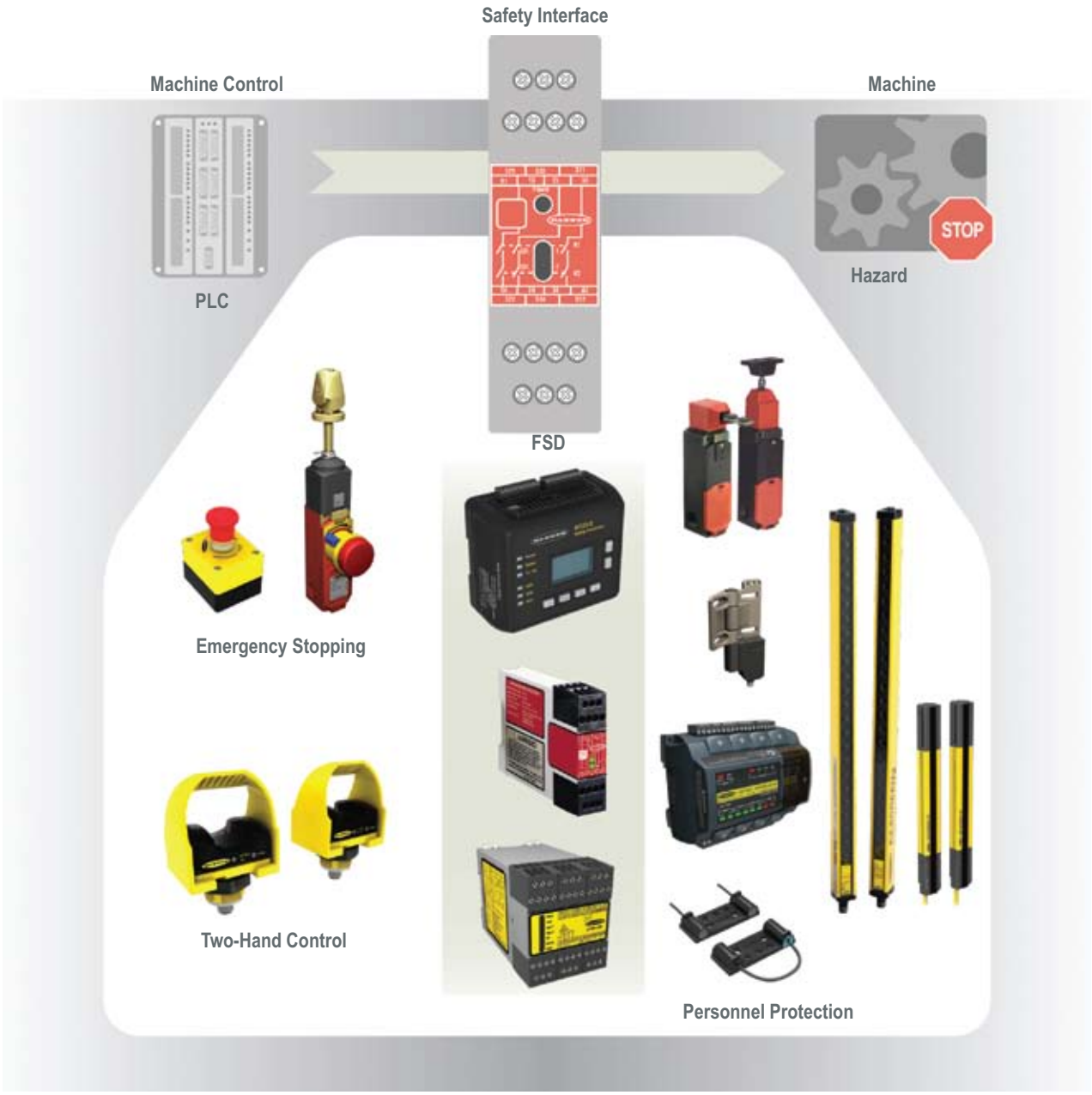
Safeguarding Basics



Basics of Safeguarding
Machine and personnel safeguarding refers to the combination of requirements, methods and solutions used to protect people who come in contact with dangerous machines in the industrial environment.

Requirements
National and regional governmental bodies have regulations, mandates, standards and recommendations for implementing a safety method or a solution.

Key regulations regarding general machine guarding include the following:
- Machinery Directive - EU
- OSHA General Duty Clause – USA

(see page 466 for an abridged version list of industry safety standards)

Device Requirements
Safety devices must be able to consistently and reliably bring a machine hazard to an orderly stop.

To be considered a safety device, the following methods must be used to ensure reliable operation: fault exclusion, redundancy and self-checking.

Safety Circuit Requirements
A safety stop circuit typically comprises of 2 normally-open contact from mechanically-linked relays. The circuit is monitored to detect certain failures that could lead to the loss of the safety function.

Methods: Risk Assessment

The Risk Assessment Process in machine safeguarding is a process used to identify hazards through each phase of the machine's life cycle and to minimize dangers to personnel and equipment.

The basic steps in a Risk Assessment Process:

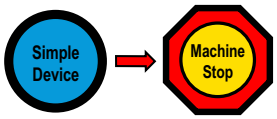
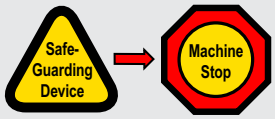
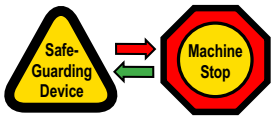
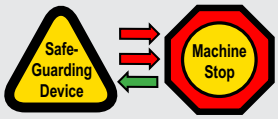
1. Identify hazards and where they occur.
2. Assess risk by severity of harm and probability of occurrence.
3. Reduce the risk through the use of protective measures.
4. Validate and document results.

Risk Assessment Standards

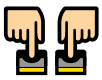
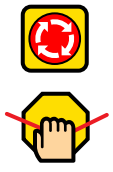
- OSHA 3071, Job Hazard Analysis
- MIL-STD-8820, US DOD System Safety Program
- ANSI/RIA R15.06,Safety Requirements for Industrial Robots and Robot Systems
- ANSI B11.0 General (Safety) Requirements and Risk Assessment
- ANSI B11.TR3, Risk Assessment and Risk Reduction
- ISO 12100, General Principles for Design, Risk Assessment and Risk Reduction
- SEMI S10, Risk Assessment, Semiconductor Manufacturing Equipment

Methods: Safety Circuits

Depending on the level of risk associated with the machine or operations, an appropriate level of control circuitry performance must be incorporated into safety device design.

	Basic	Single	Single with Monitoring	Dual with Monitoring
Generic	Stop Command	Safety Stop Command	Safety Stop Command Monitoring Signal	Redundant Safety Stop Commands Monitoring Signal
				
	• Non safety-rated components • Integrated in accordance with relevant standards • Reliability depends on robust components • Redundancy not required	• Safety-rated components • Integrated in accordance with safety principles and design • Redundancy not required	• Safety-rated components • Conducts periodic test of system • Normal operation allowed if no faults are found • If unsafe fault is found, system will default to safe state or indicate that unsafe system exists	• Safety-rated components • Greatest degree of fault tolerance • Redundancy and self-checking • Single failure cannot cause loss of safety function • Faults detected immediately or at next demand on system
Fault	Possible loss of safety function	Greater reliability, but possible loss of safety function	Fault detected at each test	Safety function is ensured with a single fault. An accumulation of faults is not possible or detected.
Risk	**Very Low** Minor bump or bruise with no lost time	**Low** Minor first aid, infrequent exposure or high likelihood of avoiding the hazard	**Mid Range** Injuries that are slight or normally reversible, requiring normal healing or only first aid	**High or Very High** Normally reserved for hand-fed applications where injuries could be severe to irreversible
ANSI / B11	—	—	—	Control Reliable ANSI B11.19 (Clause 6.1 and Annex C) Category 3 or 4 and/or PL d pr PLE satisfy Control Reliability requirements
ANSI / RIA	Simple	Single Channel	Single Channel with Monitoring	Control Reliable ANSI/RIA R15.06 (Clause 4.5) Control reliability for robots typically exceeds a Cat 3 but is not necessarily intended to be a Cat 4
ISO / EN	Category B ISO 13849-1/EN 954-1	Category 1 ISO 13849-1/EN 954-1	Category 2 ISO 13849-1/EN 954-1	Category 3 & 4 ISO 13849-1/EN 954-1

Solutions: Comparing Guards and Devices*

Type	Safety Function	Advantages	Limitations	Requirements	Standards
Guards: protective physical barrier used to prevent access.					
Fixed Guard 	Provides a fixed barrier to the hazard	• Low maintenance • Long life • Low cost for small areas • Protects all individuals • Can contain ejected materials	• Poor ergonomics • Limited visibility • Limited access • Costly for large areas • Maintenance may require removal of guard	• Protect from identified hazard • Prevent user from reaching over, under, around or through the barrier • Provide safe openings	• ANSI B11.19 • ISO 14120 • ISO 13857 • ASME B15.1
Interlocked Guard 	Interrupts power to machine when guard is opened	• Low initial investment • Can be placed close to hazard • Protects all individuals • Can contain ejected materials	• Costly for large areas • Increased maintenance	• Must be difficult to defeat • Guard may open only after machine has stopped–or must be installed at a safe distance	• ANSI B11.19 • NFPA 79 • ISO 14119 • 14120 • IEC 60204-1
Safeguarding Devices: components, attachments or mechanisms designed to perform a specific safeguarding function.					
Safety Light Screen 	Arrests power to machine when sensing field is interrupted	• Excellent ergonomics • Allows frequent access • Protects all individuals • Cost effective for large areas • Allows for good visibility	• Limited to machines that can be stopped quickly • No protection from ejected parts • May require the use of additional guards • May create a pass-through hazard	• Initiate immediate stop when sensing field is interrupted • Appropriate resolution required to detect objects the size of a torso, ankle, hand or finger	• ANSI B11.19 • IEC 61496 • ISO 13855
Multiple-Beam System: • Grids • Points 	Arrests power to machine when sensing field is interrupted	• Low initial investment • Allows frequent access • Allows for good visibility • Protects all individuals	• Limited to machines that can be stopped quickly • No protection from ejected parts • Large safety distance • May create a pass-through hazard	• Initiate immediate stop when sensing field is interrupted • Appropriate resolution required to detect objects the size of a torso	• ANSI B11.19 • IEC 61496 • ISO 13855
Two-Hand Control 	Operator must use both hands to actuate machine motion hereby preventing operator access to hazardous area	• Operator's hands are away from hazardous area • Low initial investment • Low maintenance	• Potential ergonomic impact • Provides protection only for operator • No protection from ejected parts	• Concurrent actuation within 1/2 second • Release and reactivation required before machine motion may be reinitiated	• ANSI B11.19 • NFPA 79 • ISO 13851 • IEC 60204-1
Safety Mat Monitor 	Interrupts power to machine when a minimum pressure is applied	• Excellent ergonomics • Protects all individuals • Allows for good visibility	• Costly for large areas • Maintenance intensive • Large safety distance	Minimum object sensitivity of 66 lbs on and 3-1/8" surface to detect a foot	• ANSI B11.19 • ISO 13855 • ISO 13856
Complementary Safety Devices: used to supplement a primary safeguard.					
E-Stop • Button • Rope Pull 	Operator activates button in emergency situation to shut off power to machine	• Immediate response • Safe shutdown of machine process	• Not considered a safeguard • Requires conscious act of operator • Limits injury or machine damage but typically does not prevent it	• Overrides all other functions and operations • Reset of E-stop doesn't initiate machine motion • Button must be red with yellow background • Should be located at each operation station • Final removal of power done by electromechanical components	• ANSI B11.19 • NFPA 79 • ISO 12100 • IEC 60204-1 • ISO 13850

*This represents a partial list of available safeguards & devices.

Solutions: Choosing and Locating a Safeguard

When choosing a safeguard, ask yourself the following questions:
1) is it safe, 2) is it legal and 3) does it make sense for the application.

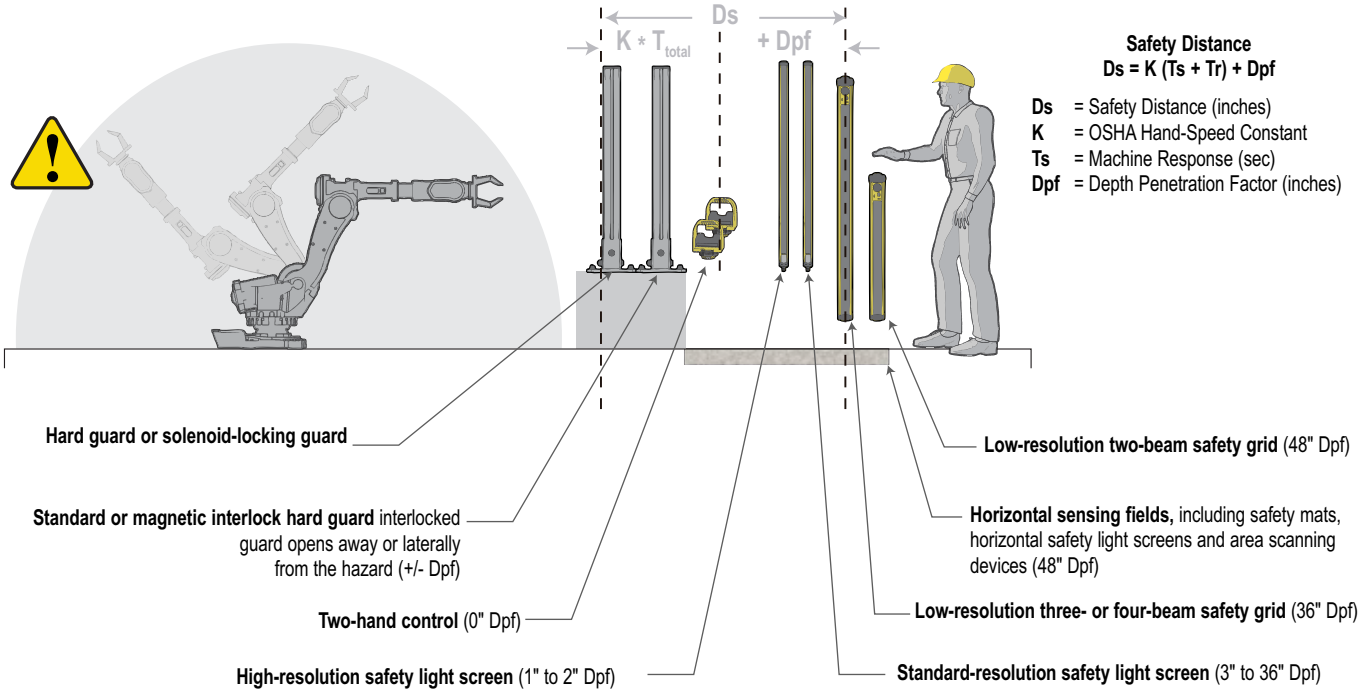
Choosing a Safety Product

- □ Who will use it?
- □ How will they use it?
- □ What hazards are associated with which task?
- □ What are the types of hazards?
- □ Where will the safeguard be located?

E = Excellent
A = Acceptable
P = Poor
X = Not Acceptable

Guarding Solutions	Maintenance $	Frequent Access	Infrequent Access	Locate Close to Hazard	Long Machine Stop Time	Ergonomic	Visibility	Multiple Operators	Guards Against Ejected Material	Comments
Fixed Hard Guard	P	P	E	E	E	P	P	E	E	• Limited access • Limited visibility to the machine • Costly for large areas • Costly to maintain and fix
Locking Guard	P	P	E	E	E	P	P	E	E	
Interlock Guard	P	P	A	E	A	P	P	E	E	
Two-Hand Control	A	A	A	A	A	A	A	P	P	• Only protects operator(s)
High-Resolution SLS	E	E	P	E	P	E	E	E	X	• Locate closer to hazard
Low-Resolution SLS	E	E	P	E	P	E	E	E	X	• Costs less than high resolution SLS
3- or 4-Beam Perimeter	E	A	A	P	A	E	E	E	X	• Takes less space than 2-beam
2-Beam Perimeter	E	A	A	P	A	E	E	E	X	• Costs less than 3- or 4-beam
Safety Mats	P	A	A	P	A	E	E	E	X	• Maintenance-intensive

Locating a Safety Product



NOTE: Illustration examples are based upon the described safeguards being used as the primary safeguarding device, all examples having identical stopping time, and following generally accepted industrial engineering practices that are found within ANSI B11.19 and ANSI/RIA R15.06 safety standards.

Requirements: Standards

Safeguarding standards are minimum requirements for product and machine design, manufacture, use and evaluation that guide the methods used to improve safety.

Go online for a more comprehensive and up-to-date list of standards.

General Requirements

U.S.
OSHA 29CFR1910.212
General Requirements for (Guarding of) All Machines

International/European
ISO 12100 Safety of Machinery General Principles for Design

ISO 14121 (EN 1050)
Safety of Machinery: Risk Assessment

Standards: Safeguarding Design

U.S.
ANSI/NFPA 79
Electrical Standard for Industrial Machinery

ANSI Z535
Safety Signs, Symbols and Color Codes

ANSI Z136.1
Safe Use of Lasers

ANSI Z244.1 Lockout/Tagout of Energy Sources

ANSI B11.21
Machine Tools Using Lasers – Safety

OSHA 29CFR1910.147
Control of Hazardous Energy

OSHA 29CFR1910.219
Mechanical Power Transmission Apparatus

ANSI B15.1
Mechanical Power Transmission Apparatus

ANSI B11.0 Safety of Machinery; General Requirements and Risk Assessment

ANSI B11.19
Performance Criteria for Safeguarding

ANSI B11.TR1
Ergonomic Guidelines

ANSI B11.TR3
Risk Assessment / Risk Reduction

OSHA 3071
Job Hazard Analysis

International/European
IEC 60204-1
Electrical Equipment of Machines

ISO 14118 (EN 1037)
Prevention of Unexpected Start Up

ISO 13849-1 (EN 954-1)
Safety Related Parts of Control Systems

ISO 14120 (EN 953)
Guards – General Requirements for the Design and Construction

Standards: Specific Machine Applications, Grouped by Type

Machine Tools
OSHA 29CFR1910.217
(Guarding of) Mechanical Power Press

ANSI B11.1
Mechanical Power Presses

EN 692
Mechanical Power Presses
More online....

Conveyors
ANSI/ASME B20.1
Conveyors and Related Equipment

ISO 4123
Belt Conveyors

ISO 9851
Overhead Electrical Monorail Conveyors

Industrial Robots
ANSI/RIA R15.06
Industrial Robots and Robot Systems

ISO 10218
Manipulating Industrial Robots – Safety

Injection Molding
ANSI B151.1
Horizontal Injection Molding Machines

ANSI B151.21
Injection Blow Molding Machines – Safety

ANSI B151.26
Dynamic Reaction – Injection Molding Machines

ANSI B151.27
Plastics Machinery – Robots Used With HIM Machines – Safety

Mills and Calenders
OSHA 29CFR1910.261
Pulp, Paper, and Paperboard Mills

OSHA 29CFR1910.216
Mills and Calenders in the Rubber and Plastics Industry

ANSI B28.1
Safety Code for Rubber Mills and Calenders

EN 1417
Rubber and Plastics Machines – Two-Roll Mills

Packaging
ANSI/PMMI B155.1
Packaging and Packaging-Related Converting Machinery – Safety

EN 415
Safety of Packaging Machines

Semiconductor
SEMI S1
Safety Guideline for Equipment Safety Labels

SEMI S2
Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment

SEMI S3
Safety Guidelines for Heated Chemical Baths

SEMI S7
Safety Guidelines for Environmental, Safety, and Health (ESH) Evaluation of Semiconductor Manufacturing Equipment

SEMI S8
Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment

SEMI S9
Safety Guideline for Electrical Design Verification Tests for Semiconductor Manufacturing Equipment

SEMI S10
Safety Guideline for Risk Assessment

And More...
Cranes, Printing, Woodworking, Lumber and Logging

Safety Standards Acronyms

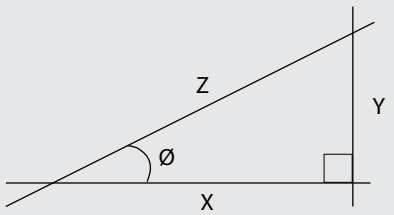
ANSI: American National Standards Institute
CE: Mark of European Conformity
CEN: European Committee for Standardization
CENELEC: European Committee for Electrotechnical Standardization
CSA: Canadian Standards Association
EN: European Norm
IEC: International Electrotechnical Commission
ISO: International Organization for Standardization
MIL-STD: USA Military Standard
OSHA: Occupation Safety and Health Administration
UL: Underwriters Laboratory

Copper Wire Information

AWG	Solid Wire Diameter American Wire or Brown and Sharpe Gage		Approximate Stranded Wire Diameter[1]		Approximate Resistance per 100 feet (30 meters)[2]
	Inches	Millimeters	Inches	Millimeters	Ohms
0000	0.4601	11,687	0.522	13.26	0.0050
000	0.4097	10.406	0.464	11.79	0.0060
00	0.3648	9.266	0.414	10.52	0.0080
0	0.3249	8.252	0.368	9.35	0.010
1	0.2893	7.348	0.328	8.33	0.012
2	0.2576	6.543	0.292	7.42	0.016
3	0.2294	5.827	—	—	0.020
4	0.2043	5.189	0.232	5.89	0.025
5	0.1819	4.620	—	—	0.030
6	0.1620	4.115	0.184	4.67	0.040
7	0.1443	3.665	—	—	0.050
8	0.1285	3.264	0.147	3.73	0.060
9	0.1144	2.906	—	—	0.080
10	0.1019	2.588	0.116	2.95	0.10
11	0.0907	2.304	—	—	0.13
12	0.0808	2.052	0.095	2.41	0.16
13	0.0720	1.829	—	—	0.20
14	0.0641	1.628	0.073	1.85	0.25
15	0.0571	1.450	—	—	0.32
16	0.0508	1.290	0.059	1.50	0.40
17	0.0453	1.151	—	—	0.50
18	0.0403	1.024	0.048	1.22	0.64
19	0.0359	0.912	—	—	0.80
20	0.0320	0.813	0.036	0.91	1.0
21	0.0285	0.724	—	—	1.3
22	0.0253	0.643	0.030	0.76	1.6
23	0.0226	0.574	—	—	2.0
24	0.0201	0.511	0.024	0.61	2.6
25	0.0179	0.455	—	—	3.2
26	0.0159	0.404	0.020	0.51	4.1
27	0.0142	0.361	0.018	0.46	5.2
28	0.0126	0.320	0.015	0.38	6.5
29	0.0113	0.287	—	—	8.2
30	0.0100	0.254	0.012	0.30	10

[1] Exact diameter is dependent upon the wire gage used for the strands. Diameter listed represents the most common wire type for AWG.
[2] Resistance values assume the resistivity of solid copper wire. Stranding and/or copper alloy increase the resistance values.

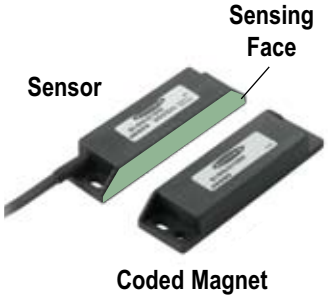
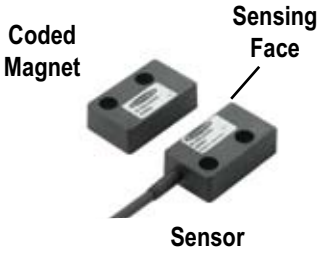
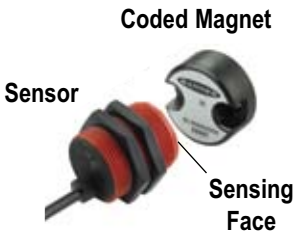
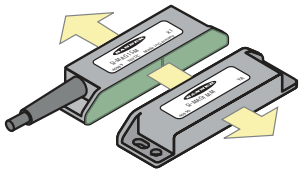
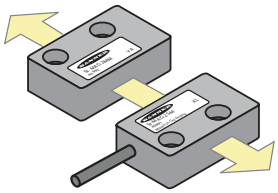
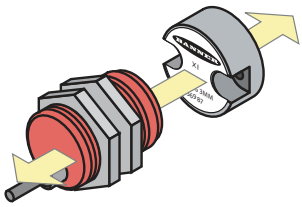
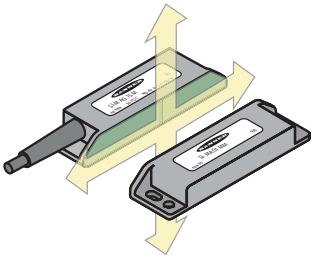
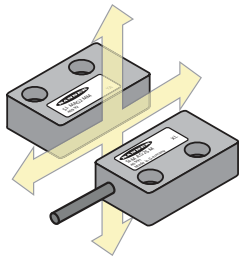
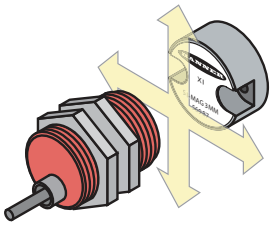
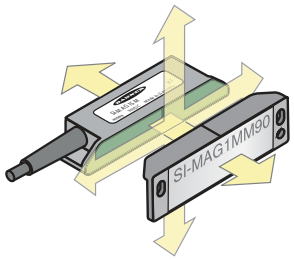
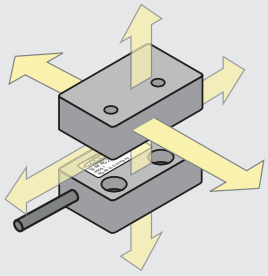
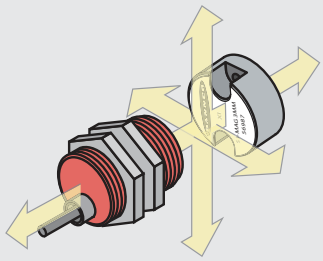
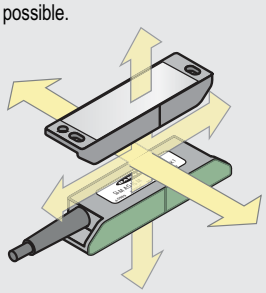
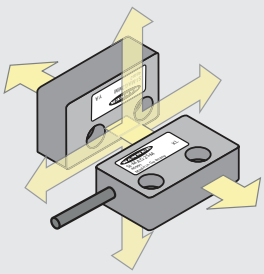
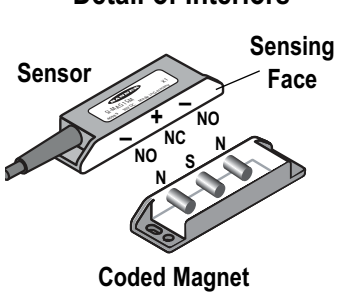
Trigonometric Formulas for Distance or Angle Calculation



Relationships:
sin ø = Y/Z
cos ø = X/Z
tan ø = Y/X
csc ø = Z/Y = 1/sin ø
sec ø = Z/X = 1/cos ø
cot ø = X/Y = 1/tan ø

Given ø and X: Y = X tan ø Z = X sec ø
Given ø and Y: X = Y cot ø Z = Y csc ø
Given ø and Z: X = Z cos ø Y = Z sin ø
Given X and Y: $Z = \sqrt{X^2 + Y^2}$ ø = arctan (Y/X)

Magnet-Style Interlocks: Direction of Approach for Sensor/Magnet Pairs

Model SI-MAG1	Model SI-MAG2	Model SI-MAG3
		
Correct Movement is **perpendicular** to the sensing face. 	**Correct** Movement is **perpendicular** to the sensing face. 	**Correct** Movement is **perpendicular** to the sensing face. 
Correct Movement is **parallel** to the sensing face. 	**Correct** Movement is **parallel** to the sensing face. 	**Correct** Movement is **parallel** to the sensing face. 
Correct 90° approach of sensor and magnet is approved only for model **SI-MAG1MM90**. 	**Incorrect** Label to label approach of sensor and magnet is not possible. 	**Incorrect** Magnet orientation relative to magnet sensor cable is incorrect. 
Incorrect Label to label approach of sensor and magnet is not possible. 	**Incorrect** 90° approach of sensor and magnet is not possible. 	**Detail of Interiors** 

NOTE: With SI-MAG1C Controller, approach speed for all magnet-style switches must be greater than 0.2 ms.
With GM-FA-10J Controller, approach speed must be greater than 0.1 ms.

LIGHT SCREENS

EZ-SCREEN™ TYPE 4

Low-Profile 14 or 25 mm Resolution

14 or 30 mm Resolution

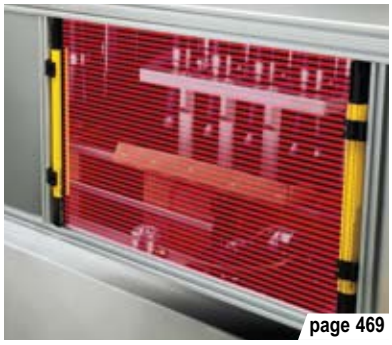
Grids & Points

EZ-SCREEN® TYPE 2

30 mm Resolution

PICO-GUARD™ TYPE 4

Grids and Points



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EZ-SCREEN® TYPE 4

- Provides point-of-operation, area, access and perimeter safeguarding
- Protects personnel from injury and equipment from damage
- Offered in a standard housing with 14 & 30 mm resolution, low-profile housing with 14 & 25 mm resolution, single-beam points or multi-beam grids
- Reduced resolution and fixed blanking
- External Device Monitoring (EDM) ensures that a controller or “third box” is not required
- Easily understood advanced diagnostics allow for quick troubleshooting
- Safety PLC input compatible (per OSSD specifications)
- Rated Type 4 per IEC 61496
- Available with optional ESD-safe housing, pigtail connectors and cascading on some models

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EZ-SCREEN® TYPE 2

- Designed for lower-risk applications
- Provides economical, compact optical safeguarding
- Rated Type 2 per IEC 61496
- Offered with 30 mm resolution and 15 m range

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PICO-GUARD™ Type 4

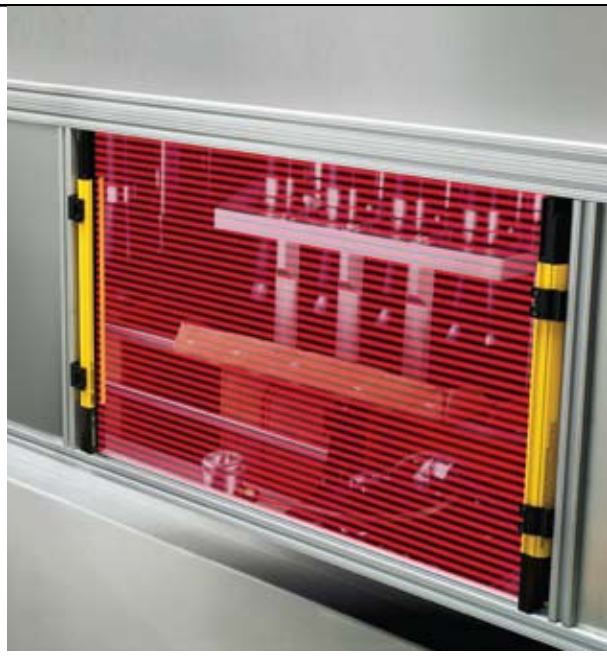
- Provides access and perimeter guarding
- Offers low-cost alternative to cumbersome machine guarding methods
- Combines fiber optic and photoelectric technologies for safeguarding in explosive or harsh environments
- Installs easily using inexpensive plastic fiber optics
- Rated Type 4 per IEC 61496

	Model		Page	Safety Rating	Resolution	Supply Voltage	Maximum Range	
EZ-SCREEN® Type 4	Standard Systems		472	Type 4 Category 4 PLe SIL 3 Control Reliable	14 & 30 mm	24V dc	6 m/18 m	
	Cascade Systems				14 & 30 mm		6 m/18 m	
	Low-Profile Systems				14 & 25 mm		7 m	
	Low-Profile Cascade Systems				14 & 25 mm		7 m	
	Grid & Point Systems			Type 4 Category 4 Control Reliable (call for PL & SIL ratings)	300 to 584 mm (beam spacing)		20 m/70 m	
EZ-SCREEN® Type 2	Type 2 Systems		489	Type 2 Category 2	30 mm	24V dc	15 m	
PICO-GUARD™	Grid Systems		502	Type 4 Category 4 Control Reliable (call for PL and SIL ratings)	300 to 584 mm (beam spacing)	24V dc	31 m	
	Point Systems				—			

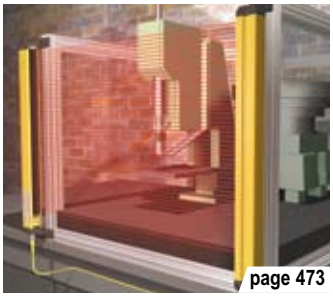
	Safety Output	Auxiliary Output	Blanking	Output Response Time	Housing Material	Environmental Rating
	2 PNP OSSD (Trip /Latch Selectable)	Yes PNP OSSD follow (when configured for 1-CH EDM)	2-beam Reduced Resolution & Fixed	9 to 56 ms	Aluminum housing with yellow polyester powder finish (other colors available) nickel-plated ESD, clear anodized aluminum or nickel-plated silver	IEC IP65
				11 to 56 ms		
				8 to 43.5 ms	Aluminum housing with yellow polyester powder finish, nickel-plated ESD, or clear anodized aluminum	
				9.5 to 43.5 ms		
		—	—	24 ms	Aluminum housing with yellow polyester powder finish	
	2 PNP OSSD (Trip or Latch)	—	—	11 to 25 ms	Aluminum housing with yellow polyester powder finish	IEC IP65
	2 PNP OSSD (Trip /Latch Selectable) See page 530 for controller	Yes (Dependent on controller model)	—	13 ms See page 530 for controller	Black aluminum housing, tempered glass window (MEK resistant)	IEC IP65
					12 mm threaded barrel: Black polycarbonate plastic housing 30 mm threaded barrel: Stainless steel housing, glass window.	IEC IP67

EZ-SCREEN®
Safety Light Screens

- Simple, two-piece integrated system has no control box.
- EZ-SCREEN point-of-operation systems provide finger, hand and ankle detection in a standard or low-profile housing to fit any machine.
- Point and Grid systems allow one-, two-, three- or four-beam perimeter and access guarding.
- Type 4 models are designed with redundant microprocessor-controlled, self-checking circuitry to exceed control reliability requirements and are certified for CE (Type 4/Category 4 PLe) and cULus/cTUVus applications.
- Type 2 systems are suited to lower-risk applications where the result of an accident is only a slight injury and meet all requirements for CE (Type 2/Category 2) and cULus applications.
- Superior optical design makes system extremely easy to align.
- Status indicators and diagnostics show when alignment is complete and if there are problems with the installation.
- Cascading models allow up to four systems of any length and resolution to be wired together to form a single safety device.
- Systems have ranges up to 70 m, with power and range for all types of applications including long-range perimeter guarding.



Interface multiple devices with the SC22-3 Safety Controller. See page 526.



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Type 4
Point-of-Operation and Area

- Provides choice of models for finger, hand and ankle detection
- Includes standard or low-profile models to fit any machine
- Meets Type 4 requirements
- Offers cascading models to allow up to four systems to be wired together to form a single safety device
- Includes ESD-safe solutions
- Provides remote (TEACH) Fixed Blanking options

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Type 2
Point-of-Operation and Area

- Designed for lower-risk applications
- Meets Type 2 requirements
- Offered with 30 mm resolution and 15 m range

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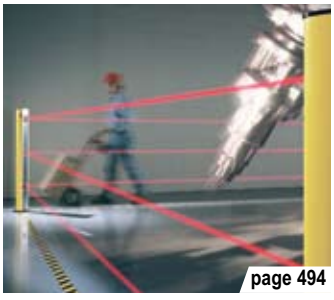
Type 4
Single-Point Access

- Uses angled mirrors to simulate a two-beam system
- Allows for the use of multiple units to create custom beam patterns
- Meets Type 4 requirements



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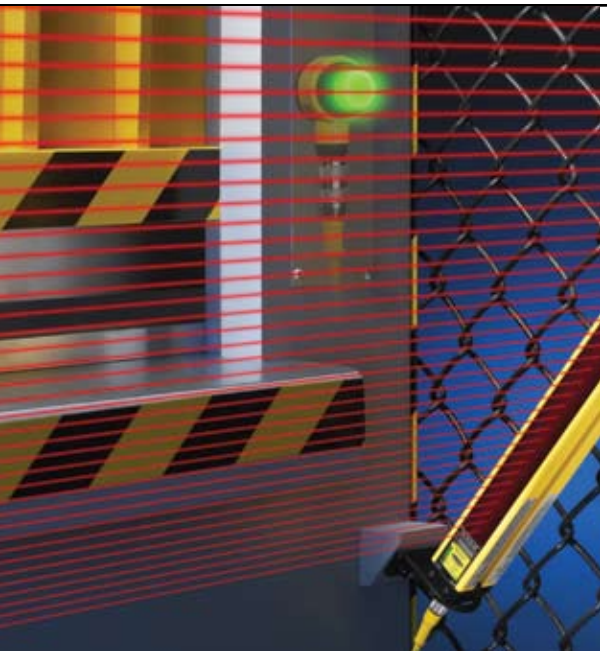
Type 4
Perimeter and Access Guarding

- Uses one-, two-, three- or four- beams for perimeter and long-range single-sided protection
- Guards multiple sides of a dangerous area up to 70 m long
- Meets Type 4 requirements



EZ-SCREEN®
Type 4 Point-of-Operation

- Available in 14 mm resolution for finger, hand and ankle detection or 30 mm resolution for hand and ankle detection
- Operates in ranges from 0.1 to 6 m (14 mm models) and 0.1 to 18 m (30 mm models)
- Offers fixed or 2-beam reduced resolution (floating blanking) to ignore tooling or constant inflow of materials
- Displays operating status, configuration error codes, and blocked beams
- User-configurable trip or latch outputs, Scan Code 1 or 2 and Aux output
- Exceeds OSHA/ANSI Control Reliability requirements, certified to cULus NIPF, and CE certified to Type 4, Cat 4 PLe, and SIL 3
- Provides external device monitoring (EDM)
- Resists impact, twisting and abusive environments with a durable aluminum housing and metal endcaps
- Available with standard yellow, clear anodized aluminum housing or nickel-plated ESD-safe housing for protection against electrostatic discharges (other color options available)
- Offers optional cascading to create up to a four sensor system that issues a single stop command
- Offers optional lens shields and enclosures for added durability

ACCESSORIES
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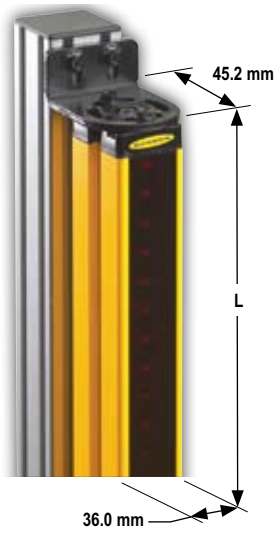

EZ-SCREEN Systems

Some of the Available Finishes

Yellow Painted Aluminum

Clear Anodized Aluminum

Nickel-Plated ESD

ONLINE
AUTOCAD, STEP, IGES & PDF

Interface multiple devices with the SC22-3 Safety Controller. See page 526

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EZ-SCREEN® Systems, 14 mm Resolution–0.1 to 6 m Range, 24V dc

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
150 mm	8-pin QD	262 mm	11 ms	20	2 PNP OSSD (Trip/Latch selectable)	SLSE14-150Q8	SLSR14-150Q8	SLSP14-150Q88
	8-pin Pigtail QD					SLSE14-150P8	SLSR14-150P8	SLSP14-150P88
300 mm	8-pin QD	372 mm	15 ms	40		SLSE14-300Q8	SLSR14-300Q8	SLSP14-300Q88
	8-pin Pigtail QD					SLSE14-300P8	SLSR14-300P8	SLSP14-300P88
450 mm	8-pin QD	522 mm	19 ms	60		SLSE14-450Q8	SLSR14-450Q8	SLSP14-450Q88
	8-pin Pigtail QD					SLSE14-450P8	SLSR14-450P8	SLSP14-450P88
600 mm	8-pin QD	671 mm	23 ms	80		SLSE14-600Q8	SLSR14-600Q8	SLSP14-600Q88
	8-pin Pigtail QD					SLSE14-600P8	SLSR14-600P8	SLSP14-600P88
750 mm	8-pin QD	821 mm	27 ms	100		SLSE14-750Q8	SLSR14-750Q8	SLSP14-750Q88
	8-pin Pigtail QD					SLSE14-750P8	SLSR14-750P8	SLSP14-750P88
900 mm	8-pin QD	971 mm	32 ms	120		SLSE14-900Q8	SLSR14-900Q8	SLSP14-900Q88
	8-pin Pigtail QD					SLSE14-900P8	SLSR14-900P8	SLSP14-900P88
1050 mm	8-pin QD	1120 mm	36 ms	140		SLSE14-1050Q8	SLSR14-1050Q8	SLSP14-1050Q88
	8-pin Pigtail QD					SLSE14-1050P8	SLSR14-1050P8	SLSP14-1050P88
1200 mm	8-pin QD	1270 mm	40 ms	160		SLSE14-1200Q8	SLSR14-1200Q8	SLSP14-1200Q88
	8-pin Pigtail QD					SLSE14-1200P8	SLSR14-1200P8	SLSP14-1200P88
1350 mm	8-pin QD	1420 mm	43 ms	180		SLSE14-1350Q8	SLSR14-1350Q8	SLSP14-1350Q88
	8-pin Pigtail QD					SLSE14-1350P8	SLSR14-1350P8	SLSP14-1350P88
1500 mm	8-pin QD	1569 mm	48 ms	200		SLSE14-1500Q8	SLSR14-1500Q8	SLSP14-1500Q88
	8-pin Pigtail QD					SLSE14-1500P8	SLSR14-1500P8	SLSP14-1500P88
1650 mm	8-pin QD	1719 mm	52 ms	220		SLSE14-1650Q8	SLSR14-1650Q8	SLSP14-1650Q88
	8-pin Pigtail QD					SLSE14-1650P8	SLSR14-1650P8	SLSP14-1650P88
1800 mm	8-pin QD	1869 mm	56 ms	240		SLSE14-1800Q8	SLSR14-1800Q8	SLSP14-1800Q88
	8-pin Pigtail QD					SLSE14-1800P8	SLSR14-1800P8	SLSP14-1800P88

EZ-SCREEN® Systems, 30 mm Resolution–0.1 to 18 m Range, 24V dc

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
150 mm	8-pin QD	262 mm	9 ms	10	2 PNP OSSD (Trip/Latch selectable)	SLSE30-150Q8	SLSR30-150Q8	SLSP30-150Q88
	8-pin Pigtail QD					SLSE30-150P8	SLSR30-150P8	SLSP30-150P88
300 mm	8-pin QD	372 mm	11 ms	20		SLSE30-300Q8	SLSR30-300Q8	SLSP30-300Q88
	8-pin Pigtail QD					SLSE30-300P8	SLSR30-300P8	SLSP30-300P88
450 mm	8-pin QD	522 mm	13 ms	30		SLSE30-450Q8	SLSR30-450Q8	SLSP30-450Q88
	8-pin Pigtail QD					SLSE30-450P8	SLSR30-450P8	SLSP30-450P88
600 mm	8-pin QD	671 mm	15 ms	40		SLSE30-600Q8	SLSR30-600Q8	SLSP30-600Q88
	8-pin Pigtail QD					SLSE30-600P8	SLSR30-600P8	SLSP30-600P88
750 mm	8-pin QD	821 mm	17 ms	50		SLSE30-750Q8	SLSR30-750Q8	SLSP30-750Q88
	8-pin Pigtail QD					SLSE30-750P8	SLSR30-750P8	SLSP30-750P88
900 mm	8-pin QD	971 mm	19 ms	60		SLSE30-900Q8	SLSR30-900Q8	SLSP30-900Q88
	8-pin Pigtail QD					SLSE30-900P8	SLSR30-900P8	SLSP30-900P88

More on next page

QD models: A model with a QD requires a mating cordset (see page 480).

For an emitter with TEST function, replace **Q8** with **Q5** on emitter model numbers (example, **SLSE14-150Q5**) and **Q88** with **Q85** on pair model numbers (example, **SLSP14-150Q85**).
For a 300 mm M12/Euro pigtail QD, replace **Q** with **P** in model numbers (example, **SLSP14-150P88**).
For a 5-pin 300 mm M12/Euro pigtail QD with No EDM or TEST functions, replace **Q8** with **P5NT** on emitter or receiver (example, **SLSE14-150P5NT**) and **Q88** with **P55NT** on pair model numbers (example, **SLSP14-150P55NT**).
For a 4-pin 300 mm M12/Euro pigtail QD with no EDM or TEST functions (GND/PE via mounting), replace **Q8** with **P4NT** or **Q88** with **P44NT** (example, **SLSP14-150P44NT**).

* **ESD-safe models**: Add **N** to the model number, prior to the QD option designation (example, **SLSE14-150NQ8**). ESD-safe models are not available with the pigtail QD option.

Optional housing finishes:
Prior to the QD designation in the model number, add **A** for a clear (brushed) anodized aluminum finish, black endcaps (example, **SLSE14-150AQ8**);
S for a nickel-plated (silver) finish, black endcaps (example, **SLSE14-150SQ8**), **B** for a black painted finish, black endcaps (example, **SLSE14-150BQ8**),
W for a white painted finish, black endcaps (example, **SLSE14-150WQ8**) or **SO** for a safety orange painted finish, black endcaps (example, **SLSE14-150SOQ8**).

† A pair includes an emitter and receiver (example, **SLSP14-150Q88**). Emitters (example, **SLSE14-150Q8**) and receivers (example, **SLSR14-150Q8**) are also sold separately.

EZ-SCREEN® Systems, 30 mm Resolution–0.1 to 18 m Range, 24V dc (cont'd)

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
1050 mm	8-pin QD	1120 mm	21 ms	70	2 PNP OSSD (Trip/Latch selectable)	SLSE30-1050Q8	SLSR30-1050Q8	SLSP30-1050Q88
	8-pin Pigtail QD					SLSE30-1050P8	SLSR30-1050P8	SLSP30-1050P88
1200 mm	8-pin QD	1270 mm	23 ms	80		SLSE30-1200Q8	SLSR30-1200Q8	SLSP30-1200Q88
	8-pin Pigtail QD					SLSE30-1200P8	SLSR30-1200P8	SLSP30-1200P88
1350 mm	8-pin QD	1420 mm	25 ms	90		SLSE30-1350Q8	SLSR30-1350Q8	SLSP30-1350Q88
	8-pin Pigtail QD					SLSE30-1350P8	SLSR30-1350P8	SLSP30-1350P88
1500 mm	8-pin QD	1569 mm	27 ms	100		SLSE30-1500Q8	SLSR30-1500Q8	SLSP30-1500Q88
	8-pin Pigtail QD					SLSE30-1500P8	SLSR30-1500P8	SLSP30-1500P88
1650 mm	8-pin QD	1719 mm	30 ms	110		SLSE30-1650Q8	SLSR30-1650Q8	SLSP30-1650Q88
	8-pin Pigtail QD					SLSE30-1650P8	SLSR30-1650P8	SLSP30-1650P88
1800 mm	8-pin QD	1869 mm	32 ms	120		SLSE30-1800Q8	SLSR30-1800Q8	SLSP30-1800Q88
	8-pin Pigtail QD					SLSE30-1800P8	SLSR30-1800P8	SLSP30-1800P88
1950 mm	8-pin QD	2018 mm	34 ms	130		SLSE30-1950Q8	SLSR30-1950Q8	SLSP30-1950Q88
	8-pin Pigtail QD					SLSE30-1950P8	SLSR30-1950P8	SLSP30-1950P88
2100 mm	8-pin QD	2168 mm	36 ms	140		SLSE30-2100Q8	SLSR30-2100Q8	SLSP30-2100Q88
	8-pin Pigtail QD					SLSE30-2100P8	SLSR30-2100P8	SLSP30-2100P88
2250 mm	8-pin QD	2318 mm	38 ms	150		SLSE30-2250Q8	SLSR30-2250Q8	SLSP30-2250Q88
	8-pin Pigtail QD					SLSE30-2250P8	SLSR30-2250P8	SLSP30-2250P88
2400 mm	8-pin QD	2468 mm	40 ms	160		SLSE30-2400Q8	SLSR30-2400Q8	SLSP30-2400Q88
	8-pin Pigtail QD					SLSE30-2400P8	SLSR30-2400P8	SLSP30-2400P88

EZ-SCREEN® Cascade Systems, 14 mm Resolution–0.1 to 6 m Range, 24V dc

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time**	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
300 mm	8-pin QD	372 mm	15 ms	40	2 PNP OSSD (Trip/Latch selectable)	SLSCE14-300Q8	SLSCR14-300Q8	SLSCP14-300Q88
	8-pin Pigtail QD					SLSCE14-300P8	SLSCR14-300P8	SLSCP14-300P88
450 mm	8-pin QD	522 mm	19 ms	60		SLSCE14-450Q8	SLSCR14-450Q8	SLSCP14-450Q88
	8-pin Pigtail QD					SLSCE14-450P8	SLSCR14-450P8	SLSCP14-450P88
600 mm	8-pin QD	671 mm	23 ms	80		SLSCE14-600Q8	SLSCR14-600Q8	SLSCP14-600Q88
	8-pin Pigtail QD					SLSCE14-600P8	SLSCR14-600P8	SLSCP14-600P88
750 mm	8-pin QD	821 mm	27 ms	100		SLSCE14-750Q8	SLSCR14-750Q8	SLSCP14-750Q88
	8-pin Pigtail QD					SLSCE14-750P8	SLSCR14-750P8	SLSCP14-750P88
900 mm	8-pin QD	971 mm	32 ms	120		SLSCE14-900Q8	SLSCR14-900Q8	SLSCP14-900Q88
	8-pin Pigtail QD					SLSCE14-900P8	SLSCR14-900P8	SLSCP14-900P88
1050 mm	8-pin QD	1120 mm	36 ms	140		SLSCE14-1050Q8	SLSCR14-1050Q8	SLSCP14-1050Q88
	8-pin Pigtail QD					SLSCE14-1050P8	SLSCR14-1050P8	SLSCP14-1050P88
1200 mm	8-pin QD	1270 mm	40 ms	160		SLSCE14-1200Q8	SLSCR14-1200Q8	SLSCP14-1200Q88
	8-pin Pigtail QD					SLSCE14-1200P8	SLSCR14-1200P8	SLSCP14-1200P88
1350 mm	8-pin QD	1420 mm	43 ms	180		SLSCE14-1350Q8	SLSCR14-1350Q8	SLSCP14-1350Q88
	8-pin Pigtail QD					SLSCE14-1350P8	SLSCR14-1350P8	SLSCP14-1350P88

More on next page

QD models: A model with a QD requires a mating cordset (see page 480).

For an emitter with TEST function, replace **Q8** with **Q5** on emitter model numbers (example, **SLSE30-1050Q5**) and **Q88** with **Q85** on pair model numbers (example, **SLSP30-1050Q85**).
For a 300 mm Euro pigtail QD, replace **Q** with **P** in model numbers (example, **SLSP30-1050P88**).
For a 5-pin 300 mm Euro pigtail QD with No EDM or TEST, replace **Q8** with **P5NT** on emitter or receiver (example, **SLSE30-1050P5NT**) and **Q88** with **P55NT** on pair models (example, **SLSP30-1050P55NT**).
For a 4-pin 300 mm M12/Euro pigtail QD with no EDM or TEST functions (GND/PE via mounting), replace **Q8** with **P4NT** or **Q88** with **P44NT** (example, **SLSP30-1050P44NT**).

* **ESD-safe models**: Add **N** to the model number, prior to the QD option designation (example, **SLSE30-1050NQ8**). ESD-safe models are not available with the pigtail QD option.
Optional housing finishes:
Prior to the QD designation in the model number, add **A** for a clear (brushed) anodized aluminum finish, black endcaps (example, **SLSE30-1050AQ8**);
S for a nickel-plated (silver) finish, black endcaps (example, **SLSE30-1050SQ8**), **B** for a black painted finish, black endcaps (example, **SLSE30-1050BQ8**),
W for a white painted finish, black endcaps (example, **SLSE30-1050WQ8**) or **SO** for a safety orange painted finish, black endcaps (example, **SLSE30-1050SOQ8**).

** **Cascading system response time:** To the response time of the slowest pair, add 2 ms for each additional pair.
Example: slowest pair's response time is 15 ms, and the system has three additional pairs (four pairs total), so the system maximum response time is 15 ms + 6 ms (3 pairs x 2 ms) = 21 ms.

† A pair includes an emitter and receiver (example, **SLSP30-1050Q88**). Emitters (example, **SLSE30-1050Q8**) and receivers (example, **SLSR30-1050Q8**) are also sold separately.

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EZ-SCREEN® Cascade Systems, 14 mm Resolution–0.1 to 6 m Range, 24V dc (cont'd)

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time**	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
1500 mm	8-pin QD	1569 mm	48 ms	200	2 PNP OSSD (Trip/Latch selectable)	SLSCE14-1500Q8	SLSCR14-1500Q8	SLSCP14-1500Q88
	8-pin Pigtail QD					SLSCE14-1500P8	SLSCR14-1500P8	SLSCP14-1500P88
1650 mm	8-pin QD	1719 mm	52 ms	220		SLSCE14-1650Q8	SLSCR14-1650Q8	SLSCP14-1650Q88
	8-pin Pigtail QD					SLSCE14-1650P8	SLSCR14-1650Q8	SLSCP14-1650P88
1800 mm	8-pin QD	1869 mm	56 ms	240		SLSCE14-1800Q8	SLSCR14-1800Q8	SLSCP14-1800Q88
	8-pin Pigtail QD					SLSCE14-1800P8	SLSCR14-1800Q8	SLSCP14-1800P88

EZ-SCREEN® Cascade Systems, 30 mm Resolution–0.1 to 18 m Range, 24V dc

Defined Area	M12/Euro Connection	Housing Length (L)	Response Time**	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
300 mm	8-pin QD	372 mm	11 ms	20	2 PNP OSSD (Trip/Latch selectable)	SLSCE30-300Q8	SLSCR30-300Q8	SLSCP30-300Q88
	8-pin Pigtail QD					SLSCE30-300P8	SLSCR30-300P8	SLSCP30-300P88
450 mm	8-pin QD	522 mm	13 ms	30		SLSCE30-450Q8	SLSCR30-450Q8	SLSCP30-450Q88
	8-pin Pigtail QD					SLSCE30-450P8	SLSCR30-450P8	SLSCP30-450P88
600 mm	8-pin QD	671 mm	15 ms	40		SLSCE30-600Q8	SLSCR30-600Q8	SLSCP30-600Q88
	8-pin Pigtail QD					SLSCE30-600P8	SLSCR30-600P8	SLSCP30-600P88
750 mm	8-pin QD	821 mm	17 ms	50		SLSCE30-750Q8	SLSCR30-750Q8	SLSCP30-750Q88
	8-pin Pigtail QD					SLSCE30-750P8	SLSCR30-750P8	SLSCP30-750P88
900 mm	8-pin QD	971 mm	19 ms	60		SLSCE30-900Q8	SLSCR30-900Q8	SLSCP30-900Q88
	8-pin Pigtail QD					SLSCE30-900P8	SLSCR30-900P8	SLSCP30-900P88
1050 mm	8-pin QD	1120 mm	21 ms	70		SLSCE30-1050Q8	SLSCR30-1050Q8	SLSCP30-1050Q88
	8-pin Pigtail QD					SLSCE30-1050P8	SLSCR30-1050P8	SLSCP30-1050P88
1200 mm	8-pin QD	1270 mm	23 ms	80		SLSCE30-1200Q8	SLSCR30-1200Q8	SLSCP30-1200Q88
	8-pin Pigtail QD					SLSCE30-1200P8	SLSCR30-1200P8	SLSCP30-1200P88
1350 mm	8-pin QD	1420 mm	25 ms	90		SLSCE30-1350Q8	SLSCR30-1350Q8	SLSCP30-1350Q88
	8-pin Pigtail QD					SLSCE30-1350P8	SLSCR30-1350P8	SLSCP30-1350P88
1500 mm	8-pin QD	1569 mm	27 ms	100		SLSCE30-1500Q8	SLSCR30-1500Q8	SLSCP30-1500Q88
	8-pin Pigtail QD					SLSCE30-1500P8	SLSCR30-1500P8	SLSCP30-1500P88
1650 mm	8-pin QD	1719 mm	30 ms	110		SLSCE30-1650Q8	SLSCR30-1650Q8	SLSCP30-1650Q88
	8-pin Pigtail QD					SLSCE30-1650P8	SLSCR30-1650P8	SLSCP30-1650P88
1800 mm	8-pin QD	1869 mm	32 ms	120		SLSCE30-1800Q8	SLSCR30-1800Q8	SLSCP30-1800Q88
	8-pin Pigtail QD					SLSCE30-1800P8	SLSCR30-1800P8	SLSCP30-1800P88
1950 mm	8-pin QD	2018 mm	34 ms	130		SLSCE30-1950Q8	SLSCR30-1950Q8	SLSCP30-1950Q88
	8-pin Pigtail QD					SLSCE30-1950P8	SLSCR30-1950P8	SLSCP30-1950P88
2100 mm	8-pin QD	2168 mm	36 ms	140		SLSCE30-2100Q8	SLSCR30-2100Q8	SLSCP30-2100Q88
	8-pin Pigtail QD					SLSCE30-2100P8	SLSCR30-2100P8	SLSCP30-2100P88
2250 mm	8-pin QD	2318 mm	38 ms	150		SLSCE30-2250Q8	SLSCR30-2250Q8	SLSCP30-2250Q88
	8-pin Pigtail QD					SLSCE30-2250P8	SLSCR30-2250P8	SLSCP30-2250P88
2400 mm	8-pin QD	2468 mm	40 ms	160		SLSCE30-2400Q8	SLSCR30-2400Q8	SLSCP30-2400Q88
	8-pin Pigtail QD					SLSCE30-2400P8	SLSCR30-2400P8	SLSCP30-2400P88

QD models: A model with a QD requires a mating cordset (see page 480).

For an emitter with TEST function, replace **Q8** with **Q5** on emitter model numbers (example, **SLSCE14-1500Q5**) and **Q88** with **Q85** on pair model numbers (example, **SLSCP14-1500Q85**).
For a 300 mm Euro pigtail QD, replace **Q** with **P** in model numbers (example, **SLSCP30-300P88**).
For a 5-pin 300 mm M12/Euro pigtail QD with No EDM or TEST, replace **Q8** with **P5NT** on emitter or receiver (example, **SLSCE14-1050P5NT**), and **Q88** with **P55NT** on pair model number (example, **SLSCP14-1050P55NT**).
For a 4-pin 300 mm M12/Euro pigtail QD with no EDM or TEST functions (GND/PE via mounting), replace **Q8** with **P4NT** or **Q88** with **P44NT** (example, **SLSP14-1050P44NT**).

* **ESD-safe models**: Add **N** to the model number, prior to the QD option designation (example, **SLSCE14-1500NQ8**). ESD-safe models are not available with the pigtail QD option.
Optional housing finishes: Prior to the QD designation in the model number, add **A** for a clear (brushed) anodized aluminum finish, black endcaps (example, **SLSCE14-1500AQ8**);
S for a nickel-plated (silver) finish, black endcaps (example, **SLSCE14-1500SQ8**), **B** for a black painted finish, black endcaps (example, **SLSCE14-1500BQ8**),
W for a white painted finish, black endcaps (example, **SLSCE14-1500WQ8**) or **SO** for a safety orange painted finish, black endcaps (example, **SLSCE14-1500SOQ8**).

** **Cascading system response time:** To the response time of the slowest pair, add 2 ms for each additional pair. Example: slowest pair's response time is 15 ms, and the system has three additional pairs (four pairs total), so the system maximum response time is 15 ms + 6 ms (3 pairs x 2 ms) = 21 ms.

† A pair includes an emitter and receiver (example, **SLSCP30-300Q88**). Emitters (example, **SLSCE30-300Q8**) and receivers (example, **SLSCR30-300Q8**) are also sold separately.

EZ-SCREEN® 14 & 30 mm Resolution Kits

You can purchase a kit that contains an emitter and receiver of equal length and resolution; brackets; and optional interfacing solution and quick-disconnect cordsets. Detailed information about individual kit components is as follows.

To Order:

1. Choose model, resolution and defined area.
2. Yellow housing is standard. To choose an optional housing, add designation listed below prior to the connection.
3. Choose the connection: Integral M12/Euro-Style QD with or without TEST, or 300 mm M12/Euro-Style pigtail with or without TEST.
4. Choose an optional interfacing solution, such as an **IM-T-9A** or **-11** interfacing model.
5. Choose one cordset for each sensor or two cordsets for a pair.

   M12/Euro QD models (example, **SLSK30-150Q88**) require mating M12/Euro QD cordsets, such as:
   - QDE cordset with flying leads
   - DEE2R double-ended cordset
   - CSB series splitter cordset

See www.bannerengineering.com for complete information and a current listing of accessories and options for kitting components. Call factory with questions regarding accessories. 1-888-373-6767.

ACCESSORIES page 480

Kit Model Key

Model Style	Kit	Resolution		Defined Area	Finish	Connection		Interfacing Options	QD Cordset Length Options
S L S	K	1 4	—	6 0 0		Q 8 8	—	1	R E 2 5

Model Style

SLS = Safety Light Screen
SLSC = Cascading Safety Light Screen

Kit

K = Kit

SLS Resolution

14 = 14 mm
30 = 30 mm

Defined Area

150 mm*
300 mm
450 mm
600 mm
750 mm
900 mm
1050 mm
1200 mm
1350 mm
1500 mm
1650 mm
1800 mm
1950 mm†
2100 mm†
2250 mm†
2400 mm†

Sensor Finish

Blank = Yellow powder coat
N = Nickel plated ESD
A = Clear Anodized Aluminum
S = Nickel-plated (silver)
B = Black powder coat
W = White powder coat

Receiver & Emitter QD Options

Q85 = Receiver with integral 8-pin M12/Euro QD Emitter with integral 5-pin M12/Euro QD with Test
Q88 = Receiver with integral 8-pin M12/Euro QD Emitter with integral 8-pin M12/Euro QD
P88 = Receiver with 8-pin M12/Euro pigtail QD Emitter with 8-pin M12/Euro pigtail QD
P55NT = Receiver with 5-pin M12/Euro pigtail QD (No EDM) Emitter with 5-pin M12/Euro pigtail QD (No Test)
P44NT = Receiver with 4-pin M12/Euro pigtail QD (No EDM) Emitter with 4-pin M12/Euro pigtail QD (No Test) (GND/PE via mounting)

QD Cordset Length Examples

RE15 = 4.5 m, 2 each
RE25 = 7.6 m, 2 each
R15E25 = 4.5 m (Receiver) & 7.6 m (Emitter)
R25E15 = 7.6 m (Receiver) & 4.5 m (Emitter)
DD1 = 0.3 DEE2R-81D, 2 each
C1D15 = CSB-M1281M1281 (Receiver) DEE2R-815D (8-pin Emitter)
C8D25 = CSB-M1288M1281 (SLS Receiver) DEE2R-825D (8-pin Emitter)
CU25D25 = CSB-UNT825M1281 (SLS Receiver) DEE2R-825D (8-pin Emitter)

Interfacing Options

1 = IM-T-9A Interface Module, 1 each (3 NO)
2 = IM-T-11A Interface Module, 1 each (2 NO/ 1 NC)
3 = 11-BG00-31-D-024 Contactors (10A), 2 each
4 = BF1801L-024 Contactors (18A), 2 each
5 = EZAC-R9-QE8 = AC Interface Box (3 NO), 1 each
6 = EZAC-R11-QE8 = AC Interface Box (2 NO/1 NC), 1 each

* 150 mm not available in cascade models
† Longer lengths not available in 14 mm resolution models.

NOTE: See notes under model number tables. Not all combinations are listed.
Contact Banner Engineering Corp. for additional information and/or verification of valid kit model numbers.

EZ-SCREEN® 14 & 30 mm Resolution Specifications

Supply Voltage at the Device	24V dc ±15% (use a SELV-rated supply according to EN IEC60950) (The external voltage supply must be capable of buffering brief mains interruptions of 20 ms, as specified in EN/IEC 60204-1.)
Residual Ripple	± 10% maximum
Supply Current	**Emitter:** 100 mA max. **Receiver:** 275 mA max., exclusive of OSSD1 and OSSD2 loads (up to an additional 0.5A each) and AUX output load (up to 75 mA)
Response Time	9 to 56 milliseconds (see model number tables) **Cascade Safety Stop Interface (CSSI):** 40 milliseconds max.
Remote Test Input (Optional – available only on model SLSE..-..Q5 emitters)	Test Mode is activated either by applying a low signal (less than 3V dc) to emitter TEST #1 terminal for a minimum of 50 milliseconds, or by opening a switch connected between TEST #1 and TEST #2 for a minimum of 50 milliseconds. Beam scanning stops to simulate a blocked condition. A high signal at TEST #1 deactivates Test Mode. **High signal:** 10 to 30V dc **Low signal:** 0 to 3V dc **Input current:** 35 mA inrush, 10 mA max.
Wavelength of Emitter Elements	Infrared LEDs, 950 nm at peak emission
Recovery Time–Blocked to clear (OSSDs turn ON; varies with total number of sensing beams and whether Sync beam is blocked)	<table><tr><th></th><th>Beam 1 (Sync Beam)</th><th>All Other Beams</th></tr><tr><td>**14 mm Models**</td><td>109 to 800 ms</td><td>33 to 220 ms</td></tr><tr><td>**30 mm Models**</td><td>81 to 495 ms</td><td>25 to 152 ms</td></tr></table>
EDM Input	+24V dc signals from external device contacts can be monitored (one-channel, two-channel or no monitoring) via EDM1 and EDM2 terminals in the receiver. **High signal:** 10 to 30V dc at 30 mA typical **Low signal:** 0 to 3V dc
Reset Input	The Reset input must be high for 0.25 to 2 seconds and then low to reset the receiver. **High signal:** 10 to 30V dc at 30 mA typical **Low signal:** 0 to 3V dc **Closed switch time:** 0.25 to 2 sec
Safety Outputs (OSSDs)	Two redundant solid-state 24V dc, 0.5 A max. sourcing OSSD (Output Signal Switching Device) safety outputs. (Use optional interface modules for ac or larger dc loads.) Capable of the Banner "Safety Handshake". **ON-State voltage:** ≥ Vin-1.5V dc **OFF-State voltage:** 1.2V dc max. (0-1.2V dc) **Max. load capacitance:** 1.0 µF **Max. load inductance:** 10 H **Leakage current:** 0.50 mA maximum **Cable resistance:** 10 Ω maximum **OSSD test pulse width:** 100 to 300 microseconds **OSSD test pulse period:** 10 to 27 milliseconds (varies with number of beams) **Switching current:** 0-0.5 A
Auxiliary (Aux.) Output Switching Capacity	Current-sourcing (PNP) solid-state output, 24V dc at 75mA max that follow the safety outputs (lockout function optional)
Controls and Adjustments	**Emitter:** **Scan Code selection:** 2-position switch (code 1 or 2). Factory default position is code 1. **Receiver:** **Scan Code selection:** 2-position switch (code 1 or 2). Factory default position is code 1. **Trip/Latch Output selection:** Redundant switches. Factory default position is T (Trip). **EDM/MPCE monitor selection:** 2-position switch selects between 1- or 2-channel monitoring. Factory default position is 2. **Reduced Resolution (2-beam Floating Blanking):** Redundant switches. Factory default is OFF.
Short Circuit Protection	All inputs and outputs are protected from short circuits to +24V dc or dc common.
Electrical Safety Class (IEC 61140)	III
Operating Range	**14 mm models:** 0.1 m to 6 m **30 mm models:** 0.1 m to 18 m Range decreases with use of mirrors and/or lens shields: **Lens shields** – approximately 10% less range per shield. **Glass-surface mirrors** – approximately 8% less range per mirror. See Accessory section for more information on a specific mirror, page 726.
Ambient Light Immunity	> 10,000 lux at 5° angle of incidence
Strobe Light Immunity	Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe
Effective Aperture Angle (EAA)	Meets Type 4 requirements per IEC 61496-2, ± 2.5° @ 3 m
Enclosure	**Materials:** Extruded aluminum housing with yellow polyester powder (optional black or white or nickel-plated silver finish) and well-sealed, rugged die-cast zinc end caps, acrylic lens cover, copolyester access cover. Endcaps on silver models are also nickel-plated. **Rating:** IP65

More on next page

EZ-SCREEN® 14 & 30 mm Resolution Specifications (cont'd)

Operating Conditions	**Temperature:** 0° to +55° C **Relative humidity:** 95% (non-condensing)
Status Indicators	**Emitter:** **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 **Receiver:** **Yellow Reset Indicator –** indicates whether system is ready for operation or requires a reset **Bi-Color (Red/Green) Status Indicator –** indicates general system and output status **Bi-Color (Red/Green) Zone Status Indicators –** indicates condition (clear or blocked beam) of a defined group of beams **7-Segment Diagnostic Indicator (3-digit) –** indicates proper operation, scan code or error code, total number of blocked beams
Mounting Hardware	Emitter and receiver each are supplied with a pair of swivel end-mounting brackets. Models longer than 900 mm also include a swivel center-mount bracket. Mounting brackets are 8-gauge cold-rolled steel, black zinc finish.
Shock and Vibration	EZ-SCREEN components have passed vibration and shock tests according to IEC 61496-1. This includes vibration (10 cycles) of 10-55 Hz at 0.35 mm single amplitude (0.70 mm peak-to-peak) and shock of 10 g for 16 milliseconds (6,000 cycles).
Design Standards	Designed to comply with Type 4 per IEC 61496; Category 4 PLe per EN ISO 13849-1; SIL 3 per IEC 61508, SIL CL 3 per IEC 62061; Type 4 per UL 61496-1/-2
Certifications	CE c UL us LISTED
Wiring Diagrams	WD001, WD003, WD004, WD005, WD006, WD007, WD013, WD014, WD015, WD016, WD017, WD018, WD019 (pp. 776-786)

Cordsets

Euro QD		
See page 690		
Length	8-Pin	5-Pin
4.57 m	QDE-815D	QDE-515D
7.62 m	QDE-825D	QDE-525D
15.3 m	QDE-850D	QDE-550D
22.9 m	QDE-875D	QDE-575D
30.5 m	QDE-8100D	QDE-5100D

Additional cordsets and information available. See page 679.

NOTE: See page 501 for interfacing solutions.
Additional accessories are listed on page 619.

Euro QD–Double-Ended		
See page 691		
Length	8-Pin*	5-Pin
0.31 m	DEE2R-81D	DEE2R-51D
0.91 m	DEE2R-83D	DEE2R-53D
2.44 m	DEE2R-88D	DEE2R-58D
4.57 m	DEE2R-815D	DEE2R-515D
7.62 m	DEE2R-825D	DEE2R-525D
15.2 m	DEE2R-850D	DEE2R-550D
22.9 m	DEE2R-875D	DEE2R-575D
30.5 m	DEE2R-8100D	DEE2R-5100D

* For connection to safety BUS gateway/node a "smart" self-monitored safety module, safety controller or safety PLC see page 691.

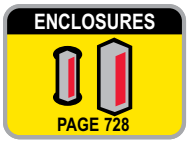
Euro QD Splitter	
See page 693	
Length	8-Pin
0 m	CSB-M1280M1280
0.30 m	CSB-M1281M1281
2.50 m	CSB-M1288M1281
4.60 m	CSB-M12815M1281
7.60 m	CSB-M12825M1281
7.60 m	CSB-UNT825M1281

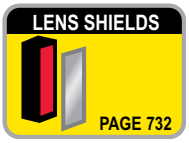
Brackets

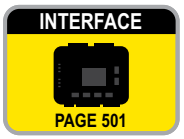
14 & 30 mm			14 & 30 mm Cascade
 pg. 629	 pg. 629	 pg. 629	 pg. 630
EZA-MBK-12*	EZA-MBK-11*	EZA-MBK-20	EZA-MBK-21

Additional brackets and information available. See page 620.

* Standard brackets included with emitter/receiver.



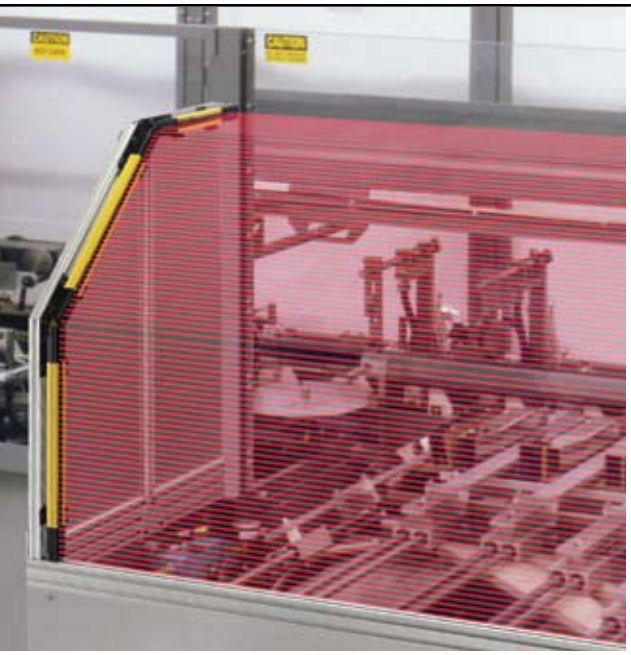




Replacement Parts

Model	Description
EZA-ADE-1	Copolyester access cover with label for 14 or 30 mm resolution emitters
EZA-ADE-2	Copolyester access cover with inverted label for 14 or 30 mm resolution emitters
EZA-ADR-1	Copolyester access cover with label for 14 or 30 mm resolution receiver
EZA-ADR-2	Copolyester access cover with inverted label for 14 or 30 mm resolution receiver
EZA-MBK-12	Center bracket kit (includes 1 bracket and hardware to mount to MSA Series stands) for 14 or 30 mm resolution EZ-SCREEN
EZA-MBK-11	Standard bracket kit with hardware (includes 2 end brackets and hardware to mount to MSA Series stands) for 14 or 30 mm resolution EZ-SCREEN
EZA-TP-1	Access cover security plate (includes 2 screws, wrench) for 14 or 30 mm resolution EZ-SCREEN
EZA-RR-1	External normally open reset switch with 8-pin/M12 Euro-style QD
MGA-K-1	Replacement key for switch MGA-KS0-1
MGA-KS0-1	Panel-mount keyed normally open reset switch
SMA-MBK-1	SSM Series Mirror Bracket Kit
STP-13	14 mm test piece (14 mm resolution systems)
STP-14	30 mm test piece (14 mm resolution systems with 2-beam Reduced Resolution and for 30 mm resolution systems)
STP-15	60 mm test piece (30 mm resolution systems with 2-beam Reduced Resolution)

Note: See Installation manual p/n 112852 for complete list of replacement parts and accessories.



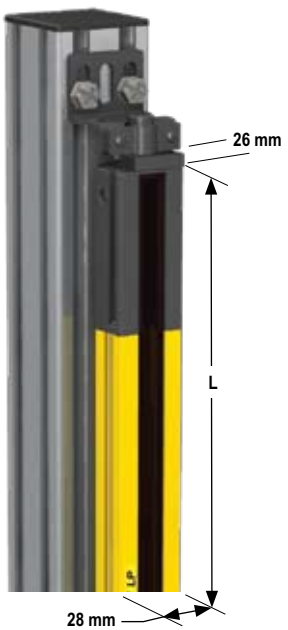
EZ-SCREEN® Low-Profile (LP)
Type 4 Point-of-Operation

- Available in 14 mm resolution for finger, hand and ankle detection or 25 mm resolution for hand and ankle detection
- Features space saving design to fit perfectly into machinery
- Operates in ranges up to 7 m
- Offers reduced resolution (2-beam floating blanking) and fixed blanking to ignore tooling or constant inflow of materials
- Features a 7-segment display for diagnostic information and number of blocked beams
- Identifies clear and blocked beam using zone indicators
- Features user-configurable trip or latch outputs, and Scan Code 1 or 2
- Provides External Device Monitoring (EDM), TEST function and Aux outputs
- Exceeds OSHA/ANSI Control Reliability requirements, certified to cTUVus, and CE certified to Type 4, Cat 4 PLe, and SIL 3
- Resists impact, twisting and abusive environments with a durable aluminum housing and metal endcaps
- Features multi-directional cable for easy integration into machinery
- Available with nickel-plated ESD-safe housing for protection against electrostatic discharges, clear anodized aluminum or with a “safety” yellow powder-coat housing
- Offers optional cascading to create up to a four sensor system that issues a single stop command

Remote Fixed Blanking

- Simple procedure to allow for frequent configuration of a fixed blanked area, without using receiver DIP switches
- Available in all low-profile cascade receivers when used as a standalone or as an end receiver
- Requires optional EZA-RBK-1 key switch or SPDT (Form C) switch to perform remote programing

See page 488.



EZ-SCREEN LP Systems

Available Finishes

Yellow Painted Aluminum | Clear Anodized Aluminum | Nickel-Plated ESD

ONLINE
AUTOCAD, STEP, IGES & PDF

Interface multiple devices with the SC22-3 Safety Controller. See page 526

ACCESSORIES page 488

EZ-SCREEN® Low-Profile Systems, 14 mm Resolution–0.1 to 7 m Range, 24V dc

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
270 mm	Pigtail QD, 8-pin M12/Euro	270 mm	10.5 ms	27	2 PNP OSSD (Trip/Latch selectable)	SLPE14-270P8	SLPR14-270P8	SLPP14-270P88
	Integral RD					SLPE14-270	SLPR14-270	SLPP14-270
410 mm	Pigtail QD, 8-pin M12/Euro	410 mm	13.5 ms	41		SLPE14-410P8	SLPR14-410P8	SLPP14-410P88
	Integral RD					SLPE14-410	SLPR14-410	SLPP14-410
550 mm	Pigtail QD, 8-pin M12/Euro	549 mm	16.5 ms	55		SLPE14-550P8	SLPR14-550P8	SLPP14-550P88
	Integral RD					SLPE14-550	SLPR14-550	SLPP14-550
690 mm	Pigtail QD, 8-pin M12/Euro	689 mm	19.5 ms	69		SLPE14-690P8	SLPR14-690P8	SLPP14-690P88
	Integral RD					SLPE14-690	SLPR14-690	SLPP14-690
830 mm	Pigtail QD, 8-pin M12/Euro	829 mm	22.5 ms	83		SLPE14-830P8	SLPR14-830P8	SLPP14-830P88
	Integral RD					SLPE14-830	SLPR14-830	SLPP14-830
970 mm	Pigtail QD, 8-pin M12/Euro	969 mm	25.5 ms	97		SLPE14-970P8	SLPR14-970P8	SLPP14-970P88
	Integral RD					SLPE14-970	SLPR14-970	SLPP14-970
1110 mm	Pigtail QD, 8-pin M12/Euro	1108 mm	28.5 ms	111		SLPE14-1110P8	SLPR14-1110P8	SLPP14-1110P88
	Integral RD					SLPE14-1110	SLPR14-1110	SLPP14-1110
1250 mm	Pigtail QD, 8-pin M12/Euro	1248 mm	31.5 ms	125		SLPE14-1250P8	SLPR14-1250P8	SLPP14-1250P88
	Integral RD					SLPE14-1250	SLPR14-1250	SLPP14-1250
1390 mm	Pigtail QD, 8-pin M12/Euro	1388 mm	34.5 ms	139		SLPE14-1390P8	SLPR14-1390P8	SLPP14-1390P88
	Integral RD					SLPE14-1390	SLPR14-1390	SLPP14-1390
1530 mm	Pigtail QD, 8-pin M12/Euro	1528 mm	37.5 ms	153		SLPE14-1530P8	SLPR14-1530P8	SLPP14-1530P88
	Integral RD					SLPE14-1530	SLPR14-1530	SLPP14-1530
1670 mm	Pigtail QD, 8-pin M12/Euro	1667 mm	40.5 ms	167		SLPE14-1670P8	SLPR14-1670P8	SLPP14-1670P88
	Integral RD					SLPE14-1670	SLPR14-1670	SLPP14-1670
1810 mm	Pigtail QD, 8-pin M12/Euro	1807 mm	43.5 ms	181		SLPE14-1810P8	SLPR14-1810P8	SLPP14-1810P88
	Integral RD					SLPE14-1810	SLPR14-1810	SLPP14-1810

EZ-SCREEN® Low-Profile Systems, 25 mm Resolution–0.1 to 7 m Range, 24V dc

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
270 mm	Pigtail QD, 8-pin M12/Euro	270 mm	8 ms	14	2 PNP OSSD (Trip/Latch selectable)	SLPE25-270P8	SLPR25-270P8	SLPP25-270P88
	Integral RD					SLPE25-270	SLPR25-270	SLPP25-270
410 mm	Pigtail QD, 8-pin M12/Euro	410 mm	9.5 ms	21		SLPE25-410P8	SLPR25-410P8	SLPP25-410P88
	Integral RD					SLPE25-410	SLPR25-410	SLPP25-410
550 mm	Pigtail QD, 8-pin M12/Euro	549 mm	11 ms	28		SLPE25-550P8	SLPR25-550P8	SLPP25-550P88
	Integral RD					SLPE25-550	SLPR25-550	SLPP25-550
690 mm	Pigtail QD, 8-pin M12/Euro	689 mm	12.5 ms	35		SLPE25-690P8	SLPR25-690P8	SLPP25-690P88
	Integral RD					SLPE25-690	SLPR25-690	SLPP25-690
830 mm	Pigtail QD, 8-pin M12/Euro	829 mm	14 ms	42		SLPE25-830P8	SLPR25-830P8	SLPP25-830P88
	Integral RD					SLPE25-830	SLPR25-830	SLPP25-830

More on next page

Connection options:

QD models: Pigtail QD models require mating cordsets with an 8-pin M12/Euro-style connector (such as **QDE-8..D**, **DEE2R-8..D** or **CSB-M128..M1281**; see page 488).
Integral RD models require mating cordsets with a removable disconnect connector (such as **RDLP-8..D** or **DELPE-8..D**; see page 488).

* Only standard yellow housing models are listed. 300 mm Pigtail QD models (example, **SLPE14-270P8**) have yellow PVC cable and black PVC QD overmold.
For other models:
Anodized aluminum housing: Prior to the connection designation (if any) in the model number, add **A** for a clear (brushed) anodized aluminum finish and black endcaps (example, **SLPE14-270AP8**). Pigtail QD models (example, **SLPE14-270AP8**) have black PVC cable and QD overmold.
ESD-safe models: Prior to the connection designation (if any) in the model number, add **N** for a nickel-plated housing and endcaps (example, **SLPE14-270NP8**).
† A pair includes an emitter and receiver (example, **SLPP25-270P88**).

EZ-SCREEN® Low-Profile Systems, 25 mm Resolution–0.1 to 7 m Range, 24V dc (cont'd)

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
970 mm	Pigtail QD, 8-pin M12/Euro	969 mm	15.5 ms	49	2 PNP OSSD (Trip/Latch selectable)	SLPE25-970P8	SLPR25-970P8	SLPP25-970P88
	Integral RD					SLPE25-970	SLPR25-970	SLPP25-970
1110 mm	Pigtail QD, 8-pin M12/Euro	1108 mm	17 ms	56		SLPE25-1110P8	SLPR25-1110P8	SLPP25-1110P88
	Integral RD					SLPE25-1110	SLPR25-1110	SLPP25-1110
1250 mm	Pigtail QD, 8-pin M12/Euro	1248 mm	18.5 ms	63		SLPE25-1250P8	SLPR25-1250P8	SLPP25-1250P88
	Integral RD					SLPE25-1250	SLPR25-1250	SLPP25-1250
1390 mm	Pigtail QD, 8-pin M12/Euro	1388 mm	20 ms	70		SLPE25-1390P8	SLPR25-1390P8	SLPP25-1390P88
	Integral RD					SLPE25-1390	SLPR25-1390	SLPP25-1390
1530 mm	Pigtail QD, 8-pin M12/Euro	1528 mm	21 ms	77		SLPE25-1530P8	SLPR25-1530P8	SLPP25-1530P88
	Integral RD					SLPE25-1530	SLPR25-1530	SLPP25-1530
1670 mm	Pigtail QD, 8-pin M12/Euro	1668 mm	22.5 ms	84		SLPE25-1670P8	SLPR25-1670P8	SLPP25-1670P88
	Integral RD					SLPE25-1670	SLPR25-1670	SLPP25-1670
1810 mm	Pigtail QD, 8-pin M12/Euro	1807 mm	24 ms	91		SLPE25-1810P8	SLPR25-1810P8	SLPP25-1810P88
	Integral RD					SLPE25-1810	SLPR25-1810	SLPP25-1810

ACCESSORIES page 488

EZ-SCREEN® Low-Profile Cascade Systems, 14 mm Resolution–0.1 to 7 m Range, 24V dc

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
410 mm	Pigtail QD, 8-pin M12/Euro	410 mm	13.5 ms	41	2 PNP OSSD (Trip/Latch selectable)	SLPCE14-410P8	SLPCR14-410P8	SLPCP14-410P88
	Integral RD					SLPCE14-410	SLPCR14-410	SLPCP14-410
550 mm	Pigtail QD, 8-pin M12/Euro	549 mm	16.5 ms	55		SLPCE14-550P8	SLPCR14-550P8	SLPCP14-550P88
	Integral RD					SLPCE14-550	SLPCR14-550	SLPCP14-550
690 mm	Pigtail QD, 8-pin M12/Euro	689 mm	19.5 ms	69		SLPCE14-690P8	SLPCR14-690P8	SLPCP14-690P88
	Integral RD					SLPCE14-690	SLPCR14-690	SLPCP14-690
830 mm	Pigtail QD, 8-pin M12/Euro	829 mm	22.5 ms	83		SLPCE14-830P8	SLPCR14-830P8	SLPCP14-830P88
	Integral RD					SLPCE14-830	SLPCR14-830	SLPCP14-830
970 mm	Pigtail QD, 8-pin M12/Euro	969 mm	25.5 ms	97		SLPCE14-970P8	SLPCR14-970P8	SLPCP14-970P88
	Integral RD					SLPCE14-970	SLPCR14-970	SLPCP14-970
1110 mm	Pigtail QD, 8-pin M12/Euro	1108 mm	28.5 ms	111		SLPCE14-1110P8	SLPCR14-1110P8	SLPCP14-1110P88
	Integral RD					SLPCE14-1110	SLPCR14-1110	SLPCP14-1110
1250 mm	Pigtail QD, 8-pin M12/Euro	1248 mm	31.5 ms	125		SLPCE14-1250P8	SLPCR14-1250P8	SLPCP14-1250P88
	Integral RD					SLPCE14-1250	SLPCR14-1250	SLPCP14-1250
1390 mm	Pigtail QD, 8-pin M12/Euro	1388 mm	34.5 ms	139		SLPCE14-1390P8	SLPCR14-1390P8	SLPCP14-1390P88
	Integral RD					SLPCE14-1390	SLPCR14-1390	SLPCP14-1390
1530 mm	Pigtail QD, 8-pin M12/Euro	1528 mm	37.5 ms	153		SLPCE14-1530P8	SLPCR14-1530P8	SLPCP14-1530P88
	Integral RD					SLPCE14-1530	SLPCR14-1530	SLPCP14-1530

More on next page

Connection options:

QD models: Pigtail QD models require mating cordsets with an 8-pin M12/Euro-style connector (such as **QDE-8..D**, **DEE2R-8..D** or **CSB-M128..M1281**; see page 488).
Integral RD models require mating cordsets with a removable disconnect connector (such as **RDLP-8..D** or **DELPE-8..D**; see page 488).

* Only standard yellow housing models are listed. Pigtail QD models (example, **SLPE25-830P8**) have yellow PVC cable and black PVC QD overmold.
For other models:
Anodized aluminum housing: Prior to the connection designation (if any) in the model number, add **A** for a clear (brushed) anodized aluminum finish and black endcaps (example, **SLPE25-830AP8**). Pigtail QD models (example, **SLPE25-830AP8**) have black PVC cable and QD overmold.
ESD-safe models: Prior to the connection designation (if any) in the model number, add **N** for a nickel-plated housing and endcaps (example, **SLPE25-380NP8**).
† A pair includes an emitter and receiver (example, **SLPP25-270P88**).

ACCESSORIES page 488

EZ-SCREEN® Low-Profile Cascade Systems, 14 mm Resolution–0.1 to 7 m Range, 24V dc (cont'd)

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
1670 mm	Pigtail QD, 8-pin M12/Euro	1667 mm	40.5 ms	167	2 PNP OSSD (Trip/Latch selectable)	SLPCE14-1670P8	SLPCR14-1670P8	SLPCP14-1670P88
	Integral RD					SLPCE14-1670	SLPCR14-1670	SLPCP14-1670
1810 mm	Pigtail QD, 8-pin M12/Euro	1807 mm	43.5 ms	181		SLPCE14-1810P8	SLPCR14-1810P8	SLPCP14-1810P88
	Integral RD					SLPCE14-1810	SLPCR14-1810	SLPCP14-1810

EZ-SCREEN® Low-Profile Cascade Systems, 25 mm Resolution—0.1 to 7 m Range, 24V dc

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output	Models*		
						Emitter	Receiver	Pair†
410 mm	Pigtail QD, 8-pin M12/Euro	410 mm	9.5 ms	21	2 PNP OSSD (Trip/Latch selectable)	SLPCE25-410P8	SLPCR25-410P8	SLPCP25-410P88
	Integral RD					SLPCE25-410	SLPCR25-410	SLPCP25-410
550 mm	Pigtail QD, 8-pin M12/Euro	549 mm	11 ms	28		SLPCE25-550P8	SLPCR25-550P8	SLPCP25-550P88
	Integral RD					SLPCE25-550	SLPCR25-550	SLPCP25-550
690 mm	Pigtail QD, 8-pin M12/Euro	689 mm	12.5 ms	35		SLPCE25-690P8	SLPCR25-690P8	SLPCP25-690P88
	Integral RD					SLPCE25-690	SLPCR25-690	SLPCP25-690
830 mm	Pigtail QD, 8-pin M12/Euro	829 mm	14 ms	42		SLPCE25-830P8	SLPCR25-830P8	SLPCP25-830P88
	Integral RD					SLPCE25-830	SLPCR25-830	SLPCP25-830
970 mm	Pigtail QD, 8-pin M12/Euro	969 mm	15.5 ms	49		SLPCE25-970P8	SLPCR25-970P8	SLPCP25-970P88
	Integral RD					SLPCE25-970	SLPCR25-970	SLPCP25-970
1110 mm	Pigtail QD, 8-pin M12/Euro	1108 mm	17 ms	56		SLPCE25-1110P8	SLPCR25-1110P8	SLPCP25-1110P88
	Integral RD					SLPCE25-1110	SLPCR25-1110	SLPCP25-1110
1250 mm	Pigtail QD, 8-pin M12/Euro	1248 mm	18.5 ms	63		SLPCE25-1250P8	SLPCR25-1250P8	SLPCP25-1250P88
	Integral RD					SLPCE25-1250	SLPCR25-1250	SLPCP25-1250
1390 mm	Pigtail QD, 8-pin M12/Euro	1388 mm	20 ms	70		SLPCE25-1390P8	SLPCR25-1390P8	SLPCP25-1390P88
	Integral RD					SLPCE25-1390	SLPCR25-1390	SLPCP25-1390
1530 mm	Pigtail QD, 8-pin M12/Euro	1528 mm	21 ms	77		SLPCE25-1530P8	SLPCR25-1530P8	SLPCP25-1530P88
	Integral RD					SLPCE25-1530	SLPCR25-1530	SLPCP25-1530
1670 mm	Pigtail QD, 8-pin M12/Euro	1668 mm	22.5 ms	84		SLPCE25-1670P8	SLPCR25-1670P8	SLPCP25-1670P88
	Integral RD					SLPCE25-1670	SLPCR25-1670	SLPCP25-1670
1810 mm	Pigtail QD, 8-pin M12/Euro	1807 mm	24 ms	91		SLPCE25-1810P8	SLPCR25-1810P8	SLPCP25-1810P88
	Integral RD					SLPCE25-1810	SLPCR25-1810	SLPCP25-1810

Connection options:

QD models: Pigtail QD models require mating cordsets with an 8-pin M12/Euro-style connector (such as **QDE-8..D**, **DEE2R-8..D** or **CSB-M128..M1281**; see page 488).
Integral RD models require mating cordsets with a removable disconnect connector (such as **RDLP-8..D** or **DELPE-8..D**; see page 488).

* Only standard yellow housing models are listed. Pigtail QD models (example, **SLPCE25-1670P8**) have yellow PVC cable and black PVC QD overmold.
For other models:
Anodized aluminum housing: Prior to the connection designation (if any) in the model number, add **A** for a clear (brushed) anodized aluminum finish and black endcaps (example, **SLPCE25-1670AP8**). Pigtail QD models (example, **SLPCE25-1670AP8**) have black PVC cable and QD overmold.
ESD-safe models: Prior to the connection designation (if any) in the model number, add **N** for a nickel-plated housing and endcaps (example, **SLPCE25-1670NP8**). Pigtail QD models (example, **SLPCP25-410NP88**) have black PVC cable and QD overmold.
† A pair includes an emitter and receiver (example, **SLPCP25-410P88**).

EZ-SCREEN® Low-Profile 14 & 25 mm Resolution Kits

You can purchase a kit that contains an emitter and receiver of equal length and resolution; brackets; and optional interfacing solution and quick-disconnect cordsets. Detailed information about individual kit components is as follows.

To Order:

1. Choose model, resolution and defined area.
2. Yellow housing is standard. To choose an optional housing, add an **A** or **N** prior to the connection designation:
   A for anodized aluminum (clear) finish with black endcaps (example, **SLPK25-270A**). †
   N for ESD-safe models with a nickel-plated housing and endcaps (example, **SLPK25-270N**). †
3. Choose the connection: 300 mm M12/Euro-Style Pigtail QD or integral Removable Disconnect (RD).
4. Choose an optional interfacing solution, such as an **IM-T-9A** or **-11** interfacing model.

See www.bannerengineering.com for complete information and a current listing of accessories and options for kitting components. Call factory with questions regarding accessories.

† Optional housings with Pigtail QD models have a black 300 mm PVC cable and QD overmold.

5. Choose one cordset for each sensor or two cordsets for a pair.

M12/Euro Pigtail QD models (example, **SLPK25-270P88**) require mating 8-pin M12/Euro QD cordsets, such as:
- QDE cordset with flying leads
- DEE2R double-ended cordset
- CSB series splitter cordset

Integral RD models (example, **SLPK25-270**) require mating cordsets, such as:
- RDLP cordset with flying leads
- DELPE double-ended cordset with M12/Euro QD (requires additional mating 8-pin M12/Euro QD cordsets)
- DELP cordset in cascade application for connection of 2nd, 3rd and 4th sensors

Kit Model Key

Model Style	Kit	Resolution		Defined Area	Finish	Connection		Interfacing Options	QD Cordset Length Options
S L P	K	1 4	—	2 7 0		P 8 8	—	1	R 1 5 E 2 5

Model Style

SLP = Standard
SLPC = Cascade

Kit

K = Kit

SLS Resolution

14 = 14 mm
25 = 25 mm

Sensor Finish

Blank = Yellow powder coat
A = Clear anodized Aluminum
N = Nickel plated (ESD)

QD Cordset Length Examples

RE15 = 4.6 m, 2 each
RE25 = 8 m, 2 each
R15E25 = 4.6 m (Receiver) & 8 m (Emitter)
R25E15 = 8 m (Receiver) & 4.6 m (Emitter)
DD1 = 0.3 m, 2 each, DEE2R-8xxD, DELPE-8xxD or DELP-11xxxE, depending on QD option
C1D15 = CSB-M1281M1281 (Receiver) DEE2R-815D (Emitter)
C8D25 = CSB-M1288M1281 (Receiver) DEE2R-850D (Emitter)
CU25D25 = CSB-UNT825M1281 (Receiver) DEE2R-825D (Emitter)

Defined Area

270 mm *
410 mm
550 mm
690 mm
830 mm
970 mm
1110 mm
1250 mm
1390 mm
1530 mm
1670 mm
1810 mm

* 270 mm not available in cascade models

Connection Options

P88 = Two 300 mm pigtail with 8-pin M12/Euro QD connector. Used with QDE-8xxD, DEE2R-8xxD or CSB-M1281M128xx. Cordsets ordered separately.
R88 = Two RDLP-8xxD Removable Disconnect cordsets with flying lead wires
D88 = Two DELPE-8xxD with 8-pin M12/Euro QD connector. Used with QDE-8xxD, DEE2R-8xxD or CSB-M1281M128xx. Cordsets ordered separately.
D1111 = Two DELP-11xxxE cordsets for 2nd, 3rd or 4th SLPC cascade sensors.

Interfacing Options

1 = IM-T-9A Interface Module, 1 each (3 NO)
2 = IM-T-11A Interface Module, 1 each (2 NO/1 NC)
3 = 11-BG00-31-D-024 Contactors (10A), 2 each
4 = BF1801L-024 Contactors (18A), 2 each
5 = EZAC-R9-QE8 = AC Interface Box (3 NO), 1 each
6 = EZAC-R11-QE8 = AC Interface Box (2 NO/1 NC), 1 each

NOTE: See notes under model number tables. Not all combinations are listed. Contact Banner Engineering Corp. for additional information and/or verification of valid kit model numbers.

EZ-SCREEN® Low-Profile 14 & 25 mm Resolution Specifications

Supply Voltage at the Device	24V dc ±15% (use a SELV-rated supply according to EN IEC 60950) (The external voltage supply must be capable of buffering brief mains interruptions of 20 milliseconds, as specified in EN/IEC 60204-1.)
Residual Ripple	± 10% maximum
Supply Current	**Emitter:** 60 mA max., exclusive of fault load **Receiver:** 150 mA max., exclusive of OSSD1 and OSSD2 loads (up to an additional 0.5A each) and Aux Output load (up to an additional 0.25A)
Response Time	8 to 43.5 milliseconds (see model number tables) **Cascade safety stop interface (CSSI):** 40 milliseconds max. (contacts must be open for 60 milliseconds min.)
Remote Test Input	Test mode is activated either by applying a low signal (less than 3V dc) to emitter Test/Reset terminal for a minimum of 50 milliseconds, or by opening a switch connected between Test/Reset and 24V dc for a minimum of 50 milliseconds. Beam scanning stops to simulate a blocked condition. A high signal at Test/Reset deactivates Test Mode. **High Signal:** 10 to 30V dc **Low Signal:** 0 to 3V dc **Input Current:** 35 mA inrush, 10 mA max.
Wavelength of Emitter Elements	Infrared LEDs, 850 nm at peak emission
Recovery Time–Blocked to clear (OSSDs turn ON; varies with total number of sensing beams and whether Sync beam is blocked)	<table><tr><th></th><th>Beam 1 (Sync Beam)</th><th>All Other Beams</th></tr><tr><td>14 mm Models</td><td>109 to 800 ms</td><td>33 to 220 ms</td></tr><tr><td>25 mm Models</td><td>81 to 495 ms</td><td>25 to 152 ms</td></tr></table>
EDM Input	+24V dc signals from external device contacts can be monitored (one-channel, two-channel or no monitoring) via EDM1 and EDM2 terminals in the receiver. **High Signal:** 10 to 30V dc at 30 mA typical **Low Signal:** 0 to 3V dc
Reset Input	The Reset input must be high for 0.25 to 2 seconds and then low to reset the receiver. **High Signal:** 10 to 30V dc at 30 mA typical **Low Signal:** 0 to 3V dc **Closed Switch Time:** 0.25 to 2 seconds
Safety Outputs (OSSDs)	Two redundant solid-state 24V dc, 0.5 A max. sourcing OSSD (Output Signal Switching Device) safety outputs. (Use optional interface modules for ac or larger dc loads.) Capable of the Banner "Safety Handshake". **ON-State voltage:** ≥ Vin-1.5V dc **OFF-State voltage:** 1.2V dc max. (0-1.2V dc) **Max. load capacitance:** 1.0 µF **Max. load inductance:** 10 H **Leakage Current:** 0.50 mA maximum **Cable Resistance:** 10 Ω maximum **OSSD test pulse width:** 100 to 300 microseconds **OSSD test pulse period:** 10 to 22 milliseconds (varies with number of beams) **Switching Current:** 0-0.5 A
Auxiliary (Aux.) /Fault Output Switching Capacity	Current-sourcing (PNP) Solid-state output, 24V dc at 250 mA max. that follow safety outputs or lock out status (configurable)
Controls and Adjustments	**Emitter:** **Scan Code selection:** 2-position switch (code 1 or 2). Factory default position is code 1. **Test/Reset:** 2-position switch. Factory default position is Reset. **Invert Display:** 2-position switch. Factory default position is OFF (Standard display). **Fault:** 2-position switch. Factory default position is OFF. **Receiver:** **Scan Code selection:** 2-position switch (code 1 or 2). Factory default position is code 1. **Trip/Latch Output selection:** Redundant switches. Factory default position is T (trip). **EDM/MPCE monitor selection:** 2-position switch selects between 1- or 2-channel monitoring. Factory default position is 2-channel monitoring. **Reduced Resolution:** Redundant switches. Factory default position is OFF. **Aux/Fault:** 2-position switch. Factory default position is Aux. **Invert Display:** 2-position switch. Factory default position is OFF.
Short Circuit Protection	All inputs and outputs are protected from short circuits to +24V dc or dc common.
Electrical Safety Class (IEC 61140)	III

More on next page

EZ-SCREEN® Low-Profile 14 & 25 mm Resolution Specifications (cont'd)

Operating Range	0.1 to 7 m Range decreases with use of mirrors and/or lens shields: **Lens shields** – approximately 10% less range per shield. **Glass-surface mirrors** – approximately 8% less range per mirror. See the Accessory section for more information on a specific mirror page 726, for further information.
Ambient Light Immunity	> 10,000 lux at 5° angle of incidence
Strobe Light immunity	Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe
Effective Aperture Angle (EAA)	Meets Type 4 requirements per IEC 61496-2, ± 2.5° @ 3 m
Enclosure	**Materials:** Extruded aluminum housing with yellow polyester powder finish standard (optional clear anodized aluminum or nickel-plated silver finish) and well-sealed, rugged die-cast zinc end caps, acrylic lens cover, copolyester access cover. End caps on silver models are also nickel-plated. ESD-safe models have static-dissipative acrylic lens cover. **Rating:** IP65
Operating Conditions	**Temperature:** 0° to +55° C **Max. Relative Humidity:** 95% maximum relative humidity (non-condensing)
Status Indicators	**Emitter:** **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 **Receiver:** **Yellow Reset indicator** – indicates whether system is ready for operation or requires a reset **Bi-color (Red/Green) Status indicator** – indicates general system and output status **Bi-color (Red/Green) Zone Status indicators** – indicate condition (clear or blocked beam) of a defined group of beams **7-Segment Diagnostic indicator (1 digit)** – indicates proper operation, scan code, or error code, total number of blocked beams
Mounting Hardware	Emitter and receiver each are supplied with a pair of swivel end-mounting brackets and two swivel side-mounting brackets. Models longer than 690 mm also include one or more additional side-mount brackets for center support.
Shock and Vibration	EZ-SCREEN LP components have passed vibration and shock tests according to IEC 61496-1. This includes vibration (10 cycles) of 10-55 Hz at 0.35 mm single amplitude (0.70 mm peak-to-peak) and shock of 10 g for 16 milliseconds (6,000 cycles).
Design Standards	Designed to comply with Type 4 per IEC 61496-1/-2; Category 4 PLe per EN ISO 13849-1; SIL 3 per IEC 61508, SIL CL3 per IEC 62061
Certifications	CE TUV Rheinland of North America, a Nationally Recognized Test Laboratory (NRTL) in the United States according to OSHA 29 CFR 1910.7, and accredited by the Standards Council of Canada to test and certify products to Canadian National Standards, has certified the EZ-SCREEN Low Profile to all applicable U.S. and Canadian National Standards. The cTUVus mark is recognized throughout the United States and Canada by OSHA and the SCC.
Wiring Diagrams	WD002, WD003, WD004, WD005, WD006, WD007, WD013, WD014, WD015, WD016, WD017, WD018, WD019 (pp. 776-786)

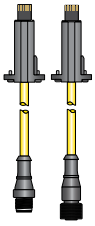
Cordsets

For use with models with integral RD connections. All standard cordsets are yellow PVC with black overmold.
For black PVC cable and overmold, add suffix **B** to model number (example, **RDLP-815DB**).

RD	
See page 695	
Length	**8-Wire***
4.57 m	RDLP-815D
7.62 m	RDLP-825D
15.2 m	RDLP-850D
22.9 m	RDLP-875D
30.5 m	RDLP-8100D

* For connection of E-Stop or other hard/relay contacts see page 695.

RD to Euro QD*		
See page 694		
Length	**8-Pin Male**	**8-Pin Female**
0.31 m	DELPE-81D	DELPEF-81D
0.91 m	DELPE-83D	DELPEF-83D
2.44 m	DELPE-88D	DELFEF-88D
4.57 m	DELPE-815D	DELPEF-815D
7.62 m	DELPE-825D	—
15.2 m	DELPE-850D	—
22.9 m	DELPE-875D	—
30.5 m	DELPE-8100D	—



RD to RD	
See page 695	
Length	**Cascade**
0.05 m	DELP-110E
0.30 m	DELP-111E
0.91 m	DELP-113E
2.44 m	DELP-118E
4.57 m	DELP-1115E
7.62 m	DELP-1125E
15.2 m	DELP-1150E
22.9 m	DELP-1175E
30.5 m	DELP-11100E

Additional cordsets and information available. See page 679.

* Requires mating 8-pin M12/Euro cordset. 8-pin Male used for Machine Interface connection (indicator end of sensor). 8-pin Female used for cascade connection when using M12/Euro QDs.

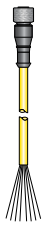
NOTE: See page 501 for interfacing solutions.
Additional accessories are listed on page 619.

For use with models with Pigtail QD and **DELPE-8xxD** connections.

Euro QD–Double-Ended	
See page 691	
Length	**8-Pin***
0.31 m	DEE2R-81D
0.91 m	DEE2R-83D
2.44 m	DEE2R-88D
4.57 m	DEE2R-815D
7.62 m	DEE2R-825D
15.2 m	DEE2R-850D
22.9 m	DEE2R-875D
30.5 m	DEE2R-8100D

* For connection to safety BUS gateway/node a "smart" self-monitored safety module, safety controller or safety PLC see page 691.

Euro QD	
See page 690	
Length	**8-Pin**
4.57 m	QDE-815D
7.62 m	QDE-825D
15.3 m	QDE-850D
22.9 m	QDE-875D
30.5 m	QDE-8100D



Euro QD Splitter	
See page 693	
Length	**8-Pin**
0 m	CSB-M1280M1280
0.30 m	CSB-M1281M1281
2.50 m	CSB-M1288M1281
4.60 m	CSB-M12815M1281
7.60 m	CSB-M12825M1281
7.60 m	CSB-UNT825M1281

Brackets

Low-Profile 14 & 25 mm			
 pg. 631	 pg. 631	 pg. 631	 pg. 633
LPA-MBK-11*	LPA-MBK-12*	LPA-MBK-20	LPA-MBK-22

Low-Profile 14 & 25 mm–Cascade				
 pg. 632	 pg. 633	 pg. 631	 pg. 632	 pg. 632
LPA-MBK-21	LPA-MBK-90	LPA-MBK-120	LPA-MBK-135	LPA-MBK-180

Additional brackets and information available. See page 620.

* Standard brackets included with emitter/receiver.

Remote Fixed Blanking Switch	
	Allows frequent configuration of a fixed blanked area, without using the receiver DIP switches.
EZA-RBK-1	

Replacement Parts

Model	Description
STP-13	14 mm test piece (for 14 mm resolution systems)
STP-17	34 mm test piece (for 14 mm resolution systems with 2-beam reduced resolution enabled)
STP-16	25 mm test piece (for 25 mm resolution systems)
STP-18	65 mm test piece (for 25 mm resolution systems with 2-beam reduced resolution enabled)
LPA-TP-1	Terminator plug, for SLPC... emitter/receiver (included with sensor)
EZA-RR-1	External normally open reset switch with 8-pin M12/Euro-style QD
MGA-KSO-1	Panel-mount keyed normally open reset switch
MGA-K-1	Replacement key for switch MGA-HSO-1
DELPE-81D	Replacement for M12-terminated pigtail QD, as shipped with standard pigtail QD models; 8-conductor cable, 22 AWG; 0.3 m long
LPA-MBK-11	End-cap bracket kit (includes 2 end brackets and hardware to mount one sensor to MSA series stands; 360° sensor rotation; 14 ga (1.9 mm) steel, black zinc plated; die-cast zinc end-cap plate
LPA-MBK-12	Side-mount bracket kit (includes 1 bracket and hardware to mount to MSA Series stands; +10°/ −30° sensor rotation; 14 ga (1.9 mm) steel, black zinc plated; die-cast zinc clamp

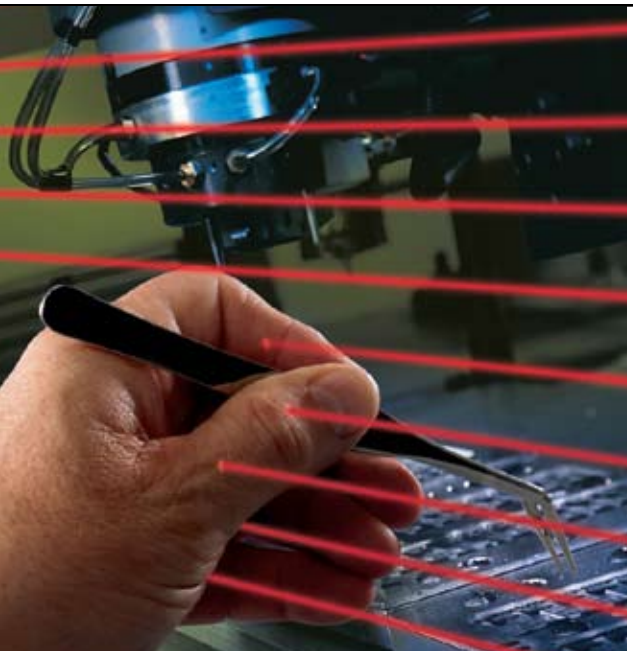
Note: See Installation manual p/n 112852 for complete list of replacement parts and accessories.

STANDS PAGE 722

MIRRORS PAGE 726

LENS SHIELDS PAGE 732

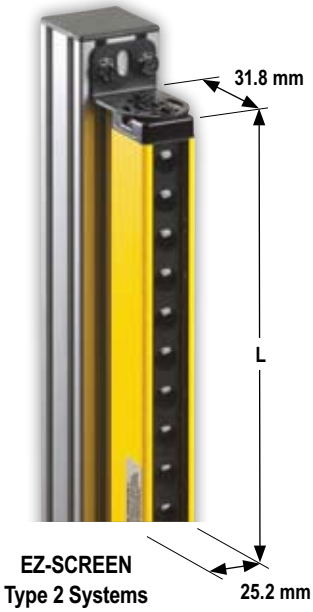
INTERFACE PAGE 501



EZ-SCREEN®
Type 2 Point-of-Operation

- A low-cost solution is suited to lower-risk applications where the result of an accident is only a slight injury such as a bump, bruise, knockdown or trapping (but not crushing), minor cuts and abrasions.
- Simple two-piece system requires no control box.
- 30 mm resolution detects narrow objects, such as a hand or ankle across long spans up to 15 m.
- System meets all requirements for Type 2 devices per IEC 61496 (CE certified) and cULus NIPF.
- System performs continual internal self-tests and provides Test function for external safety checks.
- Dedicated models eliminate selectable functions, DIP switches and programming.
- Trip output model automatically resets when the beam is cleared; Latch output model requires a manual reset.
- Fast response times of 11 to 25 milliseconds shutdown machinery quickly.

ACCESSORIES
page 493



EZ-SCREEN
Type 2 Systems

Full View

Yellow Painted Aluminum

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EZ-SCREEN® Type 2 Systems, 30 mm Resolution–15 m Range, 24V dc

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output		Models		
							Emitter	Receiver	Pair†
150 mm	8-pin M12/Euro QD	215 mm	11 ms	8	2 PNP OSSD	Trip	LS2E30-150Q8	LS2TR30-150Q8	LS2TP30-150Q88
						Latch		LS2LR30-150Q8	LS2LP30-150Q88
300 mm		365 mm	13 ms	16		Trip	LS2E30-300Q8	LS2TR30-300Q8	LS2TP30-300Q88
						Latch		LS2LR30-300Q8	LS2LP30-300Q88

More on next page

A model with a QD requires a mating cordset (see page 493).

† A pair includes an emitter and receiver (example, **LS2TP30-150Q88**).

ACCESSORIES page 493

EZ-SCREEN® Type 2 Systems, 30 mm Resolution–15 m Range, 24V dc (cont'd)

Defined Area	Connection	Housing Length (L)	Response Time	# of Beams	Output		Models		
							Emitter	Receiver	Pair†
450 mm	8-pin M12/Euro QD	515 mm	14 ms	24	2 PNP OSSD	Trip	LS2E30-450Q8	LS2TR30-450Q8	LS2TP30-450Q88
						Latch		LS2LR30-450Q8	LS2LP30-450Q88
600 mm		665 mm	16 ms	32		Trip	LS2E30-600Q8	LS2TR30-600Q8	LS2TP30-600Q88
						Latch		LS2LR30-600Q8	LS2LP30-600Q88
750 mm		815 mm	17 ms	40		Trip	LS2E30-750Q8	LS2TR30-750Q8	LS2TP30-750Q88
						Latch		LS2LR30-750Q8	LS2LP30-750Q88
900 mm		964 mm	19 ms	48		Trip	LS2E30-900Q8	LS2TR30-900Q8	LS2TP30-900Q88
						Latch		LS2LR30-900Q8	LS2LP30-900Q88
1050 mm		1114 mm	21 ms	56		Trip	LS2E30-1050Q8	LS2TR30-1050Q8	LS2TP30-1050Q88
						Latch		LS2LR30-1050Q8	LS2LP30-1050Q88
1200 mm		1264 mm	22 ms	64		Trip	LS2E30-1200Q8	LS2TR30-1200Q8	LS2TP30-1200Q88
						Latch		LS2LR30-1200Q8	LS2LP30-1200Q88
1350 mm		1414 mm	24 ms	72		Trip	LS2E30-1350Q8	LS2TR30-1350Q8	LS2TP30-1350Q88
						Latch		LS2LR30-1350Q8	LS2LP30-1350Q88
1500 mm		1563 mm	25 ms	80		Trip	LS2E30-1500Q8	LS2TR30-1500Q8	LS2TP30-1500Q88
						Latch		LS2LR30-1500Q8	LS2LP30-1500Q88
1650 mm		1713 mm	27 ms	88		Trip	LS2E30-1650Q8	LS2TR30-1650Q8	LS2TP30-1650Q88
						Latch		LS2LR30-1650Q8	LS2LP30-1650Q88
1800 mm		1863 mm	29 ms	96		Trip	LS2E30-1800Q8	LS2TR30-1800Q8	LS2TP30-1800Q88
						Latch		LS2LR30-1800Q8	LS2LP30-1800Q88

A model with a QD requires a mating cordset (see page 493).

† A pair includes an emitter and receiver (example, **LS2TP30-450Q88**).

EZ-SCREEN® Type 2 Kits

You can purchase a kit that contains an emitter and receiver of equal length; brackets; and optional interfacing solution and quick-disconnect cordsets. Detailed information about individual kit components is as follows.

To Order:
1. Choose model, output and defined area.
2. Choose an optional interfacing solution, such as an **IM-T-9A** or **-11** interfacing model.
3. Choose one cordset for each sensor or two cordsets for a pair. Require mating 8-pin M12/Euro QD cordsets, such as:
   - QDE cordset with flying leads
   - DEE2R double-ended cordset
   - CSB series splitter cordset

See www.bannerengineering.com for complete information and a current listing of accessories and options for kitting components. Call factory with questions regarding accessories.

ACCESSORIES page 493

Kit Model Key

Model Style	Kit	Resolution	Defined Area	Connection	Interfacing Options	QD Cordset Length Options
L S 2 T	K	3 0	— 6 0 0	Q 8 8	— 1	R E 2 5

Model Style

LS2T = Type 2 Light Screen (Trip)
LS2L = Type 2 Light Screen (Latch)

Kit

K = Kit

Resolution

30 = 30 mm

Defined Area

150 mm
300 mm
450 mm
600 mm
750 mm
900 mm
1050 mm
1200 mm
1350 mm
1500 mm

Receiver & Emitter QD Options

Q88 = Receiver with integral 8-pin M12/Euro QD Emitter with integral 8-pin M12/Euro QD

Interfacing Examples

1 = IM-T-9A Interface Module, 1 each (3 NO)
2 = IM-T-11A Interface Module, 1 each (2 NO/NC)
3 = 11-BG00-31-D-024 Contactors (10A), 2 each
4 = BF1801L-024 Contactors (18A), 2 each
10 = UM-FA-9A, 1 each
11 = UM-FA-11A, 1 each

QD Cordset Length Examples

RE15 = 4.5 m, 2 each
RE25 = 7.6 m, 2 each
R15E25 = 4.5 m (Receiver) & 7.6 m (Emitter)
R25E15 = 8 m (Receiver) & 5 m (Emitter)
RE50 = 15.2 m, 2 each
R15E50 = 4.6 m (Receiver) & 15.2 m (Emitter)
R50E15 = 15.2 m (Receiver) & 4.6 m (Emitter)
R25E50 = 7.6 m (Receiver) & 15.2 m (Emitter)
R50E25 = 15.2 m (Receiver) & 7.6 m (Emitter)
RE75 = 22.8 m, 2 each
RE100 = 30.4 m, 2 each

NOTE: See notes under model number tables. Not all combinations are listed below.
Contact Banner Engineering Corp. for additional information and/or verification of valid kit model number.

EZ-SCREEN® Type 2 Specifications

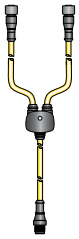
Supply Voltage at the Device	24V dc ±20% (PELV) (The external voltage supply must be capable of buffering brief mains interruptions of 20 milliseconds as specified in EN/IEC 60204-1.)
Supply Current	**Emitter:** 50 mA max. **Receiver:** 90 mA max., exclusive of OSSD1 and OSSD2 loads (up to an additional 0.5A each)
Wavelength of Emitter Elements	Infrared LEDs, 950 nm at peak emission
Short Circuit Protection	All inputs and outputs are protected from short circuits to +24V dc or dc common*
Electrical Safety Class (IEC 61140)	III
Operating Range	0.2 m to 15 m Range decreases with use of mirrors and/or lens shields: **Lens shields** – approximately 10% less range per shield. **Glass-surface mirrors** – approximately 8% less range per mirror. See Accessory section for more information on a specific mirror, page 726.
Effective Aperture Angle (EAA)	Meets Type 2 requirements per IEC 61496-2; ± 5° @ 3 m
Ambient Light Immunity	> 10,000 lux at 5° angle of incidence
Strobe Light Immunity	Immune as per IEC 61496-2
Response Time	Dependent on number of beams; see Models table on page 489.
EDM Input	"Power Monitoring" accomplished via Reset/Remote Test input
Reset Input / Remote Test Input	Connect to +24V dc via a normally closed (NC) reset switch **Auto Rest (Trip Output) Models:** Test/Reset **Manual Rest (Latch Output) Models:** Test/Restart/Reset
Safety Outputs	Two redundant solid-state 24V dc, 0.5 A max. sourcing OSSD (Output Signal Switching Device) safety outputs. (Use optional interface modules for ac or larger dc loads.) Not compatible with the Banner "Safety Handshake." **ON-State voltage:** > Vin-1.5V dc **OFF-State voltage:** 0.2V dc max. **Max. load capacitance:** 0.1 µF **Min. load resistance:** 48 Ω **Open ground leakage current:** 0.65 mA max. **OSSD test pulse width:** 0.2 - 0.25 milliseconds **OSSD test pulse period:** 260 milliseconds typical
Enclosure	**Materials:** Extruded aluminum housing with yellow polyester powder finish and well-sealed, rugged die-cast zinc end caps, acrylic lens cover **Rating:** IP65
Operating Conditions	**Temperature:** 0° to +55° C **Relative humidity:** 95% maximum (non-condensing)
Shock and Vibration	EZ-SCREEN Type 2 components have passed vibration and shock tests according to IEC 61496-1. This includes vibration (10 cycles) of 10-55 Hz at 0.35 mm single amplitude (0.70 mm peak-to-peak) and shock of 10 g for 16 milliseconds (6,000 cycles).
Design Standards	Designed to comply with Type 2 per IEC 61496-1, -2; Type 2 per UL 61496-1/-2; Category 2 per EN 954-1
Certifications	CE c UL us LISTED
Wiring Diagrams	**Emitter:** WD008 (p. 779) **Receiver with 2 Solid-State OSSDs, 2 FSDs and Power Monitoring:** WD009 (p. 780) **Power Monitoring of IM-T-9A Interface Module:** WD010 (p. 780)

Cordsets

Euro QD	
See page 690	
Length	8-Pin
4.57 m	QDE-815D
7.62 m	QDE-825D
15.3 m	QDE-850D
22.9 m	QDE-875D
30.5 m	QDE-8100D

Euro QD–Double-Ended	
See page 691	
Length	8-Pin
0.31 m	DEE2R-81D
0.91 m	DEE2R-83D
2.44 m	DEE2R-88D
4.57 m	DEE2R-815D
7.62 m	DEE2R-825D
15.2 m	DEE2R-850D
22.9 m	DEE2R-875D
30.5 m	DEE2R-8100D

Euro QD Splitter	
See page 693	
Length	8-Pin
0 m	CSB-M1280M1280
0.3 m	CSB-M1281M1281
2.50 m	CSB-M1288M1281
4.60 m	CSB-M12815M1281
7.60 m	CSB-M12825M1281
7.60 m	CSB-UNT825M1281



Additional cordset information available. See page 679.

Brackets

30 mm–Type 2			
 pg. 677	 pg. 678	 pg. 678	 pg. 678
USCMB-..	USMB-1	USMB-6	USMB-8

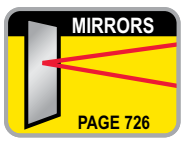
Additional bracket information available. See page 620.

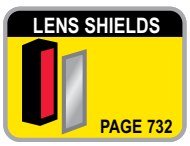
NOTE: See page 501 for interfacing solutions.

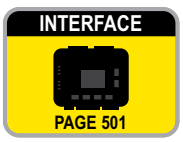
Replacement Parts

Model	Description
MGA-K-1	Replacement key for switch MGA-KS0-1
MGA-KS0-1	Panel-mount keyed normally open reset switch
STP-14	30 mm test piece
USMB-1	Standard end brackets with hardware to mount to MSA series stands
USCMB-1	Center bracket kit and standard end brackets with hardware to mount to MSA series stands (1 bracket, for 600 to 900 mm long sensors)
USCMB-2	Center bracket kit and standard end brackets with hardware to mount to MSA series stands (2 brackets, for 1050 to 1500 mm long sensors)

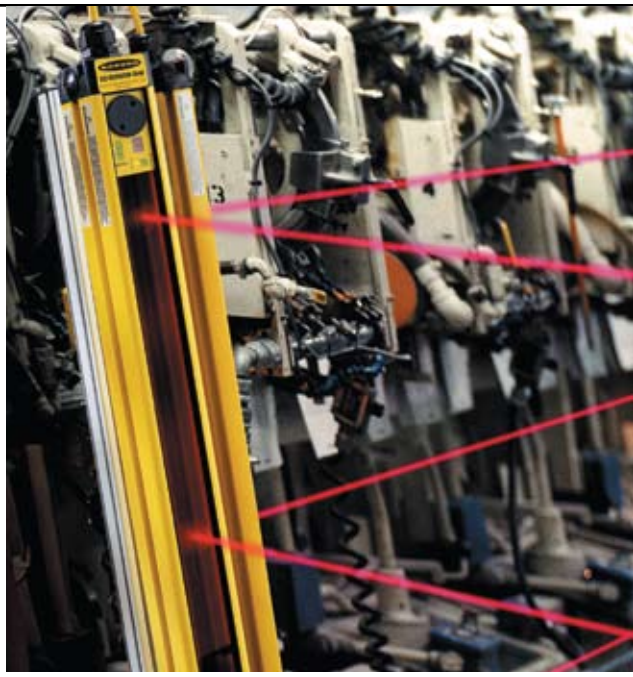
Note: See Installation manual p/n 112852 for complete list of replacement parts and accessories.







EZ-SCREEN®
Type 4 Grids and Points



- Suited to a variety of access and long-range perimeter guarding applications
- Uses 1-, 2-, 3- or 4-beams to protect personnel and machinery
- Operates in ranges from 0.8 to 20 m or 15 to 70 m, depending on model
- Displays operating status, configuration and error codes
- Includes blocked beam zone indicators
- Features user-configurable trip or latch outputs, and Scan Code 1 or 2
- Can be combined with other devices, such as mirrors and Points, for a custom configuration
- Resists impact, twisting and abusive environments with a durable aluminum housing and metal endcaps
- Exceeds OSHA/ANSI Control Reliability requirements and is certified to cULus NIPF, and certified to Type 4 and Category 4
- Offers optional lens shields and enclosures for added durability
- Easy to hookup and flexible machine interface options

ACCESSORIES page 500

Interface multiple devices with the SC22-3 Safety Controller. See page 526

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EZ-SCREEN Grid Systems

EZ-SCREEN Point Systems

EZ-SCREEN Grid EZ-SCREEN Point

EZ-SCREEN® Grid & Point Systems, 24V dc

Protected Height	Beam Spacing	Range	Connection	Housing Length (L)	Output	Models		
						Emitter	Receiver	Pair†
1066 mm	 533 mm	0.8 - 20 m	8-pin Euro QD	1251 mm	2 PNP OSSD (Trip/Latch selectable)	SGE3-533Q8E	SGR3-533Q8E	SGP3-533Q88E
		15 - 70 m				SGXLE3-533Q8E		SGXLP3-533Q88E
900 mm	 300 mm	0.8 - 20 m		1084 mm		SGE4-300Q8E	SGR4-300Q8E	SGP4-300Q88E
		15 - 70 m				SGXLE4-300Q8E		SGXLP4-300Q88E
800 mm	 400 mm	0.8 - 20 m		984 mm		SGE3-400Q8E	SGR3-400Q8E	SGP3-400Q88E
		15 - 70 m				SGXLE3-400Q8E		SGXLP3-400Q88E
584 mm	 584 mm	0.8 - 20 m		768 mm		SGE2-584Q8E	SGR2-584Q8E	SGP2-584Q88E
		15 - 70 m				SGXLE2-584Q8E		SGXLP2-584Q88E
500 mm	 500 mm	0.8 - 20 m		684 mm		SGE2-500Q8E	SGR2-500Q8E	SGP2-500Q88E
		15 - 70 m				SGXLE2-500Q8E		SGXLP2-500Q88E
N/A	 1-BEAM	0.8 - 20 m		149 mm		SPE1Q8E	SPR1Q8E	SPP1Q88E
		15 - 70 m				SPXLE1Q8E		SPXLP1Q88E

A model with a QD requires a mating cordset (see page 500).

For emitters and receivers with a wiring terminal chamber, remove the **Q8E** or **Q88E** from the model number (example, **SGE4-300**). For an emitter with a 5-pin Mini QD and TEST function, replace **Q8E** with **Q5** on emitter model numbers (example, **SGE4-300Q5**) and **Q88E** with **Q85** on pair model numbers (example, **SGP4-300Q85**).
For emitters with a 3-pin Mini QD, replace **Q8E** with **Q3** (example, **SGE4-300Q3**); and for receivers with an 8-pin Mini QD, replace **Q8E** with **Q8** on model numbers (example, **SGR4-300Q8**); or for a pair replace **Q88E** with **Q83** (example, **SGP4-300Q83**).

† A pair includes an emitter and receiver (example, **SGP4-300Q88E**). Emitters (example, **SGE4-300Q8E**) and receivers (example, **SGR4-300Q8E**) are also sold separately.

ACCESSORIES page 500

EZ-SCREEN® Grid Kits

You can purchase a kit that contains an emitter and receiver of equal length and beam spacing; brackets; and optional interfacing solution and quick-disconnect cordsets. Detailed information about individual kit components is as follows.

To Order:

1. Choose model range, number of beams and beam spacing.
2. Choose the connection: Integral M12/Euro-Style QD or intergal Mini-Style QD
3. Choose an optional interfacing solution, such as an **IM-T-9A** or **-11** interfacing model.

See www.bannerengineering.com for complete information and a current listing of accessories and options for kitting components. Call factory with questions regarding accessories.

4. Choose one cordset for each sensor or two cordsets for a pair.

M12/Euro QD models (example, **SGK4-300Q88E**) require mating 8-pin M12/Euro QD cordsets, such as:
- QDE cordset with flying leads
- DEE2R double-ended cordset
- CSB series splitter cordset

Mini QD models (example, **SGK4-300Q83**) require mating cordsets, such as:
- QDS cordset with flying leads

Kit Model Key

Model Style	Kit	No. of Beams		Beam Spacing	Connection		Interfacing Options	QD Cordset Length Options
S G	K	4	—	3 0 0	Q 8 8 E	—	1	R E 2 5

Model Style

SG = Safety Grid
SGXL = Safety Grid Long Range

Kit

K = Kit

No. of Beams

2 = two beams
3 = three beams
4 = four beams

Beam Spacing

300 mm
400 mm
500 mm
533 mm
584 mm

Receiver & Emitter QD Options

Blank =	Receiver and emitter with wiring terminal chamber
Q85 =	Receiver with integral 8-pin Mini-style QD Emitter with integral 5-pin Mini-style QD with Test
Q83 =	Receiver with integral 8-pin Mini-style QD Emitter with integral 3-pin Mini-style QD
Q88E =	Receiver and emitter with integral 8-pin M12/Euro QD

Interfacing Examples

1 = IM-T-9A Interface Module, 1 each (3 NO)
2 = IM-T-11A Interface Module, 1 each (2 NO/1 NC)
3 = 11-BG00-31-D-024 Contactors (10A), 2 each
4 = BF1801L-024 Contactors (18A), 2 each
5 = EZAC-R9-QE8 = AC Interface Box (3 NO), 1 each
6 = EZAC-R11-QE8 = AC Interface Box (2 NO/1 NC), 1 each

QD Cordset Length Examples

RE15 = 4.6 m, 2 each
RE25 = 7.6 m, 2 each
R15E25 = 4.6 m (Receiver) & 7.6 m (Emitter)
R25E15 = 7.6 m (Receiver) & 4.6 m (Emitter)
DD1 = 0.3 DEE2R-81D, 2 each
C1D15 = CSB-M1281M1281 (Receiver) DEE2R-815D (8-pin Emitter)
C8D25 = CSB-M1288M1281 (Receiver) DEE2R-825D (8-pin Emitter)
CU25D25 = CSB-UNT825M1281 (Receiver) DEE2R-825D (8-pin Emitter)

NOTE: See notes under model number table. Not all combinations are listed below. Contact Banner Engineering Corp. for additional information and/or verification of valid kit model numbers.

EZ-SCREEN® Point Kits

You can purchase a kit that contains an emitter and receiver of equal length; brackets; and optional interfacing solution and quick-disconnect cordsets. Detailed information about individual kit components is as follows.

To Order:

1. Choose model and range.
2. Choose the connection: Integral M12/Euro-Style QD or intergal Mini-Style QD
3. Choose an optional interfacing solution, such as an **IM-T-9A** or **-11** interfacing model.

See www.bannerengineering.com for complete information and a current listing of accessories and options for kitting components. Call factory with questions regarding accessories.

4. Choose one cordset for each sensor or two cordsets for a pair.

M12/Euro QD models (example, **SPK1-Q88E**) require mating 8-pin M12/Euro QD cordsets, such as:
- QDE cordset with flying leads
- DEE2R double-ended cordset
- CSB series splitter cordset

Mini QD models (example, **SPK1-Q83**) require mating cordsets, such as:
- QDS cordset with flying leads

Photoelectrics Sensors
Fiber Optic Sensors
Special Purpose Sensors
Measurement & Inspection Sensors
Vision
Wireless
Lighting & Indicators
Safety Light Screens
Safety Laser Scanners
Fiber Optic Safety Systems
Safety Controllers & Modules
Safety Two-Hand Control Modules
Safety Interlock Switches
Emergency Stop & Stop Control
ACCESSORIES page 500

EZ-SCREEN
TYPE 4 14 or 30 mm
TYPE 4 LOW PROFILE 14 or 25 mm
TYPE 2 30 mm
GRIDS & POINTS
PICO-GUARD

Kit Model Key

Model Style	Kit	No. of Beams		Connector		Interfacing Options	QD Cordset Length Options
SP	K	1	—	Q 8 8 E	—	1	R E 2 5

Model Style

SP = Safety Point
SPXL = Safety Point Long Range

Kit

K = Kit

No. of Beams

1 = one beam

Receiver & Emitter QD Options

Blank =	Receiver and emitter with wiring terminal chamber
Q85 =	Receiver with integral 8-pin Mini-style QD Emitter with integral 5-pin Mini-style QD with Test
Q83 =	Receiver with integral 8-pin Mini-style QD Emitter with integral 3-pin Mini-style QD
Q88E =	Receiver and emitter with integral 8-pin M12/Euro QD

NOTE: See notes under model table. Not all combinations are listed below. Contact Banner Engineering Corp. for additional information and/or verification of valid kit model numbers.

QD Cordset Length Examples

RE15 = 4.6 m, 2 each
RE25 = 7.6 m, 2 each
R15E25 = 4.6 m (Receiver) & 7.6 m (Emitter)
R25E15 = 7.6 m (Receiver) & 4.6 m (Emitter)
DD1 = 0.3 DEE2R-81D, 2 each
C1D15 = CSB-M1281M1281 (Receiver) DEE2R-815D (8-pin Emitter)
C8D25 = CSB-M1288M1281 (Receiver) DEE2R-825D (8-pin Emitter)
CU25D25 = CSB-UNT825M1281 (Receiver) DEE2R-825D (8-pin Emitter)

Interfacing Examples

1 = IM-T-9A Interface Module, 1 each (3 NO)
2 = IM-T-11A Interface Module, 1 each (2 NO/NC)
3 = 11-BG00-31-D-024 Contactors (10A), 2 each
4 = BF1801L-024 Contactors (18A), 2 each
5 = EZAC-R9-QE8 = AC Interface Box (3 NO), 1 each
6 = EZAC-R11-QE8 = AC Interface Box (2 NO/1 NC), 1 each

EZ-SCREEN® Grid & Point Specifications

Supply Voltage (V in)	24V dc ±15%, 10% max. ripple
Supply Current	**Emitter:** 150 mA max. **Receiver:** 500 mA max., exclusive of OSSD1 and OSSD2 loads (up to an additional 0.5A each)
Short Circuit Protection	All inputs and outputs are protected from short circuits to +24V dc or dc common (except Emitter AUX power connections)
Response Time	24 milliseconds or less from interruption of light grid beam to safety outputs going to OFF-state
EDM Input	+24V dc signals from external device contacts can be monitored (single-channel, dual-channel or no monitoring) via EDM1 and EDM2 terminals in the receiver. Monitored devices must respond within 200 milliseconds of an output change.
Reset Input	The Reset input must be high (10 to 30V dc at 30 mA) for 0.25 to 2 seconds and then low (less than 3V dc) to reset the receiver.
Remote Test Input (optional- available only on certain models)	Test mode is activated either by applying a low signal (less than 3V dc) to emitter TEST1 terminal for a minimum of 50 milliseconds, or by opening a switch connected between TEST1 and TEST2 terminals for a minimum of 50 milliseconds. Beam scanning stops to simulate a blocked condition. A high signal (10 to 30V dc, 35 mA inrush, 10 mA max.) at TEST1 terminal deactivates Test mode and allows the emitter to operate normally. TEST1 and TEST2 are factory jumpered on models with wiring chamber.
Safety Outputs	Two diverse-redundant solid-state 24V dc, 0.5 A max. sourcing OSSD (Output Signal Switching Device) safety outputs. (Use optional interface modules for ac or larger dc loads.) Capable of the Banner "Safety Handshake." **ON-State voltage:** ≥Vin-1.5V dc **OFF-State voltage:** 1.2V dc max. **Max. load resistance:** 1000 Ω **Max. load capacitance:** 0.1 µF **OSSD test pulse width:** 250 microseconds **OSSD test pulse period:** 6 milliseconds
Controls and Adjustments	**Emitter: Scan code selection:** 2-position switch (code 1 or 2). Factory default position is 1. **Receiver: Scan code selection:** 2-position switch (code 1 or 2). Factory default position is 1. **Trip/latch output selection:** redundant switches. Factory default position is L (latch) **EDM/MPCE monitor selection:** redundant switches select between 1- or 2-channel monitoring. Factory default position is 2.
Emitter/Receiver Operating Range	**Short-range models:** 0.8 m to 20 m **Long-range models:** 15 m to 70 m Range decreases with use of mirrors and/or lens shields.
Beam Spacing	**Model SG...4-300:** 300 mm **Model SG...3-400:** 400 mm **Model SG...2-500:** 500 mm **Model SG...3-533:** 533.4 mm **Model SG...2-584:** 584.2 mm
Beam Diameter	25 mm
Ambient Light Immunity	> 10,000 lux at 5° angle of incidence
Strobe Light Immunity	Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe
Emitter Elements	Infrared LEDs, 880 nm at peak emission
Effective Aperture Angle (EAA)	Meets Type 4 requirements per IEC 61496-2 **Short-range models:** ± 2.5° @ 3 m **Long-range models:** ± 2.5° @ 15 m
Enclosure	**Materials:** Extruded aluminum housings with yellow polyester powder finish and well-sealed, rugged molded PBT end caps, acrylic lens cover **Rating:** NEMA 4, 13; IP65
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 95% (non-condensing)
Shock and Vibration	EZ-SCREEN systems have passed vibration and shock tests according to IEC 61496-1/-2. This includes vibration (10 cycles) of 10-55 Hz at 0.35 mm single amplitude (0.70 mm peak-to-peak) and shock of 10 g for 16 milliseconds (6,000 cycles).

More on next page

EZ-SCREEN® Grid & Point Specifications (cont'd)

Status Indicators	**7-Segment Diagnostic Indicators, Both Emitter and Receiver** **Dash (–)** = System is OK **Error Codes** = See product manuals (p/n 68410 or 68413) for code definitions and recommended action **Scan code setting** (C1 or C2) = Appears during power-up or after scan code is changed. (Temporary indication; normal display resumes within a few seconds.) **Emitter:** One bi-color (red/green) Status indicator **Green steady** = RUN mode **Green single flashing** = TEST mode **Red single flashing** = Lockout **OFF** = No power to sensor **Receiver:** Two System Status indicators, plus one bi-color (red/green) Beam Status indicator for each beam **Yellow Reset Indicator** **ON steady** = RUN mode **Double flashing** = Waiting for manual reset after power-up **Single flashing** = Waiting for manual latch reset **OFF** = No power to sensor or system is not ready for operation **Bi-Color (Red/Green) Status Indicator** **Green steady** = Outputs ON **Red steady** = RUN mode, outputs OFF **Red single flashing** = Lockout **OFF** = No power to sensor or system is not ready for operation **Bi-Color (Red/Green) Beam Status Indicators** **Green steady** = Clear beam, strong signal **Green flickering** = Clear beam, weak signal **Red steady** = Beam blocked **OFF** = No power to sensor or no scanning
Mounting Hardware	Emitter and receiver each are supplied with a pair of swivel end mounting brackets. Mounting brackets are 8-gauge cold-rolled steel, black zinc finish.
Cables and Connections	Cables are user-supplied. Wiring terminals accommodate one 22 to 16 ga. wire or two wires up to 18 ga.; Pg 13.5 wiring chamber access port capacity varies, depending on cable gland or strain relief fitting used. Supplied cable gland is for a cable diameter of 6 to 12 mm.
Design Standards	Designed to comply with Type 4 per IEC 61496-1, -2; Type 4 per UL 61496-1/-2; Category 4 per ISO 13849-1 (EN 954-1)
Certifications	CE c UL us LISTED
Wiring Diagrams	WD011, WD012, WD013, WD014, WD015, WD016, WD017, WD018, WD019 (pp. 781-786)

Cordsets

Euro QD	
See page 690	
Length	8-Pin
4.57 m	QDE-815D
7.62 m	QDE-825D
15.3 m	QDE-850D
22.9 m	QDE-875D
30.5 m	QDE-8100D

Euro QD Splitter	
See page 693	
Length	8-Pin
0 m	CSB-M1280M1280
0.30 m	CSB-M1281M1281
2.50 m	CSB-M1288M1281
4.60 m	CSB-M12815M1281
7.60 m	CSB-M12825M1281
7.60 m	CSB-UNT825M1281

Euro QD–Double-Ended	
See page 691	
Length	8-Pin
0.31 m	DEE2R-81D
0.91 m	DEE2R-83D
2.44 m	DEE2R-88D
4.57 m	DEE2R-815D
7.62 m	DEE2R-825D
15.2 m	DEE2R-850D
22.9 m	DEE2R-875D
30.5 m	DEE2R-8100D

* For connection to safety BUS gateway/node a "smart" self-monitored safety module, safety controller or safety PLC see page 691.

Mini QD			
See page 700			
Length	3-Pin	5-Pin	8-Pin
4.75 m	QDS-315C	QDS-515C	QDS-815C
7.62 m	QDS-325C	QDS-525C	QDS-825C
15.2 m	QDS-350C	QDS-550C	QDS-850C
22.9 m	QDS-375C	–	QDS-875C
30.5 m	QDS-3100C	–	–

Additional cordset information available. See page 679.

Brackets

Grids & Points–Type 4				Points–Type 4	
 pg. 628	 pg. 630	 pg. 631	 pg. 629	 pg. 630	 pg. 630
EZA-MBK-1*	EZA-MBK-3	EZA-MBK-9	EZA-MBK-2**	EZA-MBK-4	EZA-MBK-5

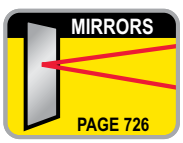
Additional bracket information available. See page 620.

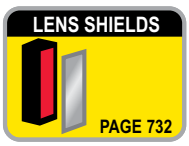
* Standard brackets included with emitter/receiver.
** One EZA-MBK-2 adapter bracket kit required per sensor when mounting to MSA series stands.
NOTE: See page 501 for interfacing solutions.

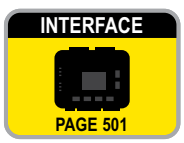
Replacement Parts

Model	Description
EZA-AP-1	Access port plug with o-ring
EZA-CP-13	Pg13.5 plug with o-ring
EZA-ECE-1	Emitter wiring chamber end cap (with gasket, captive screws, 3 plugs with o-rings, terminal block)
EZA-ECR-1	Receiver wiring chamber end cap (with gasket, captive screws, 3 plugs with o-rings, terminal block)
EZA-SW-1	Spanner wrench for Grid and Point
EZA-TBE-1	Emitter terminal block
EZA-TBR-1	Receiver terminal block
MGA-K-1	Replacement key for switch MGA-KS0-1
MGA-KS0-1	Panel-mount keyed normally open reset switch
SMA-MBK-1	SSM Series Mirror Bracket Kit
STP-3	Specified test piece, 45 mm dia.

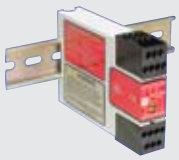
Note: See Installation manual p/n 112852 for complete list of replacement parts and accessories.







EZ-SCREEN® Interfacing Products

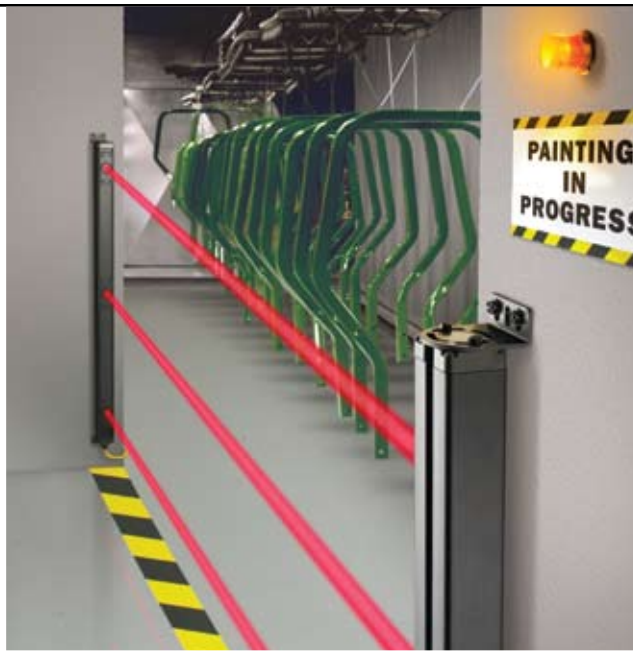
		Description	Models	Product Information
Interface Modules and Controllers		• Interface modules provide two or three normally open force-guided relay outputs rated at 6 A (-9A) or 7A (-11A). • EZ-SCREEN monitors these interface modules when they are connected to the EZ-SCREEN External Device Monitoring (EDM) inputs. • Convenient plug-in terminal blocks on a 22.5 mm DIN-rail mountable housing are included.	**IM-T-9A** (3 NO) **IM-T-11A** (2 NO/1 NC)	Page 552
		• One controller provides configurable monitoring of multiple safety devices. • 22 input terminals can monitor both contact-based and PNP solid-state input devices. • 3 pairs of independent solid-state safety outputs can be used with selectable one- or two-channel external device monitoring. • Ten configurable non-safety status outputs track inputs, outputs, lockout, I/O status and other functions. • All SC22-3 modules use 24V dc. • 10/100 Base TX Ethernet communication option using EtherNet/IP and Modbus TCP protocols (SC22-3E models).	**SC22-3-S...** **SC22-3-C...** **SC22-3E-S...** **SC22-3E-C...**	Page 526
Muting Modules		• The Muting Module temporarily inhibits a safety light screen so materials can safely pass through the screen without stopping the machinery. • The module uses redundant microcontroller-based logic. • MMD Modules can be used as dual controllers when muting function is not used.	**MMD-TA-12B** **MMD-TA-11B**	Page 544
Receiver AC Interface Boxes		• Versatile power supplies allow EZ-SCREEN systems to connect to AC power sources. • Models are available to accommodate receivers only, emitters only or both. • Receiver models include 8 amp safety relay output.	**EZAC-R9-QE8** **EZAC-R11-QE8** **EZAC-R15A-QE8-QS83** **EZAC-R8N-QE8-QS53** **EZAC-R10N-QE8-QS53**	Page 741
Emitter AC Interface Boxes			**EZAC-E-QE8** **EZAC-E-QE5** **EZAC-E-QE8-QS3** **EZAC-E-QE5-QS5**	
Contactors		• Pairs of contactors create safety stop circuits with two normally open contacts in series. • EZ-SCREEN can monitor the circuit because of the contacts' force-guided mechanically linked design. • Contactors add 10 or 18 amp current carrying capability to any safety system. • Auxiliary contacts add 3 or 4 normally open contacts. • Suppressors extend the life of an actuating device that uses a contactor. • Modular design simplifies assembly and installation.	**Mechanically Linked Contactors** **11-BG00-31-D-024** **BF1801L-024** **Aux. Contacts** **11-BGX10-40** **11-G484-30** **Suppressors** **11-BGX77-048** **11-G318-48**	Page 742

NC = Normally closed, NO = Normally open

MACHINE SAFETY

PICO-GUARD™
Grids & Points

page 519



- Fiber optic elements are for use with PICO-GUARD Controllers and fiber optic cables in personnel safety and equipment-protection applications.
- Choices include compact 12 or 30 mm non-contact fiber optic Point elements or Grid systems for perimeter and access guarding.
- Each fiber optic channel is one emitter/receiver (up to 4 pairs per controller).
- Grid system features rugged anodized aluminum construction, with 2, 3 or 4 beams and beam spacing from 300 to 584 mm.
- Each Point or Grid element can function as emitter or receiver, depending on installation.
- 12 mm Point has impact-resistant polycarbonate plastic construction.
- 30 mm Point has robust 304 stainless steel housing with tempered glass lens window.
- Environmental rating is IP65 for Grids and IP67 for Points.
- Grids and Points meet Type 4 per IEC 61496-2 and Category 4 per ISO13849-1 (EN 954-1) requirements when used with a PICO-GUARD controller.
- Grid and Points are ATEX, CSA and FM approved for use in explosive environments when used with a PICO-GUARD controller.

ACCESSORIES page 521

PICO-GUARD™ Fiber Optic Systems. See page 511

Grid Systems

- Two-, three- or four-beam systems
- Protected heights of 500 to 1066 mm
- Five lengths of fiber cable

Point Systems

- 12 or 30 mm threaded barrel housings
- Use multiple points for a customized grid system
- Three integral fiber types in five lengths