LX Series Part-Sensing Light Screen

For Sensing Small or Flat Parts at High Speeds

Features

- Emitter and receiver pair produce a strobed web of modulated light beams, in 3 lengths, 2 sensing ranges

- Simple, economical and highly reliable means of sensing small parts or flat items which pass anywhere through the light screen

- Fast response, output includes a 5-millisecond pulse stretcher for interfacing reliability

- Simple wiring configuration; emitter and receiver do not need a synchronization wire

- Rugged, self-contained and compact construction; rated IEC IP65

- Bipolar design offers both NPN (current sinking) and PNP (current sourcing) solid-state outputs

CE c**UL**us

Infrared, 880 nm

Models

Short-Range Models 75-200 mm (3"-8") 5.6 mm dia. Minimum Object Detection Size	Standard-Range Models 150 mm - 2 m (6"-6.5') 9.5 mm dia. Minimum Object Detection Size	Sensing Array Length	Cable*	Supply Voltage	Output Type
LX3ESR Emitter **LX3RSR** Receiver	**LX3E** Emitter **LX3R** Receiver	67 mm (2.6")	2 m (6.5') 5-wire Integral cable	10-30V dc	Bipolar NPN/PNP
LX6ESR Emitter **LX6RSR** Receiver	**LX6E** Emitter **LX6R** Receiver	143 mm (5.6")			
LX12ESR Emitter **LX12RSR** Receiver	**LX12E** Emitter **LX12R** Receiver	295 mm (11.6")			

*Integral cable models are listed; for 5-pin Euro-style 150 mm (6") QD pigtail, add suffix "**Q**" to model number (e.g., **LX3EQ**). QD models require a mating cable; see page 4.

⚠ **WARNING . . . Not To Be Used for Personnel Protection**

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

LX Series Part-Sensing Light Screens

Theory of Operation

The LX Series light screen sensing system consists of two self-contained units: an emitter and a receiver of equal size and sensing range. The emitter has multiple infrared LEDs spaced at 9.5 mm (0.38") increments, and the receiver has corresponding photodiodes. The emitter sequentially fires each infrared LED. Multiple photodiodes in the receiver recognize each of the emitted pulses; the result is a "cross-hatched" optical pattern. Optical synchronization enables the receiver to recognize light from each of the emitter LEDs.

The optical crosshatch pattern enables the LX system to detect targets of very small diameter, and extremely thin, flat objects – as thin as a piece of paper or an envelope. For small diameter objects, the sensing resolution is less effective at the exact center (see M.O.D.S. specification) of the sensing range and at the extreme edges of the pattern (close to the emitter and receiver faces); sensing should take place within the center 80 percent of the range, as shown in Figure 1.

LX Series sensors are available in two ranges: short and standard. Short-range emitters and receivers may be located as close together as 75 mm (3"), with a maximum separation of 200 mm (8"). Standard-range sensors may be separated 150 mm to 2 m (6" to 6.5') apart. Both emitter and receiver must be either short-range or standard models, of the same length. Detection sensitivity varies somewhat, depending on the distance between the sensors and the position of the target object.

For closer-range applications, the working range of any sensor pair can be reduced by connecting the sensor's Select wire to 0-2V dc (see Specifications; Sensing Range).

The receiver output interfaces directly with dc loads or circuits up to 30V dc, and offers both sinking (NPN) and sourcing (PNP) output transistors. Outputs conduct whenever a beam is broken. A 5 millisecond pulse stretcher (OFF-delay) is included to improve interfacing reliability.

Typical Applications
Typical applications for the LX Series include parts ejection verification and package detection on a conveyor.

Installation and Alignment

Reliable performance of the LX series light screen systems requires a simple alignment process. Mounting locations should be as free from vibration as possible.

Sensors may be mounted using the accessory brackets (available separately; see page 4) or using the T-slots in the sensor housings. Loosely mount the emitter and receiver at their operating locations with their front panels opposite each other, and at approximately the same level. After mechanical alignment is completed, the sensors can be wired and power applied.

To obtain optical alignment, adjust the emitter until the receiver detects alignment (the yellow LED turns OFF). For best alignment, position the emitter in the middle of the positions that cause a clear receiver condition. After alignment is achieved and the bracket hardware is tightened, position a pencil or similar object within the sensing area to verify that it can be reliably detected throughout the sensing area.
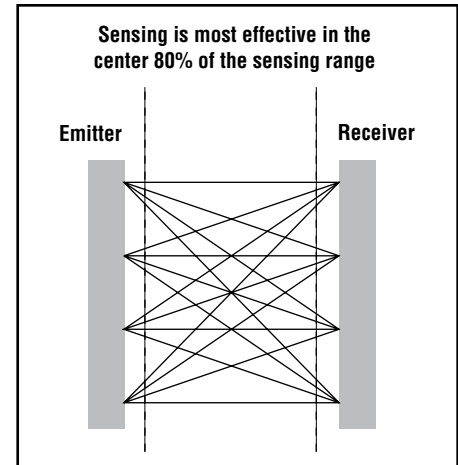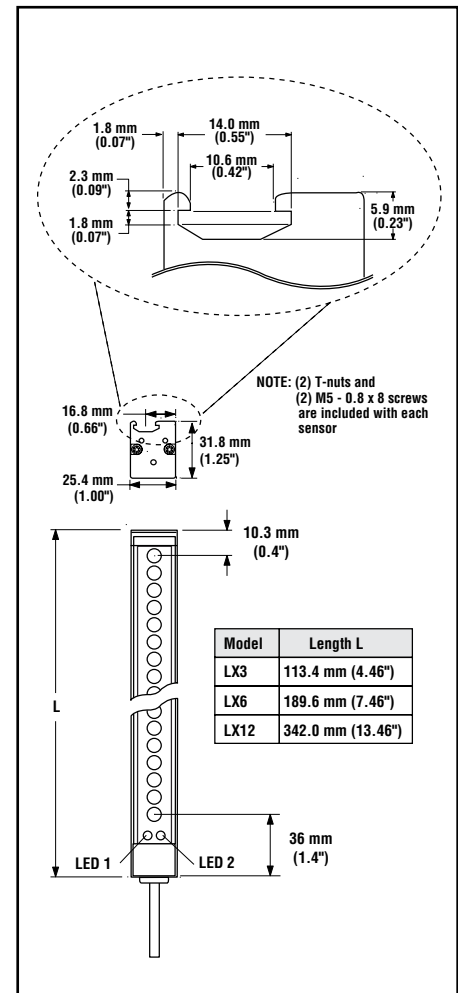

Figure 1. LX Series optical crosshatch pattern

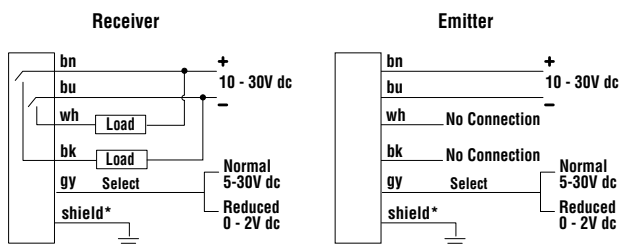| Model	Length L
LX3	113.4 mm (4.46")
LX6	189.6 mm (7.46")
LX12	342.0 mm (13.46")

Figure 2. LX features and dimensions

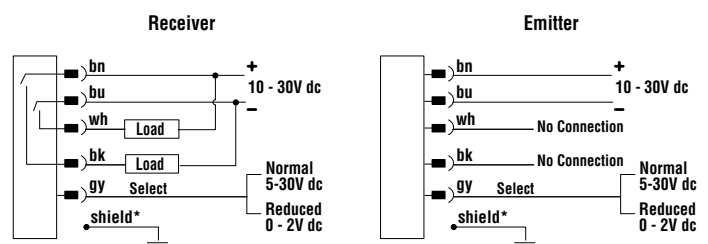## Specifications

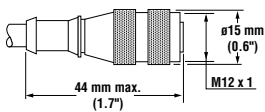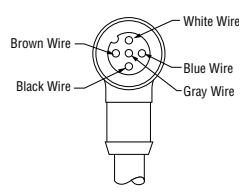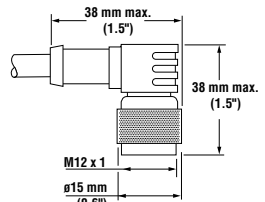|	
Supply Voltage and Power	10 to 30V dc (10% maximum ripple) at less than 1 watt each for emitter and receiver (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Sensing Range	**Normal (see hookups)** / **Reduced** **Short-Range Models** 100 to 200 mm (4" to 8") / 75 to 150 mm (3" to 6") **Standard-Range Models** 300 mm to 2 m (1' to 6.5') / 150 mm to 600 mm (6" to 24")
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	125 mA maximum each output **Off-state leakage current:** less than 5 microamp **Output saturation voltage (PNP output):** < 1 volt at 10 mA and < 1.5 volts at 100 mA **Output saturation voltage (NPN output):** < 0.5 volts at 10 mA and < 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 ms ON-time; 6 ms OFF-time (5 ms OFF-delay) **LX6:** 1.6 ms ON-time; 7 ms OFF-time (5 ms OFF-delay) **LX12:** 3.2 ms ON-time; 8.5 ms OFF-time (5 ms OFF-delay)
Minimum Object Detection Size (M.O.D.S.)	Smallest diameter rod that can be detected in sensing range: **Short-Range:** 5.6 mm (0.22") **Standard-Range:** 9.5 mm (0.38")
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-coat painted endcaps, acrylic lens window
Environmental Rating	Meets IEC IP65
Connections	2 meter (6.5') 5-conductor (with drain) pvc-jacketed attached cable or 5-pin Euro-style 150 mm (6") QD pigtail, depending on model
Operating Conditions	**Temperature:** -20° to +70° C (-4° to +158° F) **Max. rel. humidity:** 90% at 50° C (non-condensing)
Application Notes	i) The best sensing resolution occurs within the center 80% of the sensing range (see Figure 1). ii) Low-profile packages can be reliably detected. iii) Outputs are active while the light screen is interrupted. iv) Successive parts must be spaced up to 12 milliseconds (LX12) for reliable detection.
Certifications	CE cULus

Hookups

Cabled Models

Receiver

Emitter

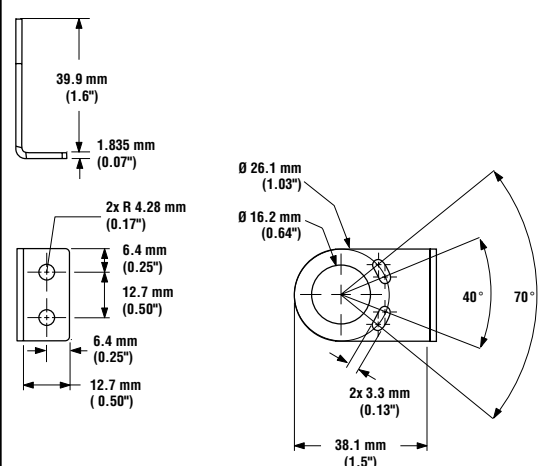### Quick-Disconnect Models

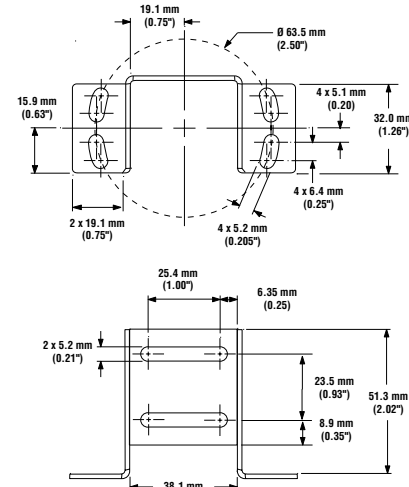**Receiver**

Emitter

*It is recommended that the shield wire be connected to earth ground or DC common.

LX Series Part-Sensing Light Screens

Accessories

Quick-Disconnect (QD) Cables

Style	Model	Length	Dimensions	Pinout
5-Pin Euro-style, Straight with shield	**MQDEC2-506** **MQDEC2-515** **MQDEC2-530**	2 m (6.5') 5 m (15') 9 m (30')	ø15 mm (0.6") M12 x 1 44 mm max. (1.7")	White Wire Brown Wire Blue Wire Black Wire Gray Wire
5-Pin Euro-style, Right-Angle, with shield	**MQDEC2-506RA** **MQDEC2-515RA** **MQDEC2-530RA**	2 m (6.5') 5 m (15') 9 m (30')	38 mm max. (1.5") 38 mm max. (1.5") M12 x 1 ø15 mm (0.6")	

Mounting Brackets

SMBLX	• End-cap brackets; set of 2 • Zinc-plated cold rolled steel • Hardware included for mounting brackets to sensor	SMBLXR	• Back-mount bracket for secure one-end mounting • Zinc-plated cold rolled steel • Hardware included for mounting bracket to sensor

SMBLX dimensions:
39.9 mm (1.6")
1.835 mm (0.07")
2x R 4.28 mm (0.17")
6.4 mm (0.25")
12.7 mm (0.50")
6.4 mm (0.25")
12.7 mm (0.50")
Ø 26.1 mm (1.03")
Ø 16.2 mm (0.64")
40°   70°
2x 3.3 mm (0.13")
38.1 mm (1.5")

SMBLXR dimensions:
19.1 mm (0.75")
Ø 63.5 mm (2.50")
15.9 mm (0.63")
4 x 5.1 mm (0.20")
32.0 mm (1.26")
4 x 6.4 mm (0.25")
2 x 19.1 mm (0.75")
4 x 5.2 mm (0.205")
25.4 mm (1.00")
6.35 mm (0.25)
2 x 5.2 mm (0.21")
23.5 mm (0.93")
51.3 mm (2.02")
8.9 mm (0.35")
38.1 mm (1.5")

LX Series Lens Shields

Lens Shield Model Number	Fits LX Series Sensor Model	
LXS3	**LX3**	Self-adhesive polycarbonate lens shields protect sensor lens window from impact or weld flash. When shields are installed on both emitter and receiver, excess gain is reduced by 36% (max. operating range reduces by 20%).
LXS6	**LX6**	
LXS12	**LX12**	

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