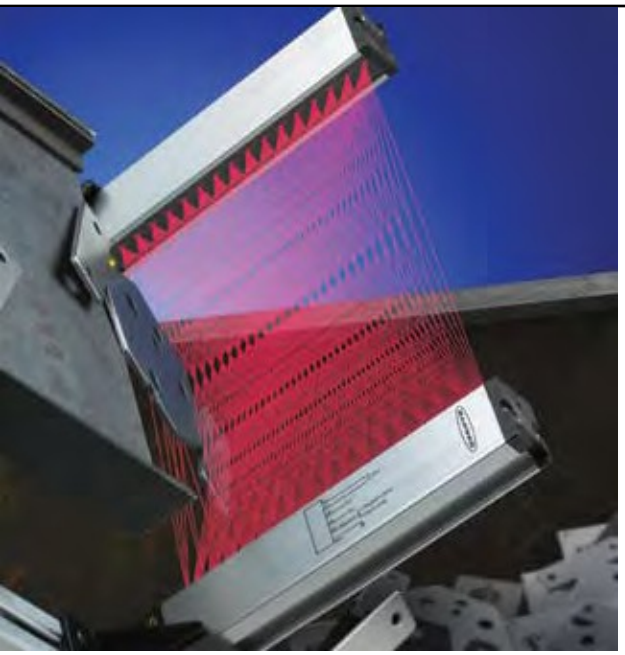
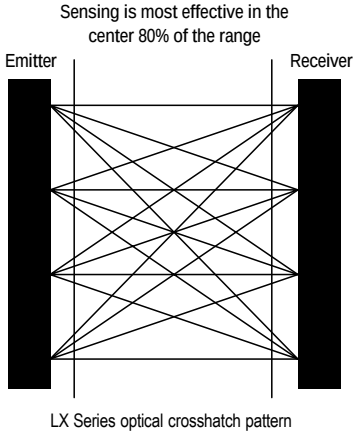


LX
High-Speed Part-Sensing Light Screen

- Generates a multiple-beam infrared pattern for extraordinary sensitively 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
- Responds in 0.8 to 6.4 milliseconds–faster than comparable products, even at its slowest response speed
- Enables automated systems to operate at peek efficiency
- Features rugged silver anodized housing with IP65 rating
- Uses integrated T-slot mounting channel for unique mounting flexibility

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 Series optical crosshatch pattern

LX Light Screens, 10-30V dc

Sensing Array Length	Short-Range (75-200 mm) Min object detection size: 9.5 mm dia.		Standard Range (150 mm - 2 m) Min object detection size: 5.6 mm dia.		Connection	Output Type
	Emitters	Receivers	Emitters	Receivers		
67 mm	LX3ESR	LX3RSR	LX3E	LX3R	2 m	Bipolar NPN/PNP
143 mm	LX6ESR	LX6RSR	LX6E	LX6R		
218 mm	–	–	LX9E	LX9R		
295 mm	LX12ESR	LX12RSR	LX12E	LX12R		

More on next page

Connection options: A model with a QD requires a mating cordset (see page 265)

For 5-pin 150 mm Euro-style Pigtail QD, add suffix Q to the 2 m model number (example, LX3EQ).

LX Light Screens, 10-30V dc (cont'd)

Sensing Array Length	Short-Range (75-200 mm) Min object detection size: 9.5 mm dia.		Standard Range (150 mm - 2 m) Min object detection size: 5.6 mm dia.		Connection	Output Type
	Emitters	Receivers	Emitters	Receivers		
371 mm	–	–	LX15E	LX15R	2 m	Bipolar NPN/PNP
447 mm	–	–	LX18E	LX18R		
523 mm	–	–	LX21E	LX21R		
599 mm	–	–	LX24E	LX24R		

Connection options: A model with a QD requires a mating cordset (see page 265)

For 5-pin 150 mm Euro-style Pigtail QD, add suffix Q to the 2 m model number (example, LX3EQ).

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 Current	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
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) LX9: 2.4 milliseconds ON-time; 7.5 milliseconds OFF-time (5 milliseconds OFF-delay) LX12: 3.2 milliseconds ON-time; 8.5 milliseconds OFF-time (5 milliseconds OFF-delay) LX15: 4.0 milliseconds ON-time; 9 milliseconds OFF-time (5 milliseconds OFF-delay) LX18: 4.8 milliseconds ON-time; 10 milliseconds OFF-time (5 milliseconds OFF-delay) LX21: 5.6 milliseconds ON-time; 11 milliseconds OFF-time (5 milliseconds OFF-delay) LX24: 6.4 milliseconds ON-time; 11.5 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 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. See page 265.
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% of the sensing range. ii) Low-profile packages can be reliably detected. iii) Outputs are active while the light screen is interrupted. iv) For reliable detection, successive parts must be spaced up to the total of ON-time plus OFF-time apart. (ie. 12 milliseconds for the LX12)
Certifications	CE c UL us
Hookup Diagrams	SP02 (p. 728)

Cordsets

Euro QD (with Shield)		
See page 663		
Length	Threaded 5-Pin	
	Straight	Right-Angle
2 m	MQDEC2-506	MQDEC2-506RA
5 m	MQDEC2-515	MQDEC2-515RA
9 m	MQDEC2-530	MQDEC2-530RA

Additional cordset information available.
See page 655.

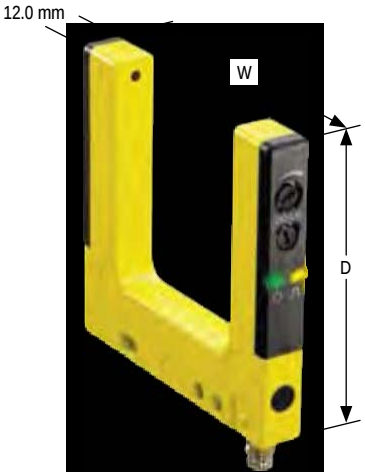
Brackets

LX	
	
pg. 636	pg. 637
SMBLX	SMBLXR

Additional bracket information available.
See page 601.

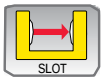
SLM
Rugged Metal Fixed-distance Slot Sensors

- Available in painted or nickel-plated die-cast 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
- Features rugged, sealed, die-cast metal housing rated IEC IP67 (NEMA 6)



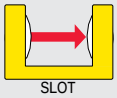
AUTOCAD, STEP, IGES & PDF

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



SLM, 10-30V dc

Visible Red LED

Sensing Mode/LED	Slot Width/ Depth	Overall Width (W)	Overall Depth (D)	Connection	Response	Models† NPN	Models† PNP
 SLOT	10 mm/ 60.8 mm	42 mm	80 mm	2 m	500 µs	SLM10B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM10B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM10N6Q	SLM10P6Q
	20 mm/ 60.8 mm	52 mm	80 mm	2 m		SLM20B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM20B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM20N6Q	SLM20P6Q

More on next page

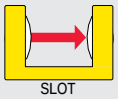
Connection options: A model with a QD requires a mating cordset (see page 269)

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

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

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

Visible Red LED

Sensing Mode/LED	Slot Width/ Depth	Overall Width (W)	Overall Depth (D)	Connection	Response	Models† NPN	Models† PNP
 SLOT	30 mm/ 60.8 mm	62 mm	80 mm	2 m	500 µs	SLM30B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM30B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM30N6Q	SLM30P6Q
	50 mm/ 60.8 mm	82 mm	80 mm	2 m		SLM50B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM50B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM50N6Q	SLM50P6Q
	80 mm/ 60.8 mm	112 mm	80 mm	2 m		SLM80B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM80B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM80N6Q	SLM80P6Q
	120 mm/ 120.7 mm	152 mm	140 mm	2 m		SLM120B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM120B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM120N6Q	SLM120P6Q
	180 mm/ 120.7 mm	202 mm	140 mm	2 m		SLM180B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM180B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM180N6Q	SLM180P6Q
	220 mm/ 120.7 mm	252 mm	140 mm	2 m		SLM220B6 (Bipolar NPN/PNP)	
				4-Pin Euro Pigtail QD		SLM220B6QPMA (Bipolar NPN/PNP)	
				3-Pin Pico QD		SLM220P6Q	SLM220N6Q

Connection options: A model with a QD requires a mating cordset (see page 269)

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

† 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

More on next page

* 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.

SLM Specifications (cont'd)	
Output Response Time	500 microseconds
Repeatability	95 microseconds
Adjustments	1-turn potentiometer Sensitivity adjustment Light Operate / Dark Operate Selection switch
Indicators	Two LED Indicators: Green: Power ON Yellow: Output activated See data sheet for detailed information
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 269) Euro-style QD models: 4-pin, threaded 150 mm pigtail with polyurethane (PUR) cable (see page 269)
Operating Conditions	Temperature: -20° to +60° C Relative humidity: 95% @ 55° C (non-condensing)
Certifications	CE
Hookup Diagrams	Bipolar Models: DC04 (p. 716) All others: DC01 (p. 716)

Cordsets

Pico QD		
See page 655		
Length	Threaded 3-Pin	
	Straight	Right-Angle
2 m	PKG3M-2	PKW3M-2
5 m	PKG3M-5	PKW3M-5
7 m	PKG3M-7	—
9 m	PKG3M-9	PKW3M-9
10 m	PKG3M-10	—

Euro QD		
See page 658		
Length	Threaded 4-Pin	
	Straight	Right-Angle
2 m	MQDC-406	MQDC-406RA
5 m	MQDC-415	MQDC-415RA
9 m	MQDC-430	MQDC-430RA

Additional cordset information available. See page 655.

SENSORS

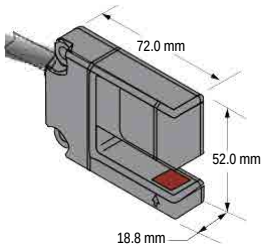
SL30 and SL10

Opposed-Mode Fixed-Distance Sensors

- Provides easy-to-use self-contained opposed-mode sensor pair in a rugged U-shaped housing
- Uses molded-in beam guides to simplify beam placement
- 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 SLO 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 (SLO model)

SLOT

SL30, SLO30 and SLE30 Models



SL10 and SLE10 Models

SL30 and SL10, 10-30V dc

Visible Red LED

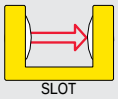
Sensing Mode/LED	Slot Width	Connection	Output Type	Response	Repeatability	Models
SLOT	30	2 m	Bipolar NPN/PNP	1 ms	250 µs	SL30VB6V
		5-Pin Euro QD				SL30VB6VQ
		2 m		300 µs	75 µs	SL30VB6VY
		5-Pin Euro QD				SL30VB6VYQ
	10	2 m	Bipolar NPN/PNP	1 ms	250 µs	SL10VB6V
		5-Pin Euro QD				SL10VB6VQ
		2 m		300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

Connection options: A model with a QD requires a mating cordset (see page 272)

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

SLO30, 10-30V dc

Infrared LED

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

Connection options: A model with a QD requires a mating cordset (see page 272)

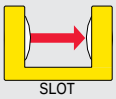
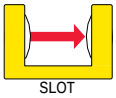
For 9 m cable, add suffix W/30 to the 2 m model number (example, SLO30VB6 W/30).

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 cordsets are ordered separately. See page 272.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% @ 50° C (non-condensing)
Certifications	CE
Hookup Diagrams	SP03 (p. 728)

SLE30 and SLE10 *Expert*™, 10-30V dc

Visible Red LED

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

Connection options: A model with a QD requires a mating cordset (see page 272)

For 9 m cable, add suffix W/30 to the 2 m model number (example, SLE30B6V W/30).

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 Confi	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.
Delay at Power-up	1 second; 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
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 cordsets are ordered separately. See page 272.
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. 716)

Cordsets

Euro QD		
See page 661		
	Threaded 5-Pin	
Length	Straight	Right-Angle
0.5 m	MQDC1-501.5	–
2 m	MQDC1-506	MQDC1-506RA
5 m	MQDC1-515	MQDC1-515RA
9 m	MQDC1-530	MQDC1-530RA

Additional cordset information available. See page 655.

Brackets

SL

pg. 650

SMBSL

Additional bracket information available. See page 601.

SLC1
C-GAGE® Label Sensors

- Accurately detects labels on web backing
- Requires no user adjustments—ADL™ (Adaptive Digital Logic) provides revolutionary self-learning capability
- Features a heavy-duty housing with 1 mm slot
- 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
- Includes web alignment guides to simplify placement
- Reliably detects the presence of most types of labels on web backing, regardless of whether the labels or web are clear or opaque

SLC1, 10-30V dc

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

Connection options: A model with a QD requires a mating cordset (see page 274)

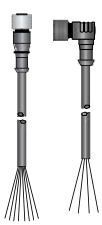
For 9 m cable, add suffix W/30 to the 2 m model number (example, SLC1BB6 W/30).

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 728)
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:** power ON **Yellow:** NPN and PNP outputs ON See data sheet for detailed information.
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 cordsets are sold separately. See page 274.
Operating Conditions	**Temperature:** +5° to 50° C **Relative humidity:** 90% at 50° C, non-condensing
Certifications	CE
Hookup Diagrams	SP04 (p. 728)

* 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.

Cordsets

Euro QD		
See page 661		
	Threaded 5-Pin	
Length	Straight	Right-Angle
0.5 m	MQDC1-501.5	–
2 m	MQDC1-506	MQDC1-506RA
5 m	MQDC1-515	MQDC1-515RA
9 m	MQDC1-530	MQDC1-530RA



Additional cordset information available. See page 655.

R58
Registration Mark Sensors

- Outstanding color contrast sensitivity; detecting contrasts as low as 2% over a wide range of colors
- Excellent performance in low-contrast or high-gloss applications
- Ultra-fast 10 kHz switching frequency (10,000 actuations per second); 15 µs repeatability
- Rugged, mechanical housing to withstand ambient electrical noise and vibration; rated IP67
- High-quality acrylic lens suitable for food processing applications
- Provides a sensing image that measures 1.2 by 3.8 mm at 10 mm from lens
- Models with push-button or potentiometer configuration
- Fast warm-up and excellent temperature stability
- Bright, highly visible LEDs for easy configuration and monitoring during operation
- Bipolar NPN/PNP with selectable light/dark operate (LO/DO)
- Models with OFF-delay for applications requiring a delay for reliable detection

CONVERGENT

R58E *Expert*™ page 276

- Senses a variety of color marks without changing sensors
- Automatically selects the correct LED to optimize contrast for each application
- Features easy-to-set TEACH options: Dynamic or Static using push buttons, or remote switch
- Provides easy-to-read, 8-segment bargraph display for TEACH and signal strength

R58A page 278

- Provides a single emitter color; red or green, depending on model
- Delivers a simplified setup with potentiometer adjustment of switching threshold and switch selectable light/dark Operate (LO/DO)
- Includes easy-to-see output and setup indicators

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
- Industry standard mounting holes

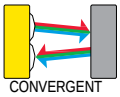
Range and application tolerant

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

R58 *Expert*™ Sensors

R58 *Expert*™, 10-30V dc

Visible Red, Green or Blue LED, depending on registration mark

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

Connection options: A model with a QD requires a mating cordset (see page 280)

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).

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)
Output Rating	100 mA max. (each output) OFF-state leakage current: NPN: less than 200 µA PNP: less than 10 µA (See Application Note 1) NPN saturation: less than 1.6V @ 100 mA PNP saturation: less than 3V @ 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
Delay at Power-up	1 second; 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	2 push buttons and remote wire for sensor TEACH programming and configuration. See data sheet for detailed information.
Indicators	8-segment Bargraph display: Green: Power ON Yellow: 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 See data sheet for detailed information.
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, integral 5-pin Euro-style QD fitting or 150 mm pigtail with 5-pin Euro-style quick-disconnect. QD cordsets are ordered separately. See page 280.

More on next page

R58 *Expert*™ Specifications (cont'd)

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	1. NPN OFF-state leakage current is < 200 µA for load impedances > 3kΩ or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current. 2. Do not mount the sensor directly perpendicular to shiny surfaces; position it at approximately 15 angle in relation to the sensing target. 3. Minimize web or product "flutter" whenever possible to maximize sensing reliability. Position sensor near a roller if possible.
Certification	CE
Hookup Diagrams	DC08 (p. 717)

R58A Sensors

R58A, 10-30V dc

Visible Red LED Visible Green LED

Sensing Mode/LED	Focus	Connection	Output Type	Sensing Image Orientation	OFF-Delay	Models
CONVERGENT	10	2 m	Bipolar NPN/PNP	Parallel to sensor length	0 ms	R58ACG1
		4-pin Euro Pigtail QD				R58ACG1Q
		2 m			20 ms	R58ACG1D
		4-pin Euro Pigtail QD				R58ACG1DQ
CONVERGENT	10	2 m	Bipolar NPN/PNP	Parallel to sensor length	0	R58ACR1
		4-pin Euro Pigtail QD				R58ACR1Q
		2 m			20 ms	R58ACR1D
		4-pin Euro Pigtail QD				R58ACR1DQ

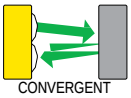
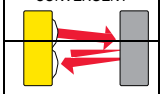
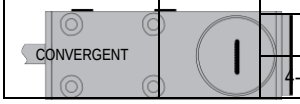
More on next page

Connection options: A model with a QD requires a mating cordset (see page 280)

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).

R58A, 10-30V dc (cont'd)

Visible Red LED Visible Green LED

Sensing Mode/LED	Focus	Connection	Output Type	Sensing Image Orientation	OFF-Delay	Models
 CONVERGENT	Bipolar NPN/PNP	2 m	Bipolar NPN/PNP	Perpendicular to sensor length	0	R58ACG2
		4-pin Euro Pigtail QD				R58ACG2Q
		2 m			20 ms	R58ACG2D
		4-pin Euro Pigtail QD				R58ACG2DQ
 CONVERGENT		2 m			0	R58ACR2
		4-pin Euro Pigtail QD				R58ACR2Q
		2 m			20 ms	R58ACR2D
		4-pin Euro Pigtail QD				R58ACR2DQ

Connection options: A model with a QD requires a mating cordset (see page 280)

For 9 m cable, add suffix W/30 to the 2 m model number (example, R58ACG2 W/30).
QD models: For integral 4-pin Euro-style QD, add suffix Q8 to the 2 m model number (example R58ACG2Q8).

R58A Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN)
Output Rating	150 mA max. (each output) OFF-state leakage current: less than 10 µA NPN saturation: less than 200 mV @ 10 mA and less than 1V @ 150 mA PNP saturation: less than 1V @ 10 mA and less than 2V @ 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	100 milliseconds; 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	Light/Dark Operate (LO/DO) select switch, and 15-turn switchpoint adjustment potentiometer
Indicators	1 Amber: Output active 2 Green: Switchpoint threshold adjustment indicators
Construction	Zinc alloy die-cast housing with black painted finish and o-ring sealed lens port cap. Lens: Acrylic Lens port cap and lens holder: ABS Sensitivity and LO/DO adjusters: Acetal QD: Anodized aluminum
Environmental Rating	IEC IP67; NEMA 6

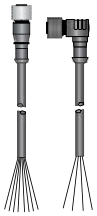
More on next page

R58A Specifications (cont'd)

Connections	PVC-jacketed 4-conductor 2 m or 9 m attached cable with internal strain relief, integrated 4-pin Euro-style QD fitting or 150 mm pigtail with 4-pin Euro-style quick-disconnect. QD cordsets are ordered separately. See page 280.
Operating Conditions	Temperature: -10° to +55° C Relative humidity: 90% at 50° C (non-condensing) Storage temperature: -20° to +80° C
Shock and Vibration	All models meet IEC 68-2-6 and IEC 68-2-27 testing criteria.
Application Notes	1. Do not mount the sensor directly perpendicular to shiny surfaces; position it at approximately 15 angle in relation to the sensing target. 2. Minimize web or product "flutter" whenever possible to maximize sensing reliability. Position sensor near a roller if possible. 3. The lens may be installed in either of the two lens ports. The lens port cap must be installed on the unused port for reliable operation.
Certification	CE
Hookup Diagrams	DC04 (p. 716)

Cordsets

Euro QD		
See page 658		
	Threaded 4-Pin	
Length	Straight	Right-Angle
2 m	MQDC-406	MQDC-406RA
5 m	MQDC-415	MQDC-415RA
9 m	MQDC-430	MQDC-430RA



Euro QD (With Shield)		
See page 663		
	Threaded 5-Pin	
Length	Straight	Right-Angle
2 m	MQDEC2-506	MQDEC2-506RA
5 m	MQDEC2-515	MQDEC2-515RA
9 m	MQDEC2-530	MQDEC2-530RA

Additional cordset information available. See page 655.

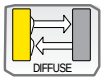
Brackets

R58E/R58A			
 pg. 624	 pg. 625	 pg. 625	 pg. 625
SMB55A	SMB55RA	SMB55F	SMB55S

Additional bracket information available. See page 601.

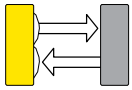
QC50/QCX50
True Color Sensor

- 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
- Provides bright LED indicators for output of programmed color
- Includes a 3-position swivel connector for installation flexibility



QC50/QCX50, 10-30V dc

Visible White LED

Sensing Beam	Range	Connection	Response Time	Output Type	Models
 DIFFUSE	20 mm typical; varies according to sensor configuration	8-pin Euro QD	335 µs	NPN, 3 channels	QC50A3N6XDWQ
				PNP, 3 channels	QC50A3P6XDWQ
			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 (see page 282)

QC50/QCX50 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 QC50 models / QCX50 models Gate ON-time: 335 microseconds / 700 microseconds Gate OFF-time: 170 microseconds / 400 microseconds
Delay at Power-up	500 milliseconds; outputs do not conduct during this time.
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 cordsets are ordered separately. See page 282.
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. 729) PNP Models: SP06 (p. 729)

Cordsets

Euro QD (Open-Shield)	
See page 665	
Length	Threaded 8-Pin Straight
2 m	MQDC2S-806
5 m	MQDC2S-815
9 m	MQDC2S-830
16 m	MQDC2S-850

Additional cordset information available. See page 655.

Brackets

QC50/QCX50
 pg. 647
SMBQC50

Additional bracket information available. See page 601.

QL50, QL51 and QL56
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 or with selectable NPN or PNP outputs

DIFFUSED

QL50 Sensors

QL50, 10-30V dc

Black Ultraviolet LED Returned Luminescence

Sensing Beam/LED	Range	Connection	Models NPN	Models PNP
DIFFUSE	0-40 mm	4-pin Euro QD	QL50AN6XD20BQ	QL50AP6XD20BQ

Connection options: A model with a QD requires a mating cordset (see page 288)

QL50 Specifications

Spot Diameter	1.5 mm @ 10 mm
Supply Voltage and Current	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
Response Curve	See chart RC-1 on page 289
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 cordsets are ordered separately. See page 288.
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 c UL us LISTED
Hookup Diagrams	SP07 (p. 729)

QL51 Sensors

QL51 Models

QL51, 15-30V dc

Black Ultraviolet LED Returned Luminescence

Sensing Beam/LED	Sensing Range	Connection	Output Type	Models
DIFFUSE	10-20 mm	4-pin Euro QD	Bipolar NPN/PNP	QL51A6XD20BQ

Connection options: A model with a QD requires a mating cordset (see page 288)

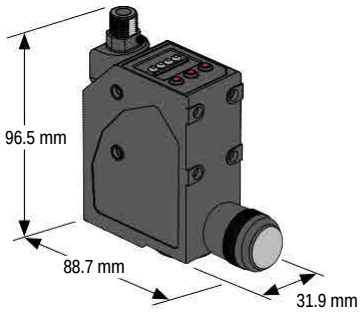
QL51 Specifications

Sensing Beam	LED UV, 375 nm; class 1
Supply Voltage and Current	15 to 30V dc, (2 V pp max ripple); 50 mA max @ 24V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity
Output Configuration	Bipolar (1 NPN & 1 PNP)
Output Rating	100 mA max.
Output Saturation Voltage	≤ 2V
Output Protection Circuitry	Overload and short circuit protection
Output Response Time	250 microseconds
Response Curves	See chart RC-2 on page 289.
Ambient Light Rejection	According to EN 60947-5-2
Adjustments	“UP” and “DOWN” push buttons determine sensitivity

More on next page

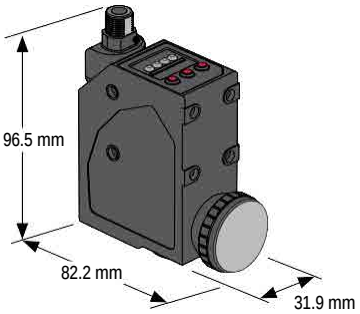
QL51 Specifications (cont'd)	
Switching Frequency	2 kHz
Indicators	Green LED: power ON Yellow LED: indicates output conducting Orange Sensitivity LED: Flashes with a frequency proportional to the set sensitivity. ON when at maximum sensitivity. See data sheet for detailed information
Construction	ABS housing, glass lens
Environmental Rating	IP67
Connections	4-pin Euro-style quick-disconnect fitting. QD cordsets are ordered separately. See page 288.
Operating Conditions	Temperature: -10° to +55° C Storage Temperature: -20° to 70° C
Minimum Spot Dimensions	2 x 7 mm @ 10 mm
Shock Resistance	30 G; 6 shocks per axis; 11 milliseconds duration (EN60068-2-27)
Vibration	0.5 mm amplitude; 10 to 55 Hz frequency, per axis (EN60068-2-6)
Certifications	CE
Hookup Diagrams	DC04 (p. 716)

QL56 Sensors



QL56M6XD30BQ8 Models

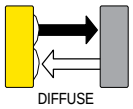
QL56M6XD15BQ8 Models



QL56M6XD40BQ8 Models

QL56, 15-30V dc

Black Ultraviolet LED Returned Luminescence

Sensing Beam/LED	Range	Connection	Output Type	Models
 DIFFUSE	10-20 mm	5-pin Euro QD	Bipolar NPN/PNP plus one 0.75-5.5V dc analog	QL56M6XD15BQ
	20-40 mm			QL56M6XD30BQ
	30-50 mm			QL56M6XD40BQ

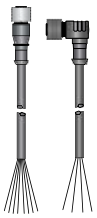
Connection options: A model with a QD requires a mating cordset (see page 288)

QL56 Specifications

Sensing Beam	LED UV, 375 nm; class 1
Supply Voltage and Current	15 to 30V dc, (2 V pp max ripple); 50 mA max @ 24V dc (excluding output current)
Supply Protection Circuitry	Protected against reverse polarity
Output Configuration	Bipolar (1 NPN & 1 PNP), plus 0.75 to 5.5V dc analog output
Analog Output	0.75 to 5.5V dc max
Analog Output Impedance	2.2 kΩ (short-circuit protection)
Output Rating	100 mA max.
Output Saturation Voltage	≤ 2V
Output Protection Circuitry	Overload and short circuit protection
Output Response Time	250 microseconds
Response Time	See charts RC-3, RC-4 and RC-5 on page 289.
Ambient Light Rejection	According to EN 60947-5-2
Adjustments	"+" and "–" push buttons determine sensitivity "Set" push button activates delay and keylock function
Switching Frequency	2 kHz
Delay at Power-up	0 milliseconds (default) or 20 milliseconds user selectable
Indicators	Green Ready LED: ON indicates power ON Yellow Output LED: ON indicates output conducting Green Ready LED: ON indicates power on; Flashing indicates output overload Orange Delay LED: ON indicates 20 ms delay activated Orange Keylock LED: ON indicates push buttons are unlocked 5-segment bar graph: Indicates sensitivity
Construction	Aluminum housing, glass lens; mass 180 g. max.
Environmental Rating	IP67
Connections	5-pin Euro-style (M12). QD cordsets are ordered separately. See page 288.
Operating Conditions	Temperature: -10° to +55° C Storage Temperature: -20° to 70° C
Minimum Spot Dimensions	2 x 8 mm @ 10 mm (QL56M6XD15BQ) 3 x 11 mm @ 24 mm (QL56M6XD30BQ) 4 x 15 mm @ 50 mm (QL56M6XD40BQ)
Shock Resistance	30 G; 6 shocks per axis; 11 milliseconds duration (EN60068-2-27)
Vibration	0.5 mm amplitude; 10 to 55 Hz frequency; per axis (EN60068-2-6)
Application Notes	The lens must be used in the lower position, and the cap must remain in place on the end position.
Certifications	CE
Hookup Diagrams	SP08 (p. 729)

Cordsets

Euro QD				
See page 658				
	Threaded 4-Pin		Threaded 5-Pin	
Length	Straight	Right-Angle	Straight	Right-Angle
2 m	MQDC-406	MQDC-406RA	MQDC1-506	MQDC1-506RA
5 m	MQDC-415	MQDC-415RA	MQDC1-515	MQDC1-515RA
9 m	MQDC-430	MQDC-430RA	MQDC1-530	MQDC1-530RA



Additional cordset information available. See page 655.

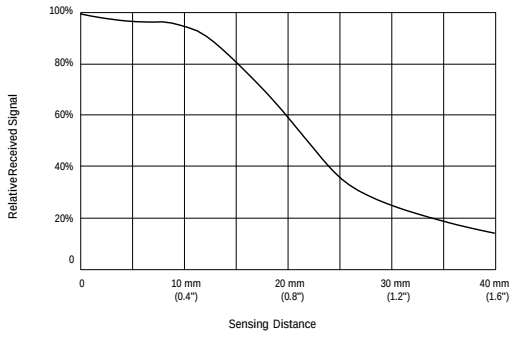
Brackets

QL50/QL51/QL56			
 pg. 624	 pg. 625	 pg. 625	 pg. 625
SMB55A	SMB55RA	SMB55F	SMB55S

Additional bracket information available. See page 601.

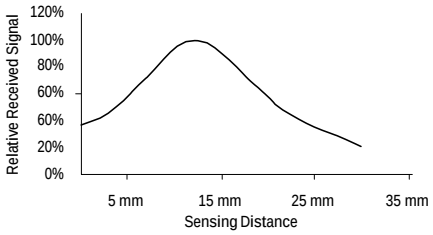
Response Curves

QL50



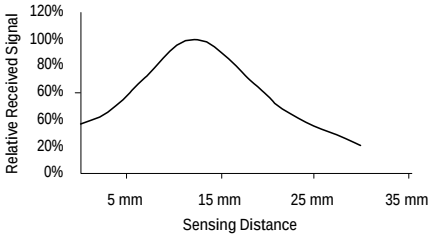
RC-1

QL51



RC-2

QL56 QL56M6XD15BQ



RC-3

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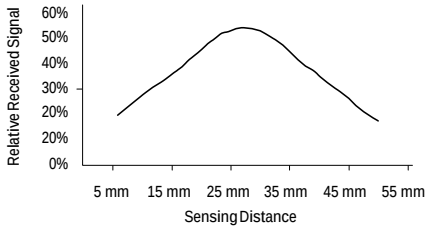

RC-4

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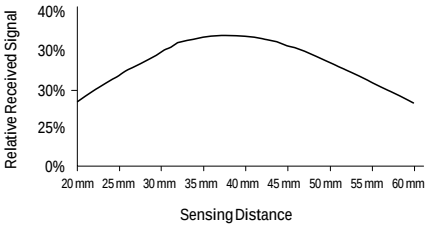
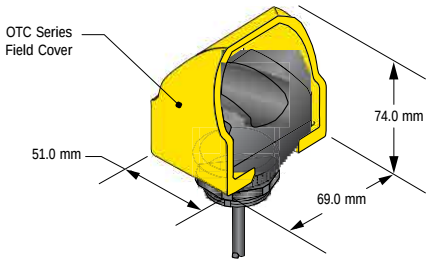


RC-5

OPTO-TOUCH™
Optical Touch Buttons

- Ergonomically designed touch buttons eliminate hand, wrist and arm stress.
- 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.

OTB, LTB, VTB and STB Models



OTB, LTB, VTB and STB Models with cover

OTB Momentary Action, 10-30V dc

Upper Housing	Connection	Models NPN	Models PNP
Polysulfone	2 m	OTBVN6	OTBVP6
	4-Pin Mini QD	OTBVN6QD	OTBVP6QD
Polycarbonate	2 m	OTBVN6L	OTBVP6L
	4-Pin Mini QD	OTBVN6LQD	OTBVP6LQD

Connection options: A model with a QD requires a mating cordset (see page 296)

For 9 m cable, add suffix W/30 to the 2 m model number (example, OTBVN6 W/30).

OTB Momentary Action, 20-30V ac or dc

Upper Housing	Connection	Output Type	Models
Polysulfone	2 m	SPDT e/m Relay	OTBVR81
	5-Pin Mini QD		OTBVR81QD
Polycarbonate	2 m	SPDT e/m Relay	OTBVR81L
	5-Pin Mini QD		OTBVR81LQD

OTB Momentary Action, 120V ac

Upper Housing	Connection	Output Type	Models
Polysulfone	2 m	SPDT e/m Relay	OTBA5
	5-Pin Mini QD		OTBA5QD
Polycarbonate	2 m	SPDT e/m Relay	OTBA5L
	5-Pin Mini QD		OTBA5LQD

OTB Momentary Action, 220/240V ac

Connection	Upper Housing	Output Type	Models
Polysulfone	2 m	SPDT e/m Relay	OTBB5
	5-Pin Mini QD		OTBB5QD
Polycarbonate	2 m	SPDT e/m Relay	OTBB5L
	5-Pin Mini QD		OTBB5LQD

Connection options: A model with a QD requires a mating cordset (see page 296)

For 9 m cable, add suffix W/30 to the 2 m model number (example, OTBVR81 W/30).

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)

More on next page

OTB Specifications (cont'd)

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 cordsets are ordered separately. See page 296.
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. 716) AC/DC Models: OTBVR81 Models: UN01 (p. 725) AC Models: OTBA5 Models: AC08 (p. 723) OTBB5 Models: AC08 (p. 723)

LTB Alternate Action, 220/240V ac

Upper Housing	Connection	Output Type	Models
Polysulfone	2 m	SPDT e/m Relay	LTBB5
	5-Pin Mini QD		LTBB5QD
Polycarbonate	2 m		LTBB5L
	5-Pin Mini QD		LTBB5LQD

LTB Alternate Action, 120V ac

Upper Housing	Connection	Output Type	Models
Polysulfone	2 m	SPDT e/m Relay	LTBA5
	5-Pin Mini QD		LTBA5QD
Polycarbonate	2 m		LTBA5L
	5-Pin Mini QD		LTBA5LQD

Connection options: A model with a QD requires a mating cordset (see page 296)

For 9 m cable, add suffix W/30 to the 2 m model number (example, LTBA5 W/30).

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 cordsets are ordered separately. See page 296.
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. 723)

VTB, 12-30V dc

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

Connection options: A model with a QD requires a mating cordset (see page 296)

For 9 m cable, add suffix W/30 to the 2 m model number (example, VTBN6 W/30).

VTB Specifications

See page 442.

STB Self-Checking, 10-30V dc

Upper Housing	Connection	Output Type	Models
Polyethermide	2 m	Complementary PnP Solid-state	STBVP6
	4-Pin Mini QD		STBVP6Q
	4-Pin Euro QD		STBVP6Q5

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

Upper Housing	Connection	Output Type	Models
Polyethermide	2 m	Two Independent and Complementary e/m Relays	STBVR81
	5-Pin Mini QD		STBVR81Q
	5-Pin Euro QD		STBVR81Q6

Connection options: A model with a QD requires a mating cordset (see page 296)

For 9 m cable, add suffix W/30 to the 2 m model number (example, STBVP6 W/30).

STB Specifications

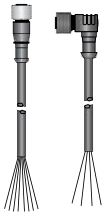
See page 547

Optical Buttons Field Covers

Description	Models		
Black cover	OTC-1-BK		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.
Green cover	OTC-1-GN		
Red cover	OTC-1-RD		
Yellow cover	OTC-1-YW		

Cordsets

Euro QD				
See page 658				
	Threaded 4-Pin		Threaded 5-Pin	
Length	Straight	Right-Angle	Straight	Right-Angle
2 m	MQDC-406	MQDC-406RA	MQDC1-506	MQDC1-506RA
5 m	MQDC-415	MQDC-415RA	MQDC1-515	MQDC1-515RA
9 m	MQDC-430	MQDC-430RA	MQDC1-530	MQDC1-530RA



Mini QD		
See page 674		
	Threaded 4-Pin	Threaded 5-Pin
Length	Straight	
2 m	MBCC-406	MBCC-506
4 m	MBCC-412	MBCC-512
10 m	MBCC-430	MBCC-530

Additional cordset information available. See page 655.

Brackets

Optical Touch Buttons		
 pg. 619	 pg. 619	 pg. 620
SMB30A	SMB30MM	SMB30SC

Additional brackets and information available. See page 601.