

EZ-SCREEN LS Safety Light Curtain Product Manual



Original Instructions

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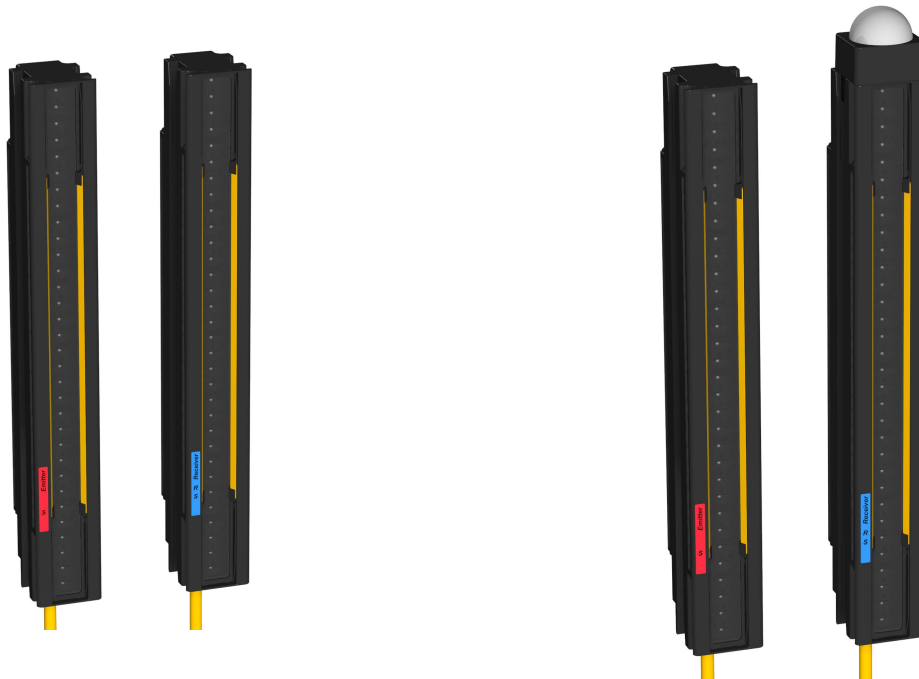
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Chapter 3 Product Overview



EZ-SCREEN LS Safety Light Curtain shown without and with the optional EZLSA-K30LGR EZ-LIGHT

Banner EZ-SCREEN LS is a two-piece ([emitter \(light curtain\)](#) and [receiver \(light curtains\)](#)), redundant, microprocessor-controlled, opposed-mode optoelectronic light curtain or safety light screen. Models are available in 14 mm, 23 mm, or 40 mm [resolution](#). Up to four pairs of SLLC.. model emitters and receivers can be connected to [cascade](#) together.

Emitters have a row of synchronized modulated infrared (invisible) light-emitting diodes (LEDs) in a robust, compact metal housing. Receivers have a corresponding row of synchronized photodetectors. The sensing field created by the emitter and receiver is called the [defined area](#); its width and height are determined by the length of the sensor pair and the distance between them. The sensing range spans:

- 280 mm to 1820 mm length models: 0.1 m to 12 m (4 in to 39 ft)
- 1890 mm to 2380 mm length models: 0.1 m to 10 m (4 in to 32.8 ft)

The range decreases with the use of corner mirrors and/or lens shields:

- Lens shields — approx 10% less range per shield
- Glass-surface mirrors — approx 8% less range per mirror

The length of the sensor pair (housing) is dependent on the model, with lengths available from 280 mm to 2380 mm (11 in to 93.7 in). The end-to-end sensing design of the EZ-SCREEN LS, also known as "no blind zone" and "no dead zone," allows mounting with minimal or no gaps in detection when using EZLSA-MBK-12 center-mount or EZLSA-MBK-16 side-mount brackets.

The EZ-SCREEN LS models have trip output ([automatic power-up](#) and [automatic reset](#)). In typical operation, if any part of an operator's body (or any opaque object) of more than a pre-determined cross section is detected, the solid-state [output signal switching device](#) (OSSD) safety outputs turn Off. These safety outputs are connected to the [guarded machine's final switching device](#) (FSDs) that controls the [machine primary control element](#) (MPCEs), which immediately stops the motion of the guarded machine. When the [defined area](#) becomes clear, the OSSD outputs are allowed to turn ON.

EZ-SCREEN LS sensors are extensively FMEA ([failure mode and effects analysis](#)) tested to establish an extremely high degree of confidence that when properly installed, no system component (even if it should ever fail) can cause a [failure to danger](#). Because of the dual scan technology, EZ-SCREEN LS sensors are also highly immune to EMI, RFI, ambient light, weld flash, and strobe light.

Eight-conductor EZ-SCREEN LS systems (receivers with an 8-pin cabled QD or flying leads) do not require an external controller when using the [external device monitoring](#) (EDM) function. This function ensures the fault detection capability required by U.S. Control Reliability and ISO 13849-1 Categories 3 or 4 and PL d or e for controlling final switching devices (FSDs) or machine primary control elements (MPCEs).

When configured with a five-conductor connection, the EZ-SCREEN LS requires a [self-checking](#) safety module, safety controller, or safety PLC/PES that conforms to the level of performance required by the risk assessment. Examples include the UM-FA-9A/-11A safety module, SC10-2roe or XS/SC26-2 safety controller for applications requiring Control Reliability and/or ISO 13849-1 Categories 3 or 4 and PL d or e.

Electrical connections (power, ground, inputs and outputs) are made via M12 quick-disconnect cordsets or unique RD (removable disconnect) cordsets, depending on model. A "System" as referred to in this manual, is defined as an emitter and its receiver, plus their cabling, or to a cascade of emitters and their receivers and their cabling.

Available features include selectable scan code via hookup, an auxiliary fault output, a recessed exit window, and robust metal housing and end-caps for industry-leading durability.

Additional features on cascade models include automatic configuration of up to four sensor pairs (any length or resolution), optional EZ-LIGHT indication (integral or remotely located) the ability to interface an E-Stop button or Interlocking switches (hard contacts), and remote fixed blanking. All models require a supply voltage of +24 V DC $\pm 15\%$.

Both emitter and receiver feature 7-segment Diagnostic Displays and individual LEDs to provide continuous indication of operating status, configuration, and error conditions. An adhesive Diagnostics label is provided that includes a summary of the operational and error codes. Active Alignment (Segment) Indicators provide beam block information and easier installation. See ["Status Indicators"](#) on [page 65](#) for more information.

3.1 Appropriate Applications and Limitations

WARNING:



- **Read this Section Carefully Before Installing the System**
- **Failure to follow these instructions could result in serious injury or death.**
- If all mounting, installation, interfacing, and checkout procedures are not followed properly, this Banner Engineering Corp. device cannot provide the protection for which it was designed.
- The user is responsible for ensuring that all local, state, and national laws, rules, codes, or regulations relating to the installation and use of this control system in any particular application are satisfied. Ensure that all legal requirements have been met and that all technical installation and maintenance instructions contained in this manual are followed.
- The user has the sole responsibility to ensure that this Banner Engineering Corp. device is installed and interfaced to the guarded machine by Qualified Persons, in accordance with this manual and applicable safety regulations. A Qualified person is a person who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work.

The EZ-SCREEN LS ability to perform its safeguarding function depends upon the appropriateness of the application and upon its proper mechanical and electrical installation and interfacing to the [guarded machine](#). **If all mounting, installation, interfacing, and checkout procedures are not followed properly, the EZ-SCREEN LS cannot provide the protection for which it was designed.**

WARNING:

- **Install System Only on Appropriate Applications**
- **Failure to follow these instructions could result in serious injury or death.**
- Use Banner's EZ-SCREEN LS only on machinery that can be stopped immediately after a [stop signal](#) is issued at any point in the machine's stroke or cycle, such as [part-revolution clutch](#) machines. Under no circumstances may the EZ-SCREEN LS be used on [full-revolution devices](#) (full-revolution clutched machinery) or in unsuitable applications.
- If there is any doubt about whether or not your machinery is compatible with the EZ-SCREEN LS, contact Banner Engineering.

3.1.1 Appropriate Applications

EZ-SCREEN LS is typically used for, but is not limited to, the following applications:

- Automated production equipment
- Robotic work cells
- Molding and power presses
- Assembly and packaging machines
- Lean manufacturing systems

3.1.2 Examples: Inappropriate Applications

Do not use EZ-SCREEN LS in the following applications:

- With any machine that cannot be stopped immediately after a stop signal is issued, such as single-stroke (or [full-revolution devices](#)) clutched machinery
- With any machine with inadequate or inconsistent [machine response time](#) and stopping performance
- With any machine that ejects materials or component parts through the [defined area](#)
- In any environment that is likely to adversely affect photoelectric sensing efficiency. For example, corrosive chemicals or fluids or unusually severe levels of smoke or dust, if not controlled, may degrade sensing efficiency
- As a tripping device to initiate or reinitiate machine motion ([presence-sensing device initiation](#) (PSDI) applications), unless the machine and its control system fully comply with the relevant standard or regulation (see [OSHA 29CFR1910.217](#), [NFPA 79](#), [ANSI B11.19](#), [ISO 12100](#), [IEC 60204-1](#), [IEC 61496-1](#), or other appropriate standard)

If an EZ-SCREEN LS is installed for use as a perimeter guard (where a [pass-through hazard](#) may exist, see ["Reducing or Eliminating Pass-Through Hazards" on page 31](#)), the dangerous machine motion can be initiated by normal means only after the safeguarded area is clear of individuals and the safety-related part of the control system that is providing the latching function has been manually reset.

3.1.3 Control Reliability: Redundancy and Self-Checking

Redundancy requires that EZ-SCREEN LS circuit components be backed up to the extent that if the failure of a single component will prevent effective machine stopping action when needed, that component must have a redundant counterpart that will perform the same function. The EZ-SCREEN LS is designed with redundant microprocessors for [control reliability](#).

Redundancy must be maintained whenever the EZ-SCREEN LS is in operation. Because a redundant system is no longer redundant after a component has failed, EZ-SCREEN LS is designed to monitor itself continuously. A component failure detected by or within the self-checking system causes a stop signal to be sent to the guarded machine and puts the EZ-SCREEN LS into a [lockout condition](#).

A recovery from this type of lockout condition requires:

- Replacement of the failed component (to restore redundancy)
- The appropriate reset procedure

The Diagnostic Display is used to diagnose the causes of a lockout condition. See ["Troubleshooting" on page 72](#).

3.2 Components

3.2.1 EZ-SCREEN LS Models

An EZ-SCREEN LS Safety Light Curtain “System” refers to a compatible **emitter** (light curtain) and **receiver** (light curtains) of equal length and resolution (available in pairs or separately), including cascaded sensors, and their cordsets. Mounting hardware may be included with each emitter and receiver, depending on model. Special-purpose mounting brackets both for standalone pairs and for cascades are also available. Depending on the connection option, interfacing solutions include IM-T-.. modules, redundant positively guided contactors, safety modules/controllers, and **muting** modules.

The 13 mm (0.5 in) minimum bend radius for all cordset models accommodates low-clearance installations; cords can exit to the left, right, or back of the sensor, when mounting. The cabled QD option is useful for connecting to splitter cables or other QD cordsets.

Figure 1. EZ-SCREEN LS Safety Light Curtain System: Emitter, Receiver, Interconnecting Cordsets

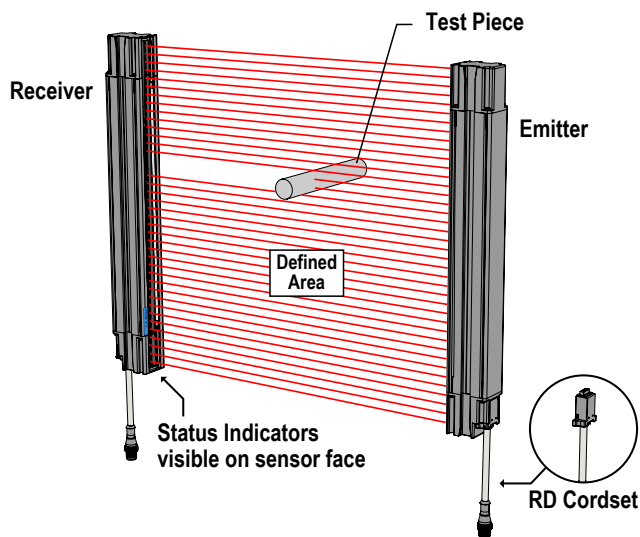
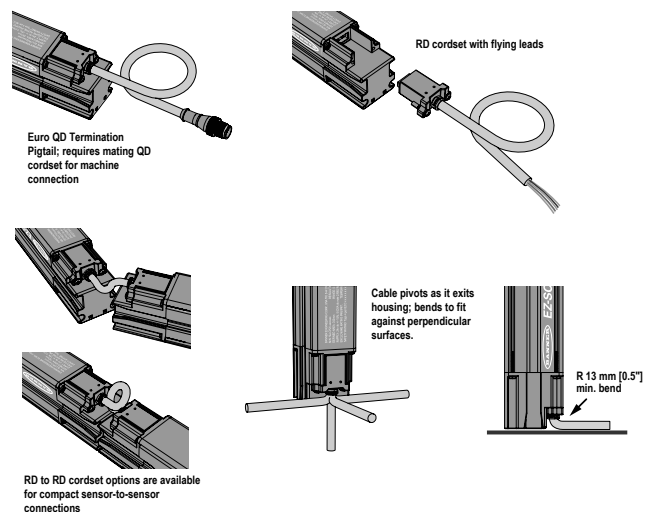


Figure 2. EZ-SCREEN LS Safety Light Curtain cordset options



EZ-SCREEN LS Pair model numbers include the following items:

Qty	Description
1	EZ-SCREEN LS Receiver
1	EZ-SCREEN LS Emitter
2	EZLSA-MBK-11 End-Cap Bracket Kit (four brackets)
2	EZLSA-MBK-12 Center-Mount Bracket Kit (two brackets included for models with defined areas ≥ 980 mm)
1	Test Rod (STP-13 for 14 mm models; STP-19 for 23 mm models; or STP-20 for 40 mm models)
1	Literature packet with Diagnostic Label

Table 1. EZ-SCREEN LS Model Key

Product Family	Cascadable	System Type	Resolution	-	Defined Area	Termination
SLL	Blank = No C = Yes	E = Emitter only	14 = 14 mm	-	280 = 280 mm *	Blank = no pigtail, RD connection (for middle/end units in cascade, or with RDLS-8..D cordset); includes standard brackets P5 = 300 mm pigtail, 5-Pin M12 QD (individual Emitter or Receiver models); includes standard brackets P55 = 300 mm pigtail, 5-Pin M12 QD (paired models); includes standard brackets P8 = 300 mm pigtail, 8-Pin M12 QD (individual Emitter or Receiver models); includes standard brackets P88 = 300 mm pigtail, 8-Pin M12 QD (paired models); includes standard brackets -S = no pigtail, RD connection (individual Emitter or Receiver only); brackets ordered separately
		R = Receiver only	23 = 23 mm		350 = 350 mm	
		P = Pair (Emitter and Receiver)	40 = 40 mm		420 = 420 mm	
					490 = 490 mm	
					560 = 560 mm	
					630 = 630 mm	
					700 = 700 mm	
					770 = 770 mm	
					840 = 840 mm	
					910 = 910 mm	
					980 = 980 mm	
					1050 = 1050 mm	
					1120 = 1120 mm	
					1190 = 1190 mm	
					1260 = 1260 mm	
					1330 = 1330 mm	
					1400 = 1400 mm	
					1470 = 1470 mm	
					1540 = 1540 mm	
					1610 = 1610 mm	
					1680 = 1680 mm	
					1750 = 1750 mm	
					1820 = 1820 mm	
					1960L = 1960 mm**	
					2100L = 2100 mm**	
					2380L = 2380 mm**	

* The 280 mm defined area model is not available on cascade systems.

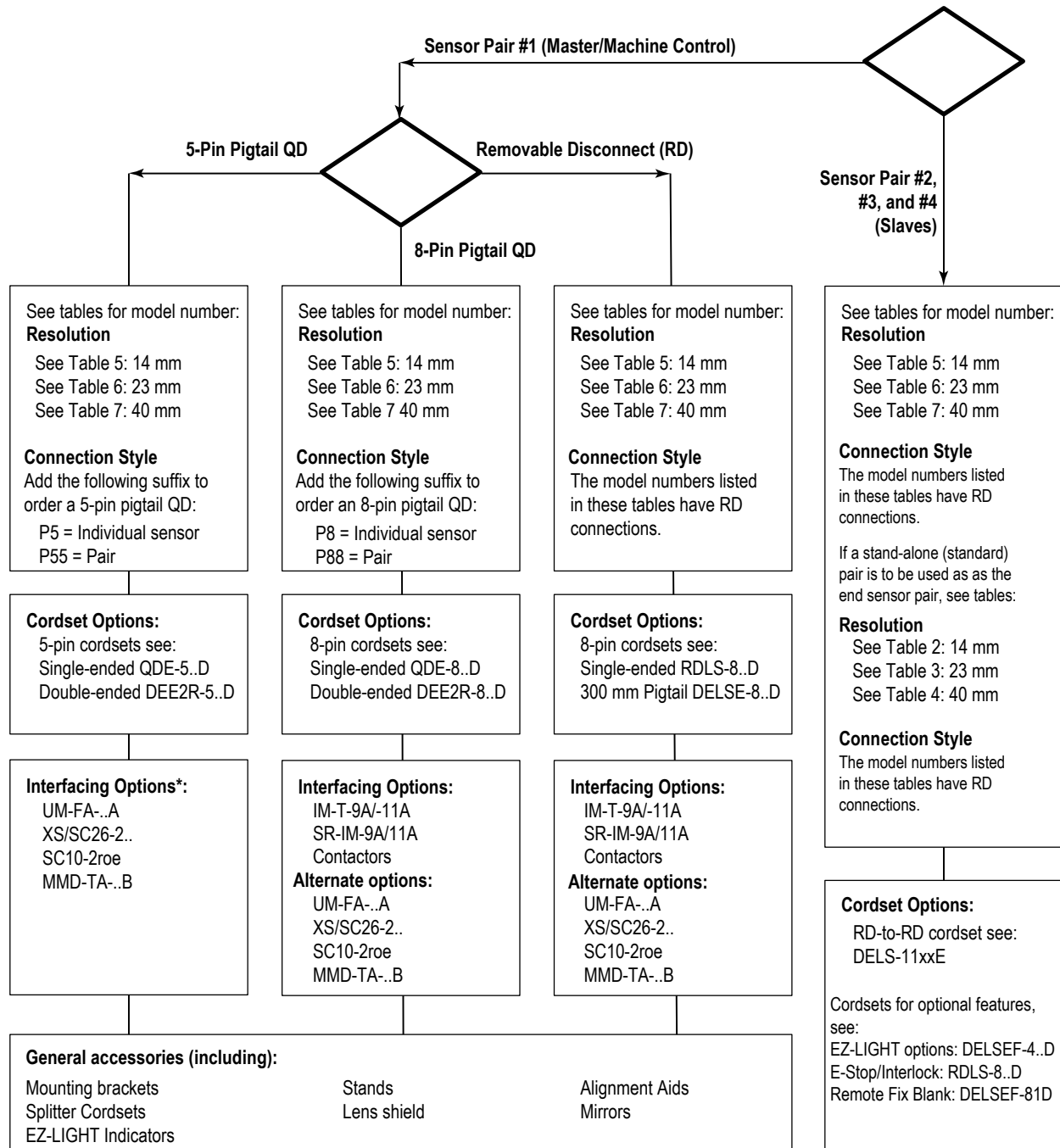
The 1960 mm, 2100 mm, and 2380 mm defined area models are only available in 23 mm resolution non-cascade systems, and only in the **-S option. Contact Banner Engineering for additional model availability.

Example Model: SLLCP23-1470P88

To determine the components required for an EZ-SCREEN LS Safety Light Curtain system using the Model Key:

1. Determine if the application calls for a stand-alone (a single, non-cascade emitter and receiver pair) or if a cascade pair is to be used as a stand-alone and/or with multiple pairs to be ordered are part of a cascaded system.
2. Choose an Emitter (E), a Receiver (R), or a Pair (P).
3. Choose resolution (14, 23, or 40 mm) and defined area.
4. Determine the Machine Interface connection style: 300 mm pigtail QD (5-pin or 8-pin) or a Removable Disconnect (RD).
5. Model number(s) can be verified in the models tables.
6. See "[Cordsets](#)" on page 87 for mating cordsets:
 - Models with RD connection use either RDLS-8..D, DELS-11..E, DELSE-81D, or DELSE-51D
 - Models with P8 (P88) suffix use QDE-8..D, DEE2R-8..D, or CSB-M128..M1281
 - Models with P5 (P55) suffix use QDE-5..D, DEE2R-5..D, or CSB-M125..M1251 (MQDEC-406SS is used in applications where pin 5 is open and ground is via mounting brackets)

Figure 4. Ordering guide for cascading systems



* 5-pin models must be interfaced with a self-checking safety module, safety controller, or safety PLC/PES that conforms to the level of performance required by the risk assessment (such as Control Reliability and/or ISO13849-1 Categories 3 or 4 and PL d or e).

Cordset models, interfacing option models and general accessory models can be found in ["Accessories" on page 87](#)

3.2.3 Models

As listed in the following tables, the models include an RD connection (for middle/end units in cascade, or with RDLS-8..D cordset). Add one of these suffixes to the end of the model number(s) listed in the tables below:

- **P5:** 300 mm (1 ft) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector (individual Emitter or Receiver models)
- **P55:** 300 mm (1 ft) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector (only Paired models)
- **P8:** 300 mm (1 ft) PVC-jacketed cable with an 8-pin M12 male quick-disconnect connector (individual Emitter or Receiver models)

- **P88:** 300 mm (1 ft) PVC-jacketed cable with an 8-pin M12 male quick-disconnect connector (only Paired models)
- **-S:** a unit with no mounting brackets (individual Emitter or Receiver models)

Table 2. EZ-SCREEN LS 14 mm Resolution Models (Standard/Stand-alone with RD connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLE14-280	SLLR14-280	SLLP14-280	280 mm	11.6	47	160
SLLE14-350	SLLR14-350	SLLP14-350	350 mm	13.3	55	186
SLLE14-420	SLLR14-420	SLLP14-420	420 mm	15.0	63	211
SLLE14-490	SLLR14-490	SLLP14-490	490 mm	16.7	69	237
SLLE14-560	SLLR14-560	SLLP14-560	560 mm	18.4	78	263
SLLE14-630	SLLR14-630	SLLP14-630	630 mm	20.1	86	288
SLLE14-700	SLLR14-700	SLLP14-700	700 mm	21.8	93	314
SLLE14-770	SLLR14-770	SLLP14-770	770 mm	23.5	101	339
SLLE14-840	SLLR14-840	SLLP14-840	840 mm	25.2	108	365
SLLE14-910	SLLR14-910	SLLP14-910	910 mm	26.9	116	391
SLLE14-980	SLLR14-980	SLLP14-980	980 mm	28.6	122	416
SLLE14-1050	SLLR14-1050	SLLP14-1050	1050 mm	30.3	130	442
SLLE14-1120	SLLR14-1120	SLLP14-1120	1120 mm	32.0	137	467
SLLE14-1190	SLLR14-1190	SLLP14-1190	1190 mm	33.7	145	493
SLLE14-1260	SLLR14-1260	SLLP14-1260	1260 mm	35.4	153	518
SLLE14-1330	SLLR14-1330	SLLP14-1330	1330 mm	37.1	160	544
SLLE14-1400	SLLR14-1400	SLLP14-1400	1400 mm	38.7	168	570
SLLE14-1470	SLLR14-1470	SLLP14-1470	1470 mm	40.4	175	595
SLLE14-1540	SLLR14-1540	SLLP14-1540	1540 mm	42.1	183	621
SLLE14-1610	SLLR14-1610	SLLP14-1610	1610 mm	43.8	191	646
SLLE14-1680	SLLR14-1680	SLLP14-1680	1680 mm	45.5	198	672
SLLE14-1750	SLLR14-1750	SLLP14-1750	1750 mm	47.2	206	697
SLLE14-1820	SLLR14-1820	SLLP14-1820	1820 mm	48.9	215	723

Table 3. EZ-SCREEN LS 23 mm Resolution Models (Standard/Stand-alone with RD Connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLE23-280	SLLR23-280	SLLP23-280	280 mm	8.2	32	110
SLLE23-350	SLLR23-350	SLLP23-350	350 mm	9.1	36	124
SLLE23-420	SLLR23-420	SLLP23-420	420 mm	9.9	40	135
SLLE23-490	SLLR23-490	SLLP23-490	490 mm	10.8	44	148
SLLE23-560	SLLR23-560	SLLP23-560	560 mm	11.6	47	160
SLLE23-630	SLLR23-630	SLLP23-630	630 mm	12.5	51	175
SLLE23-700	SLLR23-700	SLLP23-700	700 mm	13.3	55	186
SLLE23-770	SLLR23-770	SLLP23-770	770 mm	14.2	59	199
SLLE23-840	SLLR23-840	SLLP23-840	840 mm	15.0	63	211
SLLE23-910	SLLR23-910	SLLP23-910	910 mm	15.9	67	225
SLLE23-980	SLLR23-980	SLLP23-980	980 mm	16.7	69	237
SLLE23-1050	SLLR23-1050	SLLP23-1050	1050 mm	17.5	74	249
SLLE23-1120	SLLR23-1120	SLLP23-1120	1120 mm	18.4	78	269
SLLE23-1190	SLLR23-1190	SLLP23-1190	1190 mm	19.2	82	274
SLLE23-1260	SLLR23-1260	SLLP23-1260	1260 mm	20.1	86	288
SLLE23-1330	SLLR23-1330	SLLP23-1330	1330 mm	20.9	89	300
SLLE23-1400	SLLR23-1400	SLLP23-1400	1400 mm	21.8	93	314
SLLE23-1470	SLLR23-1470	SLLP23-1470	1470 mm	22.6	97	325

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Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLE23-1540	SLLR23-1540	SLLP23-1540	1540 mm	23.5	101	339
SLLE23-1610	SLLR23-1610	SLLP23-1610	1610 mm	24.3	104	350
SLLE23-1680	SLLR23-1680	SLLP23-1680	1680 mm	25.2	108	365
SLLE23-1750	SLLR23-1750	SLLP23-1750	1750 mm	26.0	112	376
SLLE23-1820	SLLR23-1820	SLLP23-1820	1820 mm	26.9	116	391
SLLE23-1960L	SLLR23-1960L	SLLP23-1960L	1960 mm	28.6	123	416
SLLE23-2100L	SLLR23-2100L	SLLP23-2100L	2100 mm	30.3	130	442
SLLE23-2380L	SLLR23-2380L	SLLP23-2380L	2380 mm	33.7	145	493

Table 4. EZ-SCREEN LS 40 mm Resolution Models (Standard/Stand-alone with RD Connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLE40-280	SLLR40-280	SLLP40-280	280 mm	8.2	32	110
SLLE40-350	SLLR40-350	SLLP40-350	350 mm	8.2	32	110
SLLE40-420	SLLR40-420	SLLP40-420	420 mm	8.2	32	110
SLLE40-490	SLLR40-490	SLLP40-490	490 mm	8.2	32	110
SLLE40-560	SLLR40-560	SLLP40-560	560 mm	8.2	32	110
SLLE40-630	SLLR40-630	SLLP40-630	630 mm	8.6	34	117
SLLE40-700	SLLR40-700	SLLP40-700	700 mm	9.1	36	124
SLLE40-770	SLLR40-770	SLLP40-770	770 mm	9.5	38	129
SLLE40-840	SLLR40-840	SLLP40-840	840 mm	9.9	40	135
SLLE40-910	SLLR40-910	SLLP40-910	910 mm	10.3	42	142
SLLE40-980	SLLR40-980	SLLP40-980	980 mm	10.8	44	148
SLLE40-1050	SLLR40-1050	SLLP40-1050	1050 mm	11.2	45	155
SLLE40-1120	SLLR40-1120	SLLP40-1120	1120 mm	11.6	47	160
SLLE40-1190	SLLR40-1190	SLLP40-1190	1190 mm	12.0	49	168
SLLE40-1260	SLLR40-1260	SLLP40-1260	1260 mm	12.5	51	175
SLLE40-1330	SLLR40-1330	SLLP40-1330	1330 mm	12.9	53	179
SLLE40-1400	SLLR40-1400	SLLP40-1400	1400 mm	13.3	55	186
SLLE40-1470	SLLR40-1470	SLLP40-1470	1470 mm	13.7	57	193
SLLE40-1540	SLLR40-1540	SLLP40-1540	1540 mm	14.2	59	199
SLLE40-1610	SLLR40-1610	SLLP40-1610	1610 mm	14.6	61	206
SLLE40-1680	SLLR40-1680	SLLP40-1680	1680 mm	15.0	63	211
SLLE40-1750	SLLR40-1750	SLLP40-1750	1750 mm	15.4	65	216
SLLE40-1820	SLLR40-1820	SLLP40-1820	1820 mm	15.9	67	225

Table 5. EZ-SCREEN LS 14 mm Resolution Models (Cascade with RD Connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLCE14-350	SLLCR14-350	SLLCP14-350	350 mm	13.3	55	186
SLLCE14-420	SLLCR14-420	SLLCP14-420	420 mm	15.0	63	211
SLLCE14-490	SLLCR14-490	SLLCP14-490	490 mm	16.7	69	237
SLLCE14-560	SLLCR14-560	SLLCP14-560	560 mm	18.4	78	263
SLLCE14-630	SLLCR14-630	SLLCP14-630	630 mm	20.1	86	288
SLLCE14-700	SLLCR14-700	SLLCP14-700	700 mm	21.8	93	314
SLLCE14-770	SLLCR14-770	SLLCP14-770	770 mm	23.5	101	339

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Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLCE14-840	SLLCR14-840	SLLCP14-840	840 mm	25.2	108	365
SLLCE14-910	SLLCR14-910	SLLCP14-910	910 mm	26.9	116	391
SLLCE14-980	SLLCR14-980	SLLCP14-980	980 mm	28.6	122	416
SLLCE14-1050	SLLCR14-1050	SLLCP14-1050	1050 mm	30.3	130	442
SLLCE14-1120	SLLCR14-1120	SLLCP14-1120	1120 mm	32.0	137	467
SLLCE14-1190	SLLCR14-1190	SLLCP14-1190	1190 mm	33.7	145	493
SLLCE14-1260	SLLCR14-1260	SLLCP14-1260	1260 mm	35.4	153	518
SLLCE14-1330	SLLCR14-1330	SLLCP14-1330	1330 mm	37.1	160	544
SLLCE14-1400	SLLCR14-1400	SLLCP14-1400	1400 mm	38.7	168	570
SLLCE14-1470	SLLCR14-1470	SLLCP14-1470	1470 mm	40.4	175	595
SLLCE14-1540	SLLCR14-1540	SLLCP14-1540	1540 mm	42.1	183	621
SLLCE14-1610	SLLCR14-1610	SLLCP14-1610	1610 mm	43.8	191	646
SLLCE14-1680	SLLCR14-1680	SLLCP14-1680	1680 mm	45.5	198	672
SLLCE14-1750	SLLCR14-1750	SLLCP14-1750	1750 mm	47.2	206	697
SLLCE14-1820	SLLCR14-1820	SLLCP14-1820	1820 mm	48.9	215	723

Table 6. EZ-SCREEN LS 23 mm Resolution Models (Cascade with RD Connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLCE23-350	SLLCR23-350	SLLCP23-350	350 mm	9.1	36	124
SLLCE23-420	SLLCR23-420	SLLCP23-420	420 mm	9.9	40	135
SLLCE23-490	SLLCR23-490	SLLCP23-490	490 mm	10.8	44	148
SLLCE23-560	SLLCR23-560	SLLCP23-560	560 mm	11.6	47	160
SLLCE23-630	SLLCR23-630	SLLCP23-630	630 mm	12.5	51	175
SLLCE23-700	SLLCR23-700	SLLCP23-700	700 mm	13.3	55	186
SLLCE23-770	SLLCR23-770	SLLCP23-770	770 mm	14.2	59	199
SLLCE23-840	SLLCR23-840	SLLCP23-840	840 mm	15.0	63	211
SLLCE23-910	SLLCR23-910	SLLCP23-910	910 mm	15.9	67	225
SLLCE23-980	SLLCR23-980	SLLCP23-980	980 mm	16.7	69	237
SLLCE23-1050	SLLCR23-1050	SLLCP23-1050	1050 mm	17.5	74	249
SLLCE23-1120	SLLCR23-1120	SLLCP23-1120	1120 mm	18.4	78	269
SLLCE23-1190	SLLCR23-1190	SLLCP23-1190	1190 mm	19.2	82	274
SLLCE23-1260	SLLCR23-1260	SLLCP23-1260	1260 mm	20.1	86	288
SLLCE23-1330	SLLCR23-1330	SLLCP23-1330	1330 mm	20.9	89	300
SLLCE23-1400	SLLCR23-1400	SLLCP23-1400	1400 mm	21.8	93	314
SLLCE23-1470	SLLCR23-1470	SLLCP23-1470	1470 mm	22.6	97	325
SLLCE23-1540	SLLCR23-1540	SLLCP23-1540	1540 mm	23.5	101	339
SLLCE23-1610	SLLCR23-1610	SLLCP23-1610	1610 mm	24.3	104	350
SLLCE23-1680	SLLCR23-1680	SLLCP23-1680	1680 mm	25.2	108	365
SLLCE23-1750	SLLCR23-1750	SLLCP23-1750	1750 mm	26.0	112	376
SLLCE23-1820	SLLCR23-1820	SLLCP23-1820	1820 mm	26.9	116	391

Table 7. EZ-SCREEN LS 40 mm Resolution Models (Cascade with RD Connection)

Emitter	Receiver	Pair	Defined Area	Response Time, Tr (ms)	Recovery Time, Typ, OSSDs OFF to ON (ms)	
					Non-sync beam blocked	All beams blocked
SLLCE40-350	SLLCR40-350	SLLCP40-350	350 mm	8.2	32	110

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Chapter 4 Specifications

4.1 General Specifications

Supply Current (mA)

Length	Emitter		Receiver*		
	Maximum***	Typical	Maximum***	Typical	Typical
280	30	25	112	-	69
350	30	25	115	100	72
420	30	25	117	102	74
490	30	25	119	104	76
560	30	25	122	106	78
630	30	25	124	108	80
700	31	25	127	110	82
770	31	26	129	112	84
840	31	26	132	114	86
910	31	26	134	117	89
980	31	26	137	119	91
1050	31	26	139	121	93
1120	31	26	141	123	95
1190	31	26	144	125	97
1260	32	26	146	127	99
1330	32	26	149	129	101
1400	32	26	151	131	103
1470	32	27	154	134	106
1540	32	27	156	136	108
1610	32	27	159	138	110
1680	32	27	161	140	112
1750	32	27	163	142	114
1820	32	27	166	144	116
1960	33	27	171	N/A	120
2100	33	27	176	N/A	125
2380	33	28	185	N/A	133

*Supply current exclusive of OSSD1 and OSSD2 loads (up to an additional 0.5 A each) and Fault Output load (up to 0.070 A).

**Adding an indicator (EZ-LIGHT) to the CSSI will increase the receiver's current draw. Consult the indicator specifications for the value of the additional current.

***Maximum current occurs at a supply voltage of 20 V DC.

Supply Voltage at the Device

24 V DC $\pm 15\%$ (use a SELV-rated power supply according to EN IEC 60950).

The external voltage supply must be capable of buffering brief mains interruptions of 20 ms, as specified in IEC/EN 60204-1.

Short Circuit Protection

All inputs and outputs are protected from short circuits to +24 V DC or DC common

Residual Ripple

$\pm 10\%$ maximum

Operating Range

280 mm to 1820 mm length models: 0.1 m to 12 m (4 in to 39 ft)

1890 mm to 2380 mm length models: 0.1 m to 10 m (4 in to 32.8 ft)

The range decreases with the use of mirrors and/or lens shields:

- Lens shields — approx 10% less range per shield
- Glass-surface mirrors — approx 8% less range per mirror

See the specific mirror datasheet for more information.

Electrical Safety Class

III (per IEC 61140: 1997)

Resolution

14 mm, 23 mm, or 40 mm, depending on model

Effective Aperture Angle (EAA)

Meets Type 4 requirements per IEC 61496-2

Enclosure

Extruded aluminum housing with black anodized (previously units had a yellow polyester powder finish) finish standard and well-sealed, rugged die-cast zinc end caps, acrylic lens cover

Mounting Hardware

Emitter and receiver each are supplied with a pair of end-mounting brackets. Models longer than 910 mm also include an additional center-mount bracket for support. Mounting brackets are 8-gauge cold-rolled steel, black zinc finish.

For models ending in -S, all mounting hardware is ordered separately.

The 1890 mm to 2380 mm models require at least 2 center brackets.

Removable Disconnect

See "Cordsets" on page 87

Tighten screws to 2.6 in/lbs to ensure a solid connection

Cables and Connections

See "Cordsets" on page 87

Safety Rating

Type 4 per IEC 61496-1, -2

Category 4 PL e per EN ISO13849-1

SIL3 per IEC 61508; SIL CL3 per IEC 62061

PFHd:

Non-Cascade 1.30×10^{-10}

1-Pair Cascade 3.92×10^{-10}

2-Pair Cascade 7.83×10^{-10}

3-Pair Cascade 1.18×10^{-9}

4-Pair Cascade 1.57×10^{-9}

Proof Test Interval: 20 years

Operating Conditions

-20 °C to +55 °C (-4 °F to +131 °F)

95% maximum relative humidity (non-condensing)

Enclosure Ratings

280 mm to 1820 mm length models: IP65/IP67

1890 mm to 2380 mm length models: IP65

Vibration and Mechanical Shock

Components have passed vibration and shock tests according to IEC 61496-1 (Class 3M4). This includes vibration (30 cycles) of 5 to 150 Hz at 3.5 mm (0.14 in) amplitude and shock of 15 g for 6 milliseconds (600 cycles).

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM



Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN



4.2 Receiver Specifications

Response Time

Dependent on the number of sensing beams; for the response time, see ["EZ-SCREEN LS Models" on page 12](#)

EDM Input (Available with 8-Conductor Models)

+24 V DC signals from external device contacts can be monitored (one-channel or no monitoring) via the EDM terminal in the receiver.

High Signal: 10 to 30 V DC at 30 mA typical

Low Signal: 0 to 3 V DC

Recovery Time

Blocked to Clear (OSSDs turn On): Dependent on the number of beams and whether the first beam (CH 1 synchronization beam) has been blocked. For specific values, see ["EZ-SCREEN LS Models" on page 12](#).

CSSI Status Output Switching Capacity

Current-sourcing (PNP) solid-state output, 24 V DC at 100 mA maximum

Strobe Light Immunity

Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe

Output Signal Switching Devices (OSSDs)

Two redundant solid-state 24 V DC, 0.5 A maximum sourcing OSSD (Output Signal Switching Device) safety outputs (Use optional interface solutions for AC or larger DC loads)

ON state voltage: $> V_{in} - 1.5 \text{ V DC}$

OFF state voltage: 0 V DC typical, 1 V DC maximum (no load)

OFF-State, maximum allowed external voltage: 1.5 V DC⁽¹⁾

Maximum load capacitance: 1.0 µF

Maximum cable resistance to load: 5 ohms per wire

Maximum leakage current: 50 µA (with open 0 V)

OSSD test pulse width: 200 µs typical

OSSD test pulse period: 200 ms typical

Switching current: 0 A minimum; 0.5 A maximum (per OSSD)

⁽¹⁾ The maximum voltage allowed on the OSSDs in the OFF-state without a lockout occurring. This voltage may occur, for example, from the input structure of a safety relay module connected to the EZ-SCREEN LS OSSDs.

Fault Output Switching Capacity (Available with 8-Conductor Models)

Current-sourcing (PNP) solid-state output, 24 V DC at 70 mA maximum

Scan Code Input (Available with 8-Conductor Models)

High Signal: 10 to 30 V DC at 30 mA typical

Low Signal: 0 to 3 V DC

Scan Code Selection: 8-pin/8-wire connection only (5-pin systems are Scan Code 1)

- Select Scan Code 1 by connecting pin 8 (violet wire) to 0 V DC or leaving it open (not connected)
- Select Scan Code 2 by connecting pin 8 (violet wire) to +24 V DC

Status Indicators

Amber Run Mode Indicator: indicates the System is ready for operation

Bi-color (red/green) Status indicator: indicates general system and output status

Bi-color (red/green) Alignment Status indicators: indicate condition (clear or blocked beam) of a defined group of beams (±35 mm of indicator)

7-Segment Diagnostic indicator (1 digit): indicates proper operation, scan code, error code, or total number of blocked beams

Ambient Light Immunity

10,000 lux at 5° angle of incidence

4.3 Emitter Specifications

Emitter Elements Wavelength

Infrared LEDs, 850 nm at peak emission

Fault Output Switching Capacity

Current-sourcing (PNP) solid-state output, 24 V DC at 70 mA maximum

Position ID Input (Available with 8-Conductor Models)

Input connected to +24 V DC to identify emitter's position as a stand-alone or the first (master) in a cascade system.

Status Indicators

One bi-color (Red/Green) Status Indicator: indicates operating mode, lockout or power Off condition

7-Segment Diagnostic indicator (1 digit): indicates proper operation, scan code, or error code

Scan Code Input (Available with 8-Conductor Models)

High Signal: 10 to 30 V DC at 30 mA typical

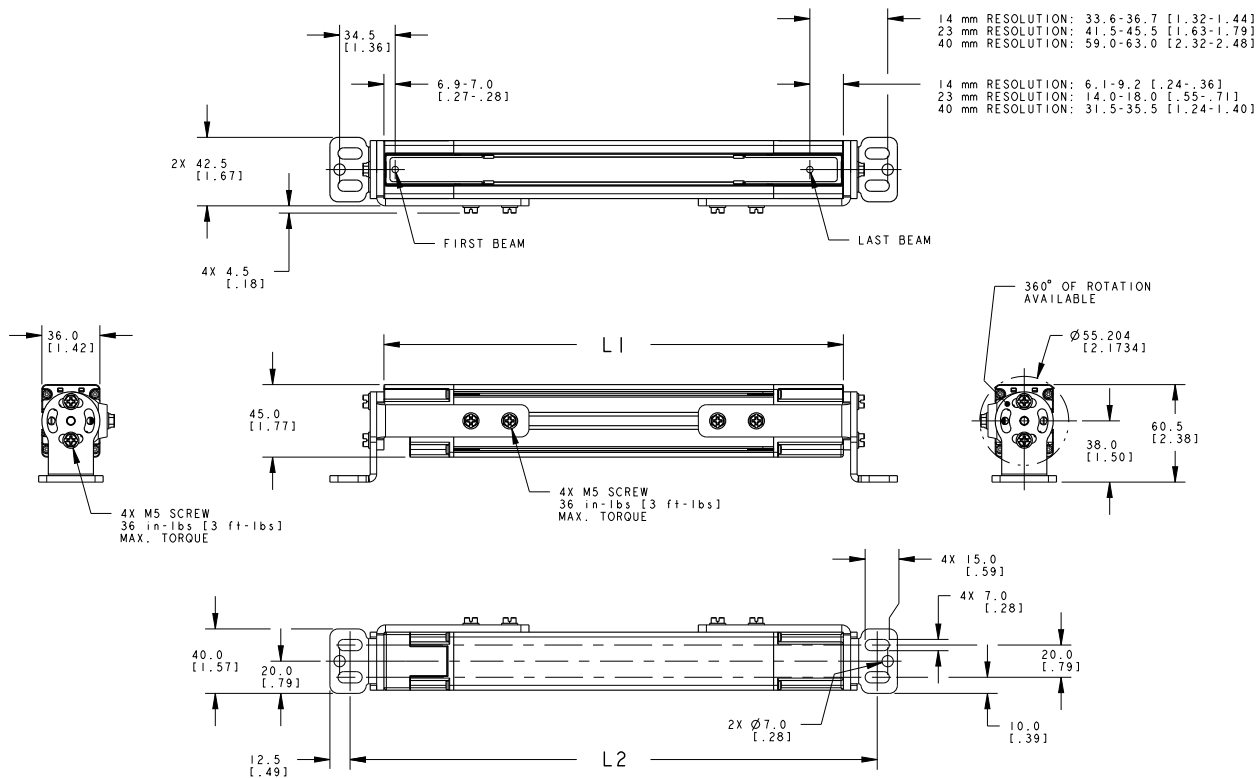
Low Signal: 0 to 3 V DC

Scan Code Selection: 8-pin/8-wire connection only (5-pin systems are Scan Code 1)

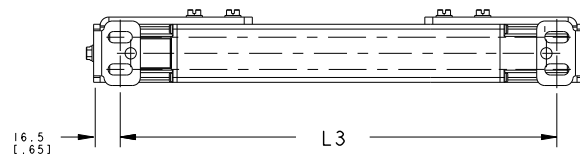
- Select Scan Code 1 by connecting pin 8 (violet wire) to 0 V DC or leaving it open (not connected)
- Select Scan Code 2 by connecting pin 8 (violet wire) to +24 V DC

4.4 Dimensions

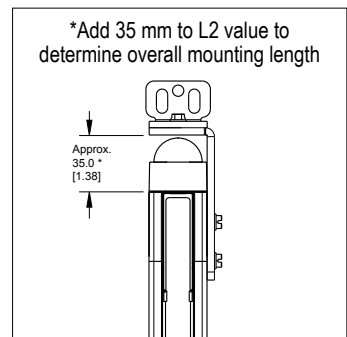
End Brackets Mounted Outward



End Brackets Mounted Inward



End Bracket with EZ-LIGHT



Emitter/Receiver Model	Housing Length (L1)	Hole to Hole Length with Brackets Out (L2) (mm)	Hole to Hole Length with Brackets In (L3) (mm)	Defined Area ⁽²⁾ (mm)
SLL...-280...	285 mm (11.2 in)	327.1	269.1	280
SLL...-350...	355 mm (14.0 in)	397.1	339.1	350
SLL...-420...	425 mm (16.7 in)	466.6	408.6	420
SLL...-490...	495 mm (19.5 in)	536.6	478.6	490
SLL...-560...	564 mm (22.2 in)	606.1	548.1	560
SLL...-630...	634 mm (25.0 in)	676.1	618.1	630
SLL...-700...	704 mm (27.7 in)	746.1	688.1	700
SLL...-770...	774 mm (30.5 in)	816.1	758.1	770
SLL...-840...	844 mm (33.2 in)	885.6	827.6	840
SLL...-910...	914 mm (36.0 in)	955.6	897.6	910
SLL...-980...	983 mm (38.7 in)	1025.1	967.1	980
SLL...-1050...	1053 mm (41.5 in)	1095.1	1037.1	1050
SLL...-1120...	1123 mm (44.2 in)	1165.1	1107.1	1120
SLL...-1190...	1193 mm (47.0 in)	1235.1	1177.1	1190
SLL...-1260...	1263 mm (49.7 in)	1304.6	1246.6	1260
SLL...-1330...	1333 mm (52.5 in)	1374.6	1316.6	1330
SLL...-1400...	1402 mm (55.2 in)	1444.1	1386.1	1400
SLL...-1470...	1472 mm (58.0 in)	1514.1	1456.1	1470
SLL...-1540...	1542 mm (60.7 in)	1584.1	1526.1	1540
SLL...-1610...	1612 mm (63.5 in)	1654.1	1596.1	1610
SLL...-1680...	1682 mm (66.2 in)	1723.6	1665.6	1680
SLL...-1750...	1752 mm (69.0 in)	1793.6	1735.6	1750
SLL...-1820...	1821 mm (71.7 in)	1863.1	1805.1	1820
SLL...-1960L...	1961 mm (77.2 in)	2003.1	1945.1	1960
SLL...-2100L...	2101 mm (84.9 in)	2142.6	2071.6	2100
SLL...-2380L...	2380 mm (95.9 in)	2422.1	2351.1	2380

⁽²⁾ Nominal measurement