IDEC

Safety Laser Scanner

SE2L Advanced







Optimized safety for harsher environments

High-performance scanner with improved durability, effective under tough use conditions

APEM
an IDEC company

https://www.ibericadeautomatismos.com/producto/se2l-advanced-safety-laser-scanner-idec/

Global manufacturing sites are seeking solutions that balance productivity and safety.

What role can IDEC play to support customers in their pursuit of safety and security?

The new SE2L Advanced safety laser scanner offers an answer.

It ensures that stable detection is possible even in harsh environments, and offers full functionality for AGV/AMR mounting. Both IDEC and the new SE2L Advanced support the creation of safe and secure environments for all on-site workers.

IDEC will continue to offer comprehensive solutions with an emphasis on safety, and stay side by side with our customers as they grow.

Enhanced environmental resistance

Maintains functionality and safety in dusty environments

Improvements to the scanner's internal build and components reduce false positives. The effects of dust, ambient light, and other interference on the sensor have been significantly reduced.



Prevents dirt and dust from sticking

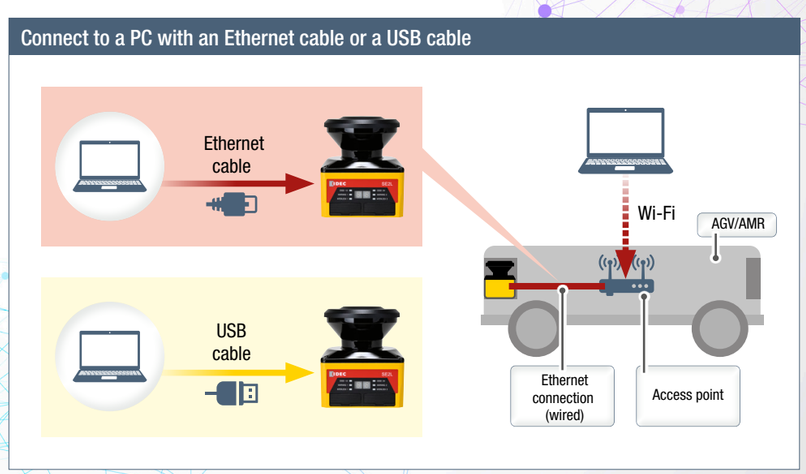
The optical window's conductive coating greatly reduces the risk of dirt and dust clinging to the scanner. This helps to prevent machinery from stopping unexpectedly.



Contributes to the evolution of wireless AGVs/AMRs

Enhanced Ethernet connectivity

By connecting the SE2L Advanced to the Ethernet access point on an AGV or AMR, the scanner can also be connected to a PC via Wi-Fi. A connected PC can be used to set the scanner's operation area.



Sensing area changes based on the AGV/AMR's turning speed

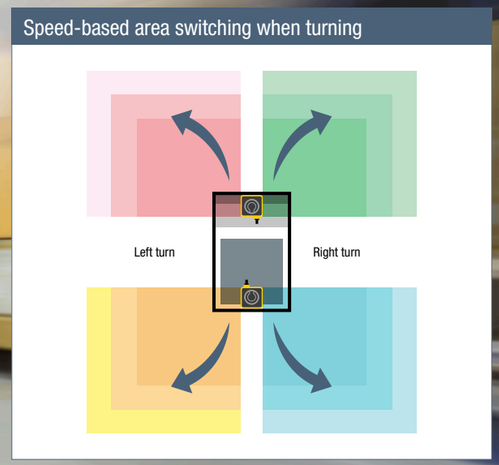
Additional encoder input

The SE2L Advanced has 4 encoder inputs for 2-axis monitoring. This allows for speed-based sensing area switching while the AGV/AMR the scanner is mounted on is turning.

The pulse signal from the incremental encoder can be input directly without a controller, making speed-based area switching easier.

This improvement of the scanner's hardware also increases the AGV/AMR's navigational accuracy.



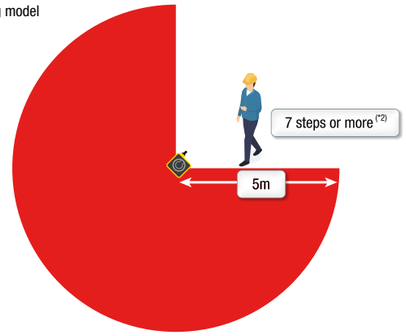


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Area Protection

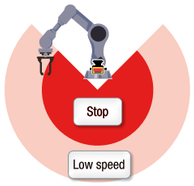
Protection zone 5m, sensing angle 270°, warning zone 20m (*1) expanded → to 30m.

*1) Existing model



A single SE2L Advanced unit can protect a wide area (5m and 270°) and can be used in a variety of applications, such as in large-scale systems or on long conveyor belts.

Ensures productivity and safety



The SE2L Advanced's stopping area can be reduced by detecting approach at the additional protection zone and starting slowdown.(*3)

*3) A conventional configuration of 1 protection zone + 2 warning zones is also possible.

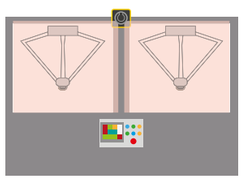
Master-slave function



Master/slave unit operation is possible using RS-485, and a maximum of 4 SE2L Advanced units can be interconnected.

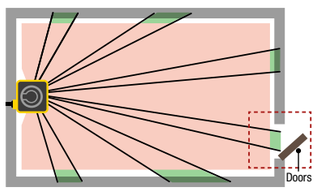
Access Protection

Dual protection function



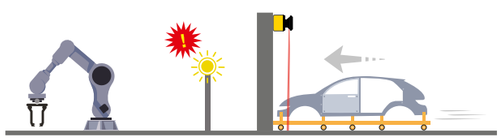
The SE2L Advanced can monitor 2 separate hazardous areas and stop machines when it detects access by humans. No reflective sensor is necessary, eliminating the need for optical axis alignment. The scanner can replace up to 2 light curtains.

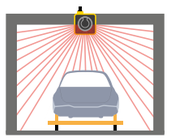
Ensures safety during positional changes



The reference monitoring function ensures safety by detecting position changes and reference boundaries, such as whether a door is open or closed.

Ensures safety at workpiece entrances, override function enables restart from an unexpected stop





The muting function can disable part of the protection zone, allowing workpieces to be brought into the area. The override function also makes it easy to move workpieces even if they are stopped due to false positives during muting.

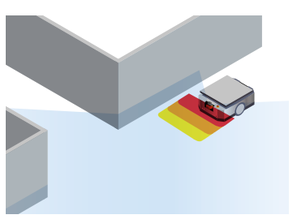
Collision Avoidance

Maximum 128 area patterns



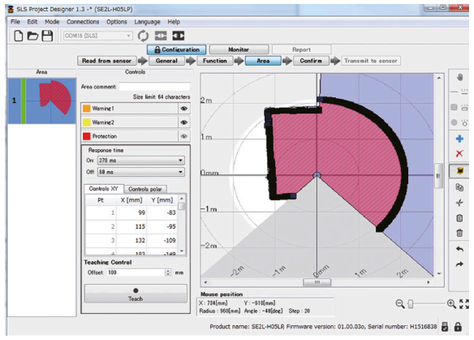
A maximum of 128 protection areas can be configured/switched.

Utilize distance measurement data



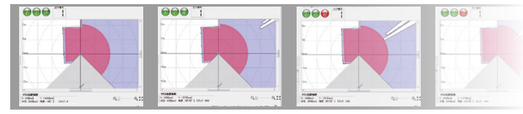
While maintaining safety protection, the SE2L Advanced can transmit distance measurement data via the Ethernet port to obtain information on nearby obstacles.

Supports area configuration



The teaching function enables automatic protection area configuration by using obstacles such as walls and columns as reference points. It is easy to sketch out protective areas, even on complex backgrounds.

Use video to check detection status



When there are no humans in the protection zone

When a human is approaching the protection zone

When there is a human inside the protection zone

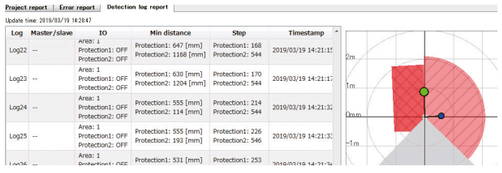
Area data and distance measurement data can be recorded while monitoring on a PC. Detection status data can be played back with video. Data for several seconds before and after detection can also be recorded.

Optical window can be replaced on site



Users can replace the scanner's optical window themselves, reducing downtime and costs. A cover bracket is also available, to prevent collision damage.

Detection log reporting function reduces maintenance



Operational status is displayed on the SE2L Advanced unit. It can also be displayed on a connected PC, to check errors and detection history and for simple troubleshooting. The detection history is displayed in an easily understandable visual format, with numerical data and mapping.

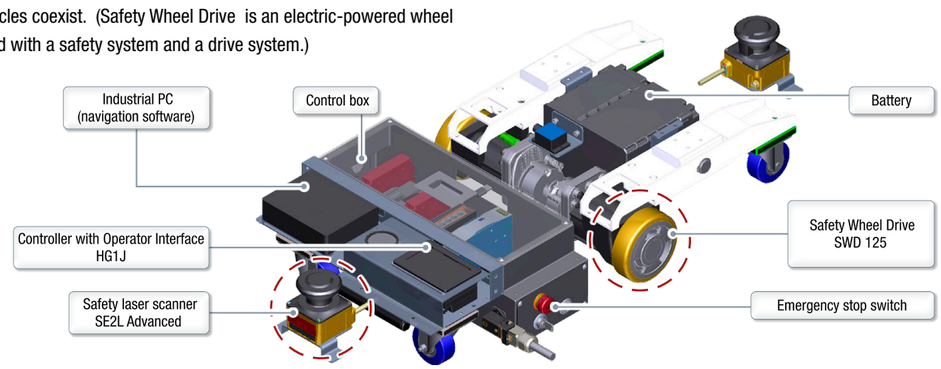
Reduced maintenance and start-up time



Area data and function settings created on a PC can be transferred to the SE2L Advanced using Ethernet, USB, or a micro SD card.

Easily build an AGV/AMR with integrated safety features

By installing the SE2L Advanced in combination with Safety Wheel Drive, it becomes even simpler to build AGVs/AMRs with integrated safety functions for use in areas where humans and autonomous vehicles coexist. (Safety Wheel Drive is an electric-powered wheel fitted with a safety system and a drive system.)



Note: Safety Wheel Drive is available in the US from spring 2025.

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Safety input to a robot controller

The connection allows the safety signal from the safety laser scanner to be easily input to a robot controller. The safety signal is converted and output as a dry contact output of a force-guided relay. 2 sets of dual signals can be output.

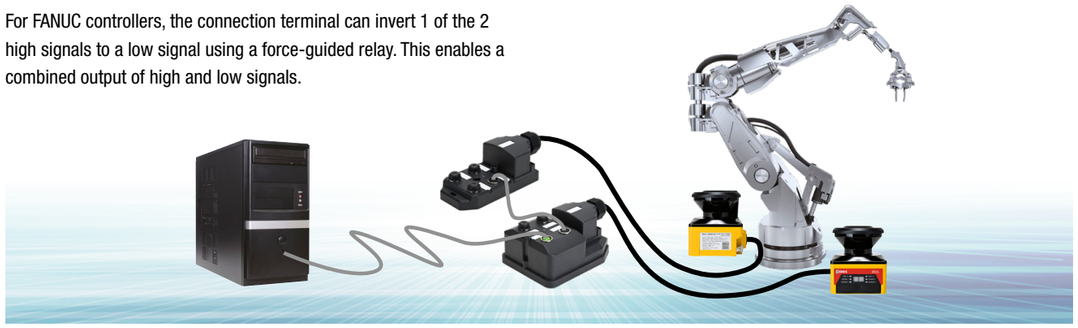
For FANUC controllers, the connection terminal can invert 1 of the 2 high signals to a low signal using a force-guided relay. This enables a combined output of high and low signals.



SE9Z-RT2D

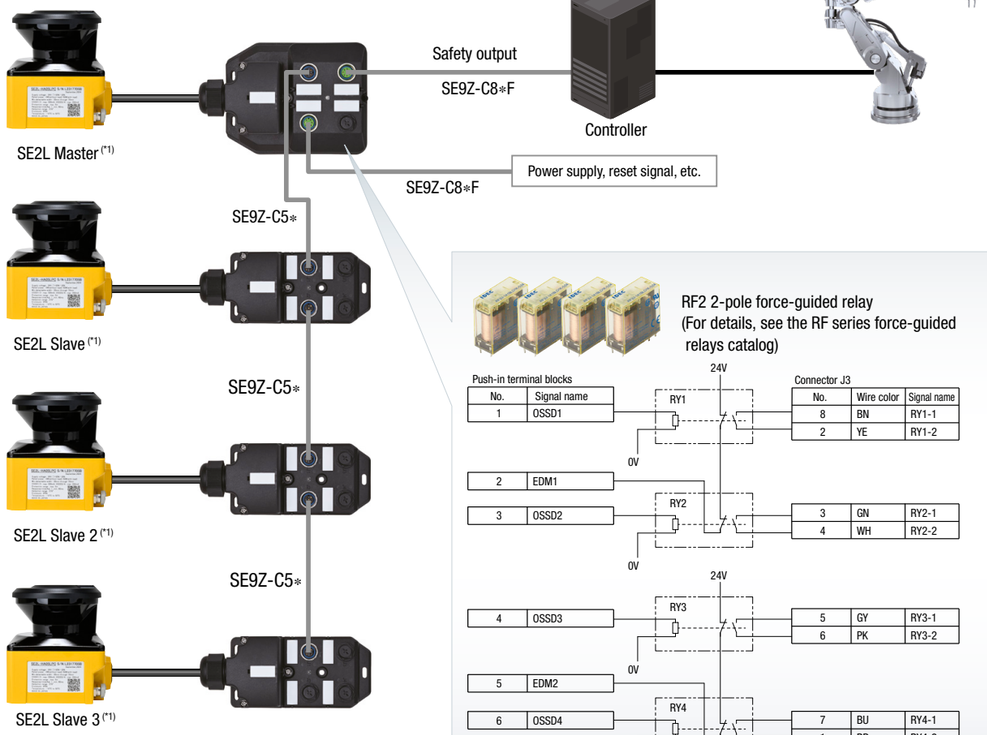
SE9Z-RT2SV

SE9Z-T



Supports master-slave connection

As well as supporting master-slave connections, SE2L Advanced units can be connected to each other with an M12 connector cable.



*1) When SE2L-HA05LP is used.

- ∗ = cable length: 002 (2m), 005 (5m), 010 (10m), 020 (20m)

SE2L Advanced Safety Laser Scanner

Safety Laser Scanner

Name / Shape	Cable length	Part No.	Remarks
Cable type 	3m	SE2L-HA05LP	• The dedicated software SLS Project Designer is used to configure each function of the product and create the detection area. The SLS Project Designer can be downloaded free of charge from the IDEC website. • Quantity: 1
Connector type 	0.3m	SE2L-HA05LPC	

See website for details on approvals and standards.

Accessories (optional)

Quantity: 1

Name / Shape	Cable length	Part No.	Remarks
Connector cable 	2m	SE9Z-HS2-C002	• Degree of protection: IP65 • For connector model only.
	5m	SE9Z-HS2-C005	
	10m	SE9Z-HS2-C010	
	20m	SE9Z-HS2-C020	
Micro USB cable 	1m	SE9Z-HS2-XCM11	• Used to connect the SE2L Advanced and PC.
Ethernet cable 	3m	SE9Z-HS2-XCD13	• Degree of protection: IP65 • Waterproof LAN cable
Extension cable	10m	SE9Z-HS2-XCE010	• Used to extend the cable length of the SE2L Advanced.
	20m	SE9Z-HS2-XCE020	
Base mounting bracket 		SE9Z-HS2-BK01	• Used to change the vertical angle alignment of the SE2L Advanced. • Adjustable by 15 degrees total (7.5 degrees each direction) • Material: Steel • Includes 4 bolts (M5×12)
Rear mounting bracket 		SE9Z-HS2-BK02	Used to change the vertical/horizontal angle alignment of the SE2L Advanced. • Adjustable by 15 degrees total (7.5 degrees each direction) • Material: Steel • Includes 4 bolts (M5×12)
Simple base mounting bracket 		SE9Z-HS2-BK03	• Includes four bolts (M5×12) • Material: Aluminum
Rear easy mounting bracket (Long type) 		SE9Z-HS2-BK04L	• Includes four bolts (M5×12) • Material: Aluminum
Cover bracket 		SE9Z-HS2-CM01	• Used to protect the optical window in combination with base mounting bracket or rear mounting bracket. • Material: Steel • Includes 4 bolts (M5×12)
Replacement optical window 		SE9Z-HS2-WD02	• Material: polycarbonate • Includes 4 bolts (M3×8)
Robot controller connection terminal 		SE9Z-RT2D	• Dry contact output x 4 • Push-in terminal block 23-pin, M12 connector 8-pin x 3, M12 connector 5-pin x 1 • Maximum current: Power line 2A, others 500mA (except RS485 line)
Robot controller connection terminal 		SE9Z-RT2SV	• (Direct output + inverted output) x 2 (for FANUC controllers) • Push-in terminal block 23-pin, M12 connector 8-pin x 3, M12 connector 5-pin x 1 • Maximum current: Power line 2A, others 500mA (except RS485 line)
Robot controller connection terminal 		SE9Z-T	• For slave connection (without built-in relay) • Push-in terminal block 23-pin, M12 connector 8-pin x 2, M12 connector 5-pin x 2 • Maximum current: Power line 2A, others 500mA (except RS485 line)
Connector cable 	2m	SE9Z-C5002	• M12 connector cable 5-pole (connectors on both sides) • Degree of protection: IP65 • For robot controller connection terminal
	5m	SE9Z-C5005	
	10m	SE9Z-C5010	
	20m	SE9Z-C5020	
Connector cable 	2m	SE9Z-C8002F	• M12 connector cable 8-pole (connector on one side) • Degree of protection: IP65 • For robot controller connection terminal
	5m	SE9Z-C8005F	
	10m	SE9Z-C8010F	
	20m	SE9Z-C8020F	

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SE2L Advanced

Performance Specifications

Part No.		SE2L-HA05LP/SE2L-HA05LPC
Detection characteristics	Protection zone	5.0m maximum
	Warning area (Note 1)	30m maximum (non-safety)
	Additional safety distance (Note 2)	+100mm
	Detection characteristics	Black reflector sheet (1.8%) to retro-reflector sheet
	Sensing angle	270°
	Minimum sensing width	ø30 mm (maximum protection distance: 1.8m) ø40 mm (maximum protection distance: 2.5m) ø50 mm (maximum protection distance: 3.0m) ø70 mm/ø150 mm (maximum protection distance: 5.0m)
	Scan cycle	30ms (rotating speed 2,000 rpm)
	Scan area	Up to 128 areas (when using fixed input mode/encoder mode)
	Response time	ON→OFF: 60 to 2010ms OFF→ON: 270 to 2010ms
Light source	Element	Pulse laser diode
	Wavelength	905nm
	Laser protection class	Laser class 1 (IEC 60825-1)
Type		Type 3 (IEC 61946-1, IEC 61496-3)
Functional safety		SIL 2 (Type B, HFT=1) (IEC 61508)
PFH_D		8.1 x 10 -8 (T1=20 years) when master slave function is disabled 1.6 × 10-7 (T1=20 years): If the master slave function is enabled
Master/slave connection		4 maximum
Enclosure	Dimensions	80W × 80D × 95H (mm) (cable not included)
	Weight (approx.)	Cable model: 0.8 kg (including 3m cable)/Connector model: 0.5 kg
	Degree of protection	IP65
	Material	Body: aluminum diecast / Optical window: polycarbonate
	Connection cable	Cable model: 3 m/Connector model 0.3 m
Power voltage		24V DC ±10%: power from converter 24V DC –30%/+20%: power from battery
Rated power consumption	Without output load	6W
	Maximum (with output load)	50W
Output	OSSD1/2 (safety)	Output type (High side SW)
		Output current (maximum: 500mA) (Note 4)
		Leakage current (maximum: 1mA)
		Cable (AWG 26)
		Allowable load (L/R=25 ms, C=1µF)
	OSSD3 (safety) OSSD4 (safety) WARNING1 (non-safety) WARNING2 (non-safety)	Output type (high side SW)
		Output current (maximum: 250mA) (Note 4)
		Leakage current (maximum: 1mA)
		Cable (AWG 28)
		Allowable load (L/R=25ms, C=1µF)
	RES_REQ1, RES_REQ2, MUT_OUT1, MUT_OUT2 AUX_OUT1, AUX_OUT2 (Note 3)	Output type (PNP transistor output)
		Output current (maximum: 200mA)
		Leakage current (maximum: 1mA)
		Cable (AWG 28)
Input	Area Switching (5 inputs × 2 channels) EDM1/EDM2/MUTING1/MUTING2/MUTING3/MUTING4/ OVERRIDE1/OVERRIDE2/RESET1/RESET2/ENC1_A/ENC1_B/ ENC2_A/ENC2_B/ENC3_A/ENC3_B/ENC4_A/ENC4_B	Input Resistance: 4.7kΩ Cable: AWG 28
Interface	PC	USB 2.0 (USB micro type B connector) / Ethernet 100BASE-TX (waterproof connector)
	Master/slave	RS-485 (cable)
	Distance measurement data output	Ethernet 100BASE-TX (waterproof connector)
Environmental resistance	Operating temperature	-10 to +50˚C (no freezing)
	Storage temperature	-25 to +70˚C (no freezing)
	Operating humidity	95% RH (no condensation)
	Storage humidity	95% RH (no condensation)
	Operating temperature (Note 5)	1500lx maximum
	Vibration resistance	Frequency: 10 to 55 Hz Sweep: 1 octave/minute Amplitude: 0.35 mm ±0.05 mm
	Shock resistance	Acceleration: 100m/s² Pulse duration: 16ms
	Outdoor operation	Not permitted
	Altitude	Below 2,000m

Note 1: When the reflectance of object is 90% or above.

Note 2: Additional distance of 200 mm is needed when the SE2L Advanced operates under high reflective background.

Note 3: Error output, optical window contamination error output, optical window contamination warning, and synchronous output can each be allotted.

Note 4: Total current supply of OSSD output and warning output should be below 1.0A.

Note 5: The angle between the sensing plane and the light source should be more than 5 degrees.

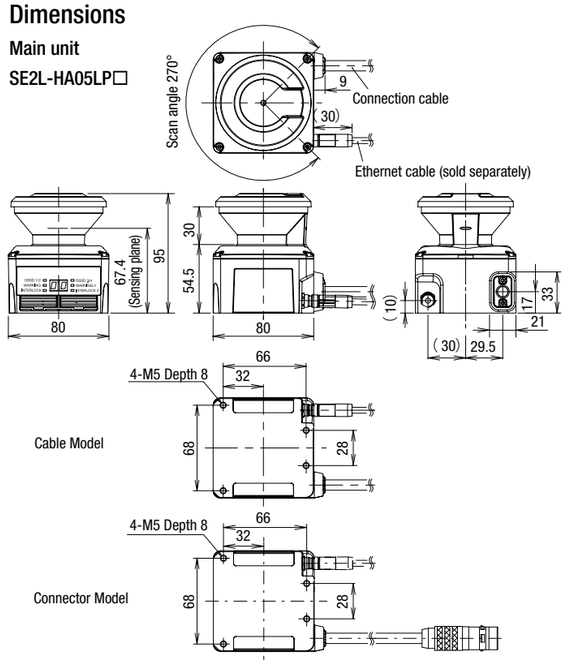
SE2L Advanced

Dimensions

All dimensions in mm.

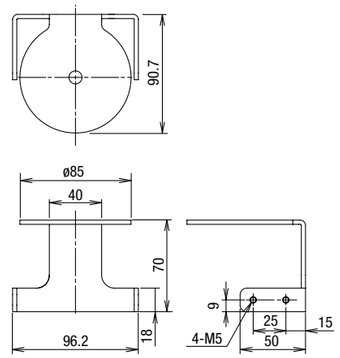
Main unit

SE2L-HA05LP□



Cover bracket

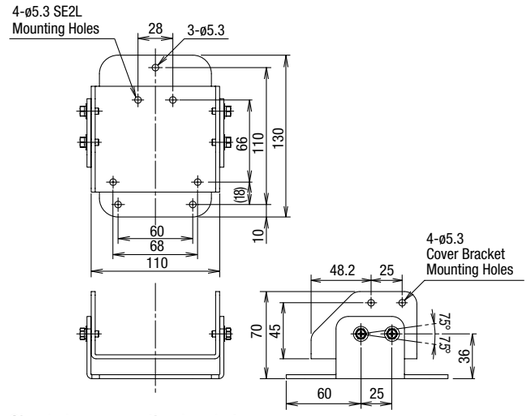
SE9Z-HS2-CM01



- Used to protect the optical window in combination with the base mounting bracket or rear mounting bracket. It cannot be used with the simple base mounting bracket or rear mounting bracket.

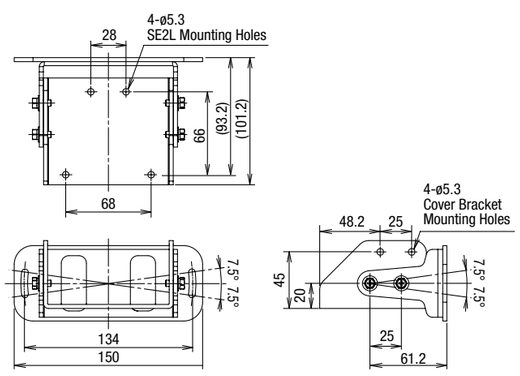
Base mounting bracket

SE9Z-HS2-BK01



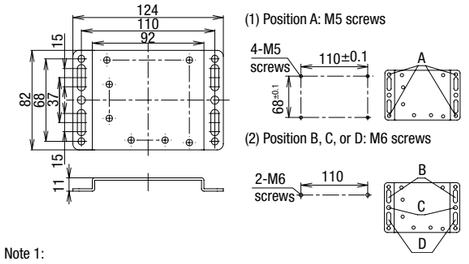
Rear mounting bracket

SE9Z-HS2-BK02



Simple base mounting bracket

SE9Z-HS2-BK03 (Note 1)

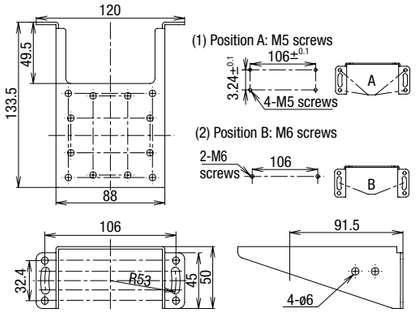


Note 1:

- Use washers when fastening screws.
- Use two M6 screws when installing on an aluminum frame.

Rear mounting bracket (long type)

SE9Z-HS2-BK04L (Note 1)

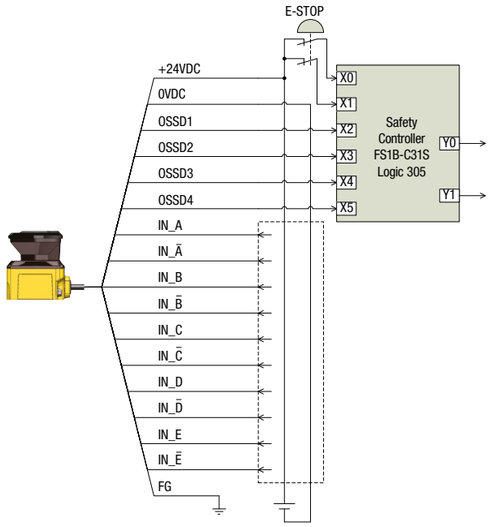


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SE2L Advanced

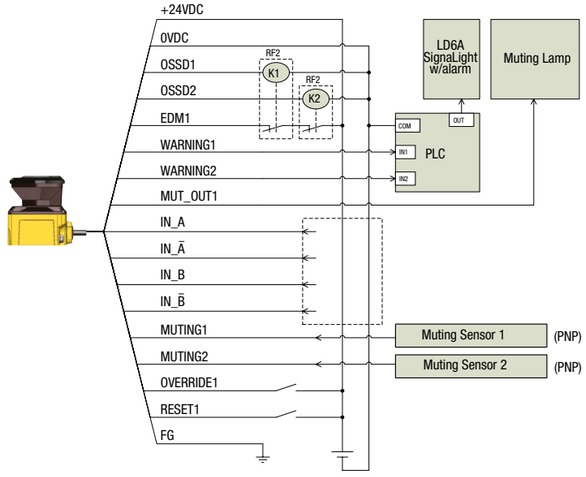
Wiring example

a) When using the maximum 128 scan area patterns (e.g. AGV)



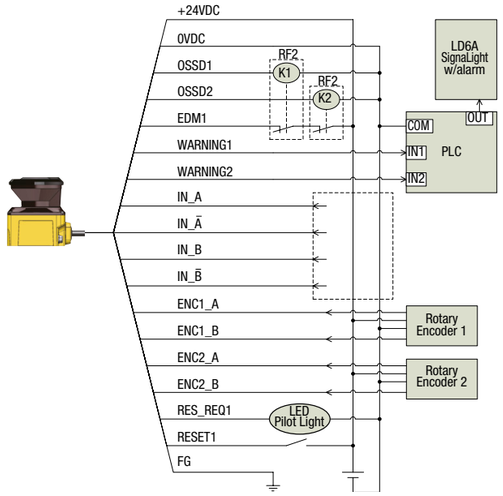
IDEC safety products
Safety controller: FS1B
E-stop: X series

b) When using muting/override/EDM



IDEC safety products
Light tower with buzzer: LD6A
PLC: FC6A
Muting sensor: SA2E
Muting sensor lamp: HW1P-5
Force-guided relay: RF2

c) When switching scan areas using an encoder



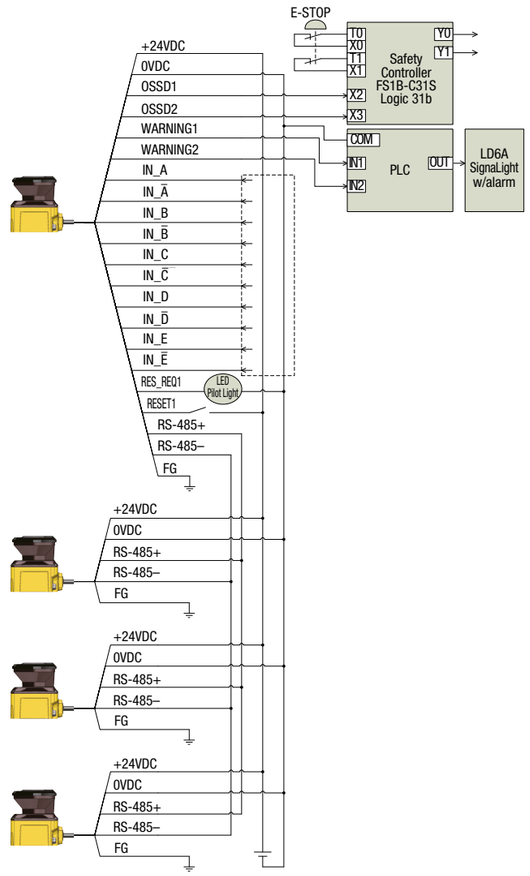
IDEC safety products
Light tower with buzzer: LD6A
PLC: FC6A
Pilot light: AP22
Force-guided relay: RF2

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SE2L Advanced

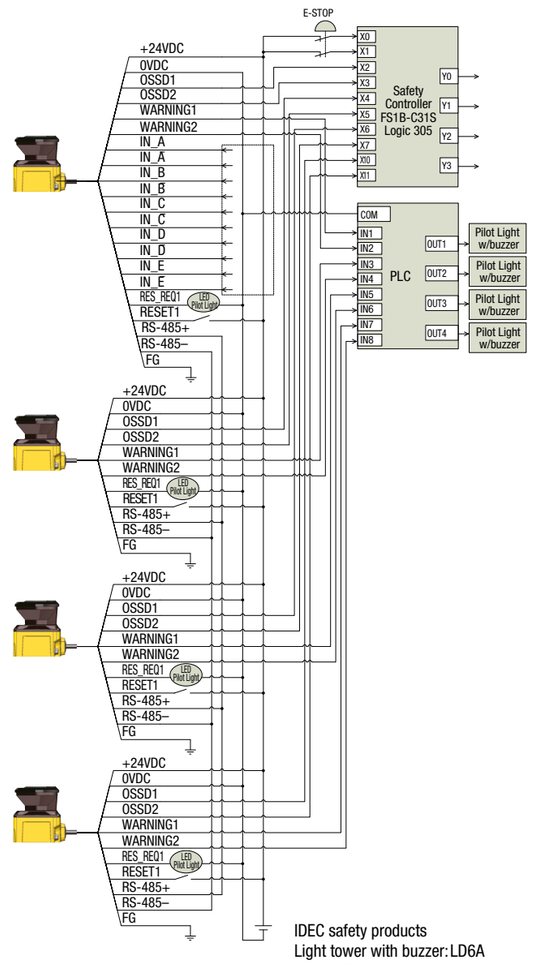
Wiring example

d) When using the master/slave function to guard an AGV or robot



IDEC safety products
Light tower with buzzer: LD6A
PLC: FC6A
Pilot light: AP22
Safety controller: FS1B
E-stop: X series

e) When using the master/slave function to guard multiple hazards and perform partial stops

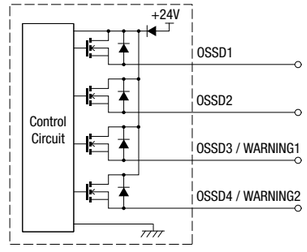


IDEC safety products
Light tower with buzzer: LD6A
PLC: FC6A
Pilot light: AP22
Safety controller: FS1B
E-stop: X series

Input/Output Circuit

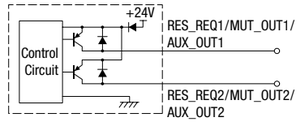
OSSD/WARNING output circuit

OSSD/WARNING outputs are N channel MOSFET outputs.



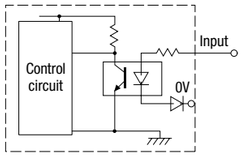
Other output circuits

RES_REQ1, RES_REQ2, MUT_OUT1, MUT_OUT2, AUX_OUT1, AUX_OUT2 outputs are PNP outputs.



Input circuit

Available for area input, EDM1, EDM2, RESET1, RESET2, MUTING1, MUTING2, MUTING3, MUTING4, OVERRIDE1, and OVERRIDE2.

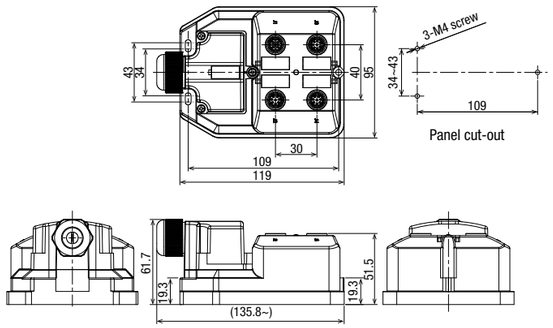


Robot controller connection terminals (accessories)

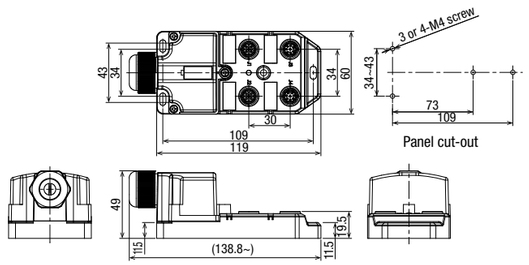
Dimensions

All dimensions in mm.

SE9Z-RT□



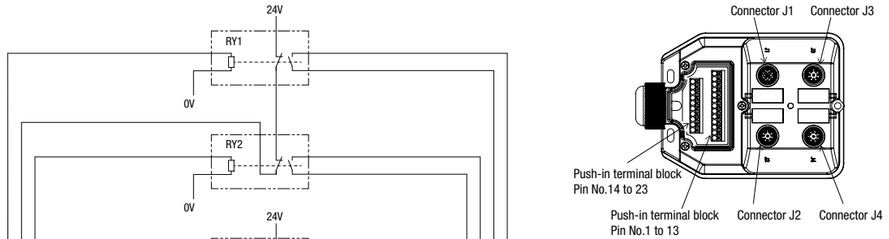
SE9Z-T



Internal circuit

SE9Z-RT2D

Relay area



Push-in terminal block

No.	Signal name (*1)
1	OSSD1
2	EDM1
3	OSSD2
4	OSSD3
5	EDM2
6	OSSD4
7	RESET1
8	RESET2
9	0V
10	24V
11	RS485-
12	RS485+
13	IN_A
14	IN_B
15	IN_C
16	IN_D
17	IN_$\overline{A}$
18	IN_$\overline{B}$
19	IN_$\overline{C}$
20	IN_$\overline{D}$
21	RES_REQ1
22	RES_REQ2
23	FG

Relay area / Others

Connector J3

No.	Wire color	Signal name (*1)
8	BN	Safety output1-1
2	YE	Safety output1-2
3	GN	Safety output2-1
4	WH	Safety output2-2
5	GY	Safety output3-1
6	PK	Safety output3-2
7	BU	Safety output4-1
1	RD	Safety output4-2

Connector J1

No.	Wire color	Signal name (*1)
3	BU	0V
4	WH/BU	24V
1	YE	RS485-
5	WH/YE	RS485+

Connector J2

No.	Wire color	Signal name (*1)
1	RD	RESET1
7	BU	RESET2
3	GN	0V
4	WH	24V

Connector J4

No.	Wire color	Signal name (*1)
1	RD	IN_A
2	YE	IN_B
3	GN	IN_C
4	WH	IN_D
5	GY	IN_$\overline{A}$
6	PK	IN_$\overline{B}$
7	BU	IN_$\overline{C}$
8	BN	IN_$\overline{D}$

5	GY	RES_REQ1
6	PK	RES_REQ2
Shield		FG

2	Shield	FG

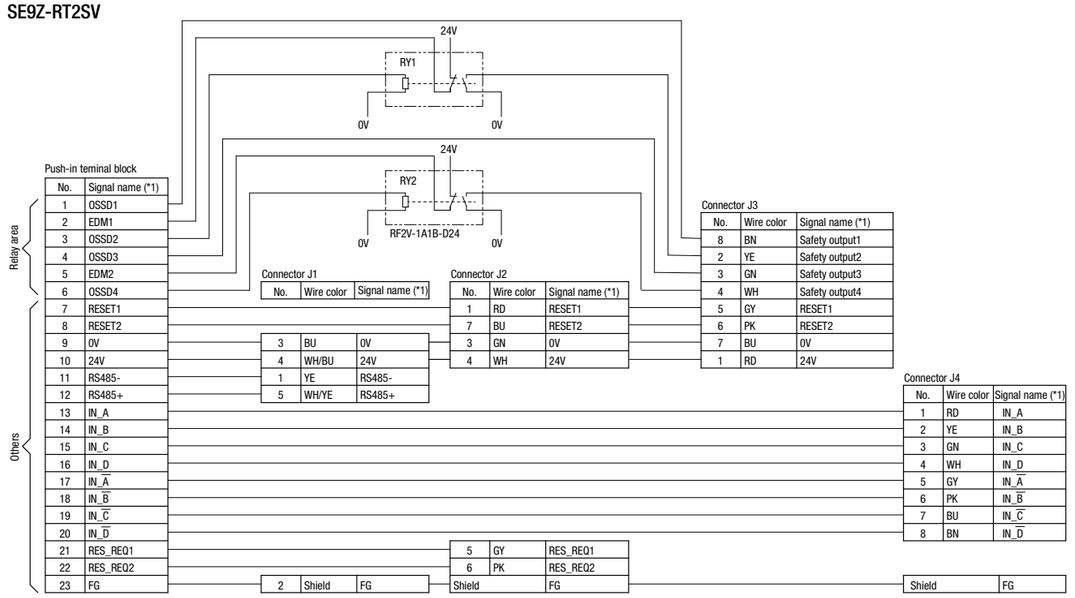
Shield	FG

*1) Signal name: when connected to SE2L Advanced

- For performance specifications of the SE9Z series, see the SE9Z series instruction manual.

Robot controller connection terminals (accessories)

SE9Z-RT2SV



Push-in terminal block

No.	Signal name (*1)
1	OSSD1
2	EDM1
3	OSSD2
4	OSSD3
5	EDM2
6	OSSD4
7	RESET1
8	RESET2
9	0V
10	24V
11	RS485-
12	RS485+
13	IN_A
14	IN_B
15	IN_C
16	IN_D
17	IN_$\overline{A}$
18	IN_$\overline{B}$
19	IN_$\overline{C}$
20	IN_$\overline{D}$
21	RES_REQ1
22	RES_REQ2
23	FG

Connector J1

No.	Wire color	Signal name (*1)
3	BU	0V
4	WH/BU	24V
1	YE	RS485-
5	WH/YE	RS485+

Connector J2

No.	Wire color	Signal name (*1)
1	RD	RESET1
7	BU	RESET2
3	GN	0V
4	WH	24V

Connector J3

No.	Wire color	Signal name (*1)
8	BN	Safety output1
2	YE	Safety output2
3	GN	Safety output3
4	WH	Safety output4
5	GY	RESET1
6	PK	RESET2
7	BU	0V
1	RD	24V

Connector J4

No.	Wire color	Signal name (*1)
1	RD	IN_A
2	YE	IN_B
3	GN	IN_C
4	WH	IN_D
5	GY	IN_$\overline{A}$
6	PK	IN_$\overline{B}$
7	BU	IN_$\overline{C}$
8	BN	IN_$\overline{D}$

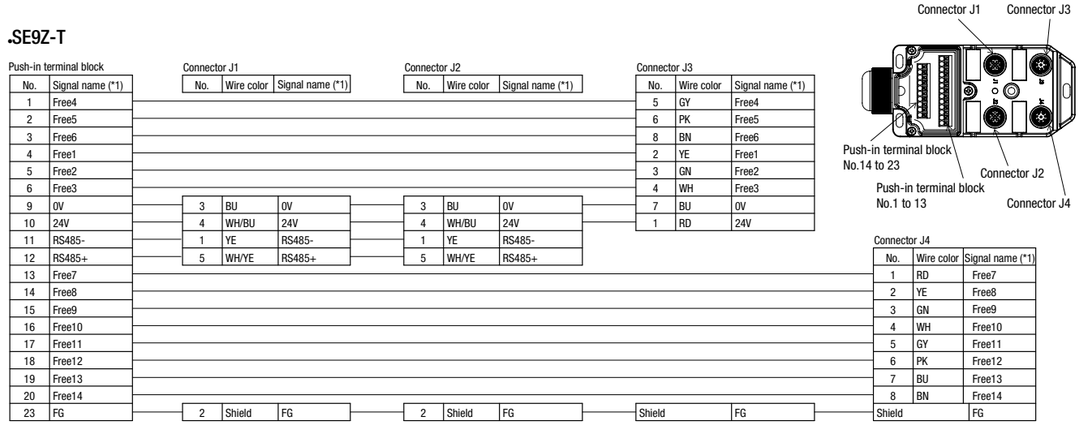
5	GY	RES_REQ1
6	PK	RES_REQ2
Shield		FG

2	Shield	FG

Shield	FG

*1) Signal name: when connected to the SE2L Advanced.

SE9Z-T



Push-in terminal block

No.	Signal name (*1)
1	Free4
2	Free5
3	Free6
4	Free1
5	Free2
6	Free3
9	0V
10	24V
11	RS485-
12	RS485+
13	Free7
14	Free8
15	Free9
16	Free10
17	Free11
18	Free12
19	Free13
20	Free14
23	FG

Connector J1

No.	Wire color	Signal name (*1)
3	BU	0V
4	WH/BU	24V
1	YE	RS485-
5	WH/YE	RS485+

Connector J2

No.	Wire color	Signal name (*1)
3	BU	0V
4	WH/BU	24V
1	YE	RS485-
5	WH/YE	RS485+

Connector J3

No.	Wire color	Signal name (*1)
5	GY	Free4
6	PK	Free5
8	BN	Free6
2	YE	Free1
3	GN	Free2
4	WH	Free3
7	BU	0V
1	RD	24V

Connector J4

No.	Wire color	Signal name (*1)
1	RD	Free7
2	YE	Free8
3	GN	Free9
4	WH	Free10
5	GY	Free11
6	PK	Free12
7	BU	Free13
8	BN	Free14

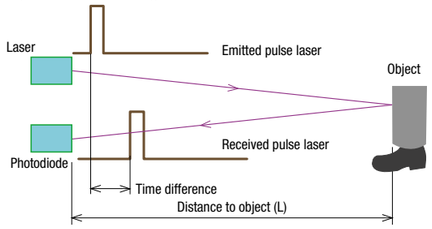
2	Shield	FG
2	Shield	FG
Shield		FG
Shield		FG

*1) Signal name: when connected to SE2L Advanced.

https://www.ibericadeautomatismos.com/producto/se2l-advanced-safety-laser-scanner-idec/

Operating principle

With the SE2L Advanced, the distance is measured by the Time of Flight (TOF) principle. The SE2L Advanced sends out very short pulses of infrared light. The mirror rotated by the motor sends the infrared light within the scanning range of 270º, and is reflected back from an object within the range.



The distance can be calculated using the time difference between the emission of the pulsed laser light and the reception of the reflected light as follows.

$$L = \frac{1}{2} \times C \times T$$

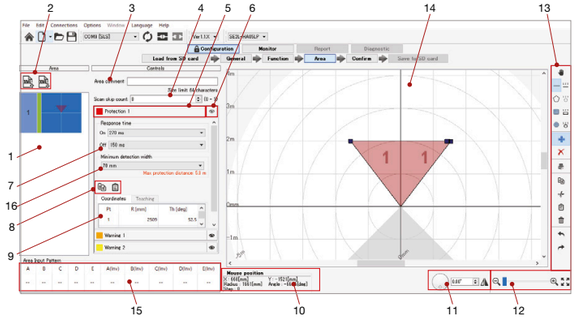
L = Distance to object
C = Speed of light
T = Time difference

Scan area setting

Scan area of SE2L Advanced consists of protection zones and warning zones or only a protection zone. In both cases, maximum 128 areas can be configured (when fixed input mode/encoder mode is used).
A software SLS Project Designer*1 supplied with the SE2L Advanced is used to configure the protection and warning zones, providing excellent user interface. Automatic zone configuration by referring the boundary is also possible.
The latest version of the software can be downloaded from IDEC website. See the User's Manual for details.

*1 Free download from the IDEC website.
Membership registration is required to download.

- Protection zone
  The area obtained by risk assessment and calculation of safety distance.
  Warning zone
  The area to send alarms which can be set according to the application.



1. Area preview
2. Import/export of XML files
3. Area comment
4. Number of skipped scans
5. Area selection button
6. Area display settings
7. Response time
8. Copy/Paste
9. Point coordinates
10. Mouse position information
11. Rotate and flip tool
12. Zoom-in /out tool
13. Drawing toolbar
14. Area display screen
15. Area input pattern
16. Minimum detection width

Area switching

The SE2L Advanced can store and configure up to 128 scan areas. The number of maximum configurable areas depends on selected functions such as scan area mode and muting.

Maximum number of patterns

Mode	Protection area	Max external input	Max. areas by external input		Max. areas by encoder input
			Pairing mode	Fixed input mode	
Standard	1	10	32	128	-
	2	10	32	128	-
EDM	1	8	16	70	-
	2	8	16	70	-
MUTING/EDM	1	4	4	6	-
	2	2	2	2	-
Encoder*2	1	6	7	-	128*3
	2	6	7	-	128*3

Note 1: Muting function modes cannot be used when encoder input mode is selected.
Note 2: Among the eight input patterns, at least one pattern must be used for encoder input. Other seven remaining patterns can be selected to be used as a static input or not in use. A pattern with encoder input mode has up to 128 areas.

Selected scan area and input signal

- 10 inputs (5 x 2)

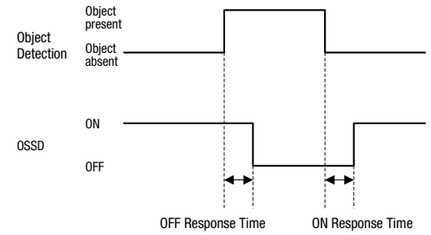
Area	IN_A	IN_B	IN_C	IN_D	IN_E	IN_Ā	IN_B̄	IN_C̄	IN_D̄	IN_Ē
1	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF
3	ON	OFF	ON	ON	ON	OFF	ON	OFF	OFF	OFF
4	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF
5	ON	ON	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
6	OFF	ON	OFF	ON	ON	ON	OFF	ON	OFF	OFF
7	ON	OFF	OFF	ON	ON	OFF	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF
9	ON	ON	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
10	OFF	ON	ON	OFF	ON	ON	OFF	OFF	ON	OFF

- See the User's Manual for more combinations (max. 128 areas).

Response time

The OFF response time for the OSSD signal and ON response time can be configured by using the SLS Project Designer. The response time for WARNING 1 and 2 can be set to a different time from that of OSSD response time. In dual protection mode, different response time can be set for protection zone 1 and 2 each. The stability of the SE2L Advanced can be increased by setting a long response time, but a long safety distance is required (see User's Manual). Before setting the response time, the user must perform a risk assessment thoroughly. The configurable response time is shown in the table below. Be sure to add the time taken to switch areas (30ms).

Time Chart



SE2L Advanced response time

	Response time (ms)							
OFF (ON→OFF)	60	90	120	150	180	210	240	270
	300	330	360	390	420	450	480	510
	540	570	600	630	660	690	720	750
	780	810	840	870	900	930	960	990
	1020	1050	1080	1110	1140	1170	1200	1230
	1260	1290	1320	1350	1380	1410	1440	1470
	1500	1530	1560	1590	1620	1650	1680	1710
	1740	1770	1800	1830	1860	1890	1920	1950
	1980	2010	–	–	–	–	–	–

	Response time (ms)							
ON (OFF→ON)	–	–	–	–	–	–	–	270
	300	330	360	390	420	450	480	510
	540	570	600	630	660	690	720	750
	780	810	840	870	900	930	960	990
	1020	1050	1080	1110	1140	1170	1200	1230
	1260	1290	1320	1350	1380	1410	1440	1470
	1500	1530	1560	1590	1620	1650	1680	1710
	1740	1770	1800	1830	1860	1890	1920	1950
	1980	2010	–	–	–	–	–	–

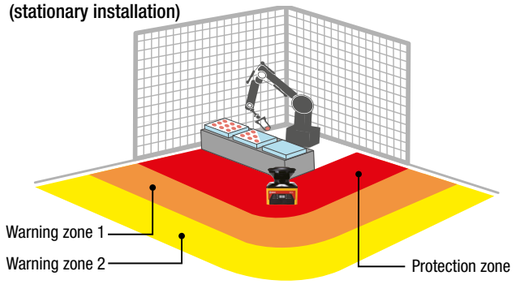
- Minimum configurable response time in Master/Slave mode
  OFF: 60ms (when OSSD is used), ON: 300ms

Safety distance

Access protection

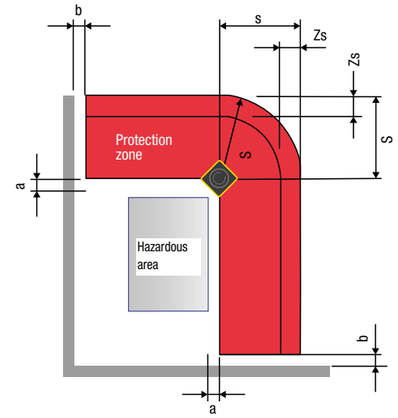
In this application, the SE2L Advanced is horizontally installed to protect the hazardous area. The protection zone is set around the hazardous area to prevent humans or objects from entering the hazardous area.

Protection zone 1 application (stationary installation)



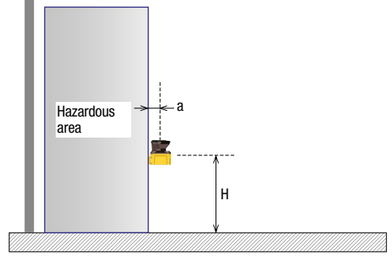
Warning zones 1 and 2 are set around the protection zone to send alarms to prevent humans or objects from entering the hazardous area and stopping the machine. By detecting humans or objects in the protection zone, the OSSD signal switches from ON to OFF. Also, when humans or objects are detected in the warning zone, WARNING signal switches from ON to OFF.

Top View (stationary)



- Maintain the distance "a" shorter than the minimum detection width. To prevent unwanted detection, maintain the distance "b" 100mm.

Side View (stationary)



Safety distance calculation

$$S = (K \times (T_m + T_s) + C + Z_s$$

S = Safety distance (mm)
K = Human approach speed 1,600 (mm/s)
T_m = Maximum stop speed of machine or system (s)
T_s = Response time of SE2L Advanced (s)
C = 1200 – 0.4 × H ≥ 850
H = height from the floor to the sensing plane (mm)
1000 ≥ H ≥ 15 × (d – 50)
d = Minimum sensing width of object (mm)
Z_s = Additional safety distance of SE2L Advanced (mm)

- See User's Manual for access protection and area protection (access detection, collision avoidance for mobiles).

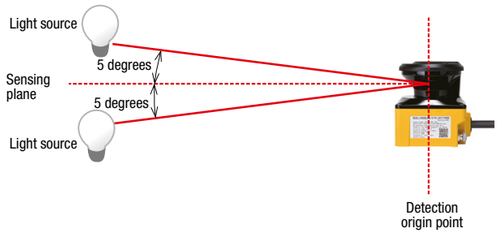
https://www.ibericadeautomatismos.com/producto/se2l-advanced-safety-laser-scanner-idec/

Installation

Light Interference

The SE2L Advanced is a sensor that transmits pulsed laser for obstacle detection. Interfering light sources may lead to false detection. Before using the SE2L Advanced, examine the surrounding environment. If the SE2L Advanced must be used under the environment shown below, install the SE2L Advanced so that the light source is located more than ±5 degrees from the sensing plane to prevent light interference.

a) Incandescent light
b) Florescent light
c) Strobe light
d) Flashing beacon
e) Sunlight
f) Infrared light



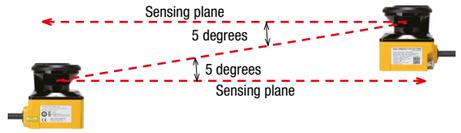
Mutual interference

When using several safety laser scanners or scanning range finders of the same model, pulse laser signals from other sensors may be falsely detected. To prevent mutual interference, see the installation methods shown below. See the User's Manual for more details.

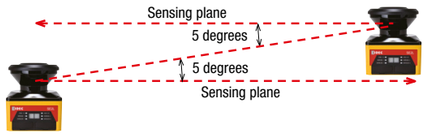
1) Changing the installation height

Install the SE2L Advanced units at different heights to keep at least 5 degree distance between the sensing surface.

①Face to face installation



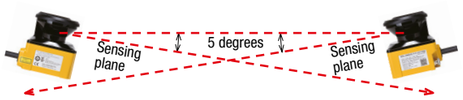
②Parallel installation



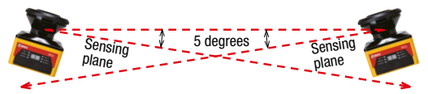
2) Changing the installation angle

Adjust the angle of SE2L Advanced units to keep at least 5 degree distance between the sensing surface.

①Face to face installation



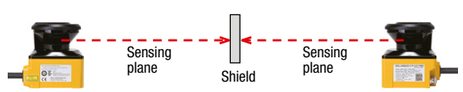
②Parallel installation



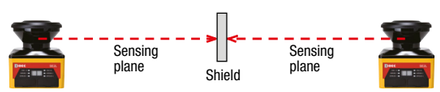
3) Separation by light shielding plate

Place a light shielding plate between the SE2L Advanced units, which may interfere with each other, to prevent the laser beam from reaching.

①Face to face installation

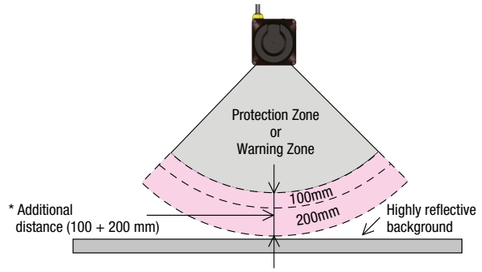


②Parallel installation



High reflective background

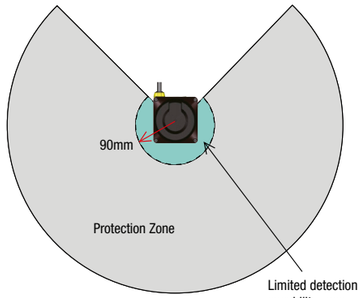
Highly reflective backgrounds may cause false detection causing the SE2L Advanced to detect a longer distance than the actual distance. If an operating environment with a highly reflective background cannot be avoided, an additional distance of 200 mm, in addition to the 100mm additional safety distance, is needed when configuring protection or warning zones.

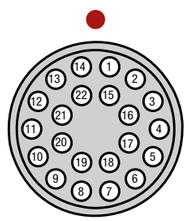


* Additional distance: the distance required to operate the SE2L Advanced under high reflective background

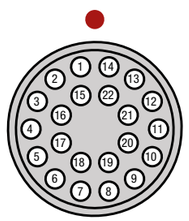
Limited detection capability area

The limited detection capability area is the area between the optical window and the beginning of the detection zone. The area from the origin point of the SE2L Advanced to 90 mm from the origin point is the limited detection capability area. In this area, a low reflective object is difficult to detect.





SE2L-HA05LPC
Pin number



SE9Z-HSC-C□□□
Socket number

Lead wire color and functions

The table below shows the functions of each wire. Use of a shielded wire is recommended.

Color	Signal	Function	Description	Pin No*1	AWG
Brown	+24V DC	Power	Power: 24V DC	1	22
Blue	0V DC		Power: 0V DC	2	22
Red	OSSD 1	Output	Protection zone output 1	3	26
Yellow	OSSD 2		Protection zone output 2	4	26
Red/ Black	OSSD 3 WARNING1	Output	Protection zone output 3 Warning zone output 1	5	28
Yellow/ Black	OSSD 4 WARNING2	Output	Protection zone output 4 Warning zone output 2	6	28
Purple	IN_A	Input	Area switching input A	7	28
Gray	IN_B MUTING3 ENC3_A ENC4_A		Area switching input B Muting input 3 Encoder input 3_A Encoder input 4_A	8	28
White	IN_C OVERRIDE1 ENC1_A		Area switching input C Override input 1 Encoder input 1_B	9	28
Pink	IN_D MUTING1 ENC1_B		Area switching input D Muting input 1 Encoder input 1_B	10	28
Green	IN_E EDM1		Area switching input E External device monitoring 1 Encoder input 3_A Encoder input 4_A	11	28
Purple/ Black	IN_$\overline{A}$		Area switching input $\overline{A}$ invert	12	28
Gray/ Black	IN_$\overline{B}$ MUTING4 ENC3_B ENC4_B		Area switching input $\overline{B}$ invert Muting input 4 Encoder input 3_B Encoder input 4_B	13	28
White/ Black	IN_$\overline{C}$ OVERRIDER2 ENC2_A		Area switching input $\overline{C}$ invert Override input 2 Encoder input 2_A	14	28
Pink/ Black	IN_$\overline{D}$ MUTING2 ENC2_B		Area switching input $\overline{D}$ invert Muting input 2 Encoder input 2_B	15	28
Green/ Black	IN_$\overline{E}$ EDM2 ENC3_B ENC4_B		Area switching input $\overline{E}$ invert External device monitoring 2 Encoder input 3_B Encode input 4_B	16	28
Yellow/ Green	RESET1 ENC3_A ENC4_A		Reset input 1 Encoder input 3_A Encoder input 4_A	17	28
Yellow/ Blue	RESET2 ENC3_B ENC4_B		Reset input 2 Encoder input 3_B Encoder input 4_B	18	28
Orange	RES_REQ1 MUT_OUT1 AUX_OUT1	Output	RES_REQ1: ON when OSSD1/2 requires external reset MUT_OUT1: ON when OSSD1/2 signals are in muting state AUX_OUT1: Synchronous signal / Error / /Optical window error / Optical window contamination warning	19	28
Orange/ Black	RES_REQ2 MUT_OUT2 AUX_OUT2		RES_REQ2: ON when OSSD3/4 requires external reset. MUT_OUT2: ON when OSSD3/4 signals are muting state AUX_OUT2: Synchronous signal / Error / Optical window error / Optical window contamination warning	20	28
White/ Blue	RS-485+	Commu-nication	Communication protocol RS-485 (twisted pair)	21	28
White/ Red	RS-485–		Communication protocol RS-485 (twisted pair)	22	28
Shield	FG	–	Frame ground	Case	–

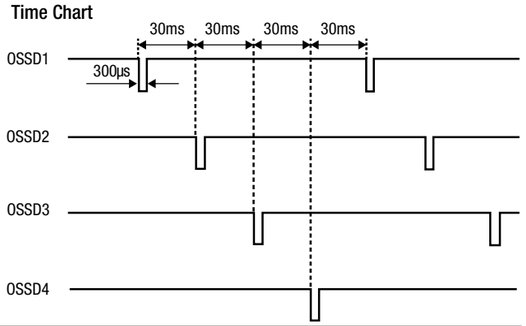
*1) Pin number of SE2L-HA05LPC connector.

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OSSD

The SE2L Advanced has a self-diagnosis function that periodically tests the signal to detect malfunctions in the OSSD signal circuit, and when an error is detected by the self-diagnosis function, it switches to the OFF state.
The self-diagnosis function of the OSSD detects abnormality by switching off OSSD 1 to OSSD 4 at intervals of 300µs maximum. Be sure to use a force-guided relay, converter, or controller that does not respond to this self-diagnosis function.

Time Chart



⚠ Safety Precautions

For correct use of the SE2L Advanced, take note of the following precautions.

General Instructions

- SE2L Advanced is a AOPDDR (Active Optoelectronic Protective Device responsive to Diffuse Reflection) that detects diffused emitted light within the protection zone.
- SE2L Advanced is designed to protect human beings or systems by monitoring the hazardous area. It is not designed for the protection from high speed objects or electromagnetic radiation.
- Perform tests before operation to check the function and performance of the SE2L Advanced.
- To maintain the degree of protection and to prevent injury or death, do not modify or disassemble the SE2L Advanced.
- IDEC does not warrant any problems that were caused by modification or disassembly of the SE2L Advanced.
- The operator must be a person qualified to operate the SE2L Advanced. The operator must be trained and be able to operate the SE2L Advanced correctly.
- The administrator must provide continuous training to the operator for correct use of the SE2L Advanced.
- The administrator must understand the User's Manual and be responsible for ensuring appropriate operating conditions for SE2L Advanced.
- SE2L Advanced has been manufactured and shipped under strict quality control. If you find any defect in the product, contact your distributor or sales representative.
- IDEC does not take responsibility for damage caused by improper use of the product by customers or third parties. IDEC cannot take responsibilities for any loss from the misuse except for the responsibilities governed by law.
- To examine the object detecting performance, use a test piece the size equivalent to the minimum detectable object.
- Error occurs when detection capability is below 30% due to homogenous dirt on the optical window. The operator must keep the windows clean.
- When the interlock function is active, make sure that the surrounding environment, especially within the protection zone, is safe before resetting the interlock.
- While SE2L Advanced is removed, a protective measure must be taken to ensure safety within the protection zone. To prevent entry into the danger zone, use protective materials such as a safety guard or light curtain.
- SE2L Advanced and its accessories are subject to change for improvement without prior notice.
- Dispose the SE2L Advanced as industrial waste or in accordance with the local regulations.
- Do not drop the product. Otherwise, the product may be damaged, lead to failure, and the performance will be degraded. Injury may also be caused.
- Take measures on the network system side to prevent unauthorized access to SE2L Advanced from external devices. Under no circumstances shall IDEC Corporation be held liable or responsible for any indirect or consequential damages and expenses resulting from unauthorized access.

Operating Environment

- Make sure that the operating environment is within the range of the specifications (temperature, humidity, light interference) described in the User's Manual, otherwise malfunction or degradation of detection performance may result.
- Do not use the SE2L Advanced near a machine that may generate strong radio waves. It may interfere with the operation of the SE2L Advanced.
- Do not use or install the SE2L Advanced where dust, smoke, or corrosive chemical substances exist. Using the SE2L Advanced under these environments may lead to degradation of detection performance.
- The SE2L Advanced is for indoor use only.

Installation

- Install the SE2L Advanced on a stable surface or structure to prevent displacement of the sensor.
- Install the SE2L Advanced securely so that screws do not loosen due to shock or vibration. (Recommended tightening torque 3 N·m). Displacement may degrade protection performance.
- Determine the safety distance before installing the SE2L Advanced. After installing the SE2L Advanced, use a test piece for all protection zones to check the sensing functions.
- After installing the SE2L Advanced, use protective materials such as safety guards and light curtains to prevent entry into the protective zone.
- The following switches must be installed far from the protection zone, so that the operator can operate the switches while overseeing the entire protection zone.
  * Switch to reset the interlock function
  * Switch to start muting function
  * Switch to start override function
- If several SE2L Advanced units are installed on the same sensing plane, mutual interference may occur.
- Provide enough space for installation and maintenance of the SE2L Advanced.
- Do not cover the front of the optical window with glass or transparent cover, otherwise detection characteristics of the SE2L Advanced may be impaired.
- Minimum sensing width differs according to the distance.

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SE2L Advanced Safety Laser Scanner

⚠ Safety Precautions

Wiring

- Be sure to turn off all power before wiring.
- When using converter power, make sure to use power that satisfies the following requirements.
  1) The rated output voltage is within 24V DC±10% (SELV circuit, overvoltage category II)
  2) The circuit between primary circuit and secondary circuit is reinforced insulation or double insulation.
  3) The output holding time is 20 ms.
  4) The power supply must comply with electrical safety and electromagnetic compatibility (EMC) regulations requirements of each country, state, and district.
- All input/output cables must be located away from power cables and high voltage cables.
- To control safety-related machine or system, use OSSD output. Because warning zone output (warning signal) is a non-safety signal, do not use for safety purposes.
- Both the OSSD1 and OSSD2 outputs should be connected to safety-related machines or control system. When OSSD3 and OSSD4 are used, connect the outputs in the same manner.
- Use shielded cable for the connection between OSSD signals and safety-related machines or systems.

Settings

- A password is used for configuring the safety function. Only an administrator or operator should be able to set safety functions.
- SE2L Advanced will not operate without initial configuration.
- Perform test operation and check the configuration before using the SE2L Advanced.
- The stability of the SE2L Advanced increases by delaying the response time of the OSSD signal but the sensing performance decreases for moving objects. Before using this function, be sure to carry out risk assessment.
- The operator must record the changes made in the configuration. SLS Configurator report function is available. For details, see the User's Manual.
- User must check the operations of this user configurable product on user's responsibility.
  Under no circumstances shall IDEC Corporation be held liable or responsible for the operations of the functions configurated by users, and any damages or losses due to the user's configurations.

Testing and Maintenance

- The operator should perform the following tests or maintenance based on the checklist described in the User's Manual.
  1) Pre-operation inspection
  2) Operation inspection
  3) Daily inspection
  4) Periodic inspection
  The checklist in the User's Manual is a basic guideline for performing tests and maintenance. The operator should perform additional tests and maintenance if necessary.
- Stop the machine if failure occurs during tests.
- Clean the optical window if any dirt is found, and ask for repair if damaged. Refer to the User's Manual for details.

Be sure to read the instruction manual carefully before performing installation, wiring, or maintenance.