

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

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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

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



QS30 Expert™

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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	—	QS30E Emitter*
		5-pin Euro QD		QS30EQ Emitter*
 HIGH-POWERED OPPOSED	213 m	2 m	Bipolar NPN/PNP	QS30R
		5-pin Euro QD		QS30RQ
		2 m	—	QS30EX Emitter
		5-pin Euro QD		QS30EXQ Emitter
2 m	Bipolar NPN/PNP	QS30ARX		
5-pin Euro QD	LO	QS30ARXQ		
2 m	Bipolar NPN/PNP	QS30RRX		
5-pin Euro QD	DO	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).

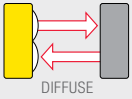
For 9 m cable, add suffix W/30 to the 2 m model number (example, QS30R W/30).

* 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

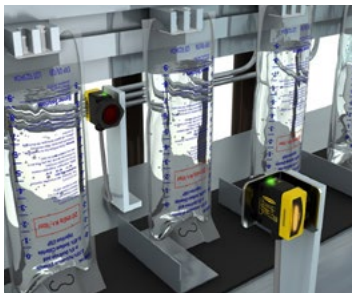
DC-Operated Long-Range Sensors



- 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



Detection of Clear Liquids in Transparent Packaging

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

Sensing Mode	Range	Connection	Output Type	Model
<p>OPPOSED WATER DETECTION</p>	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
<p>OPPOSED WATER DETECTION</p>	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
<p>SUPER HIGH-POWER OPPOSED WATER DETECTION</p>	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		

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 [†]	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.

[†] 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	Emitters (High-Power): 10 to 30 V dc (10% max. ripple) at less than 70 mA Receivers (High-Power): 10 to 30 V dc (10% max. ripple) at less than 22 mA Analog Receivers (water): 15 to 30 V dc (10% max. ripple) at less than 65 mA All others: 10 to 30 V dc (10% max. ripple) at 40 mA, (exclusive of load)	Emitters (Water): 10 to 30 V dc (10% max. ripple) at less than 80 mA Receivers (Water): 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	Bipolar: 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	Opposed: 5 milliseconds ON/OFF Opposed (High-Power): 30 milliseconds ON/OFF Opposed (Water): 10 x excess gain or more– Standard: 1 millisecond ON/OFF 2x to 10x excess gain– Standard: 3 milliseconds ON/OFF All others: 2 milliseconds ON/OFF	Super High-Power: 10 milliseconds ON/OFF Super High-Power: 30 milliseconds ON/OFF
Delay at Power-Up	100 milliseconds; outputs do not conduct during this time (except Opposed High-Powered and Water)	
Repeatability	Opposed: not applicable Opposed (High-Power): 5 milliseconds Opposed (Water): 10 x excess gain or more– Standard: 500 microseconds 2x to 10x excess gain– Standard: 2.5 milliseconds All others: 500 microseconds	Super High-Power: 5 milliseconds Super High-Power: 25 milliseconds
Adjustments	Opposed (High-Power and Water): Light Operate/Dark Operate–dependent on model selected Frequency via gray wire: A: Gray (+) B: Gray (-) Emitter only: LED inhibit, via white wire White (-) turns emitter LED OFF (to allow verification of sensor operation) Opposed, Retroreflective, and Polarized Retroreflective: Selectable Light/Dark Operate is achieved via the gray wire Light Operate: Low (0 to 3 V)* Dark Operate: High (open or 5 to 30 V)* Diffuse: Selectable Light/Dark Operate is achieved via the gray wire Light Operate: High (open or 5 to 30 V)* Dark Operate: Low (0 to 3 V)* Diffuse, Retroreflective, and Polarized Retroreflective (only): Single-turn sensitivity (Gain) adjustment potentiometer * Input impedance 10 kΩ See datasheet for more detailed information	
Indicators	Opposed (High-Power): 4-LED Signal Strength light bar Green LED: Power ON Frequency indicator: (A or B) Receiver only: Yellow LED: Output conducting All others (except emitters): Large, oval LED indicator on sensor back Yellow: Output conducting Small indicator on back (adjustable-field only) Blue/Red: End of travel (EOT) LED 2 indicators on top Green: Power ON Yellow: Light sensed	
Construction	ABS plastic housing; acrylic lens cover Opposed High-Power Lenses: Impact resistant lens material	
Environmental Rating	Opposed (High-Power): Cabled: IP67; NEMA 6P Opposed (High-Power) QD: IP69K per DIN 40050-9 Opposed (Water): IEC IP67 (nema 6); PW12 1200 PSI washdown per NEMA PW12 All others: 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	Opposed (Water), Opposed (High-Power): -20° to +60° C All others: -20° to +70° C	Relative humidity: 90% (non-condensing) Relative humidity: 90% (non-condensing)
Certifications		

QS30 *Expert*™ Specifications

Supply Voltage and Current	Diffuse LED and Retroreflective LED: 10 to 30 V dc (10% max. ripple) at less than 25 mA, exclusive of load Diffuse Laser and Retroreflective Laser: 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	LED models: 660 nm visible Red Laser models: Class 1: 650 nm visible Red Class 2: 658 nm visible Red
Beam Size at Aperture	Diffuse Laser: Approx. 2 mm Retroreflective Laser: Approx. 3 mm
Output Configuration	Bipolar: One NPN (current sinking) and one PNP (current sourcing); Light Operate (LO) or Dark Operate (DO) configurable
Output Response Time	Diffuse LED: High-speed mode: 300 microseconds Normal mode: 1.8 milliseconds Diffuse Laser, Retroreflective Laser and Retroreflective LED: 500 microseconds
Delay at Power-up	Diffuse LED and Retroreflective LED: 250 milliseconds; outputs do not conduct during this time Diffuse Laser and Retroreflective Laser: 1 second max.; outputs do not conduct during this time
Repeatability	Diffuse LED: High-speed mode: 100 microseconds Normal mode: 150 microseconds Retroreflective LED: 150 microseconds Diffuse Laser and Retroreflective Laser: 70 microseconds
Adjustments	2 push buttons and remote wire for TEACH programming and configuration See datasheet for detailed information
Indicators	2 LEDs: Green: Power ON Yellow: Output conducting See datasheets for more detailed information
Construction	PC/ABS housing with acrylic lens cover
Environmental Rating	Retroreflective LED: IEC IP67 (NEMA 6); PW12 1200 PSI washdown All others: 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	Diffuse LED and Retroreflective LED: Temperature: -10° to +55° C Relative humidity: 95% @ 55° C (non-condensing) Diffuse Laser and Retroreflective Laser: Temperature: -10° to +50° C Relative humidity: 95% @ 50° C (non-condensing)
Application Note	QS30ELVC models: 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	2 LED indicators on sensor top: Green: Power ON Yellow: Light sensed Large, oval LED indicator on sensor back (except emitters): Yellow: 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	Temperature: -20° to +70° C Relative humidity: 95% @ 50° C (non-condensing)
Certifications	 

QS30 Adjustable-Field Specifications

Supply Voltage	10 to 30 V dc (10% max. ripple); current consumption: AF600 & AFF400 models: Less than 80 mA at 10 V dc, less than 40 mA at 30 V dc AF models: 45 mA max current
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Delay at Power-Up	AF600 & AFF400 models: 200 milliseconds; outputs do not conduct during this time AF models: 250 milliseconds; outputs do not conduct during this time
Output Configuration	Bipolar: One PNP (current sourcing) and one NPN (current sinking)
Output Rating	AF600 & AFF400 models: 100 mA total output current (derate 1 mA per °C above 30° C) OFF-state leakage current: less than 5 µA @ 30 V dc ON-state saturation voltage: NPN: less than 1.5 V @ 100 mA PNP: less than 2.0 V @ 100 mA AF models: 150 mA total output current (derate 1 mA per °C above 25° C) OFF-state leakage current: less than 50 µA @ 30 V dc ON-state saturation voltage: NPN: less than 200 mV @ 10 mA; less than 1 V @ 150 mA PNP: 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	AF600 & AFF400 models: 5 milliseconds ON/OFF AF models: 1 millisecond ON/OFF
Repeatability	AF600 & AFF400 models: 750 microseconds AF models: 170 microseconds
Adjustments	AF600 & AFF400 models: Four-turn adjustment screw sets cutoff distance between min. and max. positions, clutched at both ends of travel AF models: 2 push buttons and remote wire <ul style="list-style-type: none"> • Easy push-button configuration • Manually adjust (+/-) cutoff (push buttons only) • N.O./N.C. and OFF-delay configuration options (push buttons only) • Push-button lockout (from remote wire only) 2 push buttons or LO/DO adjustment
Indicators	AF600 & AFF400 models: Large, oval LED indicator on sensor back Yellow: Output conducting Small indicator on back Blue/Red: End of travel (EOT) LED 2 indicators on top Green: Power ON Yellow: Light sensed AF models: 8-segment red bargraph: Distance relative to cutoff point Green LED: Power ON Yellow LED: 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	AF600 & AFF400 models: -20° to +60° C; 95% relative humidity @ 50° C (non-condensing) AF models: -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	