R58 *Expert*™

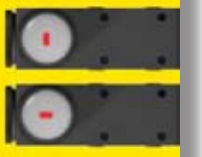
Color Registration Mark Sensors Provide High Color Contrast Sensitivity

Three LED sensing colors in one sensor

- Includes three LEDs: red, green and blue
- Automatically selects the correct LED to use based on the contrast of the background and the registration mark being sensed

Convenient and flexible mounting

- Includes two lens locations on each sensor
- Offers threaded lens and cap for easy exchange without tools
- Available with a vertical or horizontal light spot, depending on model
- Includes eight M5 threaded mounting holes for easy installation



Range and application tolerant

- Tolerates a +/-3 mm shift from the 10 mm focal point
- Accommodates web flutter and similar variations in the target's location

Features

- Provides excellent color contrast sensivity through advanced electronic circuitry
- Detects inconspicuous registration marks in low-contrast, high-gloss sensing applications
- Optimizes application contrast by automatically choosing red, green or blue sensing LEDs
- Offers continuous readout of operating status with easy-to-read, 8-segment light bar indicator
- Features static and dynamic TEACH programming and manual adjustment
- Provides a sensing image that measures 1.2 by 3.8 mm at 10 mm from the lens
- Includes bipolar discrete outputs: current sinking (NPN) and current sourcing (PNP)
- Offers configurable light- or dark-operate outputs
- Includes optional 30-millisecond ON/OFF-delay
- Performs 10,000 actuations per second (10 kHz switching frequency)
- Features rugged, zinc alloy die-cast housing rated IP67; NEMA 6
- Features high-quality acrylic lens suitable for food processing applications
- Includes integral cable or 5-pin Euro-style pigtail quick disconnect

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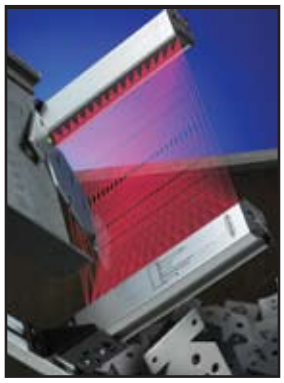
BANNER

more sensors, more solutions

Special-Purpose Sensors



Part & Area Sensors page 212
- Optical crosshatch pattern for detecting objects as small as 5.6 mm
- Fast 0.8 to 3.2 millisecond response time
- Three lengths and two ranges

Optical Buttons page 234
- Zero-force ergonomic replacement for capacitive switches and mechanical push buttons
- Momentary (OTB) and alternate (LTB) action switches
- Bright, easy-to-see sequence indicators (VTB)
- Self-checking models (STB) for use with safety controls

Slot & Label Sensors page 215
- Self-contained fixed-distance opposed-mode slot sensor
- Rugged metal or plastic U-shaped housing
- Slot widths from 10 to 220 mm, depending on model
- Fixed-sensitivity, potentiometer sensitivity adjustment or push-button programming, depending on model
- Models for detecting label on web backing

Magnetic Sensors page 241
- For detecting the presence of large metal objects
- Flat-pak or 18 mm barrel-style housing
- Self-contained replacement for inductive loop technology

Color Sensors page 224
- 3-color registration mark sensor for detecting even subtle differences
- True color sensors for detecting color and intensity
- Push-button programming
- Fast sensing response times

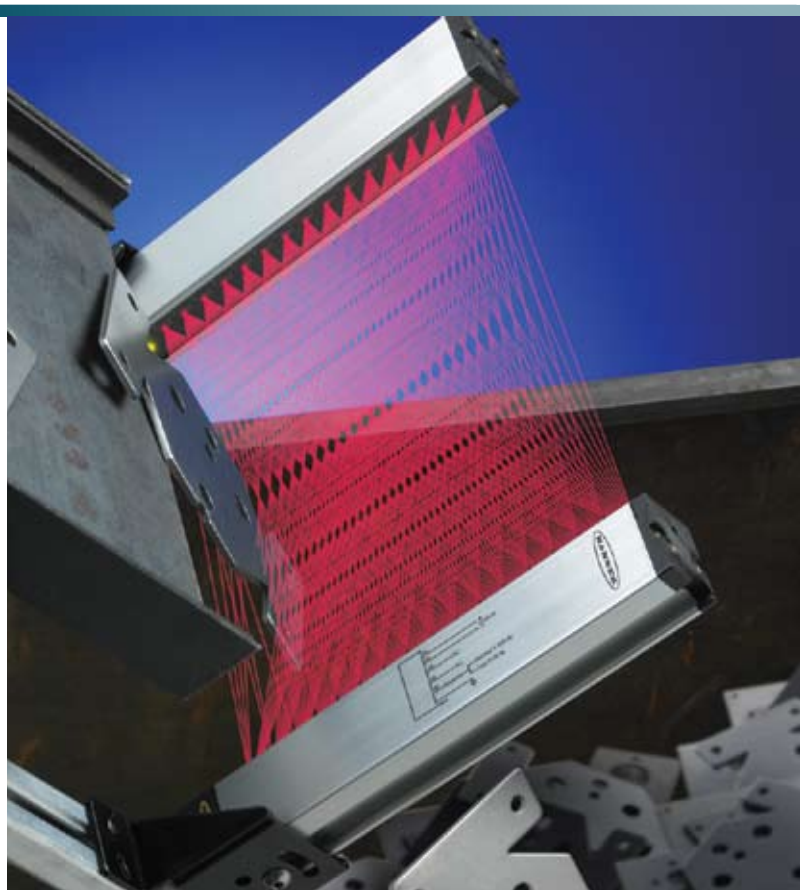
Pick-to-Light Sensors page 345
- K50 and K80 low-cost, self-contained sensors for bin-picking operations
- Ultra-bright optical touch buttons for indicating bin-picking sequences
- Two- or one-component light sensors for part assembly and error proofing

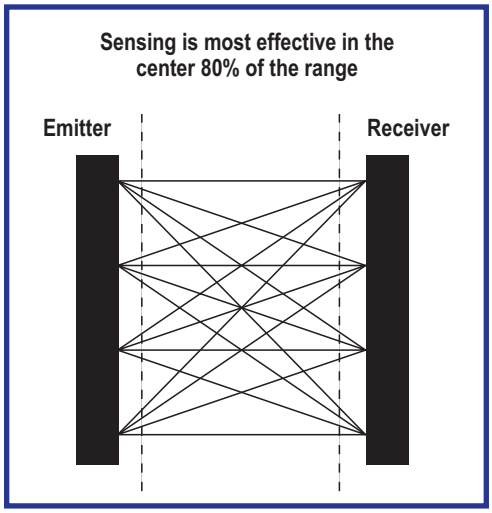
Luminescence Sensors page 230
- Low-cost luminescent sensing
- For luminescent marks on luminescent backgrounds and reflective surfaces such as ceramic, metal or mirrored glass
- Fast 250 milliseconds response time

LX
High-Speed Part-Sensing Light Screen

Special synchronized multiple-beam infrared LED emitters and receivers generate a precise optical crosshatched pattern with extraordinary sensitivity to small objects.

- Detects objects as small as 5.6 mm and extremely flat objects that pass anywhere through the light screen
- Ideal for die-protection (part ejection verification), small part or pill counting, parcel handling and sorting by height





LX Series optical crosshatch pattern

BRACKETS PAGE 372
QD CABLES 5-Pin Euro PAGE 415
LENS SHIELDS PAGE 440

Industry's fastest response speed

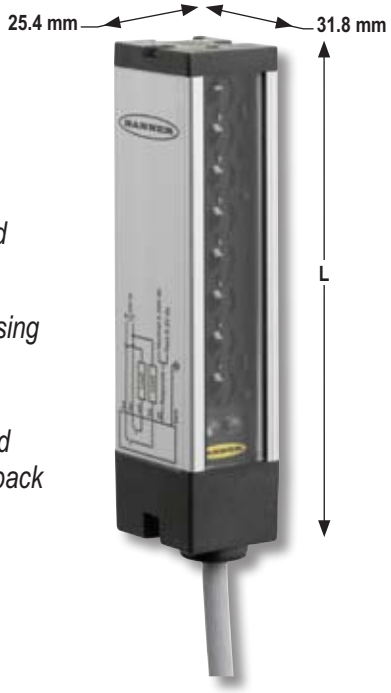
- Responds in 0.8 to 3.2 milliseconds—faster than comparable products, even at its slowest response speed
- Enables automated systems to operate at peak efficiency

A variety of lengths and ranges

- Available in 67, 143 or 295 mm lengths and two sensing ranges: 100 to 200 mm and 300 mm to 2 m
- Features rugged silver anodized housing with IP65 rating
- Uses integrated T-slot mounting channel for unique mounting flexibility

LX Sensors

- *Precise optical crosshatch pattern of infrared beams for detecting extremely small objects*
- *Simple wiring configuration; emitter and receiver need no synchronization wire*
- *Rugged silver anodized aluminum housing*
- *Three lengths and two sensing ranges*
- *Integrated mounting holes on ends, and T-slot mounting channel on sides and back*
- *5-pin Euro-style QD cables with shield ordered separately (see page 415)*



MORE INFO ONLINE Detailed Dimensions

Models	Length (L)
LX3	113.4 mm
LX6	189.6 mm
LX12	342.0 mm

LX, 10-30V dc

MORE INFO ONLINE Download PDF

Models			Normal Range	Reduced Range	Sensing Array Length	Cable*	Output Type	Data Sheet
Standard-Range Models	LX3E	Emitter	300 mm-2 m Minimum Object Detection Size 9.5 mm dia.	150-600 mm Minimum Object Detection Size 9.5 mm dia.	67 mm	2 m	Bipolar NPN/PNP	108865
	LX3R	Receiver						
	LX6E	Emitter			143 mm			
	LX6R	Receiver						
	LX12E	Emitter			295 mm			
	LX12R	Receiver						
Short-Range Models	LX3ESR	Emitter	100-200 mm Minimum Object Detection Size 5.6 mm dia.	75-150 mm Minimum Object Detection Size 5.6 mm dia.	67 mm			
	LX3RSR	Receiver						
	LX6ESR	Emitter			143 mm			
	LX6RSR	Receiver						
	LX12ESR	Emitter			295 mm			
	LX12RSR	Receiver						

* For 5-pin 150 mm Euro-style Pigtail, add suffix **Q** to the 2 m model number (example, **LX3EQ**). QD models require a mating cable (see page 415).

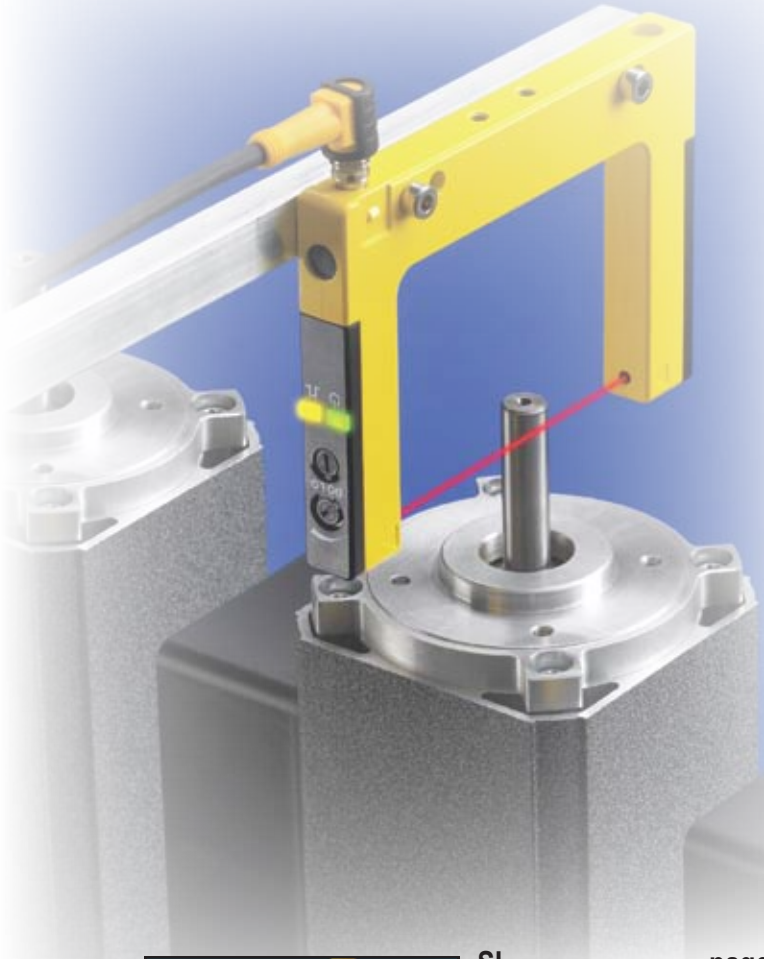
LX Specifications

Sensing Range	**Normal (see hookups)** / **Reduced** **Short-range models:** 100 to 200 mm / 75 to 150 mm **Standard-range models:** 300 mm to 2 m / 150 to 600 mm
Supply Voltage and Power	10 to 30V 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	**Bipolar:** One current sourcing (PNP) and one current sinking (NPN) open-collector transistor

More on next page

LX Specifications (cont'd)

Output Rating	125 mA max. each output **OFF-state leakage current:** less than 5 µA **Output saturation voltage (PNP output):** less than 1 volt at 10 mA and less than 1.5 volts at 100 mA **Output saturation voltage (NPN output):** 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	**LX3:** 0.8 milliseconds ON-time; 6 milliseconds OFF-time (5 milliseconds OFF-delay) **LX6:** 1.6 milliseconds ON-time; 7 milliseconds OFF-time (5 milliseconds OFF-delay) **LX12:** 3.2 milliseconds ON-time; 8.5 milliseconds OFF-time (5 milliseconds OFF-delay)
Minimum Object Detection Size	Smallest diameter rod that can be detected in sensing range: 5.6 mm (short-range) or 9.5 mm (standard-range), depending on model.
Indicators	**Emitter:** **LED1 (Green)** — **ON:** Power ON, good sensor; **OFF:** Reduced Range **LED2 (Red)** — **ON:** Reduced range; **OFF:** Normal range; **Flashing:** Emitter hardware failure **Receiver:** **LED1 (Yellow)** — **ON:** Output conducting; **OFF:** Output not conducting **LED2 (Bicolor Green/Red)** — **Green:** Normal range; **Red:** Reduced range; **Flashing Red:** Receiver hardware failure
Construction	Aluminum housing, die-cast zinc with black-coated 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. QD cables are ordered separately. See page 415.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	i) The best sensing resolution occurs within the center 80 percent of the sensing area, between the emitter and receiver. ii) Low-profile packages can be reliably detected. iii) Outputs are energized whenever the light screen is interrupted. iv) Successive parts must be spaced up to 12 milliseconds (LX12) for reliable detection.
Certifications	CE c UL us
Hookup Diagrams	SP02 (p. 530)



Slot & Label Sensors

SLM **page 216**

- Available in eight slot widths, from 10 to 220 mm
- Installs easily using molded-in beam guides that simplify beam placement
- Includes single-turn potentiometer sensitivity adjustment and visible red beam
- Features sealed die-cast metal housing rated IEC IP67; NEMA 6
- Ideal for counting, sensing parts on conveyor rails and belts, detecting edges and gear teeth, and other applications

SL **page 219**

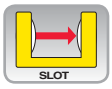
- Self-contained fixed-distance opposed-mode slot sensors
- Rugged U-shaped housings
- Molded-in beam guides to simplify mounting and beam placement
- Models with 10 and 30 mm wide slots
- Fixed sensitivity, potentiometer sensitivity adjustment or push-button programming, depending on model

SLC1 **page 222**

- Continuous automatic internal adjustment of sensing threshold and drift compensation
- Registration accuracy of ±03 mm typical at web speeds up to 15 m per second
- Heavy-duty metal housing, 1 mm slot
- For clear or opaque labels and backing

SLM
Rugged Metal Fixed-distance Slot Sensors

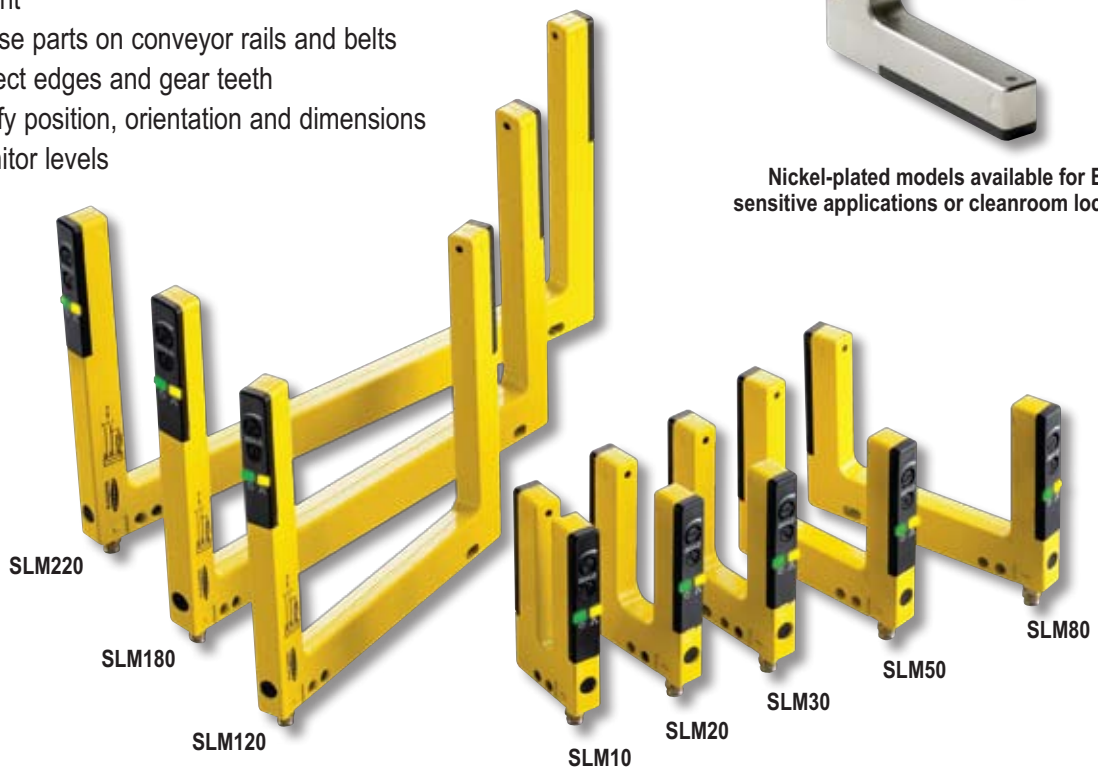
- Available in painted or nickel-plated diecast metal housings
- Senses objects that pass between the fixed-distance, opposed-mode emitter and receiver
- Requires no alignment or fibers
- Mounts easily and economically, using molded-in beam guides that simplify beam placement
- Available with current sourcing (PNP), current sinking (NPN) or bipolar (one NPN and one PNP) output, depending on model
- Delivers a fast response time of 500 microseconds
- Features a single-turn potentiometer sensitivity adjustment and a visible red beam
- Offers light- or dark-operate, selected with a sealed switch
- Operates at 10 to 30V dc
- Available with 2 m or 9 m attached cable, 4-pin Euro-style pigtail or 3-pin Pico-style quick-disconnect
- Features rugged, sealed, die-cast metal housing rated IEC IP67 (NEMA 6)



Available in eight slot widths from 10 to 220 mm for a wide variety of applications

- Count
- Sense parts on conveyor rails and belts
- Detect edges and gear teeth
- Verify position, orientation and dimensions
- Monitor levels

Nickel-plated models available for ESD sensitive applications or cleanroom locations.



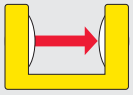
SLM Sensors

- *Rugged, sealed, die-cast metal housing rated IEC IP67 (NEMA 6)*
- *Selection switch for light/dark operate*
- *Single-turn potentiometer sensitivity adjustment*
- *Models with yellow painted or nickel-plated surface*
- *2 m or 9 m attached cable, Pico-style quick-disconnect or 150 mm pigtail with Euro-style quick-disconnect*

MORE INFO ONLINE Detailed Dimensions

SLM, 10-30V dc

MORE INFO ONLINE Download PDF

Models†	Sensing Mode/LED*	Slot Width/ Depth	Overall Width (W)	Overall Depth (D)	Cable**	Output Type	Response	Data Sheet
SLM10B6	 SLOT	10 mm/ 60.8 mm	42 mm	80 mm	2 m	Bipolar NPN/PNP	500 µs	122703
SLM10B6QPMA					4-Pin Euro Pigtail QD			
SLM10P6Q					3-Pin Pico QD	PNP		
SLM10N6Q					3-Pin Pico QD	NPN		
SLM20B6		20 mm/ 60.8 mm	52 mm	80 mm	2 m	Bipolar NPN/PNP		
SLM20B6QPMA					4-Pin Euro Pigtail QD			
SLM20P6Q					3-Pin Pico QD	PNP		
SLM20N6Q					3-Pin Pico QD	NPN		
SLM30B6		30 mm/ 60.8 mm	62 mm	80 mm	2 m	Bipolar NPN/PNP		
SLM30B6QPMA					4-Pin Euro Pigtail QD			
SLM30P6Q					3-Pin Pico QD	PNP		
SLM30N6Q					3-Pin Pico QD	NPN		
SLM50B6		50 mm/ 60.8 mm	82 mm	80 mm	2 m	Bipolar NPN/PNP		
SLM50B6QPMA					4-Pin Euro Pigtail QD			
SLM50P6Q					3-Pin Pico QD	PNP		
SLM50N6Q					3-Pin Pico QD	NPN		
SLM80B6		80 mm/ 60.8 mm	112 mm	80 mm	2 m	Bipolar NPN/PNP		
SLM80B6QPMA					4-Pin Euro Pigtail QD			
SLM80P6Q					3-Pin Pico QD	PNP		
SLM80N6Q					3-Pin Pico QD	NPN		
SLM120B6		120 mm/ 120.7 mm	152 mm	140 mm	2 m	Bipolar NPN/PNP		
SLM120B6QPMA					4-Pin Euro Pigtail QD			
SLM120P6Q					3-Pin Pico QD	PNP		
SLM120N6Q					3-Pin Pico QD	NPN		
SLM180B6		180 mm/ 120.7 mm	202 mm	140 mm	2 m	Bipolar NPN/PNP		
SLM180B6QPMA					4-Pin Euro Pigtail QD			
SLM180P6Q					3-Pin Pico QD	PNP		
SLM180N6Q					3-Pin Pico QD	NPN		

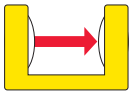
* → Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SLM10B6 W/30**). A model with a QD requires a mating cable (see pages 410 and 412).

† Standard models have yellow painted surface. For models with nickel-plated surface, add the suffix **N** to the model number (example, **SLM10P6QN**).

More on next page

SLM, 10-30V dc (cont'd)

Models†	Sensing Mode/LED*	Slot Width/ Depth	Overall Width (W)	Overall Depth (D)	Cable**	Output Type	Response	Data Sheet
SLM220B6	 SLOT	220 mm/ 120.7 mm	252 mm	140 mm	2 m	Bipolar NPN/PNP	500 µs	122703
SLM220B6QPMA					4-Pin Euro Pigtail QD			
SLM220P6Q					3-Pin Pico QD	PNP		
SLM220N6Q					3-Pin Pico QD	NPN		

* → Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SLM10B6 W/30**). A model with a QD requires a mating cable (see pages 410 and 412).

† Standard models have yellow painted surface. For models with nickel-plated surface, add the suffix **N** to the model number (example, **SLM10P6QN**).

SLM Specifications

Slot Opening	10, 20, 30, 50, 80, 120, 180 or 220 mm (depending on model); beam is 5 mm from outer edge							
Supply Voltage and Current	10 to 30V dc (10% ripple) @ less than 25 mA, exclusive of load.							
Supply Protection Circuitry	Protected against reverse polarity and transient voltages.							
Output Configuration	**Cabled and Euro-style QD models: Bipolar:** One current sourcing (PNP) and one current sinking (NPN) **Pico-style QD models:** Current sourcing (PNP) or current sinking (NPN), depending on model							
Output Rating	100 mA with short circuit protection **OFF-state leakage current:** less than 10 µA sourcing; less than 200 µA sinking **ON-state saturation voltage: NPN:** 1.6V @ 100 mA **PNP:** 2.0V @ 100 mA							
Output Protection Circuitry	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.							
Minimum Object Detection* at Max. Gain	**SLM10…**	**SLM20...**	**SLM30…**	**SLM50…**	**SLM80…**	**SLM120…**	**SLM180…**	**SLM220…**
	0.76 mm	0.91 mm	1.20 mm	1.20 mm	1.50 mm	1.80 mm	1.80 mm	2.40 mm
Minimum Object Detection* at 2X Excess gain	0.30 mm	0.30 mm	0.40 mm	0.60 mm	0.75 mm	0.90 mm	0.90 mm	1.00 mm
Hysteresis**	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.20 mm	0.20 mm	0.20 mm	0.20 mm
Repeatability***	0.02 mm	0.02 mm	0.02 mm	0.04 mm	0.06 mm	0.08 mm	0.08 mm	0.08 mm
Output Response Time	500 microseconds							
Repeatability	95 microseconds							
Adjustments	1-turn potentiometer Sensitivity adjustment Light Operate / Dark Operate Selection switch							
Indicators	Two LED Indicators: Power (Green) and Output (Yellow) **Green ON steady:** Power ON **Green flashing:** Sensor short circuit **Yellow ON steady:** Output activated							
Construction	**Housing:** Die-cast zinc with yellow paint; models with "**N**" at the end of the model number have nickel plating **Endcaps:** ABS **Optic windows:** Acrylic							
Environmental Rating	IEC IP67; NEMA 6							
Connections	**Cabled models:** 2 m or 9 m 4-conductor, PVC-jacketed cable **Pico-style QD models:** 3-pin, threaded (see page 410) **Euro-style QD models:** 4-pin, threaded 150 mm pigtail with polyurethane (PUR) cable (see page 412)							
Operating Conditions	**Temperature:** -20° to +60° C **Relative humidity:** 90% @ 55° C (non-condensing)							
Certifications	Approvals in process. Contact factory for more information.							
Hookup Diagrams	**Bipolar Models:** DC04 (p. 520) **All others:** DC01 (p. 520)							

* **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 and SL10
Opposed-Mode Fixed-Distance Sensors

- Provides easy-to-use self-contained opposed-mode sensor pair in a rugged U-shaped housing
- Available in 10 mm-wide sensing slot (SL10 models) or 30 mm-wide sensing slot (SL30 models)
- Ideal for registration mark detection, hole detection, gear tooth detection, edge guiding and counting
- Uses visible red sensing beam (infrared on SL0 models)
- Features manual sensitivity adjustment or easy push-button TEACH-mode setup, depending on model
- Provides an economical choice for many OEM applications with fixed sensitivity (SL0 model)

SLOT

BRACKETS
PAGE 372

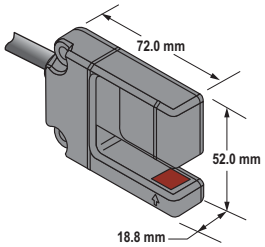
QD CABLES
5-Pin Euro
PAGE 414

MORE INFO ONLINE Detailed Dimensions

SL Series Slot Sensors

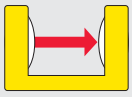
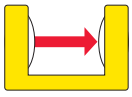
- *Molded-in beam guides to simplify mounting and beam placement*
- *10 or 30 mm slot width for a wide variety of sensing applications*
- *10 to 30V dc operation*
- *Bipolar PNP/NPN outputs*
- *Fixed-sensitivity, 4-turn potentiometer sensitivity adjustment or push-button programming, depending on model*
- *2 m or 9 m attached cable, or 5-pin Euro-style quick-disconnect*

SL30, SL030 and SLE30 Models

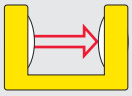


SL10 and SLE10 Models

SL30 and SL10, 10-30V dc

Models	Sensing Mode/LED*	Slot Width	Cable**	Output Type	Response	Repeatability	Data Sheet
SL30VB6V	 SLOT	30 mm	2 m	Bipolar NPN/PNP	1 ms	250 µs	56407
SL30VB6VQ			5-Pin Euro QD				
SL30VB6VY			2 m		300 µs	75 µs	
SL30VB6VYQ			5-Pin Euro QD				
SL10VB6V	 SLOT	10 mm	2 m		1 ms	250 µs	58341
SL10VB6VQ			5-Pin Euro QD				
SL10VB6VY			2 m		300 µs	75 µs	
SL10VB6VYQ			5-Pin Euro QD				

SLO30, 10-30V dc

Models	Sensing Mode/LED*	Slot Width	Cable**	Output Type	Response	Repeatability	Data Sheet
SLO30VB6	 SLOT	30 mm	2 m	Bipolar NPN/PNP	1 ms	250 µs	60073
SLO30VB6Q			5-Pin Euro QD				
SLO30VB6Y			2 m		300 µs	75 µs	
SLO30VB6YQ			5-Pin Euro QD				

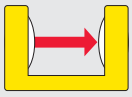
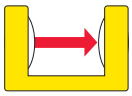
* Visible Red LED Infrared LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SL30VB6V W/30**). A model with a QD requires a mating cable (see page 414).

SL30, SL10 and SLO30 Specifications

Supply Voltage and Current	10 to 30V dc, 30 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** 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	**SL30 and SL10:** 4-turn clutched potentiometer sensitivity adjustment **SLO30:** None
Indicators	**Green:** Power ON/OFF indicator **Yellow:** Signal condition indicator
Construction	**Housing:** ABS/polycarbonate **Lenses:** 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 cables are ordered separately. See page 414.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% @ 50° C (non-condensing)
Certifications	CE
Hookup Diagrams	SP03 (p. 530)

SLE30 and SLE10 *Expert*™, 10-30V dc

Models	Sensing Mode/LED*	Slot Width	Cable**	Output Type	Response	Repeatability	Data Sheet
SLE30B6V	 SLOT	30 mm	2 m	Bipolar NPN/PNP	500 µs	100 µs	58338
SLE30B6VQ			5-Pin Euro QD				
SLE30B6VY			2 m		150 µs	75 µs	
SLE30B6VYQ			5-Pin Euro QD				
SLE10B6V	 SLOT	10 mm	2 m		500 µs	100 µs	60378
SLE10B6VQ			5-Pin Euro QD				
SLE10B6VY			2 m		150 µs	75 µs	
SLE10B6VYQ			5-Pin Euro QD				

* Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SLE30B6V W/30**). A model with a QD requires a mating cable (see page 414).

SLE30 and SLE10 *Expert*™ Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** 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) **OFF-state leakage current:** less than 5 µA @ 30V dc **ON-state saturation current:** less than 1V @ 10 mA; less than 1.5V @ 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. NOTE: 1 second delay on power-up; outputs are non-conducting during this time.
Repeatability	100 microseconds or 75 microseconds, depending on model
Adjustments	Push-button TEACH-mode sensitivity setting; remote TEACH-mode input is provided (gray wire)
Indicators	Two LEDs: Yellow and Bicolor Green/Red **Green (RUN Mode):** ON when power is applied Flashes when received light level approaches the switching threshold **Red (TEACH Mode):** 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™). **Alternating Red/Green: Flashing** Microprocessor memory error **Yellow (Static TEACH):** ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition **Yellow (Dynamic TEACH):** Pulses at 0.5 Hz when ready to sample ON to indicate Dynamic TEACH sampling OFF to indicate sampling was accepted **Yellow (RUN Mode):** ON when outputs are conducting
Construction	**Housing:** ABS/polycarbonate **Lenses:** 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 cables are ordered separately. See page 414.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	The first condition presented during TEACH mode becomes the output ON condition.
Certifications	CE
Hookup Diagrams	DC08 (p. 521)

SLC1
C-GAGE® Label Sensors

- Accurately detects labels on web backing
- Requires no user adjustments—ADL™ (Adaptive Digital Logic) provides revolutionary self-learning capability
- Provides continuous automatic internal adjustment of sensing threshold and drift compensation
- Offers typical registration accuracy of ±0.3 mm at web speeds up to 1.5 m per second
- Reliably detects the presence of most types of labels on web backing, regardless of whether the labels or web are clear or opaque

QD CABLES
5-Pin Euro
PAGE 414

SLC1 Sensors

- *Dual-LED indicators*
- *Heavy-duty metal housing, 1 mm slot*
- *Web alignment guides*
- *2 m or 9 m integral cable, or Euro-style quick-disconnect*

MORE INFO ONLINE Detailed Dimensions

SLC1, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Slot Width	Cable**	Output Type	Response	User Adjustments	Data Sheet
SLC1BB6	1 mm	2 m	Bipolar NPN/PNP	100 µs	None Required	59369
SLC1BB6Q		5-pin Euro QD				

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SLC1BB6 W/30**). A model with a QD requires a mating cable (see page 414).

SLC1 Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) @ less than 60 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Power-Up or Reset Delay	1 second typical (outputs are non-conducting during this time)
Output Configuration	**Bipolar:** one current-sourcing (PNP) and one current-sinking (NPN) open-collector transistor
Output Rating	150 mA max. (each output) **OFF-state leakage current:** less than 5 µA @ 30V dc **Output saturation voltage:** less than 1V @ 10 mA dc; less than 1.6V @ 150 mA dc
Output Protection Circuitry	Protected against continuous overload and short-circuit of outputs **Overload trip point:** greater than 200 mA, typical, at 20° C
Output Invert Control/Reset	Gray wire has dual functionality, and may be controlled by a PLC **Input impedance:** 10 KΩ **Outputs ON during gap (turn OFF at leading edge of label):** leave open, or connect to 0 to +1V dc **Outputs ON during label (turn ON at leading edge of label):** connect to +5 to 30V dc **Microprocessor reset:** toggle gray wire to opposite polarity for > 100 milliseconds (see Hookups, page 530)
Registration Accuracy*	±0.3 mm typical, web speeds up to 1.5 m per second
Maximum Web Speed*	10 m per second
Response Time*	100 microseconds
Minimum Sensing Speed*	100 mm per minute
Maximum Switching Speed*	1 kHz
Minimum Gap or Label Size	2 mm
Adjustments	No user adjustments; automatic continuous adjustment of sensing threshold and drift compensation under internal microprocessor control **Adjustment interval:** every 250 milliseconds or 4 labels, whichever is greater
Indicators	**Two LEDs, Green and Yellow:** **Green ON steady:** power ON **Green flashing @ 4 Hz:** output overloaded **Yellow ON steady:** NPN and PNP outputs ON **Green and Yellow flashing alternately @ 1 Hz:** internal error; reset sensor
Construction	Housings are machined aluminum with black anodized finish
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m 5-wire attached cable, or 5-pin Euro-style quick-disconnect fitting. QD cables are sold separately. See page 414.
Operating Conditions	**Temperature:** +5° to 50° C **Relative humidity:** 90% at 50° C, non-condensing
Certifications	CE
Hookup Diagrams	SP04 (p. 530)

* Based on 3.2 mm gap between labels, and web speeds of up to 10 m per second. Instantaneous web speed, not average web speed, must be used to determine actual operating speeds in stepped-advance label systems.

Color & Luminescence Sensors

R58 *Expert*™ **page 225**

- Outstanding color contrast sensitivity even in low-contrast or high-gloss applications
- Ultra-fast 10 kHz switching frequency
- Easy-to-set, automatic *Expert*™ TEACH programming and manual fine tuning
- Bipolar discrete outputs: one current sourcing (PNP) and one current sinking (NPN)

QC50/QCX50 **page 228**

- For comparing 3 different colors or shades of one color
- Models for challenging applications such as differentiating dark blue from black
- Easy to set and program
- Three programming parameters: channel, sensing mode and tolerance level

QL50/QL55 **page 230**

- Low-cost luminescent sensing
- For luminescent marks on luminescent backgrounds and reflective surfaces such as ceramic, metal or mirrored glass
- Fast 250 milliseconds response time
- Easy push-button programming

R58 *Expert*™
Registration Mark Sensors

- Provides excellent color contrast sensitivity, detecting contrasts as low as 2% over a wide range of colors
- Optimizes application contrast by automatically choosing red, green or blue sensing LEDs
- Maximizes performance in low-contrast or high-gloss applications
- Detects small, inconspicuous registration marks
- Features Static and Dynamic programming and manual adjustment
- Provides a sensing image that measures 1.2 by 3.8 mm at 10 mm from the lens
- Includes bipolar discrete outputs: current sinking (NPN) and current sourcing (PNP)
- Offers configurable light- or dark-operate outputs
- Includes optional 30 milliseconds ON/OFF-delay
- Features 10,000 actuations per second (10 kHz switching frequency)

Convenient and flexible mounting

- Two lens locations on each sensor
- Threaded lens and cap for easy exchange without tools
- Vertical or horizontal light spot, depending on model

Range and application tolerant

The R58E tolerates a +/-3 mm shift from the 10 mm focal point, to accommodate web flutter and similar variations in the target's location.

Three LED sensing colors in one sensor

Each sensor includes three LEDs and automatically selects the correct one to use, based on the contrast between the color of the registration mark and its background.

CONVERGENT
BRACKETS
PAGE 372
QD CABLES
5-Pin Euro
PAGE 415

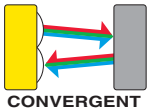
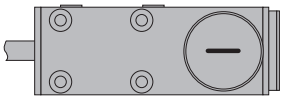
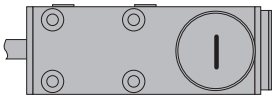
R58 *Expert*™ Sensors

- *Easy-to-read 8-segment light bar indicator*
- *Rugged zinc alloy die-cast housing*
- *High-quality acrylic lens suitable for food processing applications*
- *IP67; NEMA 6*
- *Push-button configuration for light/dark operate and ON/OFF-delays*
- *Integral cable or Euro-style quick-disconnect pigtail*
- *5-pin Euro-style QD cables with shield ordered separately (see page 415)*

MORE INFO ONLINE Detailed Dimensions

R58 *Expert*™, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Sensing Image Orientation	Focus	Cable**	Output Type	Data Sheet
R58ECRGB1	 CONVERGENT	Parallel to sensor length 	10 mm	2 m	Bipolar NPN/PNP	122928
R58ECRGB1Q				5-pin Euro Pigtail QD		
R58ECRGB2		Perpendicular to sensor length 		2 m		
R58ECRGB2Q				5-pin Euro Pigtail QD		

* Visible Red, Green or Blue LED, depending on contrast of registration mark

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **R58ECRGB1 W/30**). A model with a QD requires a mating cable (see page 415).

R58 *Expert*™ Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); **Supply current (exclusive of load current):** 75 mA @ 10V dc 35 mA @ 30V dc
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	100 mA max. (each output) **OFF-state leakage current: NPN:** less than 200 µA **PNP:** less than 10 µA **NPN saturation:** less than 200 mV @ 10 mA and less than 1V @ 100 mA **PNP saturation:** less than 1.2V @ 10 mA and less than 1.6V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs.
Output Response Time	50 microseconds NOTE: 1 second delay on power-up; outputs do not conduct during this time.
Repeatability	15 microseconds
Tri-Color LED 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 **Red:** 636 nm **Green:** 525 nm **Blue:** 472 nm
Adjustments	**Using push buttons ("+" Dynamic and "-" Static):** Manually adjust discrete output switchpoint using "+" or "-" buttons Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Light operate/Dark operate OFF-delay/ON-delay Sensing beam color enable/disable **Using Remote TEACH input (gray wire):** Dynamic TEACH (teach on-the-fly) sensitivity adjustment Static TEACH sensitivity adjustment Light operate/Dark operate OFF-delay/ON-delay Sensing beam color enable/disable Disable push buttons for security
Indicators	**8-segment Bargraph display:** Red signal strength indicator relative to taught signal level; higher segment number for higher measured sensing contrast **Green ON steady:** Power to sensor is ON **Yellow ON steady:** Outputs ON **2-position Green:** LED ON next to DO for dark operate LED ON next to LO for light operate **2-position Green:** LED ON next to ON for ON-delay LED ON next to OFF for OFF-delay
Construction	Zinc alloy die-cast and steel housing with black painted finish and o-ring sealed lens and lens port cap. **Lens:** Acrylic **Lens port cap and lens holder:** ABS **Push buttons:** Thermoplastic elastomer **Labels:** Polycarbonate
Environmental Rating	IEC IP67; NEMA 6
Connections	PVC-jacketed 5-conductor 2 m or 9 m attached cable with internal strain relief, or 150 mm pigtail with 5-pin Euro-style quick-disconnect. QD cables are ordered separately. See page 415.
Operating Conditions	**Temperature:** -10° to +55° C **Relative humidity:** 90% at 50° C (non-condensing) **Storage temperature:** -20° to +80° C
Vibration and Mechanical Shock	All models meet IEC 68-2-6 and IEC 68-2-27 testing criteria.
Application Notes	• Do not mount the sensor directly perpendicular to shiny surfaces; position it at approximately a 15° angle in relation to the sensing target • Minimize web or product "flutter" whenever possible to maximize sensing reliability.
Certification	CE
Hookup Diagrams	DC08 (p. 521)

QC50
True Color Sensor

- Accurately analyzes and compares colors or varying intensities of color
- Available in two versions for application flexibility: QC50 models for most applications and QCX50 models for challenging applications such as differentiating dark blue from black
- Offers easy-to-set push-button programming options for up to three colors
- Features compact, self-contained design
- Offers fast sensing response time of 335 microsecond (QC50) and 5 milliseconds (QCX50)
- Includes three programming parameters: channel, sensing mode and tolerance level
- Available in models with three NPN or three PNP outputs, one for each color channel

DIFFUSE

BRACKETS
PAGE 372

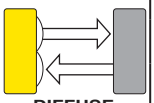
QD CABLES
8-Pin Euro
PAGE 417

QC50 Sensors

- *Push-button SET for easy programming*
- *Bright LEDs indicators for output of programmed colors*
- *3-position swivel connector*
- *8-pin Euro-style QD cables with open-shield ordered separately (see page 417)*

MORE INFO ONLINE Detailed Dimensions

QC50, 10-30V dc

Models	Sensing Beam*	Range	Cable**/ Connector	Response Time	Output Type	Data Sheet
QC50A3N6XDWQ	 DIFFUSE	20 mm typical; varies according to sensor configuration	8-pin Euro QD	335 µs	NPN, 3 channels	111523
QC50A3P6XDWQ					PNP, 3 channels	
QCX50A3N6XDWQ				Selectable 5 ms or 1 ms	NPN, 3 channels	
QCX50A3P6XDWQ					PNP, 3 channels	

* ⇨ Visible White LED
** Mating cable required (see page 417).

QC50 Specifications

Sensing Receiver	Solid-state photodiode device with R, G, B filters
Minimum Spot Diameter	4 mm
Supply Voltage and Current	10 to 30V dc, 2 V pp max ripple 40 mA max @ 24V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity, over-voltage, and transient voltage
Output Configuration	3 PNP or 3 NPN outputs, depending on model 30V dc max. **Saturation voltage:** less than 2V
Output Rating	100 mA max. load per output channel
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power-up
Output Response Time	**QC50 models:** 335 microseconds **QCX50 models:** Selectable 5 milliseconds (normal) or 1 millisecond NOTE: 500 milliseconds delay at power-up; outputs do not conduct during this time. **QC50 models** / **QCX50 models** **Gate ON-time:** 335 microseconds / 700 microseconds **Gate OFF-time:** 170 microseconds / 400 microseconds
Data Retention	EEPROM nonvolatile memory
Ambient Light Rejection	According to EN 609475-2
Adjustments	2 push buttons (Set and Select) • Color, scanning, color modes, delay and tolerance • Manual adjustment of color channels, sensing mode and tolerance level
Indicators	**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
Construction	ABS shock-resistant housing; glass window and lens
Environmental Rating	IEC IP62
Connections	8-pin Euro-style swivel quick-disconnect fitting. QD cables are ordered separately. See page 417.
Operating Conditions	**Temperature:** -10° to +55° C **Relative humidity:** 90% at 50° C (non-condensing)
Shock Resistance	Approx. 30 G; 3 shocks per axis; 11 milliseconds duration
Vibration	0.5 mm amplitude; 10 to 60 Hz frequency; 30 minutes for each X, Y, Z axis
Certifications	CE
Hookup Diagrams	**NPN Models:** SP05 (p. 531) **PNP Models:** SP06 (p. 531)

QL50 and QL55
Luminescence Sensors

- Features compact, self-contained design
- Detects luminescence inherent in a material or luminophores added to a material to make it luminescent
- Senses luminescent marks, even on luminescent backgrounds and reflective surfaces such as ceramic, metal or mirrored glass
- Includes easy-to-set programming options
- Responds in 250 microseconds
- Available in models with NPN or PNP discrete outputs (QL50) or with selectable NPN or PNP outputs (QL55)

DIFFUSE

BRACKETS
PAGE 372

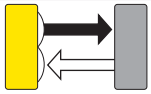
QD CABLES
4-Pin Euro
PAGE 412

QL50 Sensors

- *Push-button programming for easy setup*
- *Bright LED indicators for operating and output status*
- *3-position swivel QD connector*

MORE INFO ONLINE Detailed Dimensions

QL50, 10-30V dc

Models	Sensing Beam/LED*	Range	Cable/Connector**	Output	Data Sheet
QL50AP6XD20BQ	 DIFFUSE	0-40 mm	4-pin Euro QD	PNP	112151
QL50AN6XD20BQ				NPN	

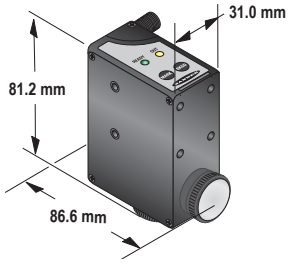
* ➡ Black Ultraviolet LED ⇨ Returned Luminescence
** Mating cable required (see page 412).

QL50 Specifications

Spot Diameter	1.5 mm @ 10 mm
Supply Voltage	10 to 30V dc, 2V max. ripple 30 mA max. @ 30V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	PNP or NPN discrete output, depending on model 30V dc max **Leakage current:** less than 1 µA
Output Rating	100 mA max. load
Output Protection	Protected against output overload and short circuit
Output Response Time	250 microseconds
Data Retention	EEPROM nonvolatile memory
Ambient Light Rejection	According to EN 60947-5-2
Adjustments	**1 push button (set), and remote program wire:** • Fine-detect autoset for Light Operate or Dark Operate • 20 milliseconds output OFF-delay • Remote wire to +V dc for remote programming and/or push-button lockout
Indicators	**Yellow Output LED:** ON when output is conducting **Bicolor Ready/Error LED:** **Green ON:** Default and Quick-Set programming RUN mode **Green OFF:** Threshold **Green Flashing:** Fine-Detection Program mode/Delay status **Green/Red bicolor flashing:** programming error
Construction	ABS shock-resistant housing; glass lens and window (tilted, antireflective)
Environmental Rating	IEC IP62
Connections	4-pin Euro-style swivel quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -25° to +55° C **Relative humidity:** 90% at 50° C non-condensing
Shock Resistance	Approx. 30 G; 3 shocks per axis; 11 milliseconds duration
Vibration	0.5 mm amplitude; 10 to 60 Hz frequency; 30 minutes for each X, Y, Z axis
Certifications	CE
Hookup Diagrams	SP07 (p. 531)

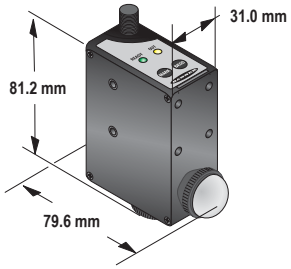
QL55 Sensors

- *Push-button programming*
- *Bright LED indicators for operating and output status*
- *Robust metal housing*
- *3-position swivel QD connector*



QL55M6XD30BQ Model

QL55M6XD15BQ Model

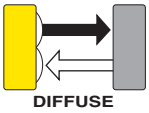


QL55M6XD50BQ Model

MORE INFO ONLINE Detailed Dimensions

QL55, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Beam/LED*	Sensing Range	Cable/Connector**	Output Type	Data Sheet
QL55M6XD15BQ	 DIFFUSE	9-18 mm	4-pin Euro QD	One selectable NPN or PNP discrete plus one 0 to 5.5V dc analog	112153
QL55M6XD30BQ		20-40 mm			
QL55M6XD50BQ		40-75 mm			

* ➡ Black Ultraviolet LED ⇨ Returned Luminescence
** Mating cable required (see page 412).

QL55 Specifications

Spot Diameter	**QL55M6XD15BQ:** 2 mm **QL55M6XD30BQ:** 3 mm **QL55M6XD50BQ:** 4 mm
Supply Voltage	10 to 30V dc, 2 V pp max ripple 80 mA max @ 30V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity
Output Configuration	Discrete NPN or PNP Analog 0 to 5.5V dc ± 10%, ripple 40 mV pp max. **Saturation voltage:** 1V max. NPN / 2V max PNP **Leakage current:** less than 100 µA
Output Rating	200 mA max. load
Output Protection	**NPN/PNP:** Protected against reverse polarity, overload and short circuit (pull down/up resistance 10 kΩ) **Analog:** Protected against short circuit (output resistance 2.2 kΩ)
Output Response Time	250 microseconds

More on next page

QL55 Specifications (cont'd)	
Response Curves	See chart RC-1 on page 516.
Data Retention	EEPROM nonvolatile memory
Ambient Light Rejection	According to EN 60947-5-2
Adjustments	2 push buttons (MARK and BKGD) determine switching threshold and Light/Dark operate 2 selector switches • 20 milliseconds Output OFF-delay • NPN/PNP output
Indicators	**Red Output LED** **ON:** output is conducting **Green Ready/Overload LED** **ON:** normal operating condition, RUN mode **Flashing 2 Hz:** setup failure due to insufficient contrast **Flashing 4 Hz:** output overload condition (verify output current ≤ 200 mA)
Construction	**Housing:** zinc, aluminum, and magnesium alloy **Lens:** glass
Environmental Rating	IEC IP62
Connections	4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -10° to +55° C **Relative humidity:** 85% at 50° C (non-condensing)
Shock Resistance	30 G; 3 shocks per axis; 11 milliseconds duration
Vibration	0.5 mm amplitude; 10 to 60 Hz frequency; 30 minutes for each X, Y, Z axis
Certifications	CE
Hookup Diagrams	SP08 (p. 531)

OPTO-TOUCH™

Optical Touch Buttons

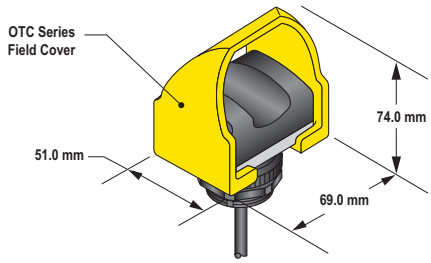
- OTB models are momentary-action touch buttons with electromechanical relay or solid-state outputs.
- LTB models are alternate-action touch buttons with electromechanical relay outputs.
- VTB models are momentary-action touch buttons with solid-state outputs and an illuminating base for sequential part-picking operations.
- STB models are momentary-action touch buttons with solid-state or electromechanical relay outputs and redundant optical channels for inputs to safety controls.

BRACKETS
PAGE 377
QD CABLES
4- & 5-Pin Euro +
4- & 5-Pin Mini
PAGE 412, 414 & 420

Optical Buttons

- *2 m or 9 m, integral cable or quick-disconnect fitting*
- *Ergonomically designed touch buttons to eliminate hand, wrist and arm stress*
- *Dual indicator LEDs*
- *Additional field cover color options available*

MORE INFO ONLINE Detailed Dimensions



OTB, LTB, VTB and STB Models
with cover

OTB, LTB, VTB and STB Models

OTB Momentary Action, 10-30V dc

Models	Cable*	Upper Housing	Output Type	Data Sheet
OTBVN6	2 m	Polysulfone	NPN	28436
OTBVN6QD	4-Pin Mini QD			
OTBVN6L	2 m	Polycarbonate	NPN	
OTBVN6LQD	4-Pin Mini QD			
OTBVP6	2 m	Polysulfone	PNP	
OTBVP6QD	4-Pin Mini QD			
OTBVP6L	2 m	Polycarbonate	PNP	
OTBVP6LQD	4-Pin Mini QD			

OTB Momentary Action, 20-30V ac or dc

Models	Cable*	Upper Housing	Output Type	Data Sheet
OTBVR81	2 m	Polysulfone	SPDT e/m Relay	28436
OTBVR81QD	5-Pin Mini QD			
OTBVR81L	2 m	Polycarbonate	SPDT e/m Relay	
OTBVR81LQD	5-Pin Mini QD			

OTB Momentary Action, 120V ac

Models	Cable*	Upper Housing	Output Type	Data Sheet
OTBA5	2 m	Polysulfone	SPDT e/m Relay	28436
OTBA5QD	5-Pin Mini QD			
OTBA5L	2 m	Polycarbonate	SPDT e/m Relay	
OTBA5LQD	5-Pin Mini QD			

OTB Momentary Action, 220/240V ac

Models	Cable*	Upper Housing	Output Type	Data Sheet
OTBB5	2 m	Polysulfone	SPDT e/m Relay	28436
OTBB5QD	5-Pin Mini QD			
OTBB5L	2 m	Polycarbonate	SPDT e/m Relay	
OTBB5LQD	5-Pin Mini QD			

* For 9 m cable, add suffix **W/30** to the 2 m model number (example, **OTBVN6 W/30**). A model with a QD requires a mating cable (see page 420)

OTB Specifications

Supply Voltage and Current	**OTBVR81 models:** 20 to 30V ac/dc **OTBA5 models:** 105 to 130V ac, 50-60 Hz **OTBB5 models:** 210 to 250V ac, 50-60 Hz **OTBVN6/VP6 models:** 10 to 30V dc All models require less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**OTBVR81, OTBA5, and OTBB5 models:** SPDT electromechanical relay **OTBVN6 models:** Complementary NPN (sinking) open-collector transistor; 1 normally open (NO) and 1 normally closed (NC) **OTBVP6 models:** Complementary PNP (sourcing) open-collector transistors; 1 normally open (NO) and 1 normally closed (NC)
Output Rating	**Electromechanical relay models:** **Max. switching current:** 7 amps (resistive load), 1 HP max. **Min. load:** 0.05 watts (dc), 0.05 VA (ac) **Mechanical life of relay:** 50,000,000 operations (min.) **Electrical life of relay:** 100,000 operations (min.) at full resistive load Transient suppression is recommended when switching inductive loads **Solid-state output models:** 150 mA max. load (each output) **ON-state saturation voltage:** less than 1 volt at signal levels; less than 1.5 volts at full load **OFF-state leakage current:** less than 1 µA
Response Time	100 milliseconds ON/OFF
Output Protection	All models protected against false pulse on power-up Models with solid-state outputs have overload and short circuit protection
Indicators	**Two Red indicator LEDs:** one lights whenever power is applied; the other lights whenever the switch is activated making the normally-open (NO) output conduct
Construction	Totally encapsulated, non-metallic enclosure. Black polysulfone or red polycarbonate upper housing (see Application Notes below); fiber-reinforced thermoplastic polyester base. Electronics fully epoxy-encapsulated. Supplied with a field cover of polypropylene (TP).
Environmental Rating	Meets NEMA standards 1, 3, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m or 9 m cables, or Mini-style quick-disconnect (QD) fitting. QD cables are ordered separately. See page 420.
Ambient Light Immunity	120,000 lux (direct sunlight)
EMI/RFI Immunity	Immune to both single and mixed EMI and RFI noise sources
Operating Conditions	**Temperature:** -20° to +50° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	**Environmental considerations for models with polysulfone upper housings:** The polysulfone upper housing will become embrittled with prolonged exposure to outdoor sunlight. Window glass effectively filters longer wavelength ultraviolet light and provides excellent protection from sunlight. **Environmental considerations for models with polycarbonate upper housings:** Avoid prolonged exposure to hot water and moist high-temperature environments above 66° C. Avoid contact with aromatic hydrocarbons (such as xylene and toluene), halogenated hydrocarbons and strong alkalis. Clean periodically using mild soap solution and a soft cloth. Avoid strong alkaline materials.
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**DC Models:** DC03 (p. 520) **AC/DC Models:** **OTBVR81 Models:** UN01 (p. 528) **AC Models:** **OTBA5 Models:** AC08 (p. 526) **OTBB5 Models:** AC08 (p. 526)

LTB Alternate Action, 120V ac

Models	Cable*	Upper Housing	Output Type	Data Sheet
LTBA5	2 m	Polysulfone	SPDT e/m Relay	28437
LTBA5QD	5-Pin Mini QD			
LTBA5L	2 m	Polycarbonate		
LTBA5LQD	5-Pin Mini QD			

LTB Alternate Action, 220/240V ac

Models	Cable*	Upper Housing	Output Type	Data Sheet
LTBB5	2 m	Polysulfone	SPDT e/m Relay	28437
LTBB5QD	5-Pin Mini QD			
LTBB5L	2 m	Polycarbonate		
LTBB5LQD	5-Pin Mini QD			

* For 9 m cable, add suffix **W/30** to the 2 m model number (example, **LTBA5 W/30**). A model with a QD requires a mating cable (see page 420).

LTB Specifications

Supply Voltage and Current	**LTBA5 models:** 105 to 130V ac, 50-60 Hz **LTBB5 models:** 210 to 250V ac, 50-60 Hz
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	All models have SPDT electromechanical relay - complementary outputs: one normally open (NO) contact and one normally closed (NC) contact which "toggle" from open to closed when the button is activated
Output Rating	Max. voltage is 250V ac or 30V dc **Max. current:** 7 amps (resistive load), 1 HP max. **Min. load:** .05 watts (dc), 0.5VA (ac) **Mechanical life of relay:** 50,000,000 operations (min.) **Electrical life of relay:** 100,000 operations (min.) at full resistive load Transient suppression is recommended when switching inductive loads.
Output Protection	All models protected against false pulse on power-up
Indicators	**Two Red indicator LEDs:** one lights whenever power is applied; the other lights when the infrared sensing beam is interrupted
Construction	Totally encapsulated, non-metallic enclosure. Black polysulfone or red polycarbonate upper housing; fiber-reinforced thermoplastic polyester base. Electronics fully epoxy-encapsulated. Supplied with a field cover of polypropylene (TP).
Environmental Rating	Meets NEMA standards 1, 3, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m or 9 m cables, or Mini-style quick-disconnect (QD) fitting. QD cables are ordered separately. See page 420.
Ambient Light Immunity	120,000 lux (direct sunlight)
EMI/RFI Immunity	Immune to both single and mixed EMI and RFI noise sources
Operating Conditions	**Temperature:** -20° to +50° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	**Environmental considerations for models with polysulfone upper housings:** The polysulfone upper housing will become embrittled with prolonged exposure to outdoor sunlight. Window glass effectively filters longer wavelength ultraviolet light and provides excellent protection from sunlight. **Environmental considerations for models with polycarbonate upper housings:** Avoid prolonged exposure to hot water and moist high-temperature environments above 66° C. Avoid contact with aromatic hydrocarbons (such as xylene and toluene), halogenated hydrocarbons and strong alkalis. Clean periodically using mild soap solution and a soft cloth. Avoid strong alkaline materials.
Certifications	CE CSA® UL LISTED
Hookup Diagrams	AC08 (p. 526)

VTB, 12-30V dc

Models	Job Light(s) Color	Cable*	Upper Housing	Output Type	Job Light Input	Data Sheet
VTBN6	Green	2 m	Polysulfone	**NPN**	0V dc	67570
VTBN6Q		4-Pin Euro QD				
VTBN6R	Red	2 m				
VTBN6RQ		4-Pin Euro QD				
VTBN6B	Blue	2 m				
VTBN6BQ		4-Pin Euro QD				
VTBN6GR	Green & Red	2 m				
VTBN6GRQ		5-Pin Euro QD				
VTBN6L	Green	2 m	Polycarbonate			
VTBN6LQ		4-Pin Euro QD				
VTBN6RL	Red	2 m				
VTBN6RLQ		4-Pin Euro QD				
VTBN6BL	Blue	2 m				
VTBN6BLQ		4-Pin Euro QD				
VTBN6GRL	Green & Red	2 m				
VTBN6GRLQ		5-Pin Euro QD				
VTBP6	Green	2 m	Polysulfone	**PNP**	+10 to 30V dc	67570
VTBP6Q		4-Pin Euro QD				
VTBP6R	Red	2 m				
VTBP6RQ		4-Pin Euro QD				
VTBP6B	Blue	2 m				
VTBP6BQ		4-Pin Euro QD				
VTBP6GR	Green & Red	2 m				
VTBP6GRQ		5-Pin Euro QD				
VTBP6L	Green	2 m	Polycarbonate			
VTBP6LQ		4-Pin Euro QD				
VTBP6RL	Red	2 m				
VTBP6RLQ		4-Pin Euro QD				
VTBP6BL	Blue	2 m				
VTBP6BLQ		4-Pin Euro QD				
VTBP6GRL	Green & Red	2 m				
VTBP6GRLQ		5-Pin Euro QD				

* For 9 m cable, add **W/30** to the 2 m model number (example, **VTBN6 W/30**). A model with a QD requires a mating cable (see pages 412 and 414).

VTB Specifications

See page 358.

STB Self-Checking, 10-30V dc

Models	Cable*	Upper Housing	Output Type	Data Sheet
STBVP6	2 m	Polysulfone	Complementary PNP Solid-state	64136
STBVP6Q	4-Pin Mini QD			
STBVP6Q5	4-Pin Euro QD			
STBVP6L	2 m	Polycarbonate		
STBVP6LQ	4-Pin Mini QD			
STBVP6LQ5	4-Pin Euro QD			

STB Self-Checking, 20-30V ac/dc

Models	Cable*	Upper Housing	Output Type	Data Sheet
STBVR81	2 m	Polysulfone	Two Independent and Complementary e/m Relays	64136
STBVR81Q	5-Pin Mini QD			
STBVR81Q6	5-Pin Euro QD			
STBVR81L	2 m	Polycarbonate		
STBVR81LQ	5-Pin Mini QD			
STBVR81LQ6	5-Pin Euro QD			

* For 9 m cable, add suffix **W/30** to the 2 m model number (example, **STBVP6 W/30**). A model with a QD requires a mating cable (see pages 412 and 420).

STB Specifications

Supply Voltage and Current	**STBVP6 Models:** 10 to 30V dc **STBVR81 Models:** 20 to 30V ac/dc
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**STBVP6 Models:** Complementary PNP (sourcing) open collector transistors **STBVR81 Models:** Complementary electromechanical relay
Output Rating	**STBVP6 Models (solid-state outputs):** **Max. load:** 150 mA **ON-state saturation voltage:** ≤ 15V @ full load **OFF-state leakage current:** less than 1 µA **STBVR81 Models (electromechanical relay):** **Max. voltage:** 125V dc, 150V ac **Max. switching current:** 1A **Max. resistive load power:** 60 VA ac or 30 W dc **Mechanical life of relay:** 10^9 cycles **Electrical life of relay:** 1.5 x 10^5 cycles at 1 amp, 24 resistive
Output Protection	All models protected against false pulse on power-up. Models with solid-state outputs have overload and short-circuit protection.
Response Time	20 milliseconds ON/OFF
Indicators	**2 Green LED indicators:** **Power:** ON – power applied OFF – power off **Output/fault:** ON – button is activated OFF – button is deactivated Flashing – internal fault or blocked button on power-up detected
Construction	Totally encapsulated, non-metallic enclosure. Black polysulfone or red polycarbonate upper housing (see Application Notes, page 240); fiber-reinforced PBT polyester base. Electronics fully epoxy-encapsulated. Supplied with polypropylene (TP) field cover.
Environmental Rating	Meets NEMA standards 1, 3, 4, 4X, 12 and 13; IEC IP66

More on next page

STB Specifications (cont'd)	
Connections	PVC-jacketed 2 m cables standard on integral-cable kits; QD fitting, depending on model. Accessory QD mating cables required for QD models. QD cables are ordered separately. See pages 412 and 420. **STBVP6 models:** 4-wire (4-pin Mini-style QD, add suffix **Q** or 4-pin Euro-style QD, add suffix **Q5**) **STBVR81 models:** 5-wire (5-pin Mini-style QD, add suffix **Q** or 5-pin Euro-style QD, add suffix **Q6**) Integral 9 m cables are also available by adding suffix **W/30** to the 2 m model number.
Ambient Light Immunity	Up to 100,000 lux
EMI/RFI Immunity	Immune to EMI and RFI noise sources per IEC 947-5-2
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Application Notes	**Environmental considerations for models with polysulfone upper housings:** The polysulfone upper housing will become brittle with prolonged exposure to outdoor sunlight. Window glass effectively filters ultraviolet light and provides excellent protection from sunlight. Avoid contact with strong alkalis. Clean periodically using mild soap solution and a soft cloth. **Environmental considerations for models with polycarbonate upper housings:** Avoid prolonged exposure to hot water and moist high-temperature environments above 66° C. Avoid contact with aromatic hydrocarbons (such as xylene and toluene), halogenated hydrocarbons and strong alkalis. Clean periodically using mild soap solution and a soft cloth.
Certifications	
Hookup Diagrams	**STB Relay Models:** UN01 (p. 528) **STB Solid-state Models:** DC03 (p. 520)

Optical Buttons Field Covers

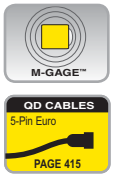
Models	Description		Data Sheet
OTC-1-BK	Black cover		28436
OTC-1-GN	Green cover		
OTC-1-RD	Red cover		
OTC-1-YW	Yellow cover		

Field covers are designed to prevent inadvertent activation of optical touch buttons due to objects (loose clothing, debris, etc.) which might accidentally block their sensing beams. Field covers are constructed of rugged polypropylene and are highly resistant to abrasion and to damage by most chemicals. OTBs are shipped with a black cover, STBs with a yellow cover and VTBs without a cover.

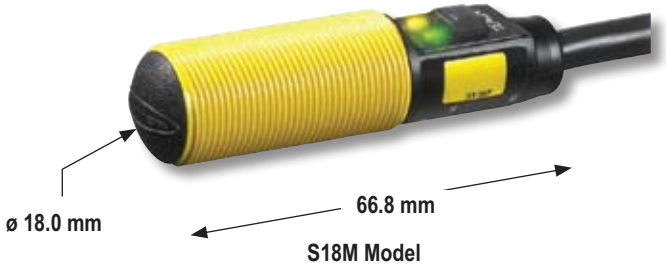
M-GAGE™
Vehicle Detection Sensors

- Detects metal objects, such as cars, trucks, motorcycles, bicycles and railcars, even when they aren't moving
- Features patented magnetoresistive-based passive sensing technology, for increased reliability
- Offers two housing designs: compact Flat-Pak Q7M for retrofits and 18 mm universal S18M for new installations
- Ideal for car wash entries and exits, fast food drive-ups, loading docks, vehicle counting, automatic overhead doors, gate actuation and turn lanes
- Easily installs above or below grade
- Features completely self-contained design with no external controller
- Replaces inductive loop sensors
- Allows PLC to be used instead of amplifiers and timer cards
- Provides reliable activation in unstable soil and substrates

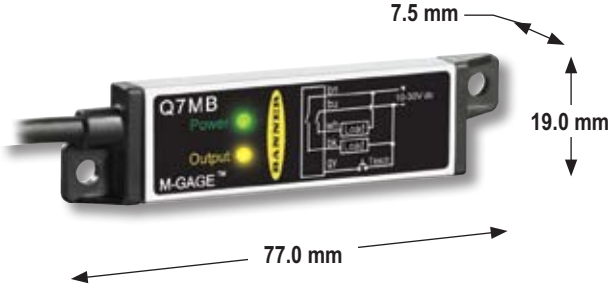
SureCross™ M-GAGE sensor with intergrated wireless connectivity and battery life up to 10 years (see page 338).



MORE INFO ONLINE Detailed Dimensions



S18M Model



Q7M Models

M-GAGE™ Sensors

- *Two housing styles*
- *Easy remote programming*
- *Rugged ABS/polycarbonate or epoxy-encapsulated anodized aluminum, depending on model*
- *Dual indicator LEDs*
- *Integral TEACH button on S18M models*
- *5-pin Euro-style QD cables with shield ordered separately (see page 415)*
- *Optional interface modules and power supplies for simplified setup, wiring and additional status indication (see page 449)*

S18M, 10-30V dc

Model	Sensor Type	Cable*	Range	Output Type**	Data Sheet
S18MB		2 m	Range varies, depending on application and target being sensed. See data sheet for more information.	Bipolar NPN/PNP	114430
S18MBQ		5-pin Euro QD			

Q7M, 10-30V dc

Model	Sensor Type	Cable*	Range	Output Type**	Data Sheet
Q7MB		2 m	Range varies, depending on application and target being sensed. See data sheet for more information.	Bipolar NPN/PNP	117172
Q7MBQ		5-pin Euro Pigtail QD			

* Other cable lengths are available–up to 60 m; consult factory for more information. A model with a QD connector requires a mating cable (see page 415).
** Consult factory for other output options.

M-GAGE™ S18M and Q7M Specifications

Supply Voltage	10 to 30V dc (10% max. ripple) at 43 mA, exclusive of load Above +50° C, supply voltage is 10 to 24V dc (10% max. ripple)
Sensing Technology	Passive 3-axis magnetoresistive transducer
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Two solid-state outputs conduct when object is sensed; one NPN (current sinking) and one PNP (current sourcing)
Output Protection	Protected against short-circuit conditions
Output Ratings	100 mA max. (each output) **NPN saturation:** less than 200 mV @ 10 mA and less than 600 mV @100 mA; **OFF-state leakage current:** less than 200 µA **PNP saturation:** less than 1.2V @ 10 mA and less than 1.6V @100 mA; **OFF-state leakage current:** less than 5 µA
Output Response Time	20 milliseconds
Delay at Power-Up	0.5 seconds
Temperature Effect	Less than 0.5 milligauss/° C
Adjustments	Configuration of Background Condition and Sensitivity Level may be set using the sensor's push button (S18M models) or remotely via the portable programming box.
Indicators	**Two indicators:** **Green:** Power Indicator **Red/Yellow:** Configuration/Output Indicator
Remote TEACH Input	Impedance 12 KΩ (low = less than 2V dc)
Construction	**S18M:** **Threaded Barrel:** Thermoplastic polyester **Push-Button Housing:** ABS/PC **Push Button:** Santoprene **Lightpipes:** Acrylic **Q7M: Housing:** Anodized aluminum **End Caps:** Thermoplastic polyester
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 100%
Connections	2 m or 9 m shielded 5-conductor (with drain) PVC jacketed attached cable, or 5-pin Euro-style quick-disconnect. QD cables are ordered separately. See page 415.
Environmental rating	Leak proof design is rated IEC IP67; NEMA 6P
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.
Certifications	CE
Hookup Diagrams	MI12 (p. 534)