	Probe ferrule Bendable stainless steel tip	5 mm	0.25 mm	✂	DF-G3 115 DF-G2 25 DF-G1 15 D10A 5	PBP16U
	Probe ferrule Bendable stainless steel tip	2 mm	1 mm	✂	DF-G3 1475 DF-G2 310 DF-G1 190 D10A 65	PBP46UHF
	Probe ferrule Stainless steel tip	15 mm	0.5 mmv	✂	DF-G3 620 DF-G2 130 DF-G1 80 D10A 25	PBPF26U
	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	✂	DF-G3 700 DF-G2 145 DF-G1 90 D10A 40	PBCT26U
	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	✂	DF-G3 700 DF-G2 145 DF-G1 90 D10A 40	PBCT26UM3
	Coaxial Threaded Stainless steel tip	5 mm	1 x 0.5 & 9 x 0.25 mm	✂	DF-G3 700 DF-G2 145 DF-G1 90 D10A 40	PBCT26UM4M2.5
	Coaxial Threaded Stainless steel tip Overmolded flex relief	15 mm	1 x 0.5 10 x 0.25 mm	✂	DF-G3 1555 DF-G2 325 DF-G1 200 D10A 110	PBCT26UMFR
	Coaxial Threaded Nickel plated Brass tip	5 mm	1 x 1.0 & 16 x 0.25 mm	✂	DF-G3 1710 DF-G2 355 DF-G1 220 D10A 120	PBCT46U
	Coaxial Threaded Stainless steel tip Overmolded flex relief	25 mm	1 x 1.0 16 x 0.25 mm	✂	DF-G3 1555 DF-G2 325 DF-G1 200 D10A 110	PBCT46UMFR
	Threaded Stainless steel tip	5 mm	0.25 mm	✂	DF-G3 80 DF-G2 15 DF-G1 10 D10A 5	PBT16U
	Threaded Nickel plated Brass tip	15 mm	0.5 mm	✂	DF-G3 620 DF-G2 130 DF-G1 80 D10A 25	PBT26U
	Stainless steel tip	12 mm	0.5 mm	✂	DF-G3 620 DF-G2 130 DF-G1 80 D10A 25	PBT26UMSSMFF

## Diffuse Fibers



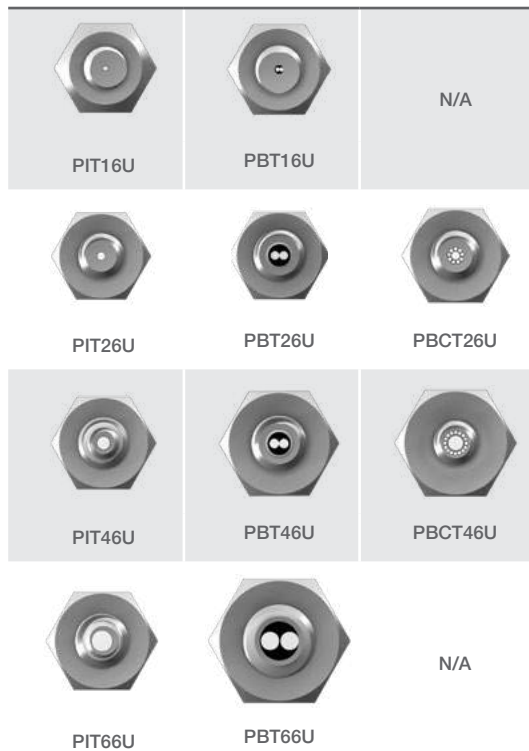
End Tip	Features	Minimum Bend Radius	Core Diameter	Free Cut	Typical Range (mm)	Models
	Threaded Nickel plated Brass tip	25 mm	1 mm		DF-G3 1710 DF-G2 355 DF-G1 220 D10A 85	PBT46U
	Threaded Nickel plated Brass tip	40 mm	1.5 mm		DF-G3 2400 DF-G2 500 DF-G1 310 D10A 170	PBT66U
	Threaded Nickel plated Brass tip	25 mm	1 mm		DF-G3 1400 DF-G2 290 DF-G1 180 D10A 70	PBT415U
	Threaded Nickel plated Brass tip	15 mm	0.5 mm		DF-G3 740 DF-G2 155 DF-G1 95 D10A 30	PBT26UM6M.1
	Stainless steel threaded 90° angle tip	25 mm	1 mm		DF-G3 930 DF-G2 195 DF-G1 120 D10A 70	PBAT46U
	10.9 mm front exit Aluminium	5 mm	32 x 0.25 mm		DF-G3 1555 DF-G2 325 DF-G1 200 D10A 65	PBR1X326U
	10.9 mm side exit Aluminium	5 mm	32 x 0.25 mm		DF-G3 1555 DF-G2 325 DF-G1 200 D10A 65	PBR1X326U
	Dual lens straight exit Aluminium	25 mm	1 mm		DF-G3 4000† DF-G2 950 DF-G1 590 D10A 210	PBL46U

† Max range determined by cable length 2 m = 4,000

## Plastic Fiber Optics Specifications

Construction	<b>Optical Fiber:</b> Acrylic (PMMA) monofilament, except as noted <b>Protective Jacket:</b> Black polyethylene, except as noted <b>Threaded End Tips and Hardware:</b> Nickel-plated brass, except as noted <b>Probe End Tips:</b> Annealed (bendable) 304 stainless steel <b>Angled End tips:</b> Hardened 304 stainless steel <b>Ferrule End Tips:</b> 303 stainless steel
Sensing Range	Refer to the specific fiber optic/sensor combination
Implied Dimensional Tolerance	<b>All dimensions are in millimeters:</b> x = $\pm 2.5$ mm, x.x = $\pm 0.25$ mm and x.xx = $\pm 0.12$ mm, unless specified "L" = $\pm 40$ mm per meter
Minimum Bend Radius	8 mm for 0.25 mm diameter fibers 12 mm for 0.5 mm diameter fibers (except DURA-BEND™) 25 mm for 1.0 mm diameter fibers (except DURA-BEND™) 38 mm for 1.5 mm diameter fibers
Repeat Bending/Flexing	Life expectancy of plastic fiber optic cable is in excess of one million cycles at bend radii of no less than the minimum and a bend of 90° or less. Avoid stress at the point where the cable enters the sensor ("control end") and at the sensing end tip. Coiled plastic fiber optic assemblies are recommended for any application requiring reciprocating fiber motion.
Chemical Resistance	The acrylic core of the monofilament optical fiber will be damaged by contact with acids, strong bases (alkalis) and solvents. The polyethylene jacket will protect the fiber from most chemical environments. However, materials may migrate through the jacket with long term exposure. Samples of fiber optic material are available from Banner for testing and evaluation.
Temperature Extremes	Temperatures below -30 °C will cause embrittlement of the plastic materials but will not cause transmission loss. Temperatures above +70 °C will cause both transmission loss and fiber shrinkage.
Operating Temperature	-30 to +70 °C, unless otherwise specified


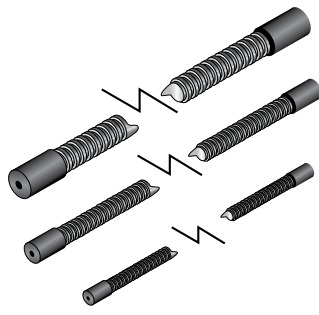
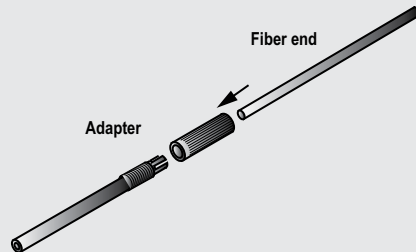
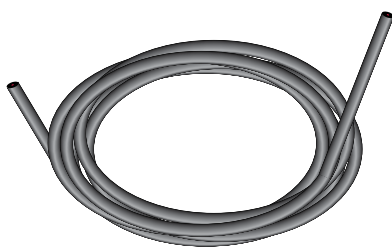
## Fiber Core Diameter Comparison



### ▲ Application Notes and Warnings ▲

- 1 Plastic fiber assemblies with "U" in the suffix of the model numbers have unterminated control ends (the end that is coupled to the photoelectric sensor). The customer can cut these fiber optic assemblies to the required length using the supplied cutter. Use only the supplied cutter to ensure optimal light coupling efficiency.
- 2 Terminated plastic fiber assemblies are optically ground and polished and cannot be shortened, spliced or otherwise modified.
- 3 Do not subject the plastic fibers to sharp bends, pinching, high tensile loads or high levels of radiation.
- 4 When ordering fiber lengths in excess of 2 m, take into account light signal attenuation due to the additional length.
- 5 Due to their light transmission properties, plastic fiber optics are recommended for use only with visible light fiber optic sensors.
- 6 Use caution when applying fiber optics in hazardous locations. Although fiber optic assemblies are, by themselves, intrinsically safe, the sensor and associated electronics must be LOCATED IN A SAFE ENVIRONMENT. Alternatively, fiber optics may be used with NAMUR sensor model Q45AD9FP. Fiber optics do not necessarily provide a hermetic seal between a hazardous environment and the safe environment.

## Fiber Optic Accessories

	Model Specific Features	General Features	Image	Model Number	
Fiber Cutters	Plastic fiber cutter	single cutter	 <p>NOTE: Adaptors used with Q45, OMNI-BEAM, ECONO-BEAM, MAXI-BEAM and VALU-BEAM sensors only.</p>	PFC-4	
		100 cutters		PFC-4-100	
	For use with 0.25 and 0.5 mm diameter cables.	<ul style="list-style-type: none"> <li>These kits are used with unterminated plastic fiber cables</li> </ul>		PFK20	
	For use with 1 and 1.5 mm diameter cables.	<ul style="list-style-type: none"> <li>Each kit contains 40 sensor adaptors and 10 cutter assemblies</li> </ul>		PFK40	
Plastic Fiber Field-Installable Sheathing	May be used with bifurcated fiber assemblies having M6 x 0.75 threaded end tips (e.g., PBCT46U, PBP46U, PBT46UHT1 and PBT66U).	<ul style="list-style-type: none"> <li>Stainless steel sheathing with stainless steel end fittings (one end internally threaded to capture fiber end tips, other end non-threaded) is used in applications where protection is required for plastic fiber optic cables</li> <li>All models listed are 1.8 m in length</li> <li>Other lengths are available by contacting Banner Applications Department</li> </ul>		PFS69S6T	
	May be used with individual or bifurcated fiber assemblies having M4 x 0.7 threaded end tips (e.g., PBCT26U, PBPF26U, PIP46U, PIT46U and PIT66U).			PFS53S6T	
	May be used with individual fiber assemblies having M3 x 0.5 threaded end tips (e.g., PIP26U, PIT26U and PIT1X46U).			PFS44S6T	
Plastic Fiber Adapters	Use to adapt plastic fiber optic cables with outside jacket diameter of 1.0 mm, such as PIT26U and PBP16U.	<ul style="list-style-type: none"> <li>Compression fitting adapters are used with small-diameter unterminated plastic fiber cables</li> <li>Use when interfacing small-diameter plastic fibers to D10, D12, QM42, QS18, R55F, FI22 and MINI-BEAM plastic fiber sensor families</li> <li>Each kit contains 100 pairs of adapters. One pair will interface either one bifurcated fiber optic cable or a pair of individual cables to a fiber optic amplifier</li> </ul>		UPFA-1-100	
	Use to adapt plastic fiber optic cables with outside jacket diameter of 1.25 mm or 1.3 mm, such as PBCT26U and PBF46UM3MJ1.3.			UPFA-2-100	
Unterminated Individual and Bifurcated Plastic Fibers	Core	Length	Type		Model Number
	0.5 mm	9 m	Single		PIU230U
		18 m			PIU260U
	1.0 mm	9 m	Single		PIU430U
		18 m			PIU460U
	1.5 mm	9 m	Single		PIU630U
		18 m			PIU660U
	1.0 mm	9 m	Duplex		PBU430U
18 m		PBU460U			



# Glass Fiber Optics

Solve numerous challenging sensing applications in the most hostile environments, including temperatures up to 480° C, corrosive materials and extreme moisture

- Withstand severe shock and vibration
- Ignore extreme electrical noise
- Constructed of a combination of optical glass fiber, stainless steel, PVC, brass, molded thermoplastics and optical-grade epoxy

## Choosing Glass or Plastic



### Fiber Construction

**Core:** Thin glass or plastic center of the fiber through which light travels

**Cladding:** Outer optical material surrounding the core that reflects light back into the core

**Jacket/**

**Sheath:** Protective layer to protect fiber from damage and moisture

Plastic fibers are for general purpose use. They tolerate severe flexing, can be cut to length in the field and cost less than glass fibers. Glass fibers are the best choice for challenging environments such as high temperatures, corrosive materials and moisture.



### Glass fibers page 192

- Solve numerous challenging sensing requirements
- Ideal for hostile environments such as high temperatures to 480° C, corrosive materials and extreme moisture
- Withstand high levels of shock and vibration
- Inherently immune to extreme electrical noise
- Available with choice of sheathings: standard stainless-steel flexible conduit, PVC or other flexible tubing
- Can be quickly custom designed



### Plastic fibers page 174

- Inexpensive and easily cut to length during installation
- Bend for a precise fit
- Available in high-flex models to withstand flexing
- Offered with special jackets that withstand corrosion, impact and abrasion
- Available for applications requiring articulated or reciprocating motion
- Available in diameters of 0.25, 0.5, 1.0 Or 1.5 mm
- Can be quickly custom designed and built for your unique applications



## Model Key

I	AT	2	3	S	XX
---	----	---	---	---	----

### ASSEMBLY STYLE

**B** = Bifurcated fiber  
**I** = Individual fiber\*

### SENSING END TIP STYLE

**A** = 90° Angle  
**AM** = Miniature 90° Angle  
**AT** = 90° Angle/Thread  
**F** = Ferrule  
**M** = Miniature Tip  
**MP** = Miniature Probe  
**MT** = Miniature Thread  
**R** = Rectangular Bundle Termination  
**T** = Thread  
**TA** = Thread/90° Angle  
**TETA** = Thread and Extra Tight 90° Angle

### MODIFICATIONS

**"MXX"** = Sensing end tip modification  
**"M600"** = Sensing end withstands 315° C  
**"M900"** = Sensing end withstands 480° C

### SHEATHING MATERIAL

**S** = Stainless steel flexible conduit  
**P** = PVC with galvanized monocoil reinforcing wire

### OVERALL LENGTH (in feet)

**2** = 2 ft. = 610 mm ±38 mm  
**3** = 3 ft. = 914 mm ±38 mm

### FIBER BUNDLE DIAMETER

**.44** = 0.027 in = 0.69 mm  
**.5** = 0.032 in = 0.81 mm  
**.75** = 0.046 in = 1.17 mm  
**1** = 0.062 in = 1.57 mm  
**1.5** = 0.09 in = 2.29 mm  
**2** = 0.125 in = 3.18 mm  
**2.5** = 0.156 in = 3.96 mm

\* Individual glass fibers are packaged separately.

## Opposed Glass Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical Range (mm)		Models
	90° angle	19 mm	3.18 mm	 	QS18 R55F SME312 D12E D12	715 1050 250 975 550	IA23S
	90° angle/thread Lenses available	19 mm	3.18 mm	 	QS18 R55F SME312 D12E D12	900 1050 250 975 550	IAT23S
	Smooth ferrule	19 mm	3.18 mm	 	QS18 R55F SME312 D12E D12	990 1050 975 550	IF23P
	Miniature thread	9.5 mm	0.69 mm		QS18 R55F SME312 D12E D12	NA 75 25 102 70	IMT.442P
	Thread Lenses available	19 mm	3.18 mm	 	QS18 R55F SME312 D12E D12	900 1050 250 975 550	IT23S
	90° angle/thread	19 mm	3.18 mm	 	QS18 R55F SME312 D12E D12	1100 1050 250 925 550	ITA23S
	Miniature probe 90° angle	19 mm	1.17 mm		QS18 R55F SME312 D12E D12	110 130 50 180 170	IAM.752S
	Miniature probe Non-bendable probe	19 mm	1.17 mm		QS18 R55F SME312 D12E D12	NA 130 50 180 170	IM.752S
	Miniature probe	9.5 mm	1.17 mm		QS18 R55F SME312 D12E D12	NA 130 50 180 170	IMP.753P

Available 315 °C models. Add M600 to end of model number (example, IA23SM600).

Available 480 °C models. Add M900 to end of model number (example, IA23SM900).  
Dimensions may vary for these models.

NA: Not recommended.

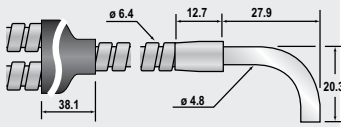
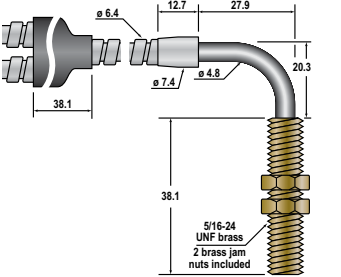
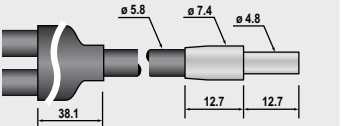
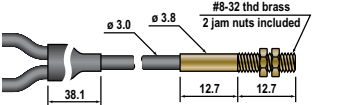
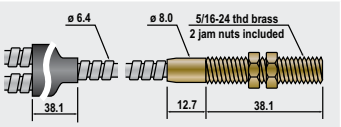
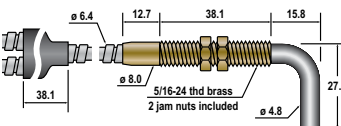
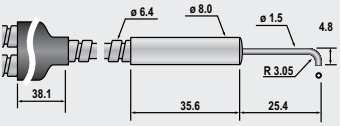
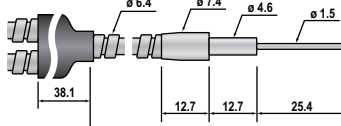
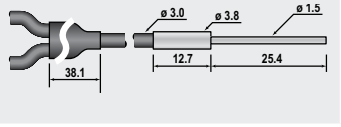
Opposed Glass Fibers



End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical Range (mm)	Models
	Straight exit; 38 mm width	19 mm	3.7 mm	M600	QS18 760 R55F 1175 SME312 350 D12E 975 D12 580	IR2.53S
	Straight exit; 10 mm width	19 mm	3.2 mm	M600	QS18 1045 R55F 1050 SME312 250 D12E 925 D12 550	IR23S
	Side exit Stainless steel	19 mm	2.3 mm	M600	QS18 250 R55F 600 SME312 180 D12E 500 D12 450	IA1.53SMETA
	Side exit Stainless steel	19 mm	2.3 mm	M600	QS18 340 R55F 600 SME312 180 D12E 500 D12 450	IA1.53SMTA
	Side exit Stainless steel	19 mm	2.3 mm	M600	QS18 390 R55F 600 SME312 180 D12E 500 D12 450	ITETA1.53S
	For use in vacuum applications No epoxy	19 mm	1.3 mm		Contact factory for sensing range	IMT.753SMVF
	Glass lens withstands 315 °C Contact factory for range					L9
	Plastic housing withstands 105 °C Contact factory for range					L16F
	Aluminum housing withstands 315 °C Contact factory for range					L16FAL
	Stainless steel housing withstands 480 °C Contact factory for range					L16FSS

M600 Available 315 °C models. Add M600 to end of model number (example, BA23SM600).

## Diffuse Glass Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical Range (mm)		Models
	Stainless steel 90° angle	19 mm	3.2 mm	<b>M600</b> <b>M900</b>	QS18 R55F SME312 D12E D12	80 110 25 180 150	BA23S
	Stainless Steel/Brass 90° angle	19 mm	3.2 mm	<b>M600</b> <b>M900</b>	QS18 R55F SME312 D12E D12	90 110 25 180 150	BAT23S
	PVC sheath	19 mm	3.2 mm	-	QS18 R55F SME312 D12E D12	100 110 25 180 150	BF23P
	PVC over Moncoil Sheathing Brass	9.5 mm	0.7 mm	-	QS18 R55F SME312 D12E D12	NA NA 1 10 5	BMT.442P
	Stainless Steel/Brass	19 mm	3.2 mm	<b>M600</b> <b>M900</b>	QS18 R55F SME312 D12E D12	100 110 25 180 150	BT23S
	Stainless steel/Brass 90° angle	19 mm	3.2 mm	<b>M600</b> <b>M900</b>	QS18 R55F SME312 D12E D12	85 110 25 180 150	BTA23S
	Stainless Steel 90° angle	19 mm	1.2 mm	<b>M600</b>	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BAM.752S
	Stainless Steel Probe	19 mm	1.2 mm	<b>M600</b>	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BM.752S
	PVC over Moncoil Sheathing Probe	9.5 mm	1.2 mm	-	QS18 R55F SME312 D12E D12	NA 11 3 42 25	BMP.753P

**M600** Available 315 °C models. Add w to end of model number (example, BA23SM600).

**M900** Available 480° C models. Add M900 to end of model number (example, BA23SM900).  
Dimensions may vary for these models.

NA: Not recommended.

Diffuse Glass Fibers

End Tip	Features	Minimum Bend Radius	Core Diameter	Temp	Typical Range (mm)	Models
	Straight exit; 38 mm width	19 mm	3.7 mm	<b>M600</b>	QS18 75 R55F 120 SME312 30 D12E 180 D12 155	BR2.53S
	Straight exit; 9.7 mm width	19 mm	3.2 mm	<b>M600</b>	QS18 110 R55F 110 SME312 25 D12E 180 D12 150	BR23S
	90° angle	19 mm	2.3 mm	<b>M600</b>	QS18 45 R55F 65 SME312 20 D12E 135 D12 125	BA1.53SMETA
	90° angle	19 mm	2.3 mm	<b>M600</b>	QS18 50 R55F 60 SME312 20 D12E 135 D12 125	BA1.53SMTA
	90° angle	19 mm	2.3 mm	<b>M600</b>	QS18 30 R55F 60 SME312 20 D12E 135 D12 125	BTETA1.53S
	Glass lens; withstands 315 °C Focuses light to .80 mm with ø 1.6 mm fiber				Contact factory for range information	L10

**M600** Available 315 °C models. Add M600 to end of model number (example, BA23SM600).

## Glass Fiber Optics Specifications

<b>Construction</b>	Combination of optical glass fiber, stainless steel or PVC, brass, molded thermoplastics, and optical-grade epoxy. Optical fiber is F2 core, EN1 clad, approx. 50 $\mu\text{m}$ diameter per strand. Flexible steel interlock sheathing is 302 stainless.
<b>Sensing Range</b>	Refer to the specific fiber optic to be used
<b>Bend Radius</b>	Inside bend radius must be 12 mm or greater for PVC covered fiber optic assemblies, and 25 mm or greater for stainless steel armored cable covered fibers
<b>Length</b>	Standard length for assemblies is 915 mm; see dimension diagrams Most models are available from the factory with shorter or longer cable lengths, up to 18 m max
<b>Length Dimension Tolerance</b>	<b>Overall assembly length:</b> $\pm 12$ mm per 300 mm of length <b>Shrink junction dimensions:</b> $\pm 12$ mm
<b>Implied Dimensional Tolerances</b>	<b>All dimensions are in millimeters:</b> x = $\pm 2.5$ mm, x.x = $\pm 0.25$ mm and x.xx = $\pm 0.12$ mm, unless specified.
<b>Operating Conditions</b>	Fiber assemblies with stainless-steel (SS) sheathing and metal end tips: $-140^{\circ}$ to $+249^{\circ}$ C Fiber assemblies with PVC sheathing and/or plastic end tips: $-40^{\circ}$ to $+105^{\circ}$ C Special order assemblies with SS sheathing and metal end tips and model suffix "M600": $-140^{\circ}$ to $+315^{\circ}$ C* Special order assemblies with SS sheathing and metal end tips and model suffix "M900": $-140^{\circ}$ to $+480^{\circ}$ C*; note dimensional changes from STD models  * sensing end tip only

▲ Application Notes and Warnings ▲

- 1** The ends of glass fiber optic assemblies are optically ground and polished. Care taken in this manufacturing process accounts for the light coupling efficiency of the fiber optic assembly. As a result, glass fiber assemblies cannot be shortened, spliced or otherwise modified.
- 2** Use caution when applying fiber optics in hazardous locations. Although fiber optic assemblies are by themselves, intrinsically safe, the sensor and associated electronics must be LOCATED IN A SAFE ENVIRONMENT. Alternatively, fiber optics may be used with sensor model SMI912FQD. This sensor is approved for use inside hazardous areas when used with an appropriate intrinsic barrier. Also, see NAMUR sensor models Q45AD9F and MIAD9F. Fiber optics do not necessarily provide a hermetic seal between a hazardous environment and the safe environment.
- 3** In applications where glass fibers are used to insulate the control from high voltage, specify silicone rubber, Teflon®, or high-density polyethylene sheathing with no reinforcing wire in the cable. It is the responsibility of the user to test each fiber optic assembly for insulation capacity.
- 4** Do not subject the fibers to sharp bends, pinching, repeated flexing or high levels of radiation.
- 5** When ordering fiber lengths in excess of 1 m, take into account light signal reduction of 5 percent per 300 mm of additional length.

Teflon® is a registered trademark of Dupont™.

## Additional Models Available

In addition to the configurations shown, Banner offers thousands of readily available alternative fiber models:

- Substitute PVC over monocoil sheathing for stainless steel
- Reduce or increase glass fiber optic bundle diameters  
Example: Change  $\varnothing$  3.18 mm bundle to  $\varnothing$  1.57 mm
- Substitute a rectangular-shaped fiber bundle (0.5 x 2.5 mm) for a circular bundle
- Change endtip material from brass to stainless steel
- Modify straight or angled probe tip dimensions
- Modify overall fiber length in intervals of 305 mm (standard lengths are 914 and 610 mm)





## Measurement

High-quality optical, ultrasonic, radar and measuring array sensors help to solve the most challenging measurement applications.

# MEASUREMENT

---

LASER page 202

ULTRASONIC page 216

RADAR page 240

ARRAYS page 246

TEMPERATURE &  
VIBRATION page 260



## Laser

Laser distance measurement sensors provide accurate non-contact measuring and monitoring of targets with varying color, shape and temperature.



Series	Description	Max Sensing Range	Dimensions H x W x D	Resolution	Housing Material	Power Supply
	<b>LTF</b> High-performance LTF Series Sensors detect targets regardless of color, material or sheen from up to 12 m away, straight-on or at an angle page 204	12 m	77 x 26 x 56 mm	0.3 to 3 mm	Die-cast zinc	12 to 30 V dc
	<b>LE</b> A laser sensor with a range of 100 up to 1000 mm right out of the box with 2-line LCD display easy adjustment, setup and use. page 206	1 m	60 x 26 x 56 mm	0.02 to 1.0 mm	Die-cast zinc	12 to 30 V dc
	<b>LH</b> High-precision laser measurement page 208	200 mm	80 x 33 x 65 mm	0.001 to 0.01 mm	Aluminum	18 to 30 V dc
	<b>LG</b> High-precision short-range laser measurement page 210	125 mm	55.3 x 20.2 x 82.3 mm	0.003 to 0.01 mm	Zinc alloy die-cast, plated and painted finish	12 to 30 V dc
	<b>LT3</b> Time-of-flight laser distance-gauging page 212	<b>Diffuse:</b> 5 m <b>Retro:</b> 50 m	68.5 x 35.3 x 87 mm	1.0 to 1.25 mm	ABS	12 to 24 V dc
	<b>LT7</b> Time-of-flight laser distance-gauging page 214	<b>Diffuse:</b> 10 m <b>Retro:</b> 250 m	93 x 42 x 95 mm	4.0 to 8.0 mm	ABS	18 to 30 V dc

## OTHER AVAILABLE MODELS



Q4X page 34



Q50 Website Only

# LTF Series

## High-Performance Laser Time of Flight




- Best in class combination of range, repeatability and accuracy enable highly reliable target detection and precise distance measurement
- Two-line, eight-character display and push-button programming for easy setup, troubleshooting and real-time distance measuring
- Durable IP67 housing, high ambient light immunity and stable performance across temperatures provide reliable performance in challenging environments
- Advanced options, including delay timers, advanced triggered measurement modes and cross-talk avoidance

### LTF

Example Model Number: LTF12IC2LDQ

Family	Range (m)	Output	Laser Class	Sensing Mode	Connector
<b>LTF</b>	<b>12</b>	<b>I</b>	<b>C2</b>	<b>LD</b>	<b>Q</b>
	12 24	I = 4 to 20 mA analog and (1) NPN/PNP discrete U = 0 to 10 V analog and (1) NPN/PNP discrete K = Dual Discrete with IO-Link	C2 = Class 2	LD = Laser diffuse	Blank = 2 m Integral Cable Q = Rotatable M12 Euro QD QP = PVC M12 Euro Pigtail QD W/30 = 9 m intergal cable
		NOTE: Discrete NPN/PNP is user configurable			



 Connection Option: A model with a QD requires a mating cordset.

**M12/Euro-Style with Shield**  
Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)



**5-Pin**  
MQDEC2-506  
2 m (6.5')  
MQDEC2-515  
5 m (15')  
MQDEC2-530  
9 m (30')

Additional cordset information is available  
See page 758



SMBLTLF



SMBLTFU



SMBAMSSLTFP



SMBLFFFA

includes 3/8" bolt for mounting  
**SMBLFFAM10**  
includes 10 mm bolt for mounting  
**SMBLFFAM12**  
clamps directly onto industry standard bracket systems of 1/2" or 12 mm rods

Additional bracket information is available  
See page 724

### LTF Specifications

<b>Supply Voltage and Current</b>	12 to 30 V dc																				
<b>Normal Run Mode:</b>	< 2.1 W. Current consumption < 85 mA at 24 V dc																				
<b>Sensing Beam</b>	Visible red laser; class 2																				
<b>Beam Spot Size</b>	<table border="1"> <thead> <tr> <th>Distance (mm)</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>6.5 mm</td> </tr> <tr> <td>7500</td> <td>10 mm</td> </tr> <tr> <td>12000</td> <td>12.5 mm</td> </tr> </tbody> </table>	Distance (mm)	Size	50	6.5 mm	7500	10 mm	12000	12.5 mm												
Distance (mm)	Size																				
50	6.5 mm																				
7500	10 mm																				
12000	12.5 mm																				
<b>Response Time</b>	<b>Fast:</b> 1.5 ms <b>Standard:</b> 8 ms <b>Medium:</b> 32 ms <b>Slow:</b> 256 ms																				
<b>Range and Linearity / Accuracy</b>	<table border="1"> <thead> <tr> <th colspan="4">Accuracy</th> </tr> <tr> <th>Reflectance</th> <th></th> <th>±10 mm</th> <th>±20 mm</th> </tr> </thead> <tbody> <tr> <td>6% Black Card</td> <td></td> <td>5 m</td> <td>7 m</td> </tr> <tr> <td>18% Gray Card</td> <td></td> <td>8 m</td> <td>11 m</td> </tr> <tr> <td>90% White Card</td> <td></td> <td>12 m</td> <td>-</td> </tr> </tbody> </table>	Accuracy				Reflectance		±10 mm	±20 mm	6% Black Card		5 m	7 m	18% Gray Card		8 m	11 m	90% White Card		12 m	-
Accuracy																					
Reflectance		±10 mm	±20 mm																		
6% Black Card		5 m	7 m																		
18% Gray Card		8 m	11 m																		
90% White Card		12 m	-																		
<b>Repeatability</b> Slow 256 ms shown (for more info see datasheet)																					
<b>Resolution</b>	< 0.3 to 3 mm*																				
<b>Construction</b>	Die-cast zinc housing; acrylic window																				
<b>Environmental Rating</b>	IEC IP67; NEMA 6																				
<b>Connections</b>	5-Pin Threaded M12/Euro-Style Cordsets— with Shield																				
<b>Operating Conditions</b>	<b>Temperature:</b> -20 to +55 °C <b>Humidity:</b> 90% at +55 °C maximum relative humidity (non-condensing)																				
<b>Certifications</b>																					

\* Resolution measured as twice repeatability with white target at slow response speed at 20 °C. See repeatability curves for more detail.

# LE Series

## Laser Sensor



- The LE laser sensors are ready to measure right out of the box with easy adjustment, setup and use.
- Easy adjustment with a two-line, eight-character intuitive display
- Repeatability and accuracy for challenging targets, from metal to black rubber
- Visible class 2 laser for small spot size and simple alignment

### LE

Example Model Number: LE550IQ

Family	Range	Output	Laser Class	Connector
<b>LE</b>	<b>550</b>	<b>I</b>	<b>Blank</b>	<b>Q</b>
	550 = 100-1000 mm 250 = 100-400 mm	I = 4 to 20 mA analog and (1) NPN/PNP discrete U = 0 to 10 V analog and (1) NPN/PNP discrete D = (2) NPN/PNP discrete K = Dual Discrete with IO-Link	Blank = Class 2 C1 = Class1	Blank = 2 m Integral Cable Q = Rotatable M12 Euro QD QP = PVC M12 Euro Pigtail QD W/30 = 9 m Integral Cable
NOTE: Discrete NPN/PNP is user configurable				



Connection Option: A model with a QD requires a mating cordset.



**M12/Euro-Style with Shield**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)

**5-Pin**

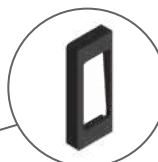
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')

**SMBLEU****SMBLEL****SMBLEFA**

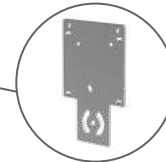
Additional bracket information is available  
See page 724



**SMBAMSLEIP**  
full assembly with plate and  
two protective windows



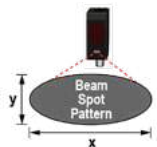

**RWAMSLE**  
replacement windows



**SMBAMSLTFP**  
mounting plate



## LE Specifications

Sensing Beam	Visible red Class 2 laser, 650 nm																																								
Supply Voltage and Current	12 to 30 V dc <b>Normal Run Mode:</b> 1.7 W, Current consumption less than 70 mA at 24 V dc																																								
Supply Protection Circuitry	Protected against reverse polarity and transient over voltages																																								
Spot Size	<div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="4">LE550 Models</th> </tr> <tr> <th colspan="4">Distance</th> </tr> <tr> <th></th> <th>100 mm</th> <th>550 mm</th> <th>1000 mm</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>8.4 mm</td> <td>10.5 mm</td> <td>12.1 mm</td> </tr> <tr> <td>Y</td> <td>3.5 mm</td> <td>4.2 mm</td> <td>4.9 mm</td> </tr> </tbody> </table> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="4">LE250 Models</th> </tr> <tr> <th colspan="4">Distance</th> </tr> <tr> <th></th> <th>100 mm</th> <th>250 mm</th> <th>400 mm</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>3.2 mm</td> <td>2.1 mm</td> <td>1.2 mm</td> </tr> <tr> <td>Y</td> <td>2.2 mm</td> <td>1.5 mm</td> <td>0.9 mm</td> </tr> </tbody> </table> </div>	LE550 Models				Distance					100 mm	550 mm	1000 mm	X	8.4 mm	10.5 mm	12.1 mm	Y	3.5 mm	4.2 mm	4.9 mm	LE250 Models				Distance					100 mm	250 mm	400 mm	X	3.2 mm	2.1 mm	1.2 mm	Y	2.2 mm	1.5 mm	0.9 mm
LE550 Models																																									
Distance																																									
	100 mm	550 mm	1000 mm																																						
X	8.4 mm	10.5 mm	12.1 mm																																						
Y	3.5 mm	4.2 mm	4.9 mm																																						
LE250 Models																																									
Distance																																									
	100 mm	250 mm	400 mm																																						
X	3.2 mm	2.1 mm	1.2 mm																																						
Y	2.2 mm	1.5 mm	0.9 mm																																						
Temperature Effect	LE250: $\pm 0.03$ to $\pm 0.15$ mm/ $^{\circ}$ C LE550: $\pm 0.25$ to $\pm 0.5$ mm/ $^{\circ}$ C																																								
Analog Linearity	LE250: $\pm 0.375$ to $\pm 0.9$ mm LE550: $\pm 2$ to $\pm 4.5$ mm																																								
Analog Resolution	LE550: Less than 0.5 mm (100 – 600 mm) Less than 1 mm (600 – 1000 mm) LE250: Less than 0.02 mm (100 – 250 mm) Less than 0.2 mm (250 – 400 mm)																																								
Construction	<b>Housing:</b> die-cast zinc <b>Lens:</b> polycarbonate																																								
Vibration/Mechanical Shock	IEC 60947-5-2																																								
Operating Conditions	<b>Temperature:</b> $-20$ to $+55$ $^{\circ}$ C <b>Humidity:</b> 90% at $+55$ $^{\circ}$ C																																								
Environmental Rating	IP67, NEMA 6																																								
Certifications																																									

# LH Series

## High-Precision Laser Measurement




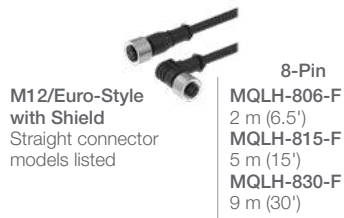
- Highly precise laser technology of a 1024 pixel CMOS linear imager provides reliable and accurate measurement on most materials, including machined metal, wood, ceramic, paper and painted targets.
- Automatic laser power and measurement rate control for reliable measurement under changing or challenging conditions such as moving processes, hot parts, machined parts and a variety of colors and textures
- Robust, self-contained laser displacement sensor

### Class 2 Laser LH

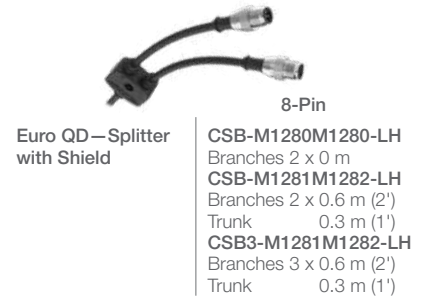
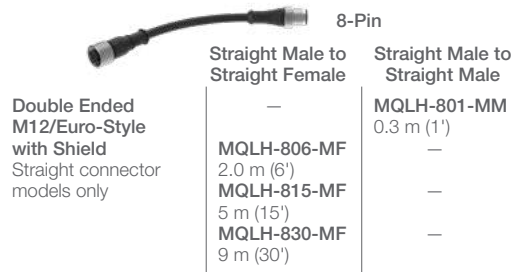


Sensing Mode	Measurement				Connection	Output	Spot Size at Reference Distance	Models
	Span	Start of Range	End of Range	Reference Distance				
 DIFFUSE LASER	10 mm	25 mm	35 mm	30 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	50 micron	LH30IX485QP
 DIFFUSE LASER	40 mm	60 mm	100 mm	80 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	125 micron	LH80IX485QP
 DIFFUSE LASER	100 mm	100 mm	200 mm	150 mm	8-pin Euro Pigtail QD	Analog 4-20 mA & RS-485	225 micron	LH150IX485QP

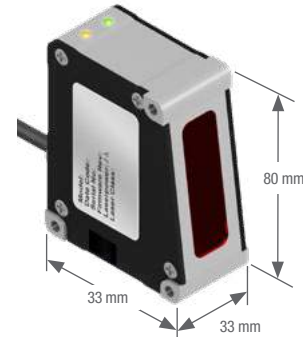
 Connection options: A model with a QD requires a mating cordset.



Additional cordset information is available  
See page 758



Additional bracket information is available  
See page 724



## LH Specifications

<b>Sensing Beam</b>	670 nm (1mW) visible red IEC and CDRH Class 2 laser
<b>Supply Voltage and Current</b>	18 to 30 V dc (10% max. ripple); 250 mA max. @ 24 V dc (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient over voltages
<b>Delay at Power-up</b>	1.25 seconds
<b>Temperature Effect</b>	0.01% of measurement range/ °C
<b>Linearity</b>	0.1% of measurement range
<b>Resolution</b>	<b>LH30:</b> 1 µm <b>LH80:</b> 4 µm <b>LH150:</b> 10 µm Resolution obtained with an average of 64 readings on a white ceramic target
<b>Ambient Light</b>	≤ 3000 Lux
<b>Measurement Frequency</b>	Dynamically adjusted from 300 to 4000 Hz depending on target conditions, or locked via LH Series configurator software
<b>Indicators</b>	<b>Green:</b> Power ON; Flashing = target at reference distance <b>Orange:</b> Target inside measurement range
<b>Construction</b>	<b>Housing:</b> Aluminum <b>Cover:</b> Aluminum <b>Lens:</b> Glass <b>Cable:</b> PVC and nickel-plated brass
<b>Environmental Rating</b>	IP67
<b>Output Configuration</b>	<b>Analog current output:</b> 4 to 20 mA (current sourcing) <b>Analog output rating:</b> 1 kΩ max. @ 24 V dc, max. load resistance = $[(V_{cc}-4.5)/0.02]\Omega$
<b>Operating Conditions</b>	<b>Operating Temperature:</b> -10 to +45 °C <b>Storage Temperature:</b> -10 to +80 °C <b>Maximum relative humidity:</b> 85% at +45 °C, non-condensing
<b>Vibration and Mechanical Shock</b>	<b>Vibration:</b> 60 Hz, 30 minutes, 3 axes <b>Shock:</b> 30G for 11 milliseconds, half sine wave, 3 axes
<b>Application Notes</b>	Allow 30-minute warm-up for specified performance
<b>Factory Default Settings</b>	<b>Mode:</b> Displacement Mode <b>Sensor Address:</b> Unset (address 0) <b>Baud Rate:</b> 115200 <b>Analog Output:</b> 4-20 mA, positive slope, full range
<b>Certifications</b>	

# LG Series

## High-Precision Short-Range Laser Measurement



- The LG5 uses an ultra-narrow beam for applications requiring precise measurement of distance, height or thickness as well as gauging applications
- Replaces two-piece laser gauging sensors with completely self-contained, compact housing
- Houses discrete (switched) and analog outputs in the same unit, each independently programmable

### Diffuse LG5

Visible Red Laser

Sensing Mode	Laser Class	Sensing Distance	Beam Size	Connection	Analog Output	Models NPN	Models PNP
 DIFFUSE LASER	Class 2	45-60 mm	<b>At 53 mm:</b> 0.4 mm x 0.6 mm  <b>Focus:</b> 70 mm	2 m	0-10 V dc	LG5A65NU	LG5A65PU
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	45-60 mm	<b>At 53 mm:</b> 0.1 mm  <b>Focus:</b> 53 mm	2 m	0-10 V dc	LG5B65NU	LG5B65PU
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	45-60 mm	<b>At 53 mm:</b> 0.1 mm  <b>Focus:</b> 53 mm	2 m	4-20 mA	LG5A65NI	LG5A65PI
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	45-60 mm	<b>At 53 mm:</b> 0.1 mm  <b>Focus:</b> 53 mm	2 m	4-20 mA	LG5B65NI	LG5B65PI
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	45-60 mm	<b>At 53 mm:</b> 0.1 mm  <b>Focus:</b> 53 mm	2 m	4-20 mA	LG5A65NIQ	LG5A65PIQ
				8-pin Euro Pigtail QD			

### Diffuse LG10

Visible Red Laser

Sensing Mode	Laser Class	Sensing Distance	Beam Size	Connection	Analog Output	Models NPN	Models PNP
 DIFFUSE LASER	Class 2	75-125 mm	<b>At 125 mm:</b> 0.6 mm x 0.8 mm  <b>Focus:</b> 180 mm	2 m	0-10 V dc	LG10A65NU	LG10A65PU
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	75-125 mm	<b>At 125 mm:</b> 0.6 mm x 0.8 mm  <b>Focus:</b> 180 mm	2 m	4-20 mA	LG10A65NI	LG10A65PI
				8-pin Euro Pigtail QD			
 DIFFUSE LASER	Class 2	75-125 mm	<b>At 125 mm:</b> 0.6 mm x 0.8 mm  <b>Focus:</b> 180 mm	2 m	4-20 mA	LG10A65NIQ	LG10A65PIQ
				8-pin Euro Pigtail QD			

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix **W/30** to the 2 m model number (example, **LG10A65PU W/30**).

Euro QD (w/ Shield)  
Straight connector models only



8-Pin  
MQDC-806  
2 m (6')  
MQDC-815  
5 m (15')  
MQDC-830  
9 m (30')



SMBLG



SMBLGA

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 724



## LG5 and LG10 Specifications

Sensing Beam	650 nm visible Red IEC and CDRH Class 2 laser; 0.20 mW max. radiant output power	
Supply Voltage and Current	12 to 30 V dc (10% max. ripple); 50 mA max. @ 24 V dc (exclusive of load)	
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages	
Delay at Power-up	1.25 second	
Output Rating	<b>Discrete (switched) and Alarm outputs:</b> 100 mA max. <b>OFF-state leakage current:</b> less than 5 $\mu$ A Output saturation voltage <b>PNP outputs:</b> less than 1.2 V at 10 mA and less than 1.6 V at 100 mA <b>NPN outputs:</b> less than 200 mV at 10 mA and less than 600 mV at 100 mA <b>Analog Current output:</b> 1 k $\Omega$ max. @ 24 V dc, max. load resistance = $[(V_{cc} - 4.5)/0.02]\Omega$ <b>Analog Voltage output:</b> 2.5 k $\Omega$ min. load impedance	
Output Configuration	Discrete (switched) & alarm outputs: Solid-state switch; choose NPN (current sinking) or PNP (current sourcing) models Analog output: 4 to 20 mA (current sourcing) or 0 to 10 V dc (voltage sourcing), depending on model	
Output Protection	Discrete and alarm outputs are protected against continuous overload and short circuit	
Output Response Time	Discrete Outputs (ON/OFF) <b>Fast:</b> 2.0 milliseconds <b>Medium:</b> 10 milliseconds <b>Slow:</b> 100 milliseconds Analog Output (-3dB) <b>Fast:</b> 450 Hz (1 millisecond average/1 millisecond update rate) <b>Medium:</b> 45 Hz (10 millisecond average/2 millisecond update rate) <b>Slow:</b> 4.5 Hz (100 millisecond average/5 millisecond update rate)	
Analog Resolution and Repeatability of Discrete Trip Point*	<b>LG5: Fast:</b> Less than 40 $\mu$ m @ 50 mm <b>Medium:</b> Less than 12 $\mu$ m @ 50 mm <b>Slow:</b> Less than 3 $\mu$ m @ 50 mm	<b>LG10: Fast:</b> Less than 150 $\mu$ m @ 100 mm <b>Medium:</b> Less than 50 $\mu$ m @ 100 mm <b>Slow:</b> Less than 10 $\mu$ m @ 100 mm
Analog Linearity*	<b>LG5:</b> +/- 60 $\mu$ m over 45 to 60 mm sensing window +/- 10 $\mu$ m over 49 to 51 mm sensing window	<b>LG10:</b> +/- 200 $\mu$ m over 75 to 125 mm sensing window +/- 20 $\mu$ m over 95 to 100 mm sensing window
	*Resolution and linearity specified @ 24 V dc, 22 °C, using a white ceramic test surface (see Application Notes)	
Minimum Window Size (Analog or Discrete)	<b>LG5:</b> 1.5 mm	<b>LG10:</b> 5 mm
Discrete Output Hysteresis	<b>LG5:</b> Less than 0.2 mm	<b>LG10:</b> Less than 1.0 mm
Color Sensitivity (typical)	<b>LG5:</b> Less than 75 $\mu$ m for white to dark gray ceramic target	<b>LG10:</b> Less than 100 $\mu$ m for white to dark gray ceramic target
Temperature Effect	<b>LG5:</b> +/- 7 $\mu$ m/ °C	<b>LG10:</b> +/- 25 $\mu$ m/ °C
Adjustments	<b>Response speed:</b> Push button toggles between Slow, Medium, and Fast (see Output Response Time) <b>Window limits (analog or discrete):</b> TEACH-mode programming of near and far window limits. Limits may also be taught remotely using TEACH wire <b>Analog output slope:</b> The first limit taught is assigned to the minimum analog output (0 V dc or 4 mA)	
Indicators	<b>Green Power ON LED:</b> Indicates when power is ON, overloaded output and laser status <b>Yellow Output LED:</b> Indicates when discrete load output is conducting <b>Red Signal LED:</b> Indicates when target is within sensing range and the condition of the received light signal <b>Tri-color Red/Green/Yellow TEACH LED:</b> Indicates sensor is ready for programming each limit (indicates Red for analog output, Green for discrete, and Yellow for simultaneous analog and discrete) <b>Yellow Fast/Slow LEDs:</b> Combination of 2 lights ON or OFF indicates 1 of 3 response speeds	
Construction	<b>Housing:</b> Zinc alloy die-cast, plated and painted finish	<b>Cover plate:</b> Aluminum with painted finish <b>Lens:</b> Acrylic
Environmental Rating	IP67; NEMA 6	
Operating Conditions	<b>Temperature:</b> -10 to +50 °C	<b>Relative humidity:</b> 90% at 50 °C (non-condensing)
Vibration and Mechanical Shock	<b>Vibration:</b> 60 Hz, 30 minutes, 3 axes <b>Shock:</b> 30G for 11 milliseconds, half sine wave, 3 axes	

Certifications



# LT3 Series

## Time-of-Flight Laser Distance-Gauging Sensors



- The LT3 uses advanced “time-of-flight” technology for precise, long-distance gauging.
- Reliably detects targets regardless of angles
- Visible red laser spot for easy alignment
- Offers push-button programming for other output response times or remote programming for added security and convenience

### Diffuse LT3, Class 2 Laser

Visible Red Laser

Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP
 DIFFUSE LASER	0.3 to 5 m*	2 m	None	LT3BD (Dual NPN or PNP selectable)	
		8-pin Euro QD		LT3BDQ (Dual NPN or PNP selectable)	
	0.3 to 5 m*	2 m	0 to 10 V dc	LT3NU	
		8-pin Euro QD		LT3NUQ	
	0.3 to 5 m*	2 m	4 to 20 mA	LT3NI	
		8-pin Euro QD		LT3NIQ	

### Retro LT3, Class 1 Laser

Visible Red Laser

Sensing Mode	Range	Connection	Analog Output	Models NPN	Models PNP
 LASER RETRO	0.5 to 50 m†	2 m	None	LT3BDLV (Dual NPN or PNP selectable)	
		8-pin Euro QD		LT3BDLVQ (Dual NPN or PNP selectable)	
	0.5 to 50 m†	2 m	0 to 10 V dc	LT3NULV	
		8-pin Euro QD		LT3NULVQ	
	0.5 to 50 m†	2 m	4 to 20 mA	LT3NULVQ	
		8-pin Euro QD		LT3NULVQ	

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, LT3BD W/30).

\* Based on a 90% reflectivity white card

† Retroreflective range is specified using a BRT-TVHG-8X10P high-grade target.

Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

Euro QD (w/ Shield)  
Straight connector models only



8-Pin  
MQDC-806  
2 m (6')  
MQDC-815  
5 m (15')  
MQDC-830  
9 m (30')



SMBLT31



SMBLT32



SMBLT3IP



Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 724

#### Reflectors



Additional information is available  
See page 790

## L-GAGE® LT3 Specifications

<b>Sensing Beam</b>	<b>Typical beam diameter:</b> 6 mm @ 3 m <b>Typical laser lifetime:</b> 75,000 hours <b>Diffuse:</b> 658 nm visible red IEC and CDRH Class 2 laser; 0.5 mW max. radiant output power <b>Retroreflective:</b> 658 nm visible red IEC and CDRH Class 1 laser; 0.15 mW max. radiant output power	
<b>Sensing Range</b>	<b>Diffuse:</b> <b>90% white card:</b> 0.3 to 5 m <b>18% gray card:</b> 0.3 to 3 m <b>6% black card:</b> 0.3 to 2 m	<b>Retroreflective:</b> 0.5 to 50 m (using supplied target)
<b>Supply Voltage and Current</b>	12 to 24 V dc (10% max. ripple); 108 mA max. @ 24 V dc or [2600/V dc] mA	
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages	
<b>Delay at Power-up</b>	1 second; outputs do not conduct during this time	
<b>Output Rating</b>	<b>Discrete (switched) output:</b> 100 mA max. <b>OFF-state leakage current:</b> less than 5 µA <b>Output saturation NPN:</b> less than 200 mV @ 10 mA; less than 600 mV @ 100 mA <b>Output saturation PNP:</b> less than 1.2 V at 10 mA; less than 1.6 V at 100 mA <b>Analog voltage output:</b> 2.5 kΩ min. load impedance (voltage sourcing) <b>Analog current output:</b> 1 kΩ max. @ 24V; max. load resistance = [Vcc-4.5/0.02 Ω] (current sourcing)	
<b>Output Protection</b>	Protected against short circuit conditions	
<b>Output Response Time</b>	<b>Discrete output</b> <b>Fast:</b> 1 millisecond ON/OFF <b>Medium:</b> 10 milliseconds ON/OFF <b>Slow:</b> 100 milliseconds ON/OFF <b>Diffuse Analog Voltage output (-3 dB)</b> <b>Retroreflective Analog Voltage output (-3 dB)</b> <b>Fast:</b> 450 Hz (1 ms average/1 ms update rate) <b>Fast:</b> 114 Hz (6 ms average/ 1 ms update rate) <b>Medium:</b> 45 Hz (10 ms average/2 ms update rate) <b>Medium:</b> 10 Hz (48 ms average/ 1 ms update rate) <b>Slow:</b> 4.5 Hz (100 ms average/4 ms update rate) <b>Slow:</b> 2.5 Hz (192 ms average/ 1 ms update rate)	
<b>Color Sensitivity (typical)</b>	Diffuse: 90% white to 18% gray: less than 10 mm; 90% white to 6% black: less than 20 mm.	
<b>Analog Linearity</b>	<b>Retroreflective:</b> ± 60 mm from 0.5 to 50 m (0.12% of full scale) (Specified @ 24 V dc, 22° C using supplied BRT-TVHG-8X10P retroreflector)	<b>Diffuse:</b> ± 30 mm from 0.3 to 1.5 m; ± 20 mm from 1.5 to 5 m (Specified @ 24 V dc, 22° C using a 90% reflectance white card)
<b>Discrete Output Hysteresis</b>	<b>Diffuse</b> <b>Fast:</b> 10 mm <b>Medium:</b> 5 mm <b>Slow:</b> 3 mm	<b>Retroreflective</b> <b>Fast:</b> 20 mm <b>Medium:</b> 10 mm <b>Slow:</b> 6 mm
<b>Temperature Effect</b>	Diffuse: less than 2 mm/° C	Retroreflective: less than 3 mm/° C
<b>Minimum Window Size</b>	Diffuse: 20 mm	Retroreflective: 40 mm
<b>Remote TEACH Input</b>	18 kΩ min. (65 kΩ at 5 V dc)	
<b>Remote TEACH</b>	<b>To teach:</b> Connect yellow wire to +5 to 24 V dc <b>To disable:</b> Connect yellow wire to 0 to +2 V dc (or open connection)	
<b>Construction</b>	<b>Housing:</b> ABS/polycarbonate blend	<b>Window:</b> Acrylic <b>Quick-disconnect:</b> ABS/polycarbonate blend
<b>Environmental Rating</b>	IP67; NEMA 6	
<b>Operating Conditions</b>	<b>Temperature:</b> 0 to +50 °C <b>Relative humidity:</b> 90% at 50 °C (non-condensing)	

Certifications





# LT7 Series

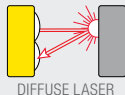
## Time-of-Flight Laser Distance-Gauging Sensors



- Visible red laser spot during programming mode for easy alignment
- Features TEACH-mode programming using integrated push-buttons or a serial interface
- Onboard LCD display for easy troubleshooting
- Long-range retroreflective models up to 250 m and diffuse models up to 10 m

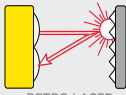
### Diffuse L-GAGE® LT7

 Infrared Laser

Sensing Mode	Laser Class	Sensing Distance*	Connection	Discrete Output	Analog Output	Serial	Models
 DIFFUSE LASER	Class 1 Infrared Sensing Laser (Class 2 Visible Red Alignment Laser)	0.5 to 10 m	12-pin M16 QD	2 PNP	4-20 mA	RS-422 or SSI	LT7PIDQ

### Retro L-GAGE® LT7

 Infrared Laser

Sensing Mode	Laser Class	Sensing Distance*	Connection	Discrete Output	Analog Output	Serial	Models
 RETRO LASER	Class 1 Infrared Sensing Laser (Class 2 Visible Red Alignment Laser)	0.5 to 250 m	12-pin M16 QD	2 PNP	—	RS-422 or SSI	LT7PLVQ

 Connection options: A model with a QD requires a mating cordset.

\*Diffuse-mode range specified using a 90% reflectance white card. Retroreflective range is specified using a BRT-250, BRT-540 or BRT-700 retroreflective target (see page page 790).

**Euro QD (w/ Shield)**

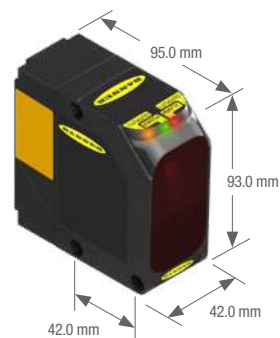
Straight connector models listed; for right-angle, replace **ST** with **RA** at the end of the model number (example, **MQDC-1210RA**)

**12-Pin**  
**MQDC-1210ST**  
 3 m  
**MQDC-1213ST**  
 10 m

**SMBLT7**

Additional bracket information is available  
 See page 724

Additional cordset information is available  
 See page 758

**Reflectors**

Additional information is available  
 See page 790


**L-GAGE® LT7 Specifications**

<b>Sensing Range</b>	<b>LT7PLVQ:</b> 0.5 to 250 m (using specified reflector)	<b>LT7PIDQ:</b> <b>6% Black card:</b> 0.5 to 3 m <b>18% Gray card:</b> 0.5 to 7 m <b>90% White card:</b> 0.5 to 10 m																									
<b>Supply Voltage and Current</b>	18 to 30 V dc (10% max. ripple)																										
<b>Power Consumption</b>	Less than 4.5 W @ 25° C																										
<b>Measuring Laser</b>	Infrared, 900 nm, Class 1																										
<b>Laser Control</b>	Measurement laser is ON when sensor is ON. Pilot (visible) laser enabled during Programming mode; alternates with measurement laser.																										
<b>Spot Size</b>	<table border="1"> <thead> <tr> <th></th> <th>Distance</th> <th>Spot Size</th> <th>Distance</th> <th>Spot Size</th> </tr> </thead> <tbody> <tr> <td><b>LT7PLVQ:</b></td> <td>10 m</td> <td>ø 20 mm</td> <td><b>LT7PIDQ:</b> 4 m</td> <td>3 x 10 mm</td> </tr> <tr> <td></td> <td>50 m</td> <td>ø 100 mm</td> <td>6 m</td> <td>4 x 12 mm</td> </tr> <tr> <td></td> <td>100 m</td> <td>ø 200 mm</td> <td>10 m</td> <td>10 x 20 mm</td> </tr> <tr> <td></td> <td>250 m</td> <td>ø 500 mm</td> <td></td> <td></td> </tr> </tbody> </table>		Distance	Spot Size	Distance	Spot Size	<b>LT7PLVQ:</b>	10 m	ø 20 mm	<b>LT7PIDQ:</b> 4 m	3 x 10 mm		50 m	ø 100 mm	6 m	4 x 12 mm		100 m	ø 200 mm	10 m	10 x 20 mm		250 m	ø 500 mm			
	Distance	Spot Size	Distance	Spot Size																							
<b>LT7PLVQ:</b>	10 m	ø 20 mm	<b>LT7PIDQ:</b> 4 m	3 x 10 mm																							
	50 m	ø 100 mm	6 m	4 x 12 mm																							
	100 m	ø 200 mm	10 m	10 x 20 mm																							
	250 m	ø 500 mm																									
<b>Pilot Laser (Alignment)</b>	Visible red, 650 nm, Class 2																										
<b>Discrete &amp; Analog Output Protection</b>	Protected against continuous overload and short circuit																										
<b>Discrete Outputs</b>	(2) 100 mA, PNP																										
<b>Discrete Switch Points</b>	Adjustable in 1 mm steps																										
<b>Discrete Output Hysteresis</b>	Adjustable, 10 mm min.																										
<b>Alarm Outputs</b>	50 mA, PNP (NO)																										
<b>Analog Output</b>	<b>LT7PLVQ:</b> None <b>LT7PIDQ:</b> 4-20 mA																										
<b>Output Response Time</b>	12 milliseconds																										
<b>Linearity</b>	±10 mm																										
<b>Resolution/Repeatability</b>	<b>LT7PLVQ:</b> ±2 mm <b>LT7PIDQ:</b> ±4 mm																										
<b>Temperature Effect</b>	Less than ± 5 mm over the total sensing range																										
<b>Minimum Analog Window Size</b>	<b>LT7PLVQ:</b> Not Applicable <b>LT7PIDQ:</b> 300 mm																										
<b>Adjustments</b>	Push-button directed password enable/disable, measurement unit select, offset value select, output limits set, output mode select, analog output slope select (diffuse models only) and output limit manual adjust. See datasheet for information.																										
<b>Serial Measurement Speed</b>	<b>SSI:</b> 1.4 milliseconds (SSI cycle 80 microseconds) <b>RS-422:</b> 2.9 milliseconds @ 57.6 kBaud																										
<b>Construction</b>	ABS shock-resistant housing; PMMA window; polycarbonate displays																										
<b>Weight</b>	Approximately 230 g																										
<b>Environmental Rating</b>	IEC IP67																										
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +50 °C in continuous operation																										
<b>Storage Temperature</b>	-30 to +75 °C																										
<b>Vibration/Shock</b>	EN 60947-5-2																										
<b>Certifications</b>	<b>CE</b>																										



## Ultrasonic

Ultrasonic sensors use sound waves rather than light, making them ideal for stable detection of uneven surfaces, liquids, clear objects, and objects in dirty environments. These sensors work well for applications that require precise measurements between stationary and moving objects.

Series	Description	Max Sensing Range	Dimensions H x W x D (mm)	Protection Rating	Housing Material	Power Supply
	<b>QT50U</b> The QT50U features a completely sealed, shock-resistant housing that is ideal for monitoring levels of liquids and solids. page 218	8 m	84.2 x 74.1 x 67.4	IP67; NEMA 6P	ABS/ Polycarbonate	10 to 30 V dc, 85 to 264 V ac
	<b>S18U</b> The S18U is ideal for material handling and packaged goods applications, such as bottling or liquid level detection and as a control for small containers. page 222	300 mm	80.8 x ø 18	IP67; NEMA 6P	Thermoplastic polyester	10 to 30 V dc
	<b>T30U/T30UX</b> The T30UX features T-style, right-angle sensor package with a 30 mm threaded barrel and a wide variety of mounting options. page 226	3 m	51.5 x 40 x 45	IP67; NEMA 6	PTB polyester	10 to 30 V dc, 12 to 24 V dc, 15 to 24 V dc
	<b>M25U</b> The M25U Ultrasonic Sensor features a smooth 316 series stainless steel construction to withstand the toughest sanitary challenges. page 226	500 mm	103 x ø 25	IP67; NEMA 6, IP69K	316 Stainless Steel	10 to 30 V dc
	<b>T18U</b> The T18U offers versatile mounting, and a response time of 1 millisecond. page 230	600 mm	51.5 x 40 x 30	IP67; NEMA 6P	PTB polyester	12 to 30 V dc
	<b>Q45U</b> The Q45U accepts programming storage cards for fast and easy sensing parameter changes. page 232	3 m	87.6 x 44.5 x 60.5	IP67; NEMA 6P	PTB polyester	12 to 24 V dc, 15 to 24 V dc
	<b>Q45UR</b> The Q45UR has sensing head choices of 18 mm diameter threaded barrel housing in plastic or stainless steel, or ultra-compact plastic Flat-Pak. page 234	250 mm	87.6 x 44.5 x 60.5 (Remote sensors vary by model)	IP67; NEMA 6P	Thermoplastic polyester	12 to 24 V dc, 15 to 24 V dc
	<b>QS18U</b> The QS18U senses clear and transparent materials, as well as color variations, including clear web material, clear or shiny bottles, highly reflective surfaces and liquid or dry bulk materials inside cramped locations. page 236	500 mm	41.5 x 15 x 33.5	IP67 or IP68; NEMA 6P	ABS	12 to 30 V dc
	<b>K50U</b> Designed for plug-and-play use with the Q45U wireless node, creating a cost-effective and easy-to-use solution for monitoring mobile or remote tanks and totes page 238	3 m	59.5 x ø 50	IP67 NEMA 6P	PTB polyester	3.6 to 5.5 V dc or 10 to 30 V dc

# QT50U Series

## Long-Range Ultrasonic Sensors



- Features a small ultrasonic dead zone of 200 mm
- Available in a chemically resistant model with a Teflon® flange
- Detects targets at long ranges within confined areas, such as a storage tank, without interference from the tank walls
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

### QT50U, 10-30 V DC

Range	Connection	Output	Models*
200 mm to 8 m	2 m	Selectable 0 to 10 V dc or 4 to 20 mA	QT50ULB
	5-pin Mini QD		QT50ULBQ
	5-pin Euro QD		QT50ULBQ6
200 mm to 8 m	2 m	Selectable Dual NPN or PNP	QT50UDB
	5-pin Mini QD		QT50UDBQ
	5-pin Euro QD		QT50UDBQ6

### QT50U Universal Voltage, 85-264 V AC/48-250 V DC

Range	Connection	Output Operation Mode	Output	Models*
200 mm to 8 m	2 m	Window-limit (complementary outputs)	SPDT e/m relay	QT50UVR3W
	5-pin Micro QD			QT50UVR3WQ1
	5-pin Mini QD			QT50UVR3WQ
200 mm to 8 m	2 m	Pump/level control (pump-in and pump-out logic)	SPDT e/m relay	QT50UVR3F
	5-pin Micro QD			QT50UVR3FQ1
	5-pin Mini QD			QT50UVR3FQ

For more specifications see page 220-221.

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QT50ULB W/30).

\* For sensors with Teflon®-protected face and transducer, add suffix -CRFV to the model number (example, QT50ULB-CRFV).

Teflon® is a registered trademark of Dupont™.



5-Pin

**Euro-Style with Shield**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)

- MQDEC2-506**  
2 m (6.5')
- MQDEC2-55**  
5 m (15')
- MQDEC2-530**  
9 m (30')



5-Pin

**Micro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQVR3S-506RA**)

- MQVR3S-506**  
2 m (6.5')
- MQVR3S-515**  
5 m (15')
- MQVR3S-50**  
9 m (30')



5-Pin

**Mini-Style**

Straight connector models only

- MBCC2-506**  
2 m (6.5')
- MBCC2-512**  
4 m (15')
- MBCC2-530**  
9 m (30')

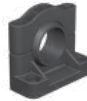
Additional cordset information is available  
See page 758



SMB30A



SMB30MM



SMB30SC

Additional bracket information is available  
See page 725




DC and Universal Voltage Models




Teflon®-protected Models  
(Suffix -CRFV)

## QT50U DC Specifications

Supply Voltage and Current	<b>Analog models:</b> 10 to 30 V dc (10% max. ripple); 100 mA max @ 10 V, 40 mA max. @ 30 V (exclusive of load) <b>Dual-discrete models:</b> 10 to 30 V dc (10% max. ripple); 100 mA max. @ 10 V, 40 mA @ 30 V (exclusive of load)
Ultrasonic Frequency	75 kHz burst, rep. rate 96 milliseconds
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Output Protection	Protected against short circuit conditions
Delay at Power-up	1.5 seconds
Output Configuration	<b>Analog models: Voltage sourcing:</b> 0 to 10 V dc <b>Current sourcing:</b> 4 to 20 mA <b>Dual-discrete models:</b> Dual PNP or NPN, selectable using DIP switch
Output Ratings	<b>Analog Voltage Output:</b> 0 to 10 V dc Minimum load resistance = 500 Ω Minimum required supply voltage for full 0-10 V output span = $(\frac{1000 + 13}{R_{LOAD}}) V$ dc  <b>Analog Current Output:</b> 4 to 20 mA Maximum load resistance = 1 kΩ or $(\frac{V_{supply} - 5}{0.02}) \Omega$ , whichever is lower  Minimum required supply voltage for full 4-20 mA output span = 10 V dc or $[(R_{Load} \times 0.02) + 5] V$ dc, whichever is greater. 4-20 mA output calibrated at 25° C with 250 Ω load.  <b>Discrete Output:</b> 150 mA max. <b>OFF-State leakage current:</b> less than 5 μA <b>Output saturation:</b> NPN: less than 200 mV @ 10 mA; less than 650 mV @ 150 mA PNP: less than 1.2 V @ 10 mA; less than 1.65 V @ 150 mA
Temperature Effect	<b>Uncompensated:</b> 0.2% of distance/° C <b>Compensated:</b> 0.02% of distance/° C
Linearity (Analog Models)	+/- 0.2% of span from 200 to 8000 mm; +/- 0.1% of span from 500 to 8000 mm (1 mm minimum)
Resolution/Repeatability	1.0 mm
Hysteresis	5 mm
Output Response Time	<b>Analog models:</b> 100 to 2300 milliseconds <b>Dual-discrete models:</b> 100 to 1600 milliseconds
Minimum Window Size	20 mm
Adjustments	<b>Sensing window limits:</b> TEACH-Mode programming of near and far window limits may be set using the buttons or remotely using TEACH input
Indicators	<b>Green Power ON LED:</b> Indicates power is ON <b>Red Signal LED:</b> Indicates target is within sensing range, and the condition of the received signal <b>Teach/Output indicator (bicolor Yellow/Red):</b> <b>Yellow:</b> Target is within taught limits <b>Yellow OFF (Discrete):</b> Target is outside taught window limits <b>Red:</b> Sensor is in TEACH mode <b>Yellow Flashing (Analog):</b> Target is outside taught window limits
Remote TEACH	See data sheet
Construction	<b>Transducer:</b> Ceramic/Epoxy composite <b>Housing:</b> ABS/Polycarbonate <b>Membrane Switch:</b> Polyester <b>Lightpipes:</b> Acrylic
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P
Operating Conditions	<b>Temperature:</b> -20 to +70 °C <b>Relative humidity:</b> 100%
Vibration and Mechanical Shock	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.
Temperature Warmup Drift	Less than 0.8% of sensing distance upon power-up with Temperature Compensation enabled
Application Notes	1. Objects passing inside the specified near limit (200 mm) may produce a false response 2. For best accuracy, allow 30 minute warm-up before programming or operating
Certifications	



## QT50U Universal Voltage Specifications

Supply Voltage	85 to 264 V ac, 50/60 Hz/48 to 250 V dc (1.5 watts max., exclusive of load)	
Ultrasonic Frequency	75 kHz burst, rep. rate 96 milliseconds	
Supply Protection Circuitry	Protected against transient over voltages. DC hookup is without regard to polarity.	
Output Protection	Protected against short circuit conditions	
Delay at Power-up	1.5 seconds	
Output Configuration	SPDT (Single-Pole, Double-Throw) electromechanical relay output One normally open (NO) and one normally closed (NC)	
Output Ratings	<p><b>Max. switching power (resistive load):</b> 2000 VA, 240 W (1000 VA, 120 W for sensors with Micro QD)  <b>Max. switching voltage (resistive load):</b> 250 V ac, 125 V dc  <b>Max. switching current (resistive load):</b> 8A @ 250 V ac, 8A @ 30 V dc derated to 200 mA @ 125 V dc (4A max. for sensors with Micro QD)  <b>Min. voltage and current:</b> 5 V dc, 10 mA  <b>Mechanical life of relay:</b> 50,000,000 operations  <b>Electrical life of relay at full resistive load:</b> 100,000 operations</p> <p>NOTE: Transient suppression is recommended when switching inductive loads</p>	
Temperature Effect	<b>Uncompensated:</b> 0.2% of distance/ °C	<b>Compensated:</b> 0.02% of distance/ °C
Repeatability	1.0 mm	
Hysteresis	<b>Window-limit sensor models:</b> 5 mm	<b>Fill-level control sensor models:</b> 0 mm
Output Response Time	Selectable 1600, 400 or 100 milliseconds	
Minimum Window Size	20 mm	
Adjustments	<p><b>Sensing limits:</b> TEACH-Mode programming of near and far limits may be set using the TEACH push button  <b>Sensor configuration:</b> Output response time and temperature compensation mode may be set using the Speed push button  <b>Factory default settings:</b> 400 milliseconds output response time; temperature compensation enabled</p>	
Indicators	<p><b>Green Power ON LED:</b> Indicates power is ON  <b>Red Signal LED:</b> Indicates target is within sensing range, and the condition of the received signal  <b>Output indicator (bicolor Yellow/Red):</b> Indicates output status or TEACH mode  <b>Response indicator (bicolor Yellow/Red):</b> Indicates output response time selection</p>	
Construction	<p><b>Transducer:</b> Ceramic/Epoxy composite  <b>Housing:</b> ABS  <b>Membrane Switch:</b> Polyester</p>	
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P	
Operating Conditions	<b>Temperature:</b> -20 to +70 °C	<b>Relative humidity:</b> 100%
Vibration and Mechanical Shock	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.	
Temperature Warmup Drift	Less than 1.0% of sensing distance upon power-up with Temperature Compensation enabled	
Application Notes	Objects passing inside the specified minimum sensing distance (200 mm) may produce a false response	
Certifications		

# S18U Series

## Barrel Ultrasonic Sensors



- Features minimal dead zone and can eliminate dead zone if used in retrosonic mode
- Compensates for temperature to provide greatest sensing accuracy
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience



Straight Models

### S18U

Range	Connections	Output	Housing Configuration	Models
30 to 300 mm	2 m	0 to 10 V dc	Straight	S18UUA
	5-pin Euro QD			S18UUAQ
30 to 300 mm	2 m	4 to 20 mA	Straight	S18UIA
	5-pin Euro QD			S18UIAQ
30 to 300 mm	2 m	Bipolar NPN/PNP	Straight	S18UBA
	5-pin Euro QD			S18UBAQ

### S18U Right-Angle

Range	Connections	Output	Housing Configuration	Models
30 to 300 mm	2 m	0 to 10 V dc	Right-Angle	S18UJAR
	5-pin Euro QD			S18UJARQ
30 to 300 mm	2 m	4 to 20 mA	Right-Angle	S18UIAR
	5-pin Euro QD			S18UIARQ
30 to 300 mm	2 m	Bipolar NPN/PNP	Right-Angle	S18UBAR
	5-pin Euro QD			S18UBARQ



Right-Angle Models



Connection options: A model with a QD requires a mating cable.

For 9 m cable, add suffix W/30 to the 2 m model number (example, S18UUA W/30).



5-Pin

**Euro-Style with Shield**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
MQDEC2-506RA)

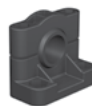
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')



SMB18A



SMB18FM



SMB18SF

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 723

Ultrasonic Wave Guides



Inside Diameter	Model
5.0 mm	UWG18-5.0
6.4 mm	UWG18-6.4

Additional wave guide information is available  
See page 959

## S18U Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple); 65 mA max. (exclusive of load), 40 mA typical @ 25 V input	
<b>Ultrasonic Frequency</b>	300 kHz, rep. rate 2.5 milliseconds	
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages	
<b>Output Protection</b>	Protected against short circuit conditions	
<b>Output Ratings</b>	<p><b>Analog Voltage Output:</b> 2.5 k<math>\Omega</math> min. load resistance Minimum supply for a full 10 V output is 12 V dc (for supply voltages between 10 and 12, V out max is at least V supply -2) <b>Analog Current Output:</b> 1 k<math>\Omega</math> max @ 24 V input Max load resistance = (Vcc-4)/0.02 <math>\Omega</math></p> <p><b>Discrete:</b> 100 mA max. <b>OFF-state leakage current:</b> less than 5 <math>\mu</math>A <b>NPN saturation:</b> less than 200 mV @ 10 mA and less than 600 mV @ 100 mA <b>PNP saturation:</b> less than 1.2 V @ 10 mA and less than 1.6 V @ 100 mA</p>	
<b>Output Configuration</b>	<p><b>Analog:</b> 0 to 10 V dc or 4 to 20 mA, depending on model <b>Discrete: Bipolar:</b> One NPN (current sinking) and one PNP (current sourcing) output in each model. Solid-state switch conducts when target is sensed within sensing window.</p>	
<b>Output Response Time</b>	<b>Analog: 30 milliseconds:</b> Black wire at 0 to 2 V dc (or open)	<b>2.5 milliseconds:</b> Black wire at 5 to 30 V dc
<b>Delay at Power-up</b>	300 milliseconds	
<b>Linearity</b>	<b>Analog output models: 2.5 milliseconds response:</b> $\pm$ 1 mm	<b>30 milliseconds response:</b> $\pm$ 0.5 mm
<b>Resolution</b>	<b>Analog output models: 2.5 milliseconds response:</b> 1 mm	<b>30 milliseconds response:</b> 0.5 mm
<b>Repeatability</b>	<b>Discrete models:</b> 0.5 mm	
<b>Temperature Effect</b>	0.02% of distance/ $^{\circ}$ C	
<b>Temperature Warmup Drift</b>	Less than 1.7% of sensing distance upon power-up	
<b>Minimum Window Size</b>	5 mm	
<b>Switching Hysteresis</b>	<b>Discrete output models:</b> 0.7 mm	
<b>Adjustments</b>	<b>Sensing window limits:</b> TEACH-Mode programming of near and far window limits may be set using the push button or remotely using TEACH input	
<b>Indicators</b>	<p><b>Power/Signal Strength (Red/Green):</b> <b>Green:</b> Target is within sensing range <b>Red:</b> Target is outside sensing range <b>OFF:</b> Sensing power is OFF</p>	<p><b>Teach/Output Indicator (Yellow/Red):</b> <b>Yellow:</b> Target is within taught limits <b>OFF:</b> Target is outside taught window limits <b>Red:</b> Sensor is in TEACH mode</p>
<b>Remote TEACH Input</b>	<b>Impedance:</b> 12 k $\Omega$	
<b>Construction</b>	<b>Threaded Barrel:</b> Thermoplastic polyester <b>Push Button:</b> Santoprene	<b>Push Button Housing:</b> ABS/PC <b>Lightpipes:</b> Acrylic
<b>Environmental Rating</b>	Leakproof design is rated IEC IP67; NEMA 6P	
<b>Operating Conditions</b>	<b>Temperature:</b> -20 to +60 $^{\circ}$ C	<b>Relative humidity:</b> 100%
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave	
<b>Application Notes</b>	Objects passing inside the specified near limit may produce a false response	
<b>Certifications</b>		

# T30UX Series

## Right-Angle, Long-Range Ultrasonic Sensors



- Built-in temperature compensation for high-accuracy across a wide range of ambient temperatures
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

### T30UX

Range	Frequency	Connection	Response Time	Output	Models*
100 mm to 1 m	224 kHz	2 m 4-Pin Euro QD	45 ms	<b>Discrete:</b> NPN, PNP, NO, NC, Selectable	T30UXDA T30UXDAQ8
200 mm to 2 m	174 kHz	2 m 4-Pin Euro QD	92 ms	<b>Discrete:</b> NPN, PNP, NO, NC, Selectable	T30UXDB T30UXDBQ8
300 mm to 3 m	114 kHz	2 m 4-Pin Euro QD	135 ms	<b>Discrete:</b> NPN, PNP, NO, NC, Selectable	T30UXDC T30UXDCQ8
100 mm to 1 m	224 kHz	2 m 4-Pin Euro QD	Selectable 45 or 105 ms	<b>Analog:</b> 0 to 10 V dc	T30UXUA T30UXUAQ8
100 mm to 1 m	224 kHz	2 m 4-Pin Euro QD	Selectable 45 or 105 ms	<b>Analog:</b> 4 to 20 mA	T30UXIA T30UXIAQ8
200 mm to 2 m	174 kHz	2 m 4-Pin Euro QD	Selectable 92 or 222 ms	<b>Analog:</b> 0 to 10 V dc	T30UXUB T30UXUBQ8
200 mm to 2 m	174 kHz	2 m 4-Pin Euro QD	Selectable 92 or 222 ms	<b>Analog:</b> 4 to 20 mA	T30UXIB T30UXIBQ8
300 mm to 3 m	114 kHz	2 m 4-Pin Euro QD	Selectable 135 or 318 ms	<b>Analog:</b> 0 to 10 V dc	T30UXUC T30UXUCQ8
300 mm to 3 m	114 kHz	2 m 4-Pin Euro QD	Selectable 135 or 318 ms	<b>Analog:</b> 4 to 20 mA	T30UXIC T30UXICQ8

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UXDA W/30).

QD models: For a 4-pin 150 mm Euro-style PUR pigtail QD, add suffix QPMA the 2 m model number (example, T30UXDAQPMA).

\* Contact factory to request chemically resistant flange or fill-level control models.



4-Pin

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

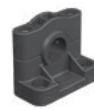
**MQDEC2-406**  
2 m (6.5')  
**MQDEC2-415**  
5 m (15')  
**MQDEC2-430**  
9 m (30')



SMB30A



SMB30FA..



SMB1815SF



Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 723



T30UX (Long-range) Models

## T30UX Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) at 40 mA, exclusive of load		
Supply Protection Circuitry	Protected against reverse polarity and transient voltages		
Output Configuration	<b>Discrete (switched) output models:</b> SPST solid-state switch. Configurable as NPN (sinking) or PNP (sourcing) via Mode push button. Normally Open (NO) or Normally Closed (NC) operation is also selectable via Mode push button. The default setting is PNP/NO. <b>Analog output models:</b> 0 to 10 V dc or 4 to 20 mA, depending on model		
Output Ratings	<b>Discrete output models:</b> 100 mA max. <b>OFF-state leakage current:</b> NPN: < 200 $\mu$ A @ 30 V dc (see NOTE 1)      PNP: < 10 $\mu$ A @ 30 V dc <b>ON-state saturation voltage:</b> NPN: < 1.6 V @ 100 mA      PNP: < 3 V @ 100 mA <b>Analog output models:</b> <b>Analog Voltage Output:</b> 2.5 k $\Omega$ min. load resistance Minimum supply for a full 10 V output is 12 V dc (for supply voltages between 10 and 12, V out max. is at least V supply -2) <b>Analog Current Output:</b> 1 k $\Omega$ max. @ 24 V input; max. load resistance = $(V_{cc}-4)/0.02\Omega$ For current output (4-20 mA) models, ideal results are achieved when the total load resistance $R = [(V_{in} - 4)/0.020]\Omega$ . Example, at $V_{in} = 24$ V dc, $R \approx 1$ k $\Omega$ (1 watt)		
Output Protection Circuitry	Protected against short circuit conditions		
Output Response Time	"A" suffix models: 45 milliseconds	"B" suffix models: 92 milliseconds	"C" suffix models: 135 milliseconds
Delay at Power-up	500 milliseconds		
Temperature Effect	0.02% of distance/ °C		
Linearity (analog models)	0.25% of distance		
Repeatability/Resolution	<b>"A" suffix models:</b> 0.1% of distance (0.5 mm min.) <b>"B" suffix models:</b> 0.1% of distance (1.0 mm min.) <b>"C" suffix models:</b> 0.1% of distance (1.5 mm min.)		
Sensing Hysteresis (discrete models)	"A" suffix models: 2 mm	"B" suffix models: 3 mm	"C" suffix models: 4 mm
Minimum Window Size	10 mm		
Adjustments	<b>Sensing window limits:</b> TEACH-Mode configuration of near and far window limits may be set using the push button or remotely via TEACH input <b>Discrete output models:</b> <b>Output Configuration:</b> NPN, PNP, Normally Open (NO), Normally Closed (NC) select <b>Advanced configuration options:</b> Push button enabled/disabled, temperature compensation enabled/disabled <b>Analog output models:</b> <b>Response speed selection:</b> Fast or Slow <b>Advanced configuration options:</b> Analog output slope, push button enabled/disabled, temperature compensation enabled/disabled		
Indicators	<b>Green Power LED ON:</b> Power ON, RUN mode <b>Red Signal LED:</b> Target signal strength <b>Amber Output LED:</b> Output enabled; sensor receiving a signal within the window limits <b>Amber Mode LED:</b> Currently selected mode		
Loss of Signal Indication (analog models)	<b>0 to 10 V dc models:</b> Analog output goes to 0 V <b>4 to 20 mA models:</b> Analog output goes to 3.6 mA		
Construction	<b>Housing:</b> PBT polyester <b>Push buttons:</b> Polyester <b>Transducer:</b> Epoxy /ceramic composite		
Environmental Rating	Leakproof design, rated IEC IP67 (NEMA 6)		
Operating Conditions	<b>Temperature:</b> -40 to +70 °C <b>Relative humidity:</b> 95% at 50 °C non-condensing		
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.		
Application Notes	The temperature warmup drift upon power-up is less than 1% of the sensing distance		
Certifications	 		

NOTE: NPN < 200  $\mu$ A for load impedance > 3 k $\Omega$ ; for load current of 100 mA, leakage < 1% of load current

# T30U Series

## Right-Angle, Long-Range Ultrasonic Sensors



- Dual-discrete models for ON/OFF switching or pump-level control
- Resists harsh environments with rugged IP67 (NEMA 6) housing and fully encapsulated electronics
- Chemically resistant models with a Teflon® coating
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

### T30U, 12-24 V DC

Range	Frequency	Connection	Response Time	Discrete Output(s)	Analog Output	Models*
150 mm to 1 m	228 kHz	2 m	48 ms	NPN	4 to 20 mA	T30UINA
		5-pin Euro QD				T30UINAQ
		2 m		PNP		T30UIPA
		5-pin Euro QD				T30UIPAQ
300 mm to 2 m <sup>†</sup>	128 kHz	2 m	96 ms	NPN	4 to 20 mA	T30UINB
		5-pin Euro QD				T30UINBQ
		2 m		PNP		T30UIPB
		5-pin Euro QD				T30UIPBQ
150 mm to 1 m	228 kHz	2 m	48 ms	Dual NPN	None	T30UDNA
		5-pin Euro QD				T30UDNAQ
		2 m		Dual PNP		T30UDPA
		5-pin Euro QD				T30UDPAQ
300 mm to 2 m <sup>†</sup>	128 kHz	2 m	96 ms	Dual NPN	None	T30UDNB
		5-pin Euro QD				T30UDNBQ
		2 m		Dual PNP		T30UDPB
		5-pin Euro QD				T30UDPBQ
150 mm to 1 m	228 kHz	2 m	48 ms	Pump/Level Control	None	T30UHNA
		5-pin Euro QD				T30UHNAQ
300 mm to 2 m <sup>†</sup>	128 kHz	2 m	96 ms	Dual NPN	None	T30UHNB
		5-pin Euro QD				T30UHNBQ
150 mm to 1 m	228 kHz	2 m	48 ms	Pump/Level Control	None	T30UHPA
		5-pin Euro QD				T30UHPAQ
300 mm to 2 m <sup>†</sup>	128 kHz	2 m	96 ms	Dual PNP	None	T30UHPB
		5-pin Euro QD				T30UHPBQ

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UXDA W/30).


QD models: For a 4-pin 150 mm Euro-style PUR pigtail QD, add suffix QPMA the 2 m model number (example, T30UXDAQPMA).

\* Contact factory to request chemically resistant flange or fill-level control models.

<sup>†</sup> Teflon®-encapsulated models have a range of 300 mm - 1.5 m

## T30U, 15-24 V DC

Range	Frequency	Connection	Response Time	Analog Output	Models NPN*	Models PNP*
150 mm to 1 m	228 kHz	2 m 5-pin Euro QD	48 ms	0 to 10 V dc	T30UUNA T30UUNAQ	T30UUPA T30UUPAQ
300 mm to 2 m†	128 kHz	2 m 5-pin Euro QD	96 ms	0 to 10 V dc	T30UUNB T30UUNBQ	T30UUPB T30UUPBQ

 Connection options: A model with a QD requires a mating cordset

For 9 m cable, add suffix W/30 to the 2 m model number (example, T30UUNA W/30).

\* For sensors with Teflon®-protected face and transducer (long-range models only), add suffix -CRFV to the model number (example, T30UUNB-CRFV).

† Teflon®-encapsulated models have a range of 300 mm - 1.5 m.

Teflon® is a registered trademark of Dupont™.



**Euro-Style with Shield**  
Straight connector models listed; for right-angle, add RA to the end of the model number (example, MQDEC2-506RA)

**5-Pin**  
MQDEC2-506  
2 m (6.5')  
MQDEC2-515  
5 m (15')  
MQDEC2-530  
9 m (30')



SMB30A



SMB30FA..




SMB1815SF

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 723



## T30U Specifications

Supply Voltage and Current	<b>Current sourcing analog output models:</b> 12 to 24 V dc (10% max. ripple); 90 mA (exclusive of load) <b>Voltage sourcing analog output models:</b> 15 to 24 V dc (10% max. ripple); 90 mA (exclusive of load) <b>Dual-discrete output models:</b> 12 to 24 V dc (10% max. ripple); 90 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Ultrasonic Frequency	<b>Short Range ("A" suffix models):</b> 228 kHz <b>Long Range ("B" suffix models):</b> 128 kHz
Output Protection	Protected against continuous overload and short-circuit; transient over-voltage; no false pulse on power-up
Output Configuration	<b>Discrete (switched) output:</b> Solid-state switch conducts when target is sensed within sensing window; choose NPN (current sinking) or PNP (current sourcing) models <b>Analog output:</b> Choose 0 to 10 V dc sourcing or 4 to 20 mA sourcing output models; output slope may be selected using TEACH sequence
Output Ratings	<b>Discrete (switched) output:</b> 100 mA max., total-both outputs <b>OFF-state leakage current:</b> less than 10 µA <b>ON-state saturation voltage:</b> less than 1 V at 10 mA and less than 1.5 V at 100 mA <b>Analog Output:</b> <b>Voltage sourcing:</b> 0 to 10 V dc (at 1 kΩ min. resistance) <b>Current sourcing:</b> 4 to 20 mA, 1 Ω to Rmax $R_{max} = \frac{V_{supply} - 7V}{20 \text{ mA}}$
Output Response Time	<b>Discrete output:</b> "A" suffix models: 48 milliseconds      "B" suffix models: 96 milliseconds <b>Analog output:</b> "A" suffix models: 48 milliseconds average, 16-millisecond update "B" suffix models: 96 milliseconds average, 32-millisecond update
Sensing Performance (Specified using a 100 x 100 mm aluminum target at 25° C under fixed sensing conditions.)	<b>Analog sensing resolution or discrete output repeatability:</b> ±0.25% of measured distance "A" suffix models: .5 mm min      "B" suffix models: 1 mm min <b>Analog linearity:</b> ±0.5% of full-scale span <b>Min. window size:</b> 10 mm <b>Hysteresis of discrete output:</b> 2.5 mm <b>Temperature effect:</b> 0.2% of sensing distance per °C
Indicators	<b>Four status LEDs: In RUN mode:</b> Green ON Steady: Power ON, RUN mode Green Flashing: Discrete output is overloaded Red Flashing: Relative received signal strength Yellow analog ON Steady: Target is inside window limits Yellow discrete ON Steady: Output conducting <b>In Program mode:</b> Green OFF: PROGRAM mode Red Flashing: Relative received signal strength Yellow ON Steady: Ready for first window limit Yellow Flashing: Ready for second limit Yellow OFF: Not teaching this output
Construction	Molded reinforced thermoplastic polyester housing
Environmental Rating	Leakproof design is rated IEC IP67; NEMA 6P
Operating Conditions	<b>Temperature:</b> -20 to +70 °C <b>Relative humidity:</b> 100%
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.
Certifications	



# M25U Series

## Stainless Steel Opposed Ultrasonic Sensors



- 316 stainless steel with no thread, gaps or seams to trap debris
- Constructed with FDA approved materials and rated to IP69K, IEC IP67 (NEMA 6) with fully encapsulated electronics
- Withstands high-temperature sprays of up to 80° C and 1500 psi occurring every few hours
- Features high-immunity to ambient electrical and sonic noise

### M25U

Range*	Frequency	Connection	Output	Response Time	Models
Normal Speed: 500 mm High Speed: 250 mm	140 kHz	4-pin Euro QD	—	—	<b>M25UEQ8</b> Emitter
		5-pin Euro QD	Bipolar NPN/PNP	<b>Normal Speed: 4.0 ms</b> <b>High Speed: 3.0 ms</b>	<b>M25URBQ8</b> Receiver

 Connection options: A model with a QD requires a mating cordset.

\* M25U receivers may be wired for either of two speed modes: Normal or High, depending on hookup. The Normal-Speed mode offers a sensing range of 500 mm. The Normal-Speed mode maximizes sensing energy, as is required in demanding environments. The High-Speed mode offers a sensing range of 250 mm. The High-Speed mode maximizes sensing response, as is needed in high-speed counting applications.



5-Pin

**Euro-Style with Shield**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDEC2-506RA**)

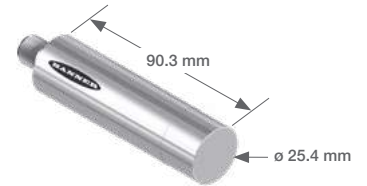
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')

**Euro-Style Washdown**  
Straight connector models only



5-Pin

**MQDCWD-506**  
2 m (6.5')  
**MQDCWD-530**  
9 m (30')



Additional cordset information is available  
See page 758



SMBM25A



SMBM25B

Additional bracket information is available  
See page 725

## M25U Specifications

<b>Sensing Range</b>	<b>Normal Speed:</b> 500 mm <b>High Speed:</b> 250 mm
<b>Ultrasonic Frequency</b>	140KHz
<b>Supply Voltage and Current</b>	<b>Emitter:</b> 10 to 30 V dc (10% max. ripple) at less than 85 mA <b>Receiver:</b> 10 to 30 V dc (10% max. ripple) at less than 38 mA (exclusive of load)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Receiver Output Configuration</b>	Bipolar (1 NPN & 1 PNP) solid-state output; Normally Open (output is activated when an object blocks the sensing beam)
<b>Output Rating</b>	100 mA (each output) with short circuit protection; see Note 1 <b>OFF-state leakage current:</b> NPN: < 200 µA sinking PNP: < 10 µA sourcing <b>ON-state saturation voltage:</b> NPN: < 1.6 V @ 100 mA PNP: < 3.0 V @ 100 mA
<b>Output Protection Circuitry</b>	Protected against short circuit conditions
<b>Output Response Time</b>	<b>Normal Speed:</b> 4.0 milliseconds <b>High Speed:</b> 3.0 milliseconds
<b>Repeatability</b>	1 millisecond
<b>Delay at Power-up</b>	< 250 milliseconds
<b>Delay for Switching Between Normal and High Speed</b>	20 milliseconds
<b>Indicators</b>	<b>Green Power LED:</b> indicates Power ON <b>Amber Output LED:</b> indicates output activated
<b>Construction</b>	<b>Housing:</b> 316 Stainless Steel <b>LED window:</b> Polysulphone
<b>Environmental Rating</b>	Leakproof design, rated IEC IP67 (NEMA 6), IP69K
<b>Operating Conditions</b>	<b>Temperature:</b> -20 to +70 °C <b>Max. Relative Humidity:</b> 95% at 50° C non-condensing
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max. amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration.
<b>Notes</b>	1. NPN < 200 µA for load impedance > 3 KΩ; for load current of 100 mA, leakage < 1% of load current 2. When mounting the M25U, care should be taken to acoustically isolate the emitter and receiver to eliminate sound energy coupling between the sensor pair. This is best accomplished with elastomeric materials between the sensor and rigid mounting brackets.

Certifications



# T18U Series

## Opposed Dual-Range Ultrasonic Sensors



- T-style right-angle sensor package with an 18 mm threaded mounting hub, for versatile mounting
- Response time of 1 millisecond and ranges up to 600 mm suitable for high-speed applications such as counting
- Offers high immunity to electrical and acoustic noise
- Includes signal strength indicator to make alignment easy
- Ideal for small object and clear object detection

### T18U

Range†	Connection	Response Time	Models NPN*	Models PNP*
NORMAL resolution: 600 mm HIGH resolution: 300 mm	2 m 4-pin Euro QD	NORMAL resolution: 2 ms HIGH resolution: 1 ms	T186UE Emitter T186UEQ Emitter	
NORMAL resolution: 600 mm HIGH resolution: 300 mm	2 m 4-pin Euro QD	NORMAL resolution: 2 ms HIGH resolution: 1 ms	T18VN6UR T18VN6URQ	T18VP6UR T18VP6URQ

 Connection options: A model with a QD requires a mating cordset.  
 For 9 m cable, add suffix W/30 to the 2 m model number (example, T18VN6UR W/30).  
 † Receivers may be wired for either resolutions: Normal or High.  
 \* Sensor pair requires one emitter and one receiver.



4-Pin

**Euro-Style**

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

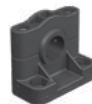
**MQDC-406**  
2 m (6.5')  
**MQDC-415**  
5 m (15')  
**MQDC-430**  
9 m (30')



SMB18A



SMB18FA..



SMB1815SF

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 723

**Ultrasonic Wave Guides**

Inside Diameter	Model
5.0 mm	UWG18-5.0
6.4 mm	UWG18-6.4

Additional wave guide information is available  
See page 959

**T18U Specifications**

<b>Sensing Range (no minimum range)</b>	<b>NORMAL resolution mode:</b> to 600 mm <b>HIGH resolution mode:</b> to 300 mm
<b>Supply Voltage and Current</b>	12 to 30 V dc, 10% max. ac ripple 50 mA (emitters); 35 mA (receivers), exclusive of output load
<b>Ultrasonic Frequency</b>	230 kHz
<b>Minimum spacing (adjacent pairs)</b>	50 mm for emitter-to-receiver separations of up to 150 mm Add 10 mm of adjacent-pair spacing for every 100 mm of emitter-to-receiver spacing beyond 150 mm
<b>Receiver Output Configuration</b>	<b>T18VN models:</b> NPN sinking, NO and NC (complementary) <b>T18VP models:</b> PNP sourcing, NO and NC (complementary)
<b>Receiver Output Rating</b>	150 mA max. each output at 25 °C, derated to 100 mA at 70 °C (derate ≈ 1 mA per °C) Both outputs may be used simultaneously. <b>ON-state saturation voltage:</b> less than 1.5 V at 10 mA; less than 2.0 V at 150 mA <b>OFF-state leakage current:</b> less than 1 µA at 30 V dc <b>Output protection:</b> Overload and short-circuit protected. <b>No false pulse upon receiver power-up:</b> false pulse protection causes a 100 millisecond delay upon power-up.
<b>Output Response Time</b>	<b>NORMAL resolution mode:</b> 2 milliseconds ON/OFF <b>HIGH resolution mode:</b> 1 millisecond ON/OFF
<b>Rep Rate</b>	<b>NORMAL resolution mode:</b> 125 Hz max. <b>HIGH resolution mode:</b> 200 Hz max.
<b>Mechanical Sensing Repeatability at 300 mm range</b>	<b>NORMAL resolution mode:</b> less than 2 mm <b>HIGH resolution mode:</b> less than 1 mm
<b>Beam Angle (-3dB full angle)</b>	15 ± 2°
<b>Indicators</b>	Emitters have a green LED for dc power ON. Receivers have two LEDs, one yellow and one green <b>Solid Green:</b> power ON <b>Flashing Green:</b> output overloaded <b>Yellow:</b> sonic signal received (flash rate is proportional to received signal strength; flash is from full to half intensity) See data sheet for detailed information
<b>Construction</b>	T-style yellow PBT polyester housing with black PBT polyester back cover. Transducer housing is threaded M18 x 1. Mating jam nut is supplied for mounting. Acoustic face is epoxy reinforced. Circuitry is epoxy-encapsulated.
<b>Environmental Rating</b>	IEC IP67; NEMA 6P
<b>Operating Temperature</b>	-40 to +70 °C
<b>Vibration and Mechanical Shock</b>	All models meet Mil.Std 202F requirements method 201A (Vibration: frequency 10 to 60 Hz, max., and double amplitude 0.06", maximum acceleration 10G) and method 213B conditions H&I (Shock: 75G with unit operation; 100G for non-operation). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.
<b>Certifications</b>	

# Q45U Series

## Versatile Ultrasonic Sensors



- The Q45U accepts programming storage cards for fast, easy sensing parameter changes with ranges up to 3 m
- Bipolar discrete models have switches for ON/OFF presence detection and HIGH/LOW level control
- In ON/OFF mode, bipolar discrete models detect when the target is within the set range or when it is outside the range
- In HIGH/LOW mode, bipolar discrete models detect when the target is outside the configured range, for fill level control, web tensioning control and similar applications
- Response time is programmed with switches in discrete models and with a potentiometer in analog models
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience



### Q45U Discrete Output, 12-24 V DC

Range	Temperature Compensation	Connection	Output Type	Response Time	Models
100 mm to 1.4 m	No	2 m	Bipolar NPN/PNP	Programmable for 20, 40, 160 or 640 ms	Q45UBB63DA Q45UBB63DAQ Q45UBB63DAQ6
		5-pin Mini QD 5-pin Euro QD			
100 mm to 1.4 m	Yes	2 m	Bipolar NPN/PNP	Programmable for 20, 40, 160 or 640 ms	Q45UBB63DAC Q45UBB63DACQ Q45UBB63DACQ6
		5-pin Mini QD 5-pin Euro QD			
250 mm to 3 m <sup>†</sup>	Yes	2 m	Bipolar NPN/PNP	Programmable for 40, 80, 320 or 1280 ms	Q45UBB63BC Q45UBB63BCQ Q45UBB63BCQ6
		5-pin Mini QD 5-pin Euro QD			

### Q45U Analog Output, 15-24 V DC

Range	Temperature Compensation	Connection	Output Type	Response Time	Models
100 mm to 1.4 m	Yes	2 m	Selectable 0 to 10 V dc or 4 to 20 mA	Adjustable from 40 to 1280 ms	Q45ULIU64ACR Q45ULIU64ACRQ Q45ULIU64ACRQ6
		5-pin Mini QD 5-pin Euro QD			
250 mm to 3 m <sup>†</sup>	Yes	2 m	Selectable 0 to 10 V dc or 4 to 20 mA	Adjustable from 80 to 2560 ms	Q45ULIU64BCR Q45ULIU64BCRQ Q45ULIU64BCRQ6
		5-pin Mini QD 5-pin Euro QD			



Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45UBB63DA W/30).

<sup>†</sup> The far limit may be extended as far as 3.9 m for good acoustical targets—hard surfaces with area greater than 100 cm<sup>2</sup>.

**Euro-Style with Shield**  
Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)



**5-Pin**  
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')

**Mini-Style with Shield**  
Straight connector models only



**5-Pin**  
**MBCC2-506**  
2 m (6.5')  
**MBCC2-515**  
5 m (15')  
**MBCC2-530**  
9 m (30')



SMB30A



SMB30MM




SMB30SC

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 722

## Q45U Specifications

<b>Sensing Range</b>	<b>"A" suffix: Near limit:</b> 100 mm min. (239 kHz) <b>"B" suffix: Near limit:</b> 250 mm min. (128 kHz) <b>"A" suffix: Far limit:</b> 1.4 m max. (239 kHz) <b>"B" suffix: Far limit:</b> 3.0 m max. (128 kHz) NOTE: The far limit may be extended on long range units, as far as 3.9 m for good acoustical targets (hard surfaces with area greater than 100 cm2)		
<b>Supply Voltage and Current</b>	<b>Discrete:</b> 12 to 24 V dc (10% max. ripple); 100 mA (exclusive of load) <b>Analog:</b> 15 to 24 V dc (10% max. ripple); 100 mA (exclusive of load)		
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages		
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short-circuit of outputs		
<b>Output Configuration</b>	<b>Discrete: Bipolar:</b> One current sourcing (PNP) and one current sinking (NPN) open collector transistor <b>Analog:</b> One voltage sourcing and one current sourcing; one or the other output is enabled by internal programming switch #2		
<b>Output Ratings</b>	<b>Discrete:</b> 150 mA max. (each) <b>OFF-state leakage current:</b> less than 25 µA at 24 V dc <b>ON-state saturation voltage:</b> less than 1.5 V at 10 mA; less than 2.0 V at 150 mA <b>Analog:</b> <b>Voltage sourcing:</b> 0 to 10 V dc, 10 mA max. <b>Current sourcing:</b> 4 to 20 mA, 1 to 500 Ω impedance		
<b>Performance Specifications</b>		<b>"A" suffix</b>	<b>"B" suffix</b>
<b>Analog resolution or discrete repeatability:</b>		± 0.1% of sensing distance (± 0.25 mm min.)	± 0.1% of sensing distance (± 0.5 mm min.)
<b>Analog Linearity:</b>		1% of full scale	1% of full scale
<b>Temperature effect:</b>		0.05% of sensing distance/ °C with temp. comp. 0.2% of sensing distance/ °C without temp. comp.	0.05% of sensing distance/ °C
<b>Min. window size:</b>		10 mm	25 mm
<b>Hysteresis (discrete output):</b>		5 mm	10 mm
<b>Adjustments</b>	The following may be selected by a 4-position DIP switch. <b>Discrete:</b> <b>Switch 1:</b> Output normally open/normally closed (pump in/pump out) <b>Switch 2:</b> High/Low level control mode or on/off presence sensing mode <b>Switch 3 &amp; 4:</b> Response speed selection (digital filter) <b>Analog:</b> <b>Switch 1:</b> Output slope positive or output slope negative <b>Switch 2:</b> Current output mode or voltage output mode <b>Switch 3:</b> Loss of echo min/max mode or loss of echo Hold Mode <b>Switch 4:</b> Loss of echo min/max default output value		
<b>Indicators</b>	<b>Discrete: Three status LEDs:</b> <b>Solid Green:</b> power ON <b>Flashing Green:</b> output overloaded <b>Yellow:</b> outputs are conducting (Yellow LED also indicates programming status during setup mode) <b>Red:</b> indicates relative strength of received echo <b>Analog: Three status LEDs:</b> <b>Green:</b> power ON <b>Flashing Green:</b> current output fault (4-20 mA current path to ground is open) <b>Yellow:</b> target is sensed within the window limits (Yellow LED also indicates programming status during setup mode) <b>Red flashing:</b> indicates relative strength of received echo 5-segment moving dot LED indicates the position of the target within the sensing window. See data sheet for detailed information.		
<b>Construction</b>	Molded PBT polyester thermoplastic polyester housing, o-ring sealed transparent acrylic top cover, and stainless steel hardware. Q45U sensors are designed to withstand 1200 psi washdown. The base of cabled models has a ½"-14NPS internal conduit thread.		
<b>Environmental Rating</b>	Leakproof design is rated IEC IP67; NEMA 6P		
<b>Operating Conditions</b>	<b>Temperature:</b> -25 to +70 °C <b>Relative humidity:</b> 100%		
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max., double amplitude 0.06", maximum acceleration 10G). Method 213B conditions H & I (Shock: 75G with unit operating; 100G for non-operation). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.		
<b>Application Notes</b>	<b>"A" suffix: Min. target size:</b> 10 x 10 mm aluminum plate at 500 mm                      35 x 35 mm aluminum plate at 1.4 m <b>"B" suffix: Min. target size:</b> 50 x 50 mm aluminum plate at 3 m <b>Discrete:</b> Enable/Disable; Connect yellow wire to +5 to 24 V dc to enable sensor and 0 to +2 V dc to disable sensor. When the sensor is disabled, the last output state is held until the sensor is re-enabled. The wire must be held to the appropriate voltage for at least 40 milliseconds for the sensor to enable or disable.		
<b>Certifications</b>			




# Q45UR Series

## Remote Transducer Ultrasonic Sensors






- Q45 housing with an available plastic or a stainless steel 18 mm threaded barrel sensing head or an ultra-compact plastic Flat-Pak sensing head
- The Q45UR has sensing ranges up to 250 mm
- Resolution/repeatability +/- 0.2% of sensing distance
- Analog models feature a selectable positive or negative output slope
- Environmental rating is IEC IP65 and NEMA 4
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

### Q45UR Discrete Output, 12-24 V DC

Sensor Range	Controller Connection	Controller Output	Kit Models	Kit Includes: Controller & Sensor	
50 to 250 mm	2 m	Bipolar NPN/PNP	Q45UR3BA63CK	 <b>M18C2.0</b> Stainless Steel Barrel	
	5-pin Mini QD		Q45UR3BA63CQK		Q45UR3BA63C
	5-pin Euro QD		Q45UR3BA63CQ6K		Q45UR3BA63CQ6
50 to 250 mm	2 m	Bipolar NPN/PNP	Q45UR3BA63CKQ	 <b>Q13C2.0</b> Flat-Pak	
	5-pin Mini QD		Q45UR3BA63CQKQ		Q45UR3BA63C
	5-pin Euro QD		Q45UR3BA63CQ6KQ		Q45UR3BA63CQ6
50 to 250 mm	2 m	Bipolar NPN/PNP	Q45UR3BA63CKS	 <b>S18C2.0</b> Molded Barrel	
	5-pin Mini QD		Q45UR3BA63CQKS		Q45UR3BA63C
	5-pin Euro QD		Q45UR3BA63CQ6KS		Q45UR3BA63CQ6



### Q45UR Analog Output, 15-24 V DC

Sensor Range	Controller Cable	Controller Output	Kit Models	Kit Includes: Controller & Sensor	
50 to 250 mm	2 m		Q45UR3LIU64CK	 <b>M18C2.0</b> Stainless Steel Barrel	
	5-pin Mini QD		Q45UR3LIU64CQK		Q45UR3LIU64C
	5-pin Euro QD		Q45UR3LIU64CQ6K		Q45UR3LIU64CQ6
50 to 250 mm	2 m	Selectable 0 to 10 V dc or 4 to 20 mA	Q45UR3LIU64CKQ	 <b>Q13C2.0</b> Flat-Pak	
	5-pin Mini QD		Q45UR3LIU64CQKQ		Q45UR3LIU64C
	5-pin Euro QD		Q45UR3LIU64CQ6KQ		Q45UR3LIU64CQ6
50 to 250 mm	2 m		Q45UR3LIU64CKS	 <b>S18C2.0</b> Molded Barrel	
	5-pin Mini QD		Q45UR3LIU64CQKS		Q45UR3LIU64C
	5-pin Euro QD		Q45UR3LIU64CQ6KS		Q45UR3LIU64CQ6

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, Q45UR3BA63CK W/30).



**Euro-Style with Shield**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)

**5-Pin**

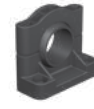
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')



**Mini-Style with Shield**  
Straight connector models only

**5-Pin**

**MBCC2-506**  
2 m (6.5')  
**MBCC2-512**  
4 m (12')  
**MBCC2-530**  
9 m (30')

**SMB30A****SMB30MM****SMB30SC**

Additional bracket information is available  
See page 722

Additional cordset information is available  
See page 758

**Q45UR High-Gain Controllers**

Version	Model
Discrete	63060 <b>Q45UR3BA63CQ6-63060</b>
Analog	63667 <b>Q45UR3LIU64CQ6-63667</b>

NOTE: Special High-Gain controllers are available for small object detection.  
Contact factory for more information.

**Q45UR Remote Sensors Specifications**

<b>Supply Voltage and Current</b>	<b>Discrete:</b> 12 to 24 V dc (10% max. ripple); 100 mA (exclusive of load)	<b>Analog:</b> 15 to 24 V dc (10% max. ripple); 100 mA (exclusive of load)
<b>Ultrasonic Frequency</b>	400 kHz	
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages	
<b>Output Protection Circuitry</b>	Both outputs are protected against continuous overload and short circuit	
<b>Output Rating</b>	<b>Discrete:</b> 150 mA max. (each output) <b>OFF-state leakage current:</b> less than 25 $\mu$ A at 24 V dc <b>ON-state saturation voltage:</b> less than 1.5 V at 10 mA;	<b>Analog:</b> <b>Voltage sourcing:</b> 0 to 10 V dc, 10 mA max. <b>Current sourcing:</b> 4 to 20 mA, 1 to 500 $\Omega$ impedance
<b>Output Configuration</b>	<b>Discrete: Bipolar:</b> One current sourcing (PNP) and one current sinking (NPN) open collector transistor	<b>Analog:</b> One voltage sourcing and one current sourcing; one or the other output is enabled by internal programming switch #2
<b>Performance Specifications</b>	<b>Discrete:</b> <b>Response Speed:</b> 40 or 160 ms (switch selectable) <b>Repeatability*:</b> $\pm$ 0.2% of measured distance <b>Temperature stability:</b> $\pm$ 0.03% of the window limit positions per $^{\circ}$ C from 0 to 50 $^{\circ}$ C, ( $\pm$ 0.05% per $^{\circ}$ C over remainder of operating temperature range) <b>Sensing window width:</b> 5 to 200 mm, when independent near and far limits are taught; 1, 2, 3, or 4 mm (switch selectable), when a sensing distance set point is taught <b>Hysteresis:</b> 0.5 mm <b>Ultrasonic beam angle:</b> $\pm$ 3.5 $^{\circ}$	<b>Analog:</b> <b>Response Speed:</b> 10 to 320 ms (2 to 64 cycles) selectable <b>Resolution*:</b> 0.2% of sensing distance at 320 ms response, 0.4% of sensing distance at 10 ms response <b>Linearity*:</b> 1% of full scale <b>Temperature stability:</b> $\pm$ 0.03% of sensing distance per $^{\circ}$ C from 0 to 50 $^{\circ}$ C, ( $\pm$ 0.05% per $^{\circ}$ C over remainder of operating temperature) <b>Ultrasonic beam angle:</b> $\pm$ 3.5 $^{\circ}$
	* Repeatability and analog resolution and linearity are specified using a 50 x 50 mm aluminum plate at 22 $^{\circ}$ C under fixed sensing conditions (Analog: using the 4 to 20 mA output @ 15 V dc)	
<b>Adjustments</b>	<b>Discrete:</b> The following may be selected by a 4-position DIP switch <b>Switch 1:</b> Output normally open (output is energized when target is within sensing window limits), or normally closed (output is energized when target is outside sensing window limits) <b>Switches 2 &amp; 3:</b> Sensing window size (1, 2, 3 or 4 mm) <b>Switch 4:</b> Response speed selection (40 or 160 milliseconds)	<b>Analog:</b> Push-button TEACH-mode programming of window limits. The following may be selected by a 4-position DIP switch located on top of the controller, beneath a transparent o-ring sealed acrylic cover and beneath the black inner cover. <b>Switch 1:</b> Output slope: output value increases or decreases with distance <b>Switch 2:</b> Output mode: current output or voltage output <b>Switches 3 &amp; 4:</b> Response to loss of echo <b>Response Speed Adjustment:</b> Single-turn potentiometer selects six response values from 10 to 320 milliseconds
<b>Indicators</b>	<b>Discrete: Three status LEDs:</b> <b>Green:</b> Power ON <b>Yellow:</b> Output are conducting (Yellow also indicates programming status during setup) <b>Red:</b> Relative strength of received echo  5-segment moving dot LED indicates the position of the target within the sensing window	<b>Analog: Three status LEDs:</b> <b>Solid Green:</b> Power ON <b>Flashing Green:</b> current output fault (4-20 mA current path to ground is open) <b>Yellow:</b> Target is sensed within the window limits (Yellow LED also indicates programming status during setup mode) <b>Red:</b> Relative strength of received echo  5-segment moving dot LED indicates the position of the target within the sensing window (See data sheet for detailed information)
<b>Construction</b>	<b>Controller:</b> Molded thermoplastic polyester housing, o-ring sealed transparent acrylic top cover, and stainless steel hardware <b>Sensors: M18C2.0:</b> Stainless steel M18 threaded barrel housing and jam nuts, polyetherimide front cover, ceramic transducer, polyurethane rear cover <b>S18C2.0:</b> Thermoplastic polyester S18 threaded barrel housing and jam nuts, polyetherimide front cover, ceramic transducer, polyurethane rear cover <b>Q13C2.0:</b> Molded 30% glass reinforced thermoplastic polyester housing, ceramic transducer, fully epoxy-encapsulated	
<b>Environmental Rating</b>	<b>Controller:</b> IEC IP67; NEMA 6P	<b>Sensor:</b> IEC IP65; NEMA 4
<b>Operating Conditions</b>	<b>Controller and sensor:</b> -25 to +70 $^{\circ}$ C	<b>Relative humidity:</b> 85% (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements. Method 201A Vibration: 10 to 60Hz max., double amplitude 0.06" (maximum acceleration 10G). Method 213B conditions H & I (Shock: 75G with unit operating; 100G for non-operation). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.	
<b>Certifications</b>	CE	

# QS18U Series

## Right-Angle Ultrasonic Sensors



- Senses clear and transparent materials, as well as color variations, including clear web material, clear or shiny bottles, highly reflective surfaces and liquid or dry bulk materials inside cramped locations
- Sensing range up to 500 mm.
- Features a universal housing with an 18 mm threaded lens or side mount
- Available in encapsulated IP68 models rated for a range of harsh conditions
- Push-button and remote TEACH-mode programming with an external switch, computer or controller for added security and convenience

### QS18U

Range	Connection	TEACH Options	Models NPN	Models PNP
50 to 500 mm	2 m	Integral push button and remote TEACH (IP67; NEMA 6P)	QS18UNA	QS18UPA
	4-pin Euro QD		QS18UNAQ8	QS18UPAQ8
50 to 500 mm	2 m	Remote TEACH (epoxy-encapsulated, IP68; NEMA 6P)	QS18UNAE*	QS18UPAE*
	4-pin Euro QD		QS18UNAEQ8*	QS18UPAEQ8*

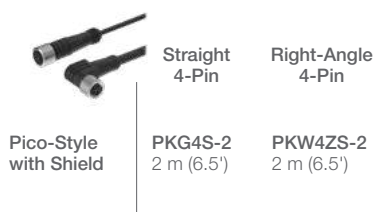
\* Models are epoxy-encapsulated, IP68; NEMA 6P with remote TEACH programming

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, QS18UNA W/30).

QD models:

- For 4-pin integral Euro-style QD, add suffix Q8 (example, QS18UNAQ8).
- For 4-pin integral Pico-style QD, add suffix Q7 (example, QS18UNAQ7).
- For 4-pin 150 mm Euro-style pigtail, add suffix Q5 (example, QS18UNAQ5).
- For 4-pin 150 mm Pico-style pigtail, add suffix Q (example, QS18UNAQ).



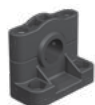
Additional cordset information is available  
See page 758



SMB18A



SMB18FA..



SMB1815SF

Additional bracket information is available  
See page 722

#### Ultrasonic Wave Guides



Inside Diameter	Model
5.0 mm	<b>UWG18-5.0</b>
6.4 mm	<b>UWG18-6.4</b>

Additional wave guide information is available  
See page 959



## QS18U Specifications

<b>Sensing Range</b>	50 to 500 mm	
<b>Supply Voltage and Current</b>	12 to 30 V dc (10% max. ripple); 25 mA max. (exclusive of load)	
<b>Ultrasonic Frequency</b>	300 kHz, rep. rate 7.5 milliseconds	
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages	
<b>Output Protection</b>	Protected against short circuit conditions	
<b>Delay at Power-Up</b>	300 milliseconds	
<b>Output Configurations</b>	Solid-state switch conducts when target is sensed within sensing window; one NPN (current sinking) or one PNP (current sourcing), depending on model	
<b>Temperature Effect</b>	<b>Non-encapsulated models:</b> $\pm 0.05\%$ per $^{\circ}\text{C}$ from $-20$ to $+50$ $^{\circ}\text{C}$ , $\pm 0.1\%$ per $^{\circ}\text{C}$ from $+50$ to $+60$ $^{\circ}\text{C}$ <b>Encapsulated models:</b> $\pm 0.05\%$ per $^{\circ}\text{C}$ from $0^{\circ}$ to $+60^{\circ}$ C, $\pm 0.1\%$ per $^{\circ}\text{C}$ from $-20^{\circ}$ to $0^{\circ}$ C	
<b>Repeatability</b>	0.7 mm	
<b>Hysteresis</b>	1.4 mm	
<b>Output Ratings</b>	100 mA max. (see Application Note 1) <b>OFF-state leakage current:</b> less than 10 $\mu\text{A}$ (sourcing); less than 200 $\mu\text{A}$ (sinking); See Application Note 2 <b>NPN ON-state saturation voltage:</b> less than 1.6 V @ 100 mA <b>PNP ON-state saturation voltage:</b> less than 3.0 V @ 100 mA	
<b>Output Response Time</b>	15 milliseconds	
<b>Minimum Window Size</b>	5 mm	
<b>Adjustments</b>	<b>Sensing window limits:</b> TEACH-Mode programming of near and far window limits may be set using the push button or remotely using TEACH input	
<b>Indicators</b>	<b>Range Indicator (Red/Green)</b> <b>Green:</b> Target is within sensing range <b>Red:</b> Target is outside sensing range <b>OFF:</b> Sensing power is OFF	<b>Teach/Output Indicator (Yellow/Red)</b> <b>Yellow:</b> Target is within taught limits <b>OFF:</b> Target is outside taught window limits <b>Red:</b> Sensor is in TEACH mode
<b>Construction</b>	<b>Housing:</b> ABS <b>Push Button:</b> TPE	<b>Push Button Housing:</b> ABS <b>Lightpipes:</b> Polycarbonate
<b>Environmental Rating</b>	Leakproof design, rated IEC IP67 or IP68; NEMA 6P, depending on model; UL type 1	
<b>Operating Conditions</b>	<b>Temperature:</b> $-20$ to $+60$ $^{\circ}\text{C}$	<b>Relative humidity:</b> 100% (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 milliseconds duration, half sine wave.	
<b>Temperature Warmup Drift</b>	See data sheet	
<b>Application Notes</b>	1. If supply voltage is $> 24$ V dc, derate maximum output current 5 mA/ $^{\circ}\text{C}$ above 50 $^{\circ}\text{C}$ . 2. NPN OFF-state leakage current is $< 200$ $\mu\text{A}$ for load resistances $> 3$ k $\Omega$ or optically isolated loads. For load current of 100 mA, leakage is $< 1\%$ of load current. 3. Objects passing inside the specified near limit may produce a false response.	
<b>Certifications</b>		

# K50U Series

## Ultrasonic Sensor for Wireless Level and Tank Monitoring



- Three meter sensing range with a 300 mm dead zone
- Provides a distance measurement from the target to the sensor
- Built-in temperature compensation
- Rugged design for demanding sensing environments; rated IEC IP67, NEMA 6P
- Functions as a Modbus slave device using RS-485

### K50U

Range and Frequency	Supply Voltage	I/O	Models
Range: 300 mm to 3 m Frequency: 114 kHz	3.6 to 5.5 V dc	Distance to target using a 1-wire serial interface	K50UX1RA
Range: 300 mm to 3 m Frequency: 114 kHz	3.6 to 5.5 V dc or 10 to 30 V dc	Distance to target using Modbus RS-485	K50UX2RA



5-Pin

**Euro-Style**

Double-ended, straight male to female

**DEE2R-51D**  
0.31 m (1')  
**DEE2R-53D**  
0.91 m (3')  
**DEE2R-58D**  
2.44 m (8')

Additional cordset information is available  
See page 758

**BWA-BK-006**

Mounts both the K50U Ultrasonic sensor and a Wireless Q45 Node



Ø 50.0 mm

1/4" NPT  
connection

59.5 mm




## K50U Specifications

<b>Supply Voltage and Current</b>	3.6 to 5.5 V dc or 10 to 30 V dc
<b>Current</b>	Active comms: 11.3 mA at 30 V dc
<b>Indicators</b>	Two LEDs
<b>Performance</b>	<b>Sensing range:</b> 300 mm to 3 m (11.8 in to 118 in) <b>Ultrasonic frequency:</b> 114 kHz <b>Temperature effect:</b> 0.02% of distance/°C <b>Resolution:</b> 0.1% of distance (1.5 mm minimum)
<b>Discrete Inputs</b>	300 milliseconds
<b>Output Configurations</b>	One Sinking <b>Rating:</b> 3 mA max current at 30 V dc <b>ON Condition:</b> Less than 0.7 V <b>OFF Condition:</b> Greater than 2 V or open
<b>Communication Protocol</b>	Modbus RTU
<b>Communication Hardware</b>	RS-485 Serial <b>Baud Rates:</b> 9.6k, 19.2k (default), or 38.4k <b>Data Format:</b> 8 data bits, No parity (default), even parity, or odd parity 1 stop bit Do not use a termination resistor
<b>Communications Line</b>	<b>Level Receive ON:</b> Greater than 2 V <b>Level Receive OFF:</b> Less than 0.7 V <b>Level Transmit ON:</b> 2.7 to 3 V <b>Level Transmit OFF:</b> 0 V (pulldown resistor of 10 kOhm)
<b>Construction</b>	<b>Housing:</b> PBT polyester <b>Transducer:</b> Epoxy/ceramic composite
<b>Environmental Rating</b>	Leakproof design, rated IEC IP67 (NEMA 6)
<b>Operating Conditions</b>	<b>Temperature:</b> -40 to +70 °C <b>Relative humidity:</b> 95% at +50 °C maximum relative humidity (non-condensing)
<b>Vibration and Mechanical Shock</b>	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 Hz to 60 Hz max., double amplitude 0.06 inch, maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 ms duration, half sine wave
<b>Certifications</b>	<b>CE</b>



## Radar

Radar sensors use Frequency Modulated Continuous Wave (FMCW) radar to reliably detect moving or stationary targets, including cars, trains, trucks and cargo in rain, snow, high and low temperatures and wind.

Series	Description	Max. Sensing Range	Beam Angle	Outputs	Dimensions H x W x D	Power Supply
	<b>Q120R</b> FMCW Radar dual-zone, narrow-beam, high-sensitivity, sensor ideal for port crane anticollision and train detection. page 242	40 m	24° x 50°	DIP-switch-selectable NPN or PNP; N.O. or N.C.	159.5 x 90.8 x 62 mm	12 to 30 V dc
	<b>Q240RA</b> Radar-based dual-zone narrow-beam sensors for detection of moving and stationary targets page 243	100 m	11° x 13°	DIP-switchselectable NPN or PNP; N.O. or N.C.	186.9 x 159.9 x 55.5 mm	12 to 30 V dc
	<b>QT50R</b> FMCW Radar wide-beam easy-to-configure sensor ideal for traffic monitoring, ships, tollways, and car parking. page 244	24 m	90° x 76°	Bipolar NPN/PNP; DIP switch-selectable N.O. or N.C.	100.2 x 74.1 x 46.1 mm	12 to 30 V dc



# Q120R Series

## Radar-Based Adjustable-Field Sensor



- Radar-based narrow-beam sensors with high sensitivity for detection of moving and stationary targets
- Unaffected by wind, falling rain or snow, fog, humidity, air temperatures or light.
- FMCW (true-presence) radar detects moving and stationary objects
- 1 or 2 independent, adjustable sensing zones
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Cordsets and brackets available see page 245

### Q120R Narrow Beam (24° x 50°)

Sensing Mode	Max Range†	Connection	Telecom Approval*	Output	Model
 ADJUSTABLE-FIELD	12 m	5-pin M12 QD	US, Canada and Brazil	Bipolar NPN/PNP	<b>Q120RA-US-AFQ</b>
			Europe, UK, Australia, New Zealand, Japan and China	Selectable NO or NC	<b>Q120RA-EU-AFQ</b>
			South Korea		<b>Q120RA-KR-AFQ</b>
 ADJUSTABLE-FIELD	40+ m	5-pin M12 QD	US, Canada and Brazil	(2) Selectable Dual NPN/PNP	<b>Q120RA-US-AF2Q</b>
			Europe, UK, Australia, New Zealand, Japan and China	Selectable NO or NC	<b>Q120RA-EU-AF2Q</b>
			South Korea		<b>Q120RA-KR-AF2Q</b>
 ADJUSTABLE-FIELD	26 m	5-pin M12 QD	US and Canada	(2) Selectable Dual NPN/PNP	<b>Q120RA-US-AF2WQ</b>
			Europe, UK, Australia, New Zealand, Japan and China	Selectable NO or NC	<b>Q120RA-EU-AF2WQ</b>
			South Korea		<b>Q120RA-KR-AF2WQ</b>

For more specifications see page 245.

QD models: A model with a QD requires a mating cordset (see page 245).

Cabled models: For cabled models, omit Q at the end of the QD model (example, Q120RA-US-AF2).

† Range is dependent on target object.

\* Contact factory at 1-888-373-6767 for additional information.

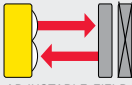

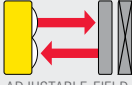

# Q240R Series

## Radar-Based Adjustable-Field Sensor




- Radar-based sensor has a very narrow beam pattern, making it an extremely robust solution for applications where users need to monitor a specific area without detecting adjacent objects
- FMCW (true-presence) radar detects moving and stationary objects
- Narrow beam pattern, high sensitivity, and long range
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Two independent adjustable sensing zones (far and near proximity warning signal)
- Cordsets and brackets available see page 245

### Q240R Narrow Beam (11° x 13°)

Sensing Mode	Max Range†	Connection	Telecom Approval*	Output	Model
 ADJUSTABLE-FIELD	40+ m	5-pin M12 QD	US, Canada and Brazil	(2) Selectable Dual NPN/PNP	Q240RA-US-AF2Q
			Europe, UK, Australia, New Zealand and Japan	Selectable NO or NC	Q240RA-EU-AF2Q
			China		Q240RA-CN-AF2Q
 ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada	(2) Selectable Dual NPN/PNP	Q240RA-US-AF2LQ
			Europe, UK, Australia, New Zealand and Japan	Selectable NO or NC	Q240RA-EU-AF2LQ
			China		Q240RA-CN-AF2LQ
 ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada	(1) 0-10 V Analog and (1) Selectable NPN/PNP	Q240RA-US-ULQ
			Europe, UK, Australia, New Zealand and Japan	Selectable NO or NC	Q240RA-EU-ULQ
			China		Q240RA-CN-ULQ
 ADJUSTABLE-FIELD	100 m	5-pin M12 QD	US and Canada	(1) 4-20 mA Analog and (1) Selectable NPN/PNP	Q240RA-US-ILQ
			Europe, UK, Australia, New Zealand and Japan	Selectable NO or NC	Q240RA-EU-ILQ
			China		Q240RA-CN-ILQ

For more specifications see page 245.

<p> QD models: A model with a QD requires a mating cordset (see page 245).</p> <p>Cabled models: For cabled models, omit Q at the end of the QD model (example, Q240RA-US-AF2).</p> <p>† Range is dependent on target object.</p> <p>* Contact factory at 1-888-373-6767 for additional information.</p>
--

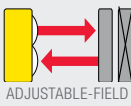
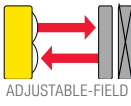
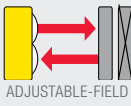
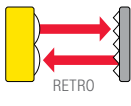
# QT50R Series

## Radar-Based Sensor



- Sensor's functions are unaffected by wind, rain, fog, light, humidity and temperature, making it ideal for outdoor environments
- Uses Frequency Modulated Continuous Wave (FMCW) to detect moving and stationary objects
- Easy setup and configuration of range, sensitivity and output with simple DIP switches
- Retroreflective models use a reference target, enabling reliable detection of weak targets in the foreground
- Adjustable-field models ignore objects beyond the set point

### QT50R Wide Beam (90° x 76°)

Sensing Mode	Max Range†	Connection	Telecom Approval*	Output	Model
 ADJUSTABLE-FIELD	24 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	Bipolar NPN/PNP  Selectable NO or NC	QT50R-US-AFHQ QT50R-EU-AFHQ QT50R-KR-AFHQ QT50R-TW-AFHQ
 ADJUSTABLE-FIELD	24 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	(2) Selectable NPN/PNP  Selectable NO or NC	QT50R-US-AF2Q QT50R-EU-AF2Q QT50R-KR-AF2Q QT50R-TW-AF2Q
 ADJUSTABLE-FIELD	3.75 m	5-pin M12 QD	Europe, UK, Australia, New Zealand, Japan and China South Korea	Bipolar NPN/PNP  Selectable NO or NC	QT50R-EU-AFSQ QT50R-KR-AFSQ
 RETRO	12 m	5-pin M12 QD	US, Canada and Brazil Europe, UK, Australia, New Zealand, Japan and China South Korea Taiwan	Bipolar NPN/PNP  Selectable NO or NC	QT50R-US-RHQ QT50R-EU-RHQ QT50R-KR-RHQ QT50R-TW-RHQ

 QD models: A model with a QD requires a mating cordset.

Cabled models: For cabled models, omit Q at the end of the QD model (example, QT50R-US-AF2W).

† Range is dependent on target object.

\* Contact factory at 1-888-373-6767 for additional information.



## 5-Pin

## Euro-Style

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, MQDEC2-506RA)

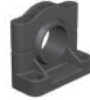
**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-55**  
5 m (15')  
**MQDEC2-530**  
9 m (30')



SMB30A



SMB30MM



SMB30SC



SMBQ240SS1



SMBQ240SS2



SMBQ240SS3

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 725

## Weather Deflectors



QT50RCK



SMBWSQ120



Q240WS

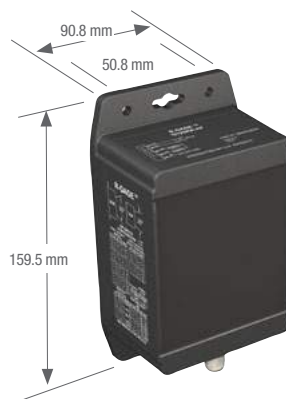
## Retro Wave Radar Target



BRTR-CC20E



R-GAGE® QT50R



R-GAGE® Q120RA



R-GAGE® Q240RA

## R-GAGE® Specifications

Range	The sensor is able to detect a proper object (see Detectable Objects) from 0 to 100 m, depending on model
Detectable Objects	Objects containing metal, water or similar high-dielectric material
Operating Principle	Frequency Modulated Continuous Wave (FMCW) radar
Operating Frequency	24.00-24.25 GHz, ISM Band (varies slightly by model and national telecom regulations)
Supply Voltage	12 to 30 V dc, less than 100 mA (exclusive of load) <b>KR models:</b> 12 to 24 V dc
Supply Protection Circuitry	Protected against reverse polarity and transient overvoltages
Delay at Power-up	Less than 2 seconds
Output Configuration	NPN and PNP, N.O. and N.C., 150 mA each
Output Protection	Protected against short circuit conditions
Indicators	<b>Power LED:</b> Green (Power ON) <b>Signal Strength LED:</b> Red, flashes in proportion to signal strength <b>Output LEDs:</b> Yellow (output energized)/Red (configuration) See data sheets for more detailed information
Response Time	DIP-switch configurable ON/OFF response time
Adjustments	DIP-Switch configurable sensing distance, sensitivity, response time, and output configuration. Remote line TEACH for retroreflective models.
Construction	<b>Housing:</b> ABS/polycarbonate <b>Lightpipes:</b> Acrylic <b>Access Cap:</b> Polyester
Operating Temperature	-40 to +65 °C
Environmental Rating	IP67

## Certifications






For more information regarding telecom approvals consult datasheet



## Arrays

Using an array of closely spaced light beams, measuring light screens are designed for profiling, inspections and process monitoring.

Series	Description	Minimum Object Detection Size	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>EZ-ARRAY™</b> Two piece measuring array page 248	5 mm	H (varies by model) 36 x 45.2 mm	IP65	Aluminum with clear anodized finish	12 to 30 V dc
	<b>MINI ARRAY®</b> For inspections and profiling with a long range page 252	19.1 mm	H (varies by model) 38.1 x 38.1 mm	IP65	Aluminum with black anodized finish	<b>Controller:</b> 16 to 30 V dc
	<b>High Res MINI ARRAY®</b> Excels at high-speed, precise monitoring and inspection applications page 256	2.5 mm	H (varies by model) 38.1 x 38.1 mm	IP65	Aluminum with black anodized finish	<b>Controller:</b> 16 to 30 V dc

## EZ-ARRAY™

## Two-Piece Measuring Light Screens



- Two-piece light-screen design eliminates the need for a separate controller
- 5 mm beam spacing provides edge resolution of 2.5 mm
- High excess gain option for detecting opaque objects in single and double edge scan mode
- Seven zone LEDs provide instant alignment and beam blockage information
- Remote TEACH capable
- Rugged aluminum housing

## EZ-ARRAY™, 12-30 V DC, 5 mm Beam Spacing

Housing Length (L)	Array Length	Total Beams	Range*	Analog Output	Emitter Model	Receiver Model NPN Outputs	Receiver Model PNP Outputs
227 mm	150 mm	30	0.4 to 4 m	Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E150Q	EA5R150NIXMODQ EA5R150NUXMODQ	EA5R150PIXMODQ EA5R150PUXMODQ
379 mm	300 mm	60		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E300Q	EA5R300NIXMODQ EA5R300NUXMODQ	EA5R300PIXMODQ EA5R300PUXMODQ
529 mm	450 mm	90		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E450Q	EA5R450NIXMODQ EA5R450NUXMODQ	EA5R450PIXMODQ EA5R450PUXMODQ
678 mm	600 mm	120		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E600Q	EA5R600NIXMODQ EA5R600NUXMODQ	EA5R600PIXMODQ EA5R600PUXMODQ
828 mm	750 mm	150		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E750Q	EA5R750NIXMODQ EA5R750NUXMODQ	EA5R750PIXMODQ EA5R750PUXMODQ
978 mm	900 mm	180		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E900Q	EA5R900NIXMODQ EA5R900NUXMODQ	EA5R900PIXMODQ EA5R900PUXMODQ
1128 mm	1050 mm**	210		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E1050Q	EA5R1050NIXMODQ EA5R1050NUXMODQ	EA5R1050PIXMODQ EA5R1050PUXMODQ
1278 mm	1200 mm**	240		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E1200Q	EA5R1200NIXMODQ EA5R1200NUXMODQ	EA5R1200PIXMODQ EA5R1200PUXMODQ
1578 mm	1500 mm**	300		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E1500Q	EA5R1500NIXMODQ EA5R1500NUXMODQ	EA5R1500PIXMODQ EA5R1500PUXMODQ
1878 mm	1800 mm**	360		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E1800Q	EA5R1800NIXMODQ EA5R1800NUXMODQ	EA5R1800PIXMODQ EA5R1800PUXMODQ
2178 mm	2100 mm**	420		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E2100Q	EA5R2100NIXMODQ EA5R2100NUXMODQ	EA5R2100PIXMODQ EA5R2100PUXMODQ
2478 mm	2400 mm**	480		Current (4 to 20 mA) Voltage (0 to 10 V)	EA5E2400Q	EA5R2400NIXMODQ EA5R2400NUXMODQ	EA5R2400PIXMODQ EA5R2400PUXMODQ

For more specifications see page 251.

 QD models: A model with a QD requires a mating cordset (see page 252).

\* Models with a range of 300 mm to 1500 mm models are available upon request. Contact factory at 1-888-373-6767 for more information.

\*\* Models with array lengths 1050 mm and longer ship with a center bracket and two end-cap brackets.



## EZ-ARRAY™ IO-Link, 0-10 V DC–5 mm Beam Spacing

Housing Length (L)	Array Length	Total Beams	Range*	Emitter Model	Receiver Model PNP Outputs
227 mm	150 mm	30	0.4 to 4 m	EA5E150Q	EA5R150XKQ
379 mm	300 mm	60		EA5E300Q	EA5R300XKQ
529 mm	450 mm	90		EA5E450Q	EA5R450XKQ
678 mm	600 mm	120		EA5E600Q	EA5R600XKQ
828 mm	750 mm	150		EA5E750Q	EA5R750XKQ
978 mm	900 mm	180		EA5E900Q	EA5R900XKQ
1128 mm	1050 mm**	210		EA5E1050Q	EA5R1050XKQ
1278 mm	1200 mm**	240		EA5E1200Q	EA5R1200XKQ
1578 mm	1500 mm**	300		EA5E1500Q	EA5R1500XKQ
1878 mm	1800 mm**	360		EA5E1800Q	EA5R1800XKQ
2178 mm	2100 mm**	420		EA5E2100Q	EA5R2100XKQ
2478 mm	2400 mm**	480		EA5E2400Q	EA5R2400XKQ

For more specifications see page 251.

 QD models: A model with a QD requires a mating cordset (see page 252).

\* Models with a range of 300 mm to 1500 mm models are available upon request. Contact factory at 1-888-373-6767 for more information.

\*\* Models with array lengths 1050 mm and longer ship with a center bracket and two end-cap brackets.

# MEASUREMENT

# LASER

# ULTRASONIC

# RADAR



**8-Pin**  
**MAQDC-815**  
 4 m (13')  
**MAQDC-830**  
 9 m (30')  
**MAQDC-850**  
 15 m (49')

**M12/Euro-Style**  
 Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MAQDC-815RA**)

Additional cordset information is available  
 See page 758



**5-Pin**  
**MQDMC-506**  
 2 m (13')  
**MQDMC-515**  
 4 m (13')  
**MQDMC-530**  
 9 m (30')

**Communication Cordsets**  
 Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDMC-506RA**)



**Double-Ended Euro-Style**  
 Male/female straight Euro QD connectors

8-Pin	
<b>DEE2R-81D</b> 0.31 m (1.0')	<b>DEE2R-825D</b> 7.62 m (25.0')
<b>DEE2R-83D</b> 0.91 m (3.0')	<b>DEE2R-850D</b> 15.3 m (50.0')
<b>DEE2R-88D</b> 2.44 m (8.0')	<b>DEE2R-875D</b> 22.9 m (75.0')
<b>DEE2R-815D</b> 4.57 m (15.0')	<b>DEE2R-8100D</b> 30.5 m (100.0')

For IO-Link splitters see datasheet

## Serial Adapters



**EZA-MBK-20**



**SMBLBCZB**

Additional bracket information is available  
 See page 725



**EZA-USB485-01**



**INTUSB485-1**

Additional adapter information is available  
 See page 819

## Stands



Additional information is available  
 See page 802

## Enclosures



Additional information is available  
 See page 808

## Lens Shields





Additional information is available  
 See page 812



### EZ-ARRAY Light Screen

W = 36.0 mm      D = 45.2 mm  
 L = Length (see model chart page 255)

## EZ-ARRAY™ Specification

Supply Voltage (Limit Values)	<b>Emitter:</b> 12 to 30 V dc <b>Receiver Analog Current Models:</b> 12 to 30 V dc <b>Receiver Analog Voltage Models:</b> 15 to 30 V dc <b>IO-Link receiver:</b> 18 to 30 V dc
Supply Power Requirements	<b>Emitter/Receiver Pair (Exclusive of discrete load):</b> Less than 9 watts <b>Power-up delay:</b> 2 seconds
Emitter/Receiver Range	400 mm to 4 m
Field of View	Nominally $\pm 3^\circ$
Beam Spacing	5 mm
Light Source	Infrared LED
Minimum Object Detection Size	<b>Straight Scan, Low-Contrast:</b> 5 mm <b>Straight Scan, High-Excess-Gain:</b> 10 mm
Sensor Positional Resolution	<b>Straight Scan:</b> 5 mm <b>Double-Edge Scan:</b> 2.5 mm <b>Single-Edge Scan:</b> 2.5 mm
Teach Input (Receiver Gray Wire)	<b>Low:</b> 0 to 2 volts <b>High:</b> 6 to 30 volts or open (input impedance 22 k $\Omega$ )
Two Discrete Outputs	Solid-State NPN or PNP (current sinking or sourcing) <b>Rating:</b> 100 mA max. each output <b>OFF-State Leakage Current:</b> <b>NPN:</b> less than 200 $\mu$ A @ 30 V dc <b>PNP:</b> less than 10 $\mu$ A @ 30 V dc <b>ON-State Saturation Voltage:</b> <b>NPN:</b> less than 1.6 V @ 100 mA <b>PNP:</b> less than 2.0 V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit.  <b>IO-Link Model:</b> Discrete Output 1 (SIO Mode) <b>Type:</b> Solid-State Push-Pull <b>Rating:</b> 100 mA maximum (sourcing or sinking) <b>ON-State Saturation Voltage:</b> less than 3V @100mA (sourcing or sinking)
Two Analog Outputs	<b>Voltage Sourcing:</b> 0 to 10 V (maximum current load of 5 mA) <b>Current Sourcing:</b> 4 to 20 mA (maximum resistance load = $(V_{supply}-3)/0.020$ )
Serial Communication Interface	EIA-485 Modbus RTU (up to 15 nodes per communication ring) RTU binary format <b>Baud Rate:</b> 9600, 19.2K or 38.4K <b>IO-Link Baud Rate:</b> 38,400 bps (COM2) 8 Data Bits, 1 Stop Bit, and Even, Odd, or 2 Stop Bits and No Parity <b>Process data width:</b> 16 bits
Scan Time	Scan times depend on scan mode and sensor length. Straight scan times range from 2.8 to 26.5 milliseconds.
Status Indicators	<b>Emitter:</b> Red Status LED ON Steady—Status Flashing at 1 hz—Error <b>IO-Link:</b> <b>Green:</b> IO-Link OK <b>Yellow flashing:</b> IO-Link Comm <b>Solid Red:</b> IO-Link error <b>Receiver:</b> 7 Zone Indicators Red—Blocked channels within zone    Green—All channels clear within zone 3-digit 7-segment indicators for measurement mode/diagnostic information Sensor Status Bicolor Indicator LED Red—Hardware Error or Marginal Alignment    Green—OK <b>Modbus Activity Indicator LED:</b> Yellow <b>Modbus Error Indicator LED:</b> Red
System Configuration (Receiver Interface)	<b>6-position DIP switch:</b> Used to set scanning type, measurement modes, analog slope and discrete output 2 function. Alternate software GUI interface provides additional options; see full manual. <b>Push Buttons:</b> Two momentary push buttons for alignment and gain level selection <b>IO-Link models:</b> Supplied IODD files provide all configuration options (see manual)
Connections	<b>Serial communication:</b> The receiver uses a PVC-jacketed, 5-conductor 22-gauge quick-disconnect cable, 5.4 mm diameter. QD cordsets are ordered separately. <b>Other Sensor connections:</b> 8-conductor quick-disconnect cordsets (one each for emitter and receiver), ordered separately (may not exceed 75 m long), PVC-jacketed cordsets measure 5.8 mm diameter, have shield wire; 22-gauge conductors.
Construction	Aluminum housing with clear-anodized finish; acrylic lens cover
Environmental Rating	IEC IP65
Operating Conditions	<b>Temperature:</b> -40 to +70 °C <b>Relative humidity:</b> 95% at 50 °C (non-condensing)
Certification	 

# MINI-ARRAY® Series

## Measuring Light Screens



The MINI-ARRAY® is a programmable measuring light screen for inspections and profiling with a long range up to 16.5 m.

- Offers programmable controller with a selection of measurement modes, scan modes and output configurations
- Available with 9.5 or 19 mm beam spacing for detecting objects as small as 12.7 mm
- Advanced software GUI
- Highly visible indicators for status monitoring

### MINI-ARRAY® 19.1 mm Beam Spacing

Max Range	Minimum Object Size	Total Beams	3-Piece Models*			2-Piece Models		
			Length (L)	Emitter	Receiver	Length (L)	Emitter	Receiver
16.5 m	Interlaced Mode: 25.4 mm  Other scan modes: 38.1 mm	8	201 mm	BMEL616A	BMRL616A	231 mm	MAE616Q	MAR616NX485Q
		16	356 mm	BMEL1216A	BMRL1216A	384 mm	MAE1216Q	MAR1216NX485Q
		24	505 mm	BMEL1816A	BMRL1816A	536 mm	MAE1816Q	MAR1816NX485Q
		32	659 mm	BMEL2416A	BMRL2416A	689 mm	MAE2416Q	MAR2416NX485Q
		40	810 mm	BMEL3016A	BMRL3016A	841 mm	MAE3016Q	MAR3016NX485Q
		48	963 mm	BMEL3616A	BMRL3616A	993 mm	MAE3616Q	MAR3616NX485Q
		56	1115 mm	BMEL4216A	BMRL4216A	1146 mm	MAE4216Q	MAR4216NX485Q
13.5 m	Interlaced Mode: 25.4 mm  Other scan modes: 38.1 mm	64	1267 mm	BMEL4816A	BMRL4816A	1298 mm	MAE4816Q	MAR4816NX485Q
		72	–	–	–	1451 mm	MAE5416Q	MAR5416NX485Q
		80	1572 mm	BMEL6016A	BMRL6016A	1514 mm	MAE6016Q	MAR6016NX485Q
		88	–	–	–	1667 mm	MAE6616Q	MAR6616NX485Q
		96	1877 mm	BMEL7216A	BMRL7216A	1819 mm	MAE7216Q	MAR7216NX485Q

For more specifications see page 255.

 QD models: A model with a QD requires a mating cordset (see page 254).

\* One controller and an emitter/receiver pair (of matching length and resolution) required per system.

## MINI-ARRAY® 9.5 mm Beam Spacing

Max Range	Minimum Object Size	Total Beams	Length (L)	3-Piece Models*		Length (L)	2-Piece Models	
				Emitter	Receiver		Emitter	Receiver
6.1 m	Interlaced Mode: 12.7 mm  Other scan modes: 19.1 mm	16	201 mm	BMEL632A	BMRL632A	231 mm	MAE632Q	MAR632NX485Q
		32	356 mm	BMEL1232A	BMRL1232A	384 mm	MAE1232Q	MAR1232NX485Q
		48	505 mm	BMEL1832A	BMRL1832A	536 mm	MAE1832Q	MAR1832NX485Q
		64	659 mm	BMEL2432A	BMRL2432A	689 mm	MAE2432Q	MAR2432NX485Q
		80	810 mm	BMEL3032A	BMRL3032A	841 mm	MAE3032Q	MAR3032NX485Q
		96	963 mm	BMEL3632A	BMRL3632A	993 mm	MAE3632Q	MAR3632NX485Q
		112	1115 mm	BMEL4232A	BMRL4232A	1146 mm	MAE4232Q	MAR4232NX485Q
		128	1267 mm	BMEL4832A	BMRL4832A	1298 mm	MAE4832Q	MAR4832NX485Q
4.6 m	Interlaced Mode: 12.7 mm  Other scan modes: 19.1 mm	144	–	–	–	1451 mm	MAE5432Q	MAR5432NX485Q
		160	1572 mm	BMEL6032A	BMRL6032A	1603 mm	MAE6032Q	MAR6032NX485Q
		176	–	–	–	1755 mm	MAE6632Q	MAR6632NX485Q
		192	1877 mm	BMEL7232A	BMRL7232A	1908 mm	MAE7232Q	MAR7232NX485Q

## MINI-ARRAY® Controllers\*, 16-30 V DC

Inputs	Solid-State Discrete Outputs	Analog Outputs	Serial Output	Controller Models
1 Sensor pair & Trigger (Gate)	1 Reed & 1 NPN	–	RS-232 & RS-485	MAC-1
	2 NPN	–		MACN-1
	2 PNP	–		MACP-1
	1 NPN	(2) 0-10 V Sourcing	RS-232	MACV-1
	1 NPN	(2) 4-20 mA Sinking		MACI-1
1 Sensor pair & Trigger (Gate)	16 NPN	–	RS-232	MAC16N-1
	16 PNP	–		MAC16P-1

For more specifications see page 255.

 QD models: A model with a QD requires a mating cordset (see page 254).

\* One controller and an emitter/receiver pair (of matching length and resolution) required per 3-piece system.

## Used with 2-Piece Arrays

## Used with 3-Piece Arrays

**Euro-Style with Shield**  
Straight connector models only



**8-Pin**  
**MAQDC-806**  
2 m (6')  
**MAQDC-8015**  
4.5 m (15')  
**MAQDC-830**  
9 m (30')  
**MAQDC-850**  
15 m (50')

**Communication Cordsets**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDMC-506RA**)



**5-Pin**  
**MQDMC-506**  
2 m (13')  
**MQDMC-515**  
4 m (13')  
**MQDMC-530**  
9 m (30')



DIN-35-..



MSMB-3

Additional bracket information is available  
See page 725

Additional cordset information is available  
See page 758

## Stands



Additional information is available  
See page 802

## Enclosures

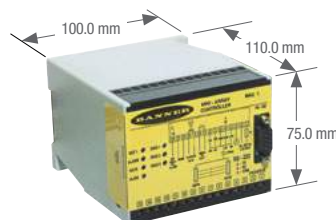


Additional information is available  
See page 808

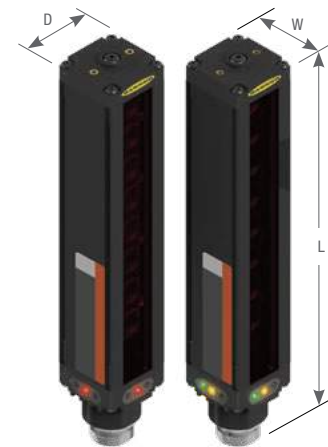
## Lens Shields



Additional information is available  
See page 812



MINI-ARRAY Controller




MINI-ARRAY Sensors

W = 38.1 mm      D = 38.1 mm  
L = Length (see model chart)


## MINI-ARRAY® 3-Piece Set, Emitter/Receiver Specifications

<b>Max Emitter/Receiver Range</b>	<b>9.5 mm beam spacing:</b> Length 201 to 1115 mm: 6.1 m Length 1267 to 1877 mm: 4.6 m	<b>19.1 mm beam spacing:</b> Length 201 to 1115 mm: 16.5 m Length 1267 to 1877 mm: 13.5 m
<b>Minimum Object Sensitivity</b>	<b>9.5 mm Beam Spacing:</b> Straight, Edge Modes: 19.1 mm Interlaced Mode: 12.7 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 12.7 mm*	<b>19.1 mm Beam Spacing:</b> Straight, Edge Modes: 38.1 mm Interlaced Mode: 25.4 mm* Skip Mode: Multiply the above by the number of skipped beams, plus 1 Interlaced Mode: 25.4 mm*
	*Assumes sensing is in the middle 1/3 of sensing range	
<b>Sensor Scan Time</b>	55 microseconds per beam, plus 1 millisecond post process time per scan	
<b>Power Requirements</b> †Maximum current is for a 6' sensor	<b>9.5 mm beam spacing:</b> 12 V dc ±2%, supplied by controller Emitter: 0.10 A @ 12 V dc Receiver: 0.75 A @ 12 V dc†	<b>19.1 mm beam spacing:</b> 12 V dc ±2%, supplied by controller Emitter: 0.10 A @ 12 V dc Receiver: 0.50 A @ 12 V dc†
<b>Status Indicators</b>	<b>Emitter:</b> Red LED lights to indicate proper emitter operation <b>Receiver:</b> Green indicates sensors aligned (> 3x excess gain) Amber indicates marginal alignment of one or more beams (1x -3x excess gain) Red indicates sensors misaligned or one or more beam(s) blocked	
<b>Construction</b>	Aluminum, with black anodized finish; acrylic lens cover	
<b>Environmental Rating</b>	NEMA 4, 13; IP65	
<b>Certification</b>		

## MINI-ARRAY® 3-Piece Set, Controller Specifications

<b>Power Requirements</b>	16 to 30 V dc @ 1.25 amps max. (see current requirements for sensors); controller alone, (without sensors connected) requires 0.1 amp.	
<b>Inputs</b>	<b>Sensor input (5 connections):</b> Emitter and receiver wire in parallel to five terminals <b>Trigger (Gate) input:</b> Optically isolated, requires 10 to 30 V dc (7.5K input impedance) for gate signal	
<b>Discrete Outputs</b>	<b>MACN-1:</b> (2) Open collector NPN transistor outputs <b>MAC16P-1:</b> Sixteen open collector PNP transistor outputs	<b>MAC16N-1:</b> Sixteen open collector NPN transistor outputs 30 V dc max., 150 mA max., short circuit protected <b>OFF-state leakage current:</b> less than 10 µA <b>ON-state saturation voltage:</b> less than 1 V @ 10 mA; less than 1.9 V @ 150 mA
<b>Serial Data Outputs</b>	RS-232, ASCII or binary data format <b>Baud Rate:</b> 9600, 19.2K, or 38.4K, 8 data bits, 1 start bit, 1 stop bit, even parity Clear data may be suppressed Header string may be suppressed in binary format	
<b>Analog Outputs</b>	<b>Resolution:</b> Span/(Number of sensor channels) Linearity: 0.1% of Full Scale	<b>Temperature variation:</b> 0.01% of Full Scale/ °C
<b>Controller Programming</b>	Via RS-232 PC-compatible computer running Windows XP, 2000, Vista, Windows 7 or Windows 8 and using Banner supplied software	
<b>Sensor Scan Time</b>	<b>All models:</b> 55 microseconds per beam plus processing time Processing time is dependent on the scan analysis and the number of active outputs. This timing assumes a straight scan, continuous, and TBB mode <b>MACN-1:</b> 1 millisecond processing time <b>MAC16N-1 &amp; MAC16P-1:</b> 2.3 to 7 milliseconds processing time	
<b>System Response Time</b>	Outputs are not active for 5 seconds after system power up. Maximum response time for the system is two sensor scan cycles. A scan cycle includes a sensor scan plus any serial data transmission. Serial transmission (if activated) follows every sensor scan.	
<b>Status Indicators</b>	The following status LEDs are located on the top surface of the module: <b>MACN-1:</b> OUT 1 (Red) - Indicates that output 1 is energized <b>MAC16N-1 &amp; MAC16P-1:</b> OUT (Red) - Indicates that at least one output is active ALARM (Red) - Indicates that Output 2 is active/MAC16N-1 & MAC16P-1: Indicates output 16 is active GATE (Red) - Indicates voltage is applied to Trigger (Gate) input ALIGN (Green) - Indicates sensor aligned (excess gain > 1x) DIAG1 (Green) - Indicates power is applied to the module DIAG2 (Red) - Indicates receiver failure DIAG3 (Red) - Indicates emitter failure	
<b>Construction</b>	Polycarbonate	
<b>Environmental Rating</b>	NEMA 1; IP20	
<b>Operating Conditions</b>	<b>Temperature:</b> -20 to +70 °C	<b>Relative humidity:</b> 95% (non-condensing)
<b>Certifications</b>		

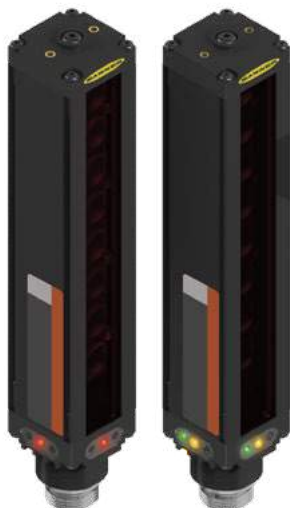
## MINI-ARRAY® 2-Piece Set, Emitter/Receiver Specifications

<b>Emitter/Receiver Range</b>	<b>9.5 mm beam spacing:</b> Array Length 231 to 1146 mm: 6.1 m Array Length 1298 to 1908 mm: 4.6 m	<b>19.1 mm beam spacing:</b> Array Length 231 to 1146 mm: 16.5 m Array Length 1298 to 1908 mm: 13.5 m
<b>Minimum Object Sensitivity</b>	<b>9.5 mm Beam Spacing:</b> <b>Straight, Edge Modes:</b> 19.1 mm <b>Interlaced Mode:</b> 12.7 mm* <b>Skip Mode:</b> Multiply the above by the number of skipped beams, plus 1 <b>Interlaced Mode:</b> 12.7 mm*	<b>19.1 mm Beam Spacing:</b> <b>Straight, Edge Modes:</b> 38.1 mm <b>Interlaced Mode:</b> 25.4 mm* <b>Skip Mode:</b> Multiply the above by the number of skipped beams, plus 1 <b>Interlaced Mode:</b> 25.4 mm*
	*Assumes sensing is in the middle 1/3 of sensing range	
<b>Sensor Scan Time</b>	0.9-27.1 ms depending on scan mode, array length and beam spacing	
<b>Supply Voltage and Power</b>	16 V dc to 30 V dc; maximum power 12 watts	
<b>Status Indicators</b>	<b>Emitter:</b> Red LED lights to indicate proper emitter operation <b>Receiver:</b> Green indicates sensors aligned (> 3x excess gain) Amber indicates marginal alignment of one or more beams (1x -3x excess gain) Red indicates sensors misaligned or one or more beam(s) blocked	
<b>Construction</b>	Aluminum, with black anodized finish; acrylic lens cover	
<b>Environmental Rating</b>	NEMA 4, 13; IP65	
<b>Certification</b>		



# High Resolution MINI-ARRAY®

## High-Resolution Measuring Light Screens



- Offers programmable controller with a selection of measurement modes scan modes and output configurations
- 120 sensing beams per foot provides reliable detection of objects as small as 2.5 mm
- Features a 1.8 m range and easy alignment
- Advanced software GUI
- Highly visible indicators for status monitoring

### High-Resolution MINI-ARRAY®, 2.5 mm Beam Spacing

Housing Length (L)	Array Length	Total Beams	Connection	Range	Minimum Object Size	Models*	
						Emitters	Receivers
236 mm	163 mm	64	5-pin Mini QD	0.4 to 1.8 m	2.5 mm	MAHE6A	MAHR6A
399 mm	325 mm	128				MAHE13A	MAHR13A
561 mm	488 mm	192				MAHE19A	MAHR19A
724 mm	650 mm	256				MAHE26A	MAHR26A
887 mm	813 mm	320				MAHE32A	MAHR32A
1049 mm	975 mm	384				MAHE38A	MAHR38A
1215 mm	1138 mm	448				MAHE45A	MAHR45A
1377 mm	1300 mm	512				MAHE51A	MAHR51A
1540 mm	1463 mm	576				MAHE58A	MAHR58A
1703 mm	1626 mm	640				MAHE64A	MAHR64A
1865 mm	1788 mm	704				MAHE70A	MAHR70A
2028 mm	1951 mm	768	MAHE77A	MAHR77A			

For more specifications see page 258.

 QD models: A model with a QD requires a mating cordset.

\* "E" and "R" in model numbers denotes "Emitter" and "Receiver" respectively. Sold separately.

## High-Resolution MINI-ARRAY® Controllers†, 16-30 V DC

Inputs	Solid-State Discrete Outputs	Analog Outputs	Serial Output	Controller Models
1 Sensor pair & Trigger (Gate)	2 PNP	(2) 0 to 10 V Sourcing	RS-232 & RS-485	MAHCVP-1
	2 NPN	(2) 0 to 10 V Sourcing		MAHCVN-1
	2 PNP	(2) 4 to 20 mA Sinking		MAHCIP-1
	2 NPN	(2) 4 to 20 mA Sinking		MAHCIN-1



† One controller and an emitter/receiver pair (of matching length) required per system.

**Mini-Style Cordsets**  
Straight connector models only



**5-Pin**  
**QDC-515C** 5 m (15')  
**QDC-525C** 8 m (25')  
**QDC-550C** 15 m (50')  
**MAQDC-575C** 23 m (75')  
**MAQDC-5100C** 30.5 m (100')  
**MAQDC-5150C** 45.5 m (150')

**DB9 Communication Cordset** | **9-Pin MASC** 2 m (13')



DIN-35-..

MSMB-3

Additional bracket information is available  
See page 725

Additional cordset information is available  
See page 758

Stands



Additional information is available  
See page 802

Enclosures

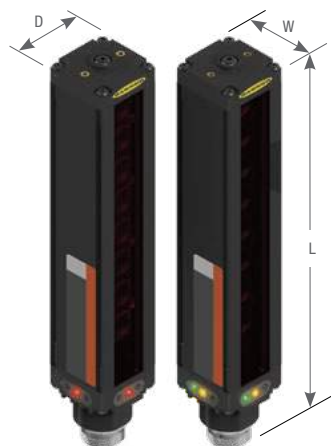


Additional information is available  
See page 808

Lens Shields



Additional information is available  
See page 812




MINI-ARRAY Sensors

W = 38.1 mm      D = 38.1 mm  
L = Length (see model chart page 256)




MINI-ARRAY Controller

## High-Resolution MINI-ARRAY® Emitter/Receiver Specifications

Emitter/Receiver Range	380 mm to 1.8 m
Minimum Object Sensitivity	2.5 mm
Sensor Scan Time	1.8 to 58.4 milliseconds, depending on scanning method and sensor length plus 1 millisecond post processing time for controller
Power Requirements	12 V dc $\pm$ 2%, supplied by controller
Connections	Sensors connect to controller using two 5-conductor quick-disconnect cordset (one each for emitter and receiver), ordered separately. Use only Banner cordset, which incorporate a "twisted pair" for noise immunity. Cordsets measure 8.1 mm in diameter and are shielded and PVC-jacketed. Conductors are 20 gauge (0.9 mm). Emitter and receiver cordset may not exceed 75 m long, each. See page 257.
Status Indicators	<b>Emitter:</b> Red LED lights to indicate proper emitter operation <b>Receiver:</b> Green indicates sensors aligned Yellow indicates marginal alignment of one or more beams Red indicates sensors misaligned or one or more beam(s) blocked
Construction	Aluminum, with black anodized finish; acrylic lens cover
Environmental Rating	NEMA 4, 13; IP65
Operating Conditions	<b>Temperature:</b> 0 to +50 °C <b>Relative humidity:</b> 95% at 50 °C (non-condensing)
Certifications	

## High-Resolution MINI-ARRAY® Controller Specifications



<b>Power Requirements</b>	16 to 30 V dc @ 1.0 A (typical: 0.5 A @ 16 V dc)
<b>Inputs</b>	<b>Sensor input:</b> Emitter and receiver wire in parallel to five terminals <b>Trigger (Gate) input:</b> Optically isolated, requires 10 to 30 V dc (7.5 kΩ impedance) for gate signal <b>Remote alignment input:</b> Optically isolated, requires 10 to 30 V dc (7.5 kΩ impedance) for alignment sequence signal
<b>Discrete (Switched) Outputs</b>	<b>NPN outputs:</b> Open collector NPN transistor rated at 30 V dc max., 150 mA max. <b>PNP outputs:</b> Open collector PNP transistor rated at 30 V dc max., 150 mA max. <b>All discrete outputs:</b> <b>OFF-state leakage current:</b> less than 10 μA @ 30 V dc <b>ON-state saturation voltage:</b> less than 1 V @ 10 mA; less than 1.5 V @ 150 mA
<b>Serial Data Outputs</b>	RS-232 or RS-485 interface. (Up to 15 control modules may be given unique addresses on one RS-485 party line.) ASCII or binary data format 9600, 19.2K or 38.4K baud rate 8 data bits 1 stop bit, and even, odd or no parity
<b>Analog Outputs</b>	<b>Voltage-sourcing outputs:</b> 0 to 10 V dc (25 mA current limit) <b>Current-sinking outputs:</b> 4 to 20 mA (16 to 30 V dc input) <b>Resolution:</b> Span / Number of sensing channels <b>Linearity:</b> 0.1% of full scale <b>Temperature variation:</b> 0.01% of full scale per °C
<b>Output Configuration</b>	<b>MAHCVP-1:</b> Two PNP discrete (switched), two 0-10 V voltage sourcing <b>MAHCVN-1:</b> Two NPN discrete (switched), two 0-10 V voltage sourcing <b>MAHCIP-1:</b> Two PNP discrete (switched), two 4-20 mA current sinking <b>MAHCIN-1:</b> Two NPN discrete (switched), two 4-20 mA current sinking
<b>System Programming</b>	Via RS-232 interface to PC-compatible computer running Windows® XP, Vista, Windows 7, Windows 8 and using software supplied with each control module
<b>Status Indicators</b>	<b>Output 1 (Red):</b> Lights to indicate Discrete Output #1 is active <b>Alarm (Red):</b> Lights to indicate Discrete Output #2 is active <b>Gate (Red):</b> Lights to indicate Trigger (Gate) is active <b>Align (Green):</b> Lights to indicate emitter and receiver are aligned <b>Diagnostics indicator:</b> (Key on controller side label) Identifies System errors and status
<b>Construction</b>	Polycarbonate housing; mounts to flat surface or directly onto 35 mm DIN rail
<b>Environmental Rating</b>	NEMA 1; IP20
<b>Operating Conditions</b>	<b>Temperature:</b> 0 to +50 °C <b>Relative humidity:</b> 95% @ 50 °C (non-condensing)
<b>Certifications</b>	



---

## Temperature & Vibration

Temperature sensors detect small differences between the temperature of an object and the surrounding ambient temperature. Vibration and temperature sensor measures RMS velocity, in inches per second or millimeters per second, and temperature.

Series	Description	Minimum Object Detection Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>M18T</b> Works on moving or still products by detecting infrared energy that objects emit. page 262	1 m	18 mm ø x (varies by model)	IP67 NEMA 6	Stainless Steel	12 to 30 V dc
	<b>M12F</b> Designed to work as a Modbus slave device via RS-485 or with Sure Cross® Wireless products page 264	264	12 mm ø x (varies by model)	IP67 NEMA 6	Metal	12 to 24 V dc 3.6 to 5.5 V dc
	<b>QM42VT</b> Provides high accuracy vibration (velocity RMS) and temperature measurements page 266		42 x 13 x 42 mm	IP67 NEMA 6	Zinc alloy	3.6 to 5.5 V dc

# M18T Series

## Non-Contact Temperature Sensors



- Senses temperature differences as small as 3 °C, on moving or still products
- Senses from 0 to 300 °C
- Allows threshold adjustment and real-time information display through a PC
- Requires no emitter or controller
- Uses remote or push-button programming

### M18T

Sensing Face	D:S Ratio*	Output	Connection	Models
Integrated lens	8:1	0 to 10 V dc analog, plus PNP Alarm	2 m	M18TUP8
			5-pin Euro QD	M18TUP8Q
Enclosed Plastic face (for food industry use)	6:1	0 to 10 V dc analog, plus PNP Alarm	2 m	M18TUP6E
			5-pin Euro QD	M18TUP6EQ
Germanium lens	14:1	0 to 10 V dc analog, plus PNP Alarm	2 m	M18TUP14
			5-pin Euro QD	M18TUP14Q
Integrated lens	8:1	4 to 20 mA analog, plus PNP Alarm	2 m	M18TIP8
			5-pin Euro QD	M18TIP8Q
Enclosed Plastic face (for food industry use)	6:1	4 to 20 mA analog, plus PNP Alarm	2 m	M18TIP6E
			5-pin Euro QD	M18TIP6EQ
Germanium lens	14:1	4 to 20 mA analog, plus PNP Alarm	2 m	M18TIP14
			5-pin Euro QD	M18TIP14Q

 Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18TUP8 W/30).

\* For a sensor with an 8:1 D:S ratio, the sensor's spot size is a 1" diameter circle at a distance of 8"



**M12/Euro-Style with Shield**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDEC2-506RA**)

**5-Pin****MQDEC2-506**

2 m (6.5')

**MQDEC2-515**

5 m (15')

**MQDEC2-530**

9 m (30')

**SMB18A****SMB18SF****SMB18UR**

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 723



**APC-18**  
Air Purge Collar  
(sensor not included)



**LAT1812**  
Laser Alignment Tool



**Cabled Models (L)**  
M18T..Q8 81.3 mm  
M18T..6EQ 81.7 mm  
M18T..14Q 86.5 mm



**QD Models (L)**  
M18T..Q8 91.3 mm  
M18T..6EQ 91.8 mm  
M18T..14Q 96.6 mm

**M18T Specifications**

<b>Supply Voltage and Current</b>	12 to 30 V dc
<b>Wavelength</b>	8 to 14 $\mu$ m
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Response Time</b>	75 ms (for a 95% step change)
<b>Delay at Power-up</b>	1.5 second
<b>Repeatability</b>	$\pm$ 1% of measurement, or $\pm$ 1 $^{\circ}$ C, whichever is greater
<b>Construction</b>	<b>Threaded Barrel:</b> Stainless steel <b>Housing:</b> ABS/PC
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Sensing Field of View</b>	See datasheet
<b>Performance Curves</b>	See datasheet
<b>Operating Conditions</b>	<b>Temperature:</b> -20 to +70 $^{\circ}$ C
<b>Certifications</b>	<b>CE</b>

# M12F Series

## Temperature and Humidity Sensors



- Manufactured with a robust metal housing
- Designed to work as a Modbus slave device via RS-485 or with Sure Cross® 1-wire serial interface -P6 nodes, -H6 MultiHop Radios, or Q45 Sensor Node DX80N2Q45TH
- Ships with aluminum grill filter cap; optional stainless steel 10 micrometer sintered filter available separately

### M12FTH Temperature and Humidity

I/O	Power	Connection	Models
RS-485 Modbus	3.6 to 5.5 V dc low power option or 12 to 24 V dc	5-pin Euro QD	M12FTH3Q
1-wire serial interface	3.6 to 5.5 V dc		M12FTH4Q

### M12FT Temperature

I/O	Power	Connection	Models
RS-485 Modbus	3.6 to 5.5 V dc low power option or 12 to 24 V dc	5-pin Euro QD	M12FT3Q
1-wire serial interface	3.6 to 5.5 V dc		M12FT4Q



**Double Ended  
M12/Euro-Style  
with Shield**  
Straight connector  
models only straight  
male to straight female

**5-Pin**

**DEE2R-51D**  
0.3 m (1')  
**DEE2R-53D**  
1 m (3')  
**DEE2R-58D**  
2.5 m (8')

*Additional cordset information is available  
See page 758*


**Filter Caps**

**FTH-FIL-001**  
Aluminum Grill Filter Cap



**FTH-FIL-002**  
Stainless Steel Filter Cap

**M12F Specifications**

<b>Supply Voltage and Current</b>	3.6 to 5.5 V dc low power option or 12 to 24 V dc
<b>Resolution</b>	<b>Humidity:</b> 0.1% relative humidity <b>Temperature:</b> 0.1 °C
<b>Construction</b>	<b>Housing:</b> metal
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Operating Conditions</b>	<b>Temperature:</b> -40 °C to +85 °C
<b>Certifications</b>	 c Us CSA: Class I, Division 2, Groups A, B, C, D — Certificate 1921239

# QM42VT Series

## Vibration and Humidity Sensors



- Provides high accuracy vibration (velocity RMS) and temperature measurements
- Manufactured with a robust zinc alloy housing
- Connects via a 1-wire serial interface
- Reduces labor costs by obviating manual checks and eliminating error

### QM42VT

I/O	Power	Connection	Models
1-Wire Serial	3.6 to 5.5 V dc	3 m	QM42VT1
RS-485 Modbus	3.6 to 5.5 V dc low power option or 10 to 24 V dc	3 m	QM42VT2



**Double Ended M12/Euro-Style with Shield**  
Straight connector models only straight male to straight female

**5-Pin**  
**DEE2R-51D**  
0.3 m (1')  
**DEE2R-53D**  
1 m (3')  
**DEE2R-58D**  
2.5 m (8')

Additional cordset information is available  
See page 758



RS-485 to  
USB Adaptor

BWA-HW-006



RS-485 to  
USB Adaptor

BWA-USB1WIRE-001



BWA-BK-002



BWA-BK-001



## QM42VT Specifications

Supply Voltage and Current	3.6 to 5.5 V dc or 10 to 24 V dc
Vibration	<b>Mounted base resonance:</b> 5.5 kHz nominal <b>Measuring range:</b> 0-46 mm/sec or 0-1.8 in/sec RMS <b>Frequency Range:</b> 10 – 1000 Hz <b>Accuracy:</b> ± 10% @25 °C
Temperature	<b>Measuring range:</b> -40 to +105 °C (-40 to +221 °F) <b>Resolution:</b> 0.1 °C Accuracy: ±3 °C
Construction	<b>Housing:</b> Zinc alloy
Shock	400G
Environmental Rating	IEC IP67; NEMA 6
Operating Conditions	<b>Temperature:</b> -40 to +105 °C
Certifications	<b>CE</b>



## Special Purpose

Special purpose sensors provide a variety of choices for challenging environments and applications where standard sensors don't make the cut. From hazardous areas and heavy duty washdown environments to sensing specific colors and temperatures for maximum accuracy, special purpose sensors meet specific application needs.

# SPECIAL PURPOSE

---

BARCODE READERS **page 270**

REGISTRATION, COLOR &  
LUMINESCENCE **page 282**

STAINLESS STEEL **page 296**

CLEAR OBJECT **page 312**

TEMPERATURE **page 324**

HAZARDOUS AREA **page 328**





## Barcode Readers

Able to decode over a dozen commonly used 1D and 2D barcode symbols, provides fast read rates, wide depth of field, and high resolution.

Series	Description	Max Sensing Range	Dimensions (H x W x D)	Housing Material	Power Supply
	<p><b>iVu BCR</b> Easy to set up, powerful, affordable inspection solution solves a wide variety of simple and complex applications. page 272</p>	Varies by selected lens	95.3 x 81.2 x 53.2 mm	Black PBT	10-30 V dc
	<p><b>P4 BCR</b> Find and decode 2D and 1D linear bar codes. page 278</p>	Varies by selected lens	124.5 x 66.8 x 34.3 mm	Black anodized aluminum	10-30 V dc
	<p><b>Laser Barcode Scanner</b> Can detect over a dozen of the most commonly used linear barcode symbols with a fast reading rate. page 280</p>	600 mm	68 x 83.4 x 32.8 mm	Black anodized aluminum	10-30 V dc

# iVu BCR and iVu Plus BCR

## Bar Code Reader (BCR)



- Powerful, affordable inspection solution solves a wide variety of simple and complex applications
- Solve a variety of linear and 2D bar code applications
- First-time users can have it up and running in minutes
- Optional remote touch screen for programming
- Ability to change parameters on the fly
- iVu BCR Plus models have Ethernet communication available and is capable of storing and controlling up to 30 inspections for fast product change over

### iVu BCR Applications

#### Bar Code Type



Reading a 1D barcode

#### Screen Interface Pass



#### Screen Interface Fail



Reading a 2D barcode



- No PC required to configure, change or monitor
- Built-in or remote touch screen
- Self-contained sensor with easy configuration and convenient monitoring right on the sensor



Installation and configuration in four easy steps

1. Install and connect the sensor
2. Select the sensor or bar code type, depending on model
3. Acquire a good image
4. Set inspection parameters

1  
2  
3  
4

Intuitive operation with menu driven tools to guide you through setup

- Define region of interest
- Adjust intensity/contrast
- Define the pass criteria



Conducts high-performance reading of industry standard barcodes.

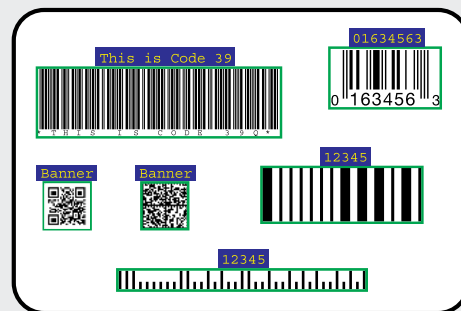
Reads up to ten 1D and 2D bar codes at one time.

#### 2D Bar Codes

Data Matrix (ECC200)  
QR & Micro QR

#### 1D Bar Codes

Code 128	EAN-13 (UPC-A)	Postnet
Code 39	EAN-8	Pharmacode
Codabar	UPC-E	
Interleaved 2 of 5	IMB	



## iVu BCR (Barcode Reader)

Example Model Number: IVU2PRBR04

Family	Touch Screen	Ring Light Color	Lens (mm)
<b>IVU2P</b>	<b>RB</b>	<b>R</b>	<b>04</b>
<b>IVU2</b> = Reads 1D and 2D <b>IVU2P</b> = Reads 1D and 2D with Ethernet and storage for 30 inspections	<b>TB</b> = Integrated <b>RB</b> = Remote	<b>R</b> = Red <b>B</b> = Blue <b>G</b> = Green <b>W</b> = White <b>I</b> = Infrared <b>6</b> = UV365 <b>9</b> = UV395 <b>XC</b> = C-mount* <b>X</b> = No Ring Light	<b>04</b> = 4.3 <b>06</b> = 6 <b>08</b> = 8 <b>12</b> = 12 <b>16</b> = 16 <b>25</b> = 25 <b>Blank</b> = No lens (only C-Mount)

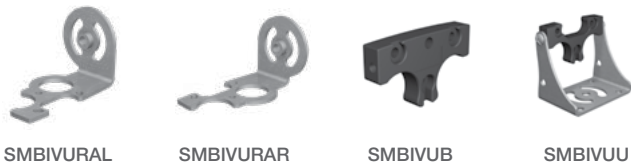
\* Requires C-mount lens. For C-Mount lenses see page 362

Power	12-Pin	USB	8-Pin Euro**	4-Pin Pico
<b>M12/Euro-Style with Shield</b> Straight connector models listed; for right-angle, add <b>RA</b> to the end of the model number (example, <b>MQDC2S-1206RA</b> )	<b>MQDC2S-1206</b> 2 m (6.5') <b>MQDC2S-1215</b> 5 m (15') <b>MQDC2S-1230</b> 9 m (30') <b>MQDC2S-1250</b> 15 m (50')	Straight connector models listed	<b>MQDEC-8005-USB</b> 0.15 m (0.5') <b>MQDEC-801-USB</b> 0.3 m (1') <b>MQDEC-803-USB</b> 0.9 m (3') <b>MQDEC-810-USB</b> 3 m (10')	<b>PSG-4M-4005-USB</b> 0.15 m (0.5') <b>PSG-4M-401-USB</b> 0.3 m (1') <b>PSG-4M-403-USB</b> 0.9 m (3') <b>PSG-4M-410-USB</b> 3 m (10')
<b>Ethernet</b> <b>RJ45 to 4-Pin Pico QD</b>	<b>IVUC-E-406</b> 2 m (6.5') <b>IVUC-E-415</b> 5 m (15') <b>IVUC-E-430</b> 9 m (30')	<b>IVUC-E-450</b> 12 m (50') <b>IVUC-E-475</b> 23 m (75')	Used with: BCR with Integrated Touch Screen	Used with: BCR with Remote Touch Screen and BCR Plus with Remote or Integrated Touch Screen

\*\* For right-angle, add **RA** to the middle of the model number (example, **MQDEC-8005RA-USB**)

Used with: BCR Plus only

Additional cordset information is available. See page 758



SMBIVURAL    SMBIVURAR    SMBIVUB    SMBIVUU

Used with: iVu BCR and iVu Plus BCR

Additional bracket information is available. See page 726

For more specifications see page 277.

Display and cordsets ordered separately.  
 Remote display is required for set up and viewing of sensors with a remote touch screen.

## Remote Display Touch Screen

Description	Model
3.5" diagonal remote touch screen — Machine-mountable	RDM35
3.5" diagonal remote touch screen — Handheld	RD35

## RDM35 Accessory Kits

Description	Straight	Right-Angle
1 m cordset, bracket/docking station, stylus and hardware	IVURDM-QDK-803	IVURDM-QDK-803RA
2 m cordset, bracket/docking station, stylus and hardware	IVURDM-QDK-806	IVURDM-QDK-806RA
5 m cordset, bracket/docking station, stylus and hardware	IVURDM-QDK-815	IVURDM-QDK-815RA
9 m cordset, bracket/docking station, stylus and hardware	IVURDM-QDK-830	IVURDM-QDK-830RA
16 m cordset, bracket/docking station, stylus and hardware	IVURDM-QDK-850	IVURDM-QDK-850RA



**RDM35**  
Machine-mountable Remote Display  
Used for- programming & monitoring

## RD35 Accessory Kits

Description	Straight	Right-Angle
1 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-803	IVURD-MXK-803RA
2 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-806	IVURD-MXK-806RA
5 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-815	IVURD-MXK-815RA
9 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-830	IVURD-MXK-830RA
16 m cordset, bracket/docking station, stylus and hardware	IVURD-MXK-850	IVURD-MXK-850RA



**RD35**  
Handheld Remote Display  
Used for- programming

## Cordsets for Remote Display

Hand Held Remote Display (RD35)		Machine Mountable Remote Display (RDM35)	
8-Pin		8-Pin	
<b>Double Ended M12/Euro-Style</b> Straight connector models listed; for right-angle, add <b>RA</b> to the end of the model number (example, <b>IVURD-QD-803RA</b> )	IVURD-QD-803 1 m (3')	<b>Euro-Style to Molex</b> Straight connector models listed; for right-angle, add <b>RA</b> to the end of the model number (example, <b>IVURD-MX-803RA</b> )	IVURD-MX-803 1 m (3')
	IVURD-QD-806 2 m (6')		IVURD-MX-806 2 m (6')
	IVURD-QD-815 5 m (15')		IVURD-MX-815 5 m (15')
	IVURD-QD-830 9 m (30')		IVURD-MX-830 9 m (30')
	IVURD-QD-850 16 m (50')		IVURD-MX-850 16 m (50')

Additional cordset information is available  
See page 773

## Brackets for Remote Display



SMBRD35



SMBKS



SMBRDM35

**Lenses**



Lens	Model
4.3 mm	LMF04
6 mm	LMF06
8 mm	LMF08
12 mm	LMF12
16 mm	LMF16
25 mm	LMF25*

Used with: iVu and iVu Plus

\* 25 mm filter holder is purchased separately

**Filter Kits†**



Used with: iVu and iVu Plus

\* Blue band-pass filters are preinstalled on ultraviolet ringlight models  
 \*\* Infrared band-pass filters are preinstalled on infrared ring light models  
 † Filter kits include 1 color and two sizes of filter holders

**Filter Model**

Red	FLTMR2
Blue	FLTMB*
Green	FLTMG
Infrared	FLTMI**

**Replacement Windows**

Focusing ring with optically clear glass  
 Focusing ring with plastic window  
 Replacement cover for touch screen

**Model**

IVUW-G
IVUW
IVUBC

Used with: iVu and iVu Plus

**Sensor Interface Module**



**IVUSIM**  
 For simplified wiring of iVu sensors in an electrical box

**2 GB USB Drive**



IVU-USBFD2

**Stylus**



**Model**

STYLUS-1 (Qty 1)
STYLUS-10 (Qty 10)

**C-Mount Lens Covers**



Description	Model
Lens cover 50 mm — plastic window	IVUSLC50-P
Lens cover 75 mm — plastic window	IVUSLC75-P



Additional C-mount Lens information is available  
 See page 362

**Accessories for C-Mount Lenses\***

Description	Format Size	Model	Used With
Extension Kit (0.5, 1.0, 5.0, 10, 20 and 40 mm)	—	LEK	All Lenses
Extension Kit (0.25 and 0.5 mm)		LEKS	
Lens Extender (increases focal length 2X)		LCF2X	
UV Lens Filter, Clear Glass	2/3"	FLTUV	Tamron Megapixel Lenses



**Bandpass Filters**

Example Model Number: FLTB470-27

Description	Model	Diameter
Blue	FLTB470-	25.5
Green	FLTG525-	
Infrared	FLTI850-	27
Red	FLTR635-	30.5
Dark Red	FLTR660-	34
Polarizing Filter	FLTPR032-	43

**C-Mount Color Filters\***



Color	Description	Plastic Models	Glass Models
Infrared	High-pass filter blocks visible light and passes infrared light. Included with all Banner Infrared light sources.	FLTI (> 760 nm)	FLTI850 (810-990 nm)
Blue	Band-pass filter improves quality by helping to reduce ambient light; it passes blue and infrared light.	FLTB (400-525 nm)	FLTB470 (435-490 nm)
Green	Band-pass filter improves quality by helping to reduce ambient light; it passes green and infrared light.	FLTG (400-575 nm)	FLTG525 (495-565 nm)
Red	High-pass filter improves quality by helping to reduce ambient light; it passes red and infrared light.	FLTR (> 600 nm)	FLTR635 (600-660 nm)
Dark Red	High-pass filter improves quality by helping to reduce ambient light; it passes red and infrared light.	—	FLTR660 (650-680 nm)

\* For C-Mount lenses see page 362

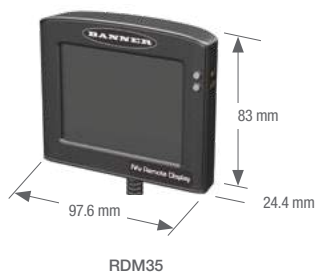
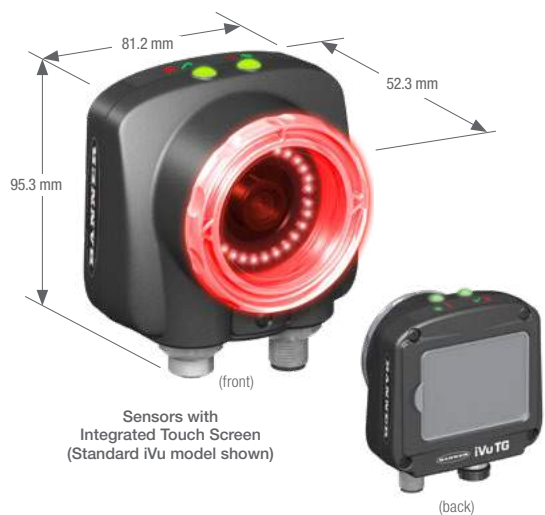


# SPECIAL PURPOSE

# BARCODE READERS



# REGISTRATION, COLOR & LUMINESCENCE

# STAINLESS STEEL





## iVu BCR &amp; iVu Plus BCR Specifications

General	
Supply Voltage	10-30 V dc
Demo Mode	Full tool functionality on canned images
Sensor Lock	Optional password protection
Integrated Ring Light	Red, IR, Green, Blue, White, UV or no integrated ring light
Imager	1/3 inch CMOS 752 x 480 pixels; adjustable Field-of-View (FOV)
Lens Mount	M12 X 1 mm thread (c-mount lens); microvideo lens 4.3, 6, 8, 12, 16, 25 mm
Output Rating	150 mA
Exposure Time	0.1 milliseconds to 1.049 seconds
Construction	Black PBT sensor housing; acrylic window <b>iVu Plus Integrated:</b> Die cast zinc and Black PBT
External Strobe Output	+ 5 V dc
Environmental Rating	IP67
Model Specific	
Power Connection	<b>iVu BCR</b> (integrated and remote touch screen): 12-pin Euro-style (M12) male connector <b>iVu Plus BCR</b> (integrated and remote touch screen): 12-pin Euro-style (M12) male connector Accessory cordset required for operation; QD cordsets are ordered separately.
Supply Current	<b>iVu BCR:</b> 800 mA max. (exclusive of I/O load) <b>iVu Plus BCR:</b> 850 mA max. (exclusive of I/O load)
USB 2.0 Host	<b>iVu BCR</b> (integrated touch screen): 8-pin Euro-style (M12) female connector <b>iVu BCR</b> (remote touch screen): 4-pin Pico-style (M8) female connector <b>iVu Plus BCR</b> (integrated and remote touch screen): 4-pin Pico-style (M8) female connector Optional USB cordset required for operation of USB Thumb Drive. QD cordsets are ordered separately. See page 274.
Ethernet Connection	<b>iVu Plus BCR:</b> 4-pin Pico-style (M8) male connector. Ethernet cordsets are ordered separately. See page 274
Output Configuration	NPN or PNP, software selectable
Display	<b>Integrated touch screen:</b> 68.5 mm (2.7") LCD Color Integrated Display 320 x 240 pixels <b>Remote touch screen:</b> See RD35 Remote Display specifications
Acquisition	<b>iVu BCR</b> (integrated touch screen): 50 fps (frames per second) max. <b>iVu Plus BCR</b> (integrated and remote touch screen): 100 fps (frames per second) max. <b>iVu BCR</b> (remote touch screen): 50 fps (frames per second) max.
Operating conditions	<b>Stable Ambient Temperature:</b> <b>BCR:</b> 0 to + 50 °C <b>iVu Plus BCR</b> (integrated touch screen): 0 to +45 °C <b>iVu Plus BCR</b> (remote touch screen): 0 to +40 °C
Remote Display connection (Remote Touch Screen Models Only)	8-pin Euro-style (M12) female connector Accessory cordset required for remote display; QD cordsets are ordered separately.
Certifications	 <b>NOTE:</b> iVu Plus remote must use Euro QD power cordset for CE compliance. 

## iVu Remote Display Specifications

Screen Size	3.5" diagonal
LCD Aspect Ratio	4:3
Display Resolution	320 x 240 RGB
Viewing Angle	60 degrees left, and 60 degrees right, 50 degrees up, and 55 degrees down
Housing Material	Zinc Zamac #3
Bracket Material	Delrin
Stylus	Delrin
Display Weight	4.8 oz
Bracket & Stylus Weight	1.1 oz
Connection	Molex HandyLink connector
Operating Temperature	0 to + 50 °C

# P4 BCR

## Bar Code Reader



- P4 Bar Code Readers find and decode 2D and 1D linear bar codes.
- Industry-standard bar code metrics and grading
- Economical one-piece solution
- High performance vision inspections in self-contained in-line or right-angle housing styles that fit in the palm of your hand

Conducts high-performance reading of industry standard barcodes.

#### 2D Bar Codes

Data Matrix (ECC200)  
QR & Micro QR

#### 1D Bar Codes

Code 128  
Code 39  
Codabar  
Interleaved 2 of 5

EAN-13 (UPC-A)  
EAN-8  
UPC-E  
IMB

Postnet  
Pharmacode

### Choosing a P4 BCR

Example Model Number P4BCR



Right-Angle Sensor Models  
(shown with lens—sold separately)




In-line Sensor Models  
(shown with lens—sold separately)

\* To add the OCR/OCV premium tool add suffix -OC to the model number. (example P4BCR-OC)

Power and I/O Cable	12-Pin	Video (BNC to BNC)	Ethernet	Shielded	Shielded Crossover	
Hirose with 12 flying leads	<b>P4C06</b> 2 m (6.5') <b>P4C23</b> 7 m (23') <b>P4C32</b> 10 m (32')	<b>P4C50</b> 15 m (49') <b>P4C75</b> 23 m (75') <b>P4C110</b> 34 m (111')	Coaxial with male BNC both ends	<b>BNC06</b> 2 m (6.5') <b>BNC15</b> 5 m (15') <b>BNC30</b> 9 m (30') <b>BNC48</b> 15 m (49')	Straight RJ45 to RJ45 Cable length: 2 m  <b>STP07</b> 2 m (6.5') <b>STP25</b> 7 m (25') <b>STP50</b> 9 m (30') <b>STP75</b> 22 m (30')	<b>STPX07</b> 2 m (6.5') <b>STPX25</b> 7 m (25') <b>STPX50</b> 9 m (30') <b>STPX75</b> 22 m (30')

Additional cordset information is available  
See page 758

### PresencePLUS® P4 Dedicated-Function Specifications

Supply Voltage and Current	10 to 30 V dc (24 V dc $\pm 10\%$ if the sensor powers a light source) <b>P4BCR:</b> Less than 650 mA (exclusive of lights and I/O load) <b>P4BCR 1.3:</b> Less than 550 mA (exclusive of lights and I/O load)	
Memory (Storage)	<b>BCR—8 MB Inspection (jobs):</b> 999 max.	<b>BCR 1.3—32 MB Inspection (jobs):</b> 999 max.
Input/Output Configuration	NPN (sinking) or PNP (sourcing) software selectable	
Output Rating	150 mA max. each output <b>OFF-state leakage current:</b> less than 100 $\mu$ A <b>ON-state saturation voltage:</b> NPN—less than 1 V @ 150 mA max. PNP—greater than V+ -2 V	
Bicolor Status Indicators	<b>PASS/FAIL:</b> Green ON steady—PASS Red ON steady—FAIL <b>POWER/ERROR:</b> Green ON steady—POWER Red ON steady—ERROR <b>READY/TRIGGER:</b> Green ON steady—READY Yellow ON steady—TRIGGER	
Display Options	PC or NTSC video (uses 9 m max. BNC cordset)	
Discrete I/O	1 Trigger IN 1 Strobe OUT 4 Programmable I/O 1 Product Change IN 1 Remote TEACH IN	
Communications	RJ-45 10/100 Ethernet connection for running PresencePLUS P4 software and/or output inspection results RS-232 connection for output of inspection results	
Imager Resolution	<b>BCR:</b> 640 x 480 pixels	<b>BCR 1.3:</b> 1280 x 1024 pixels
Pixel Size	<b>BCR:</b> 7.4 x 7.4 $\mu$ m	<b>BCR 1.3:</b> 6.7 x 6.7 $\mu$ m
Imager Size	<b>BCR:</b> 4.8 x 3.6 mm, 6 mm diagonal (1/3 inch CCD)	<b>BCR 1.3:</b> 8.6 x 6.9 mm, 11 mm diagonal (2/3 inch CMOS)
Levels of Gray	256 Gray Scale	
Exposure Time	<b>BCR:</b> 0.1 to 2830 milliseconds	<b>BCR 1.3:</b> 0.1 to 1670 milliseconds
Full Image Acquisition	<b>BCR:</b> 48 frames per second max.*	<b>BCR 1.3:</b> 27 frames per second max.*
Lens Mount	Standard C-mount (1 inch—32 UN)	
Construction	Black anodized aluminum housing, glass lens	
Weight	<b>In-line:</b> 293 g	<b>Right-angle:</b> 385 g
Environmental Rating	IEC IP20; NEMA 1	
Operating Temperature	<b>Stable ambient temperature:</b> 0 to +50 °C <b>Stable ambient lighting:</b> No large, quick changes in light level; no direct or reflected sunlight <b>Relative humidity:</b> 90% (non-condensing)	
Certifications		

\* A reduced Field-of-View (FOV) dramatically increases acquisition rates.

# Barcode Scanner

## Laser Barcode Scanner



- The TCNM can detect over a dozen of the most commonly used linear barcode symbols with a fast reading rate
- Advanced algorithm and multiple scans can reconstruct damaged codes
- Has a barcode reading range of up to 600 mm
- Rugged, IP65-rated industrial housing
- SMART TEACH push button programming



**Correct Label Verification**  
Lot control and traceability for a pharmaceutical manufacturer

### Barcode Scanner, 10-30 V DC

Visible Red Laser

Sensing Mode	Range	Resolution	Laser Output	Models
Class 2 laser	40-300 mm	Standard resolution: 8-20 mils	Single line scan	TCNM-AD-1200
	50-310 mm	High performance: 6-20 mils		TCNM-AD-1204
	30-90 mm	High resolution: 6-12 mils		TCNM-AD-2200
	45-100 mm	High resolution, High performance 5-8 mils		TCNM-AD-2204
Class 2 laser	40-300 mm	Standard resolution: 8-20 mils	Ten line raster scan	TCNM-AD-1210
	50-310 mm	High performance: 6-20 mils		TCNM-AD-1214
	30-90 mm	High resolution: 6-12 mils		TCNM-AD-2210
	45-100 mm	High resolution, High performance 5-8 mils		TCNM-AD-2214
Class 2 laser	75-340 mm	Short range: 8-14 mils	Single line scan	TCNM-EX-0200
	100-440 mm	Medium range: 10-20 mils		TCNM-EX-1200
	190-600 mm	Long range: 14-20 mils		TCNM-EX-2200
Class 2 laser	75-340 mm	Short range: 8-14 mils	Ten line raster scan	TCNM-EX-0210
	100-440 mm	Medium range: 10-20 mils		TCNM-EX-1210
	190-600 mm	Long range: 14-20 mils		TCNM-EX-2210

#### Conducts high-performance reading of industry standard barcodes.

Code 128	Postnet
Code 39	Pharmacode
Codabar	GS1 DataBar
Interleaved 2 of 5	GS1 DataBar Expanded
EAN-13 (UPC-A)	GS1 DataBar Limited
EAN-8	
UPC-E	
IMB	

## Accessories



**TCNM-AD-CAB**  
Serial interface adapter (RS232 or RS-485) going from TCNM-ACBB1 to PC (DB9)



**TCNM-ACBB1**  
Connection box



## Barcode Scanner Specifications

Supply Voltage and Current	10 to 30 V dc Maximum 0.5 to 0.17 A; 5 W
Input/Output Configuration	<b>Input 1 (External Trigger), Input 2:</b> Optocoupled, polarity insensitive
Reading Features	<b>Scan Rate (software):</b> (600 to 1000 scans/sec) <b>Aperture Angle:</b> 50°
Construction	Black anodized aluminum housing, glass lens
Weight	330 g
Environmental Rating	IP65
Operating Temperature	<b>Operating temperature:</b> 0 to +45 °C <b>Storage temperature:</b> -20 to +70 °C <b>Relative humidity:</b> 90% (non-condensing)
Hookup Diagrams	See data sheet for more information



Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Housing Material	Power Supply
	<b>QC50/QCX50</b> Accurately analyze and compare colors or varying intensities of color. page 284	Diffuse: 20 mm	50 x 25 x 50 mm	IEC IP62	ABS	10 to 30 V dc
	<b>Q26</b> Reliably detects luminescent plastics, coatings, lubricants, and other targets on even and uneven surfaces page 286	Diffuse: 30 mm	14 x 25 x 42 mm	IEC IP67	ABS	12 to 30 V dc
	<b>QL56</b> Detects luminescent marks, even on luminescent backgrounds, and reflective surfaces such as ceramic, metal or mirrored glass. page 288	Diffuse: 50 mm	96.5 x 31.9 x 65.5 mm	IEC IP67	Aluminum	15 to 30 V dc
	<b>R58</b> Registration mark sensors that detect contrasts as low as 2% over a wide range of colors. page 290	Convergent: 10 mm	62.1 x 30 x 83.3 mm	IEC IP67	Zinc alloy	10 to 30 V dc
	<b>R55</b> Delivers outstanding color contrast sensitivity and features an innovative TEACH function for setting the sensing threshold. page 294	Varies depending on fiber	85.4 x 30 x 25 mm	IEC IP67; NEMA 6	ABS/polycarbonate blend	10 to 30 V dc



# QC50/QCX50 Series

## True Color Sensors



- The QC50 and QCX50 accurately analyze and compare colors or varying intensities of color. The QC50 will solve most color comparison applications and for challenging applications such as reading the difference between dark blue and black use the QCX50.
- Offers easy-to-set push-button programming options for up to three colors
- Compact, self-contained design
- Offers fast response time of 335 microseconds, depending on model

### QC50, 10-30 V DC

Visible White LED

Sensing Mode	Range	Connection	Response Time	Output Type	Models
	20 mm typical; varies according to sensor configuration	8-pin Euro QD	335 $\mu$ s	NPN, 3 channels	QC50A3N6XDWQ
				PNP, 3 channels	QC50A3P6XDWQ

### QCX50, 10-30 V DC

Visible White LED

Sensing Mode	Range	Connection	Response Time	Output Type	Models
	20 mm typical; varies according to sensor configuration	8-pin Euro QD	Selectable 5 ms or 1 ms	NPN, 3 channels	QCX50A3N6XDWQ
				PNP, 3 channels	QCX50A3P6XDWQ

Connection options: A model with a QD requires a mating cordset.

**Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC2S-806RA**)

**MQDC2S-806**  
2 m (6.5')  
**MQDC2S-815**  
5 m (15')  
**MQDC2S-830**  
9 m (30')

**SMBQC50**

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 725



## QC50/QCX50 Specifications

<b>Sensing Receiver</b>	Solid-state photodiode device with R, G, B filters
<b>Minimum Spot Diameter</b>	4 mm
<b>Supply Voltage and Current</b>	10 to 30 V dc, 2 V pp max ripple 40 mA max @ 24 V dc (excluding output current)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity, over-voltage, and transient voltage
<b>Output Configuration</b>	3 PNP or 3 NPN outputs, depending on model 30 V dc max. Saturation voltage: less than 2 V
<b>Output Rating</b>	100 mA max. load per output channel
<b>Output Protection Circuitry</b>	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power-up
<b>Output Response Time</b>	<b>QC50 models:</b> 335 microseconds <b>QCX50 models:</b> Selectable 5 milliseconds (normal) or 1 millisecond <b>QC50 models</b> <b>QCX50 models</b> <b>Gate ON-time:</b> 335 microseconds      700 microseconds <b>Gate OFF-time:</b> 170 microseconds      400 microseconds
<b>Delay at Power-up</b>	500 milliseconds; outputs do not conduct during this time
<b>Data Retention</b>	EEPROM nonvolatile memory
<b>Ambient Light Rejection</b>	According to EN 609475-2
<b>Adjustments</b>	2 push buttons (Set and Select) • Color, scanning, color modes, delay and tolerance • Manual adjustment of color channels, sensing mode and tolerance level
<b>Indicators</b>	4-Digit LCD Display: indicates sensing mode, run status, tolerance level, output status Yellow Output LED: ON when any output is conducting 3 Green Channel Output Status LEDs: ON when its corresponding output is conducting
<b>Construction</b>	ABS shock-resistant housing; glass window and lens
<b>Environmental Rating</b>	IEC IP67
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +55 °C <b>Relative humidity:</b> 90% at 50 °C (non-condensing)
<b>Shock Resistance</b>	Approx. 30 G; 3 shocks per axis; 11 milliseconds duration
<b>Vibration</b>	0.5 mm amplitude; 10 to 60 Hz frequency; 30 minutes for each X, Y, Z axis
<b>Certifications</b>	

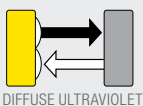
# Q26 Series

## Luminescence Sensor



- Reliably detects luminescent plastics, coatings, lubricants, and other targets on even and uneven surfaces
- Simple configuration with the push button on the sensor's housing or via a remote input line
- Rotary switch selects Light Operate or Dark Operate
- IP67-rated housing for use in rugged industrial environments
- Compact housing size

### Q26, 12-30 V DC

Sensing Mode	Range	Connection	Models NPN	Models PNP
 DIFFUSE ULTRAVIOLET	10 to 30 mm	4-pin M12/Euro-style quick disconnect fitting on a 150 mm (6 in) PVC cable jacket	Q26NLUMQ5	Q26PLUMQ5



Connection options: A model with a QD requires a mating cordset.

For a 9 m cable, add suffix W/30 to the 2 m model number (example, Q26NXLQ7 W/30)

**Euro-Style Cordsets**

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

**4-Pin**



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

**SMBLSTDLQ26****SMBLSTQ26**

Additional bracket information is available  
See page 725

Additional cordset information is available  
See page 758

**Q26 Specifications**

<b>Supply Voltage and Current</b>	12 to 30 V dc (2 Vpp maximum ripple) <b>Supply current (exclusive of load current):</b> 30 mA
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	NPN or PNP
<b>Output Rating</b>	100 mA max (exclusive of load) <b>ON-state saturation voltage:</b> less than 2 V @ 10 mA dc; less than 1.5 V @ 150 mA dc
<b>Output Protection Circuitry</b>	Protected against false power-up and continuous overload or short circuit of outputs
<b>Output Response Time</b>	250 $\mu$ S or 1 ms (based on sensitivity)
<b>Indicators</b>	<b>Green ON:</b> Power ON <b>Amber ON:</b> Output conducting
<b>Construction</b>	ABS plastic housing, glass window, polycarbonate lens
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +55 °C <b>Relative Humidity:</b> 90% at 50°; non-condensing
<b>Environmental Rating</b>	IEC IP67
<b>Vibration and Shock</b>	EN60068-2-6 and EN60068-2-27
<b>Certifications</b>	 

# QL56 Series

## Luminescence Sensors



- The Q25 sensor is completely epoxy-encapsulated for use in harsh sensing environments, including food and beverage applications.
- Compact, self-contained design
- Includes easy-to-set programming options
- High-speed response of 250 microseconds

### QL56, 15-30 V DC



Sensing Mode	Range	Connection	Output Type	Models
 DIFFUSE	10-20 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD15BQ
 DIFFUSE	20-40 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD30BQ
 DIFFUSE	30-50 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5 V dc analog	QL56M6XD40BQ

Connection options: A model with a QD requires a mating cordset.



QL56M6XD30BQ Models



QL56M6XD15BQ Models



QL56M6XD40BQ Models

**Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

**5-Pin****MQDC1-506**

2 m (6.5')

**MQDC1-515**

5 m (15')

**MQDC1-530**

9 m (30')

**SMB55A****SMB55RA****SMB55F****SMB55S**

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 725

## QL56 Specifications

<b>Sensing Beam</b>	LED UV, 375 nm; class 1
<b>Supply Voltage and Current</b>	15 to 30 V dc, (2 V pp max ripple); 50 mA max @ 24 V dc (excluding output current)
<b>Supply Protection Circuitry</b>	Protected against reverse polarity
<b>Output Configuration</b>	Bipolar (1 NPN & 1 PNP), plus 0.75 to 5.5 V dc analog output
<b>Analog Output</b>	0.75 to 5.5 V dc max
<b>Analog Output Impedance</b>	2.2 k $\Omega$ (short-circuit protection)
<b>Output Rating</b>	100 mA max.
<b>Output Saturation Voltage</b>	< 2 V
<b>Output Protection Circuitry</b>	Overload and short circuit protection
<b>Output Response Time</b>	250 microseconds
<b>Ambient Light Rejection</b>	According to EN 60947-5-2
<b>Adjustments</b>	"+" and "-" push buttons determine sensitivity "Set" push button activates delay and keylock function
<b>Switching Frequency</b>	2 kHz
<b>Delay at Power-up</b>	0 milliseconds (default) or 20 milliseconds user selectable
<b>Indicators</b>	<b>Green Ready LED:</b> ON indicates power on; Flashing indicates output overload <b>Yellow Output LED:</b> ON indicates output conducting <b>Orange Delay LED:</b> ON indicates 20 milliseconds delay activated <b>Orange Keylock LED:</b> ON indicates push buttons are unlocked <b>5-segment bar graph:</b> Indicates sensitivity
<b>Construction</b>	Aluminum housing, glass lens; mass 180 g. max.
<b>Environmental Rating</b>	IP67
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +55 °C <b>Storage Temperature:</b> -20 to 70 °C
<b>Minimum Spot Dimensions</b>	2 x 8 mm @ 10 mm ( <b>QL56M6XD15BQ</b> ) 3 x 11 mm @ 24 mm ( <b>QL56M6XD30BQ</b> ) 4 x 15 mm @ 50 mm ( <b>QL56M6XD40BQ</b> )
<b>Shock Resistance</b>	30 G; 6 shocks per axis; 11 milliseconds duration (EN60068-2-27)
<b>Vibration</b>	0.5 mm amplitude; 10 to 55 Hz frequency; per axis (EN60068-2-6)
<b>Application Notes</b>	The lens must be used in the lower position, and the cap must remain in place on the end position
<b>Certifications</b>	

# R58 Expert™ Series

## Registration Mark Sensors



- The R58E sensors offer maintenance-free, solid-state reliability for color contrast applications. With a fast, 50-microsecond sensing response time, the R58E provides excellent registration repeatability, even in speedy applications.
- Bipolar outputs
- 10,000 actuations per second and 15 microsecond repeatability
- Rugged mechanical housing rated to IP67

### R58 Expert™, 10-30 V DC

Visible Red, Green or Blue LED, depending on registration mark

Sensing Mode/LED	Focus	Connection	Output Type	Models	
				Parallel	Perpendicular
 CONVERGENT	10 mm	2 m	Bipolar NPN/PNP	R58ECRGB1	R58ECRGB2
		5-pin Euro Pigtail QD	Bipolar NPN/PNP	R58ECRGB1Q	R58ECRGB2Q
		2 m	PNP	R58BPCRGB1	R58BPCRGB2
		5-pin Euro Pigtail QD	PNP	R58BPCRGB1Q	R58BPCRGB2Q
		2 m	NPN	R58BNCRGB1	R58BNCRGB2
		5-pin Euro Pigtail QD	NPN	R58BNCRGB1Q	R58BNCRGB2Q

For more specifications see page 293.

Connection options: A model with a QD requires a mating cordset (see page 292)

For 9 m cable, add suffix W/30 to the 2 m model number (example, R58ECRGB1 W/30).

QD models: For integral 5-pin Euro-style QD, add suffix Q8 to the 2 m model number (example R58ECRGB1Q8).



# R58A Series

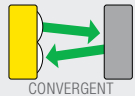
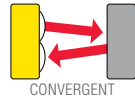
## Registration Mark Sensors



- Easy to set multi-turn potentiometer
- The R58A provides outstanding color contrast sensitivity in low-contrast or high-gloss applications and detects contrasts as low as 2% over a wide range of colors
- Bipolar outputs
- Provides a single emitter color of red or green, depending on model
- Rugged mechanical housing rated to IP67

R58A Expert™, 10-30 V DC

→ Visible Red LED → Visible Green LED

Sensing Mode/LED	Focus	Connection	Output Type	OFF-Delay	Models	
					Parallel	Perpendicular
 CONVERGENT	10 mm	2 m	Bipolar NPN/ PNP	0 ms	R58ACG1	R58ACG2
		4-pin Euro Pigtail QD			R58ACG1Q	R58ACG2Q
		2 m			R58ACG1D	R58ACG2D
		4-pin Euro Pigtail QD			R58ACG1DQ	R58ACG2DQ
 CONVERGENT	10 mm	2 m	Bipolar NPN/ PNP	0 ms	R58ACR1	R58ACR2
		4-pin Euro Pigtail QD			R58ACR1Q	R58ACR2Q
		2 m			R58ACR1D	R58ACR2D
		4-pin Euro Pigtail QD			R58ACR1DQ	R58ACR2DQ

For more specifications see page 293.

Connection options: A model with a QD requires a mating cordset (see page 292)

For 9 m cable, add suffix W/30 to the 2 m model number (example, R58ACG1 W/30).

QD models: For integral 4-pin Euro-style QD, add suffix Q8 to the 2 m model number (example, R58ACG1Q8).

# SPECIAL PURPOSE

# BARCODE READERS

# REGISTRATION, COLOR & LUMINESCENCE

# STAINLESS STEEL



**Euro-Style**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDEC2-506RA**)

**Used with:** Expert models

**MQDEC2-506**  
2 m (6.5')  
**MQDEC2-515**  
5 m (15')  
**MQDEC2-530**  
9 m (30')



4-Pin

**Euro-Style Cordsets**  
Straight connector models listed;  
for right-angle, add **RA** to the end  
of the model number (example,  
**MQDC-406RA**)

**Used with:** R58A models

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

Additional cordset information is available  
See page 758



SMB55A



SMB55RA



SMB55F



SMB55S

Additional bracket information is available  
See page 725



R58 Expert




R58B



R58A

## R58 Specifications

Supply Voltage and Current	10 to 30 V dc (10% max. ripple) <b>R58A:</b> 36 mA exclusive of load <b>R58B &amp; R58E:</b> 75 mA @ 10 V dc 35 mA @ 30 V dc
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	<b>R58 Expert &amp; R58A:</b> Bipolar: One current sourcing (PNP) and one current sinking (NPN) <b>R58B:</b> Single output: One current sourcing (PNP) or one current sinking (NPN)
Output Rating	<b>R58 Expert &amp; R58B:</b> 100 mA max. (each output) OFF-state leakage current: NPN less than 200 $\mu$ A; PNP less than 10 $\mu$ A NPN saturation: less than 1.6 V @ 100 mA PNP saturation: less than 3 V @ 100 mA <b>R58A:</b> 150 mA max. (each output) OFF-state leakage current: less than 10 $\mu$ A NPN saturation: less than 200 mV @ 10 mA and less than 1 V @ 150 mA PNP saturation: less than 1 V @ 10 mA and less than 2 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	50 microseconds
Delay at Power-up	<b>R58A:</b> 100 milliseconds; outputs do not conduct during this time <b>R58B &amp; R58E:</b> 1 second; outputs do not conduct during this time
Repeatability	15 microseconds
Sensing Image	Rectangular: 1.2 x 3.8 mm at 10 mm from face of lens; image oriented either parallel or perpendicular to sensor length, depending on model
Adjustments	<b>R58 Expert &amp; R58B:</b> 2 push buttons and remote wire for sensor TEACH programming and configuration. See datasheet for detailed information. <b>R58A:</b> Light/Dark Operate (LO/DO) select switch, and 15-turn switchpoint adjustment potentiometer
Indicators	<b>R58 Expert: 8-segment Bargraph display:</b> <b>Green:</b> Power ON <b>Yellow:</b> Outputs ON <b>2-position Green:</b> LED ON next to DO for Dark Operate LED ON next to LO for Light Operate <b>2-position Green:</b> LED ON next to ON for ON-delay LED ON next to OFF for OFF-delay <b>R58B: Green:</b> Power ON <b>Amber:</b> Output active <b>R58A: Amber:</b> Output active <b>Green:</b> Switchpoint threshold adjustment indicators See datasheet for detailed information.
Construction	Zinc alloy die-cast housing with black painted finish and o-ring sealed lens port cap <b>Lens:</b> Acrylic <b>Lens port cap and lens holder:</b> ABS <b>Sensitivity and LO/DO adjusters:</b> Acetal <b>QD:</b> Anodized aluminum
Environmental Rating	IEC IP67
Operating Conditions	<b>Temperature: R58E:</b> -10 to +50 °C <b>R58A &amp; R58B:</b> -10 to +55 °C <b>Relative humidity:</b> 90% at 50 °C (non-condensing) <b>Storage temperature:</b> -20 to +80 °C
Shock and Vibration	All models meet IEC 68-2-6 and IEC 68-2-27 testing criteria
Certification	

# R55F Series

## Fiber Optic Sensors



- Reliably detects 16 levels of grayscale at up to 10,000 actuations per second
- 10,000 actuations per second and 15 microsecond repeatability
- Bipolar outputs

### R55F Fiber Optic, 10-30 V DC

Visible Green LED

Visible Blue LED

Visible White LED

 Infrared LED  
 Visible Red LED

Sensing Mode	Range	Connection	Output Type	Models
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55F
		5-pin Euro QD		R55FQ
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FV
		5-pin Euro QD		R55FVQ
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FVG
		5-pin Euro QD		R55FVGQ
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FVB
		5-pin Euro QD		R55FVBQ
 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FVW
		5-pin Euro QD		R55FVWQ
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FP
		5-pin Euro QD		R55FPQ
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FPG
		5-pin Euro QD		R55FPGQ
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FPB
		5-pin Euro QD		R55FPBQ
 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	R55FPW
		5-pin Euro QD		R55FPWQ

Connection options: A model with a QD requires a mating cordset.

For 9 m cable, add suffix W/30 to the 2 m model number (example, R55F W/30).

**Euro-Style**

Straight connector models listed; for right-angle, add **RA** to the end of the model number (example, **MQDC1-506RA**)

**MQDC1-506**  
2 m (6.5')  
**MQDC1-515**  
5 m (15')  
**MQDC1-530**  
9 m (30')

**DIN-35...****SMBR55F01****SMBR55FRA**

Additional cordset information is available  
See page 758

Additional bracket information is available  
See page 722



## R55F Fiber Optic Specifications

<b>Supply Voltage and Current</b>	10 to 30 V dc (10% max. ripple) at less than 70 mA, exclusive of load
<b>Supply Protection Circuitry</b>	Protected against reverse polarity and transient voltages
<b>Output Configuration</b>	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
<b>Output Rating</b>	150 mA max each output @ 25 °C (derate ≈ 1 mA per °C increase) <b>OFF-state leakage current:</b> less than 5 µA @ 30 V dc <b>ON-state saturation voltage:</b> PNP: less than 1 V @ 10 mA; 1.5 V @ 150 mA NPN: less than 200 mV @ 10 mA; 1 V @ 150 mA
<b>Output Protection Circuitry</b>	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
<b>Output Response Time</b>	50 microseconds
<b>Delay at Power-up</b>	100 milliseconds; outputs do not conduct during this time
<b>Adjustments</b>	<p><b>Using push buttons (“+” Dynamic and “-” Static):</b> Manually adjust Switch Point using “+” or “-” buttons Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Static Single-Point TEACH Light Operate/Dark Operate OFF-Delay select: 0 milliseconds, 20 milliseconds or 40 milliseconds</p> <p><b>Using Remote TEACH input (gray wire):</b> Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Static Single-Point TEACH Light Operate/Dark Operate OFF-Delay select: 0 milliseconds, 20 milliseconds or 40 milliseconds Push button lockout for security</p>
<b>Indicators</b>	<p>10-segment light bar indicates signal strength <b>Light Operate:</b> Green <b>Dark Operate:</b> Green <b>Outputs Conducting:</b> Yellow <b>OFF-Delay (Green):</b> SETUP Mode: OFF—no delay      <b>RUN Mode:</b> OFF—no delay Flashing—20 milliseconds delay      ON—20 or 40 milliseconds delay ON—40 milliseconds delay</p>
<b>Construction</b>	Black ABS/polycarbonate blend; nylon fiber clip mounts to standard 35 mm DIN rail. 1 stainless steel right angle bracket and 1 PBT polyester bracket for mounting to flat surfaces also included with sensor.
<b>Environmental Rating</b>	IEC IP67; NEMA 6
<b>Operating Conditions</b>	<b>Temperature:</b> -10 to +55 °C <b>Relative humidity:</b> 90% at 50 °C (non-condensing)
<b>Application Notes</b>	<ul style="list-style-type: none"> <li>Do not mount the fiber tip directly perpendicular to shiny surfaces; position it at approximately a 15° angle in relation to the sensing target</li> <li>Minimize web or product “flutter” whenever possible to maximize sensing reliability</li> </ul>







Certifications





## Stainless Steel

Stainless steel sensors hold up well in extremely abusive environments and can handle a wide variety of chemicals. This makes them ideal for hygienic applications, such as food and beverage applications.

Series	Description	Max Sensing Range	Dimensions H x W x D	Protection Rating	Power Supply
	<b>QM26</b> The QM26 withstands high-pressure washdown environments and is easy to mount for a hassle-free setup. Page 298	<b>Opposed:</b> 8.5 m <b>Polar Retro:</b> 3 m <b>Coaxial Polar Retro:</b> 2.6 m <b>Background Suppression:</b> 200 mm	48.5 x 14 x 25 mm	IP69K	10-30 V dc
	<b>QMH26</b> The QMH26 is designed with minimal grooves and crevices, making it easy to clean and ideal for clean-in-place (CIP) applications. Page 300	<b>Polar Retro:</b> 3 m <b>Coaxial Polar Retro:</b> 2.6 m <b>Background Suppression:</b> 400 mm <b>Foreground Suppression:</b> 200 mm	53.7 x 14 x 20.3 mm	IP69K	10-30 V dc
	<b>M25U</b> Universal housing design with 18 mm threaded lens; an ideal replacement for hundreds of other sensor styles. Available in eight modes with a compact housing for limited space setups. Page 302	<b>Ultrasonic:</b> 500 mm	103 x ø 25 mm	IP67; NEMA 6, IP69K	10-30 V dc
	<b>SM30</b> Powerful sensor with a long range and the stainless steel model can be used in abusive environments. Page 304	<b>Opposed:</b> 150 m	30 ø x 102 mm	IEC IP67; NEMA 6	10-30 V dc, 2-240 V ac
	<b>VSM Series</b> Heavy-duty metal sensors that are compact and ideal for use in confined areas. Page 306	<b>Opposed:</b> 250 mm <b>Diffuse:</b> 200 mm	Varies by model	IP67; NEMA 6P	10-30 V dc
	<b>M18-4</b> Heavy-duty barrel sensor protected by a 316 stainless steel housing that resists exposure to harsh chemicals and washdown conditions. Page 308	<b>Opposed:</b> 25 m <b>Retro:</b> 7.5 m <b>Polarized Retro:</b> 6 m <b>Diffuse:</b> 750 mm <b>Fixed-Field:</b> 200 mm	18 ø x 63.5 mm	IP67 IP68 IP69K	10-30 V dc

## OTHER AVAILABLE MODELS



Q4X page 34



# QM26 Series

## Washdown Sensors



- The QM26 withstands high-pressure washdown environments and is easy to mount for a hassle-free setup
- Rugged, chemically resistant and food safe 316L stainless steel housing
- Reliably detects clear materials in harsh environments
- IP69K rated for use in harsh 1500 psi and 80 °C washdown
- Withstands environmental temperature cycling from -30 to 60 °C

### Opposed QM26

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 OPPOSED	8.5 m	4-pin Euro QD	QM26EQ5 Emitter	
			QM26VNRQ5	QM26VPRQ5

### Polar Retro QM26

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 POLAR RETRO	3 m	4-pin Euro QD	QM26VNLPCQ5	QM26VPLPCQ5

### Coaxial Polar Retro QM26

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 COAXIAL POLAR RETRO	2.6 m	4-pin Euro QD	QM26ENXLPQ5	QM26EPXLPQ5

### Background Suppression QM26

Visible Red LED

Sensing Mode	Range	Connection	Models NPN	Models PNP
 BACKGROUND SUPPRESSION	5-400 mm Cutoff	4-pin Euro QD	QM26VNAF400Q5	QM26VPAF400Q5
	5-200 mm Cutoff (small light spot)	4-pin Euro QD	QM26VNAF200Q5	QM26VPAF200Q5

Connection options: A model with a QD requires a mating cordset.

For a 5 m cable, replace Q5 with -5M to the 2 m model number (example, QM26E-5M)

Banner **Минск** т.80447584780 Viber email minsk17@tut.by  
www.fotorele.net www.tiristor.by радиодетали, электронные компоненты  
tel.+375 29 758 47 80 МТС

[каталог](#), [описание](#), [технические](#), [характеристики](#), [datasheet](#), [параметры](#), [маркировка](#), [габариты](#), [фото](#), [даташит](#), [Banner](#)

### [где и как купить в Минске?](#)

Сделать заявку или запрос можно по телефону факсу или по электронной почте

Просим Вас указывать в заявке:

- название предприятия, факс, контактный телефон, контактное лицо;
- полное наименование и количество товара;
- возможность замены или аналоги;

## Каталог Banner

Автоматизация

## **Banner в Беларуси**