KEYENCE

Safety Laser Scanner
SZ Series

Maximum safety standard for scanners

Type3 | **SIL2** | **Category3** | **PLd**

TYPE3 SAFETY LASER SCANNER

Up to 48 Zones

Select from 4 different models for your application

Simple function type (SZ-01S)	Multi-function type (SZ-04M)	Multi-zone sets (banks) type (SZ-16V)	Measurement data output type (SZ-16D)

Incredibly small, versatile, and affordable

Compact!

Die-cast body

Up to 48 zones can be configured.*

Maximum protection zone

4.2 m (13.78')

* Model: SZ-16V/SZ-16D only

See P.4

Area Protection

A safety laser scanner allows users to configure protection zones anywhere, even in complex-shaped zones.

See P.6

Access Protection

A safety laser scanner is easy to install. Side-mounted installation significantly reduces labor related to beam axis adjustment and wiring.

See P.8

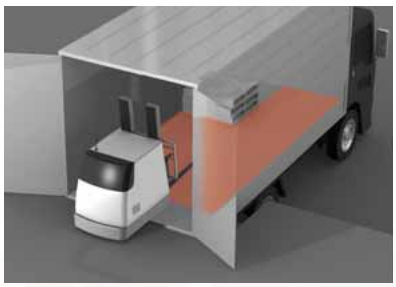
Collision Prevention

A safety laser scanner can be mounted on an automated guide vehicle. The following three area settings are available: slow area, stop area, and emergency stop area. SZ-16V users can configure up to 16 different zone sets, each consisting of unique slow, stop, and emergency stop area settings for a total of 48 zones.

See P.11

Measurement Data Output

A safety laser scanner can output positional data. The SZ-16D makes it possible to output the measured distance from each beam axis up to 16 m 52.49' and 270 degrees. This allows the surrounding area to be profiled for AGV navigation and also provides measurement data for additional position analysis.



Safety Laser Scanner
SZ Series

4 models available according to the application

Simple function type	SZ-01S	**Multi-function type**	SZ-04M	**Multi-zone sets (banks) type**	SZ-16V	**Measurement data output type**	SZ-16D

SZ series

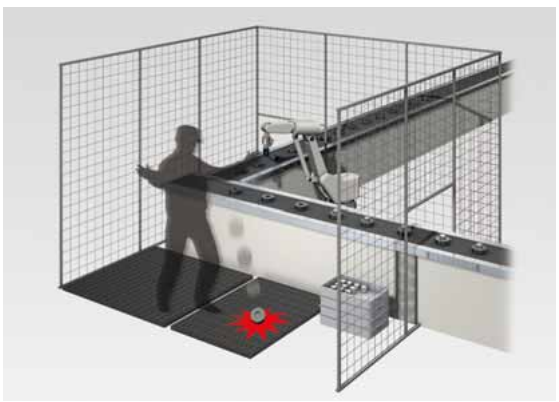
Area Protection

A type 3 safety laser scanner allows users to easily configure protection zones.

Configure zones anywhere and save space

AREA PROTECTION - CONVENTIONAL METHOD VS. SZ SERIES METHOD

Safety Mat



- A safety mat may break if something heavy or sharp drops on it
- Having to stock different sized mats can be cumbersome
- Change in the facility layout can make safety mats unusable
- Not easy to move due to its heavy weight
- Only rectangular shapes can be covered in the protection zone

SZ Series

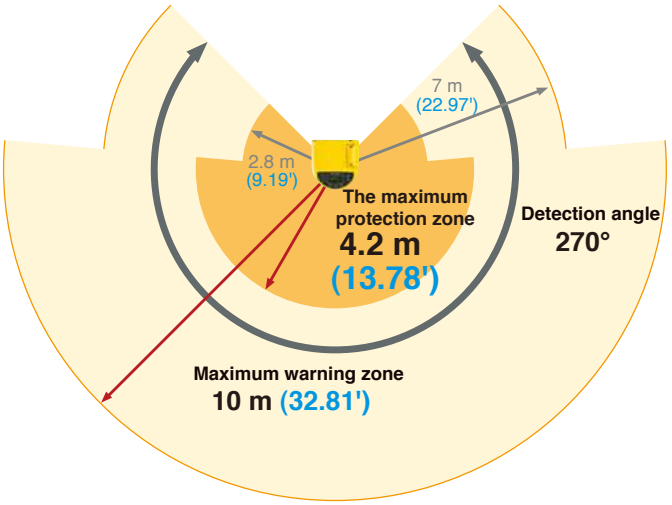
- Non-contact detection is free from damage caused by falling objects or vehicle traffic
- No need to stock different size mats
- Protection zones easily modified for workspace layout changes
- Easy to move due to its compact body and light weight
- Complex-shaped zones can be configured

Easily configure zones to protect any area

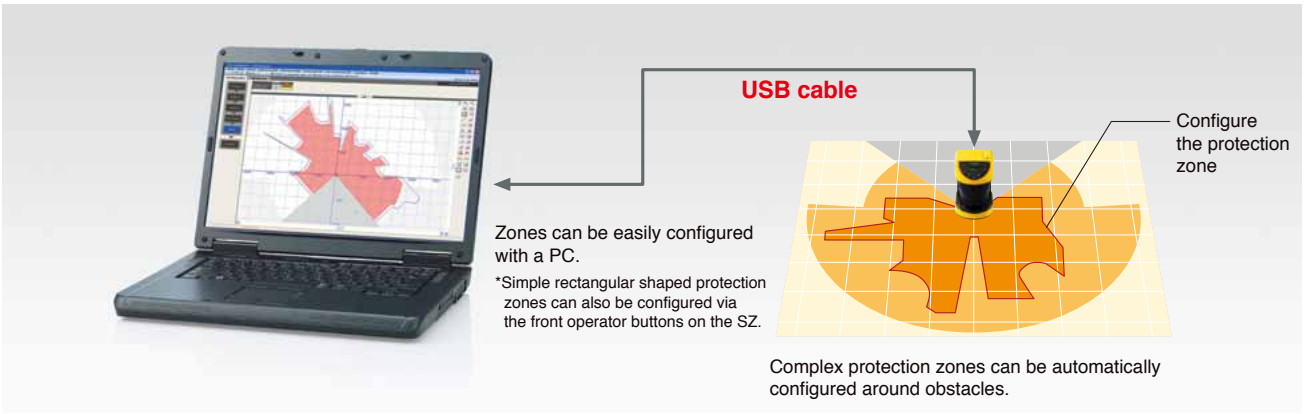
SZ-01S SZ-04M SZ-16V SZ-16D

A laser scanner can be installed anywhere since protection zones and/or warning zones can be easily configured with the SZ Configurator software. The SZ Series has a maximum protection zone of 4.2 m 13.78' and a maximum warning zone of 10 m 32.81'.

ZONE CONFIGURATION



PC CONFIGURATION

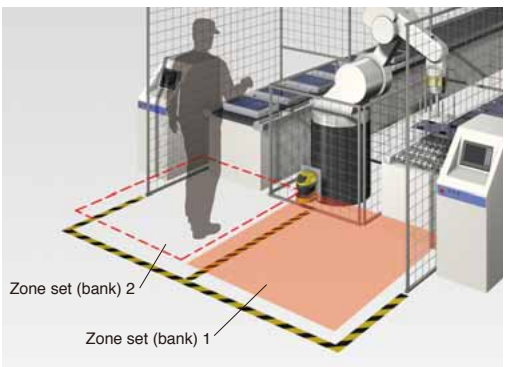


Multiple protection zones/ warning zones can be switched

SZ-04M SZ-16V SZ-16D

Multiple zones (protection zones/warning zones) can be selected via remote input. For example, in the image on the right, the zone set is selected via feedback on the robot's position.

* SZ-04M: 4 zone sets (banks)
  SZ-16V/SZ-16D: 16 zone sets (banks)



SZ series

Access Protection

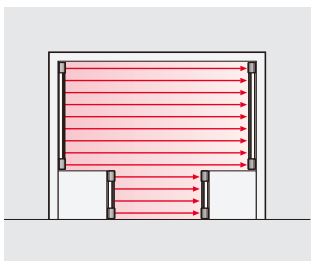
A type 3 safety laser scanner is easy to install.

The SZ-16V (Multi-zone set type) is not equipped with the Reference Point Monitoring function.

Simple installation covers complex-shaped zones

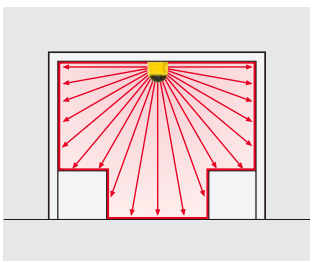
ACCESS PROTECTION - CONVENTIONAL METHOD VS. THE SZ SERIES METHOD

Light curtain



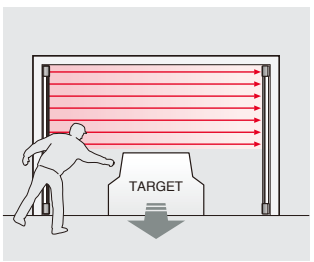
- Installation was difficult due to the clearance of a complex shape.
- The transmitter and receiver required installation on both sides.

SZ Series



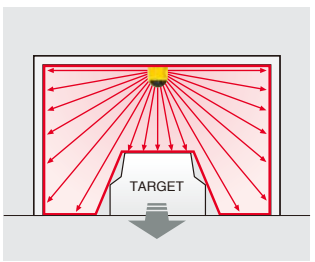
- The SZ Series can be customized to protect clearances of any shape.

Light curtain



- The Muting function could nullify an area that requires protection.

SZ Series

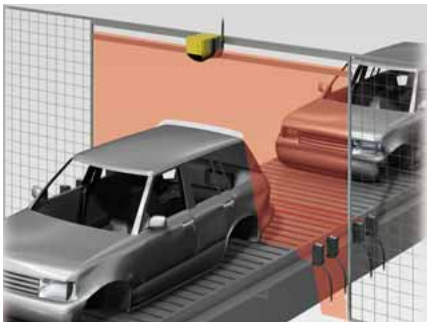


- Safety is increased by minimizing the dead zone caused by the Muting function.

First laser scanner with a built-in Muting function

INDUSTRY FIRST SZ-04M

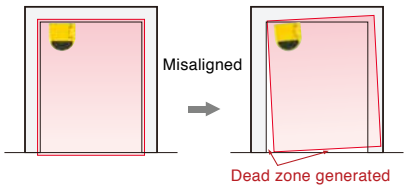
Similar to KEYENCE safety light curtains, muting sensors signal the scanner to ignore certain areas of the protection zone to allow passage of a target. However, unlike light curtains, muting the scanner results in a much tighter protection zone, minimizing dead zones around the passing target.



Maintain safe conditions, even after unexpected misalignment, by using the Reference Point Monitoring function

SZ-01S SZ-04M

For vertical guarding (access protection), reference points are required to prevent changes from creating an unsafe condition (e.g. removal of a door or hard guard, unintended or even deliberate misalignment of the scanner). Configuring reference points with our user-friendly software can be done in seconds. If the reference points are breached, a stop signal is sent, preventing a potentially unsafe situation. (Reference Point Monitoring function)



Can be easily installed anywhere due to its light-weight and super-compact body

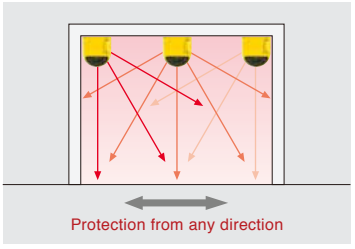
SZ-01S SZ-04M

The SZ Series installs easily for vertical guarding or access protection applications. Compared to conventional scanning devices, the SZ offers smaller overall footprint and lighter weight, enabling simple installation. A variety of mounting brackets are available to help reduce installation time for any application, vertical or horizontal.
(For details, see P. 11)

Can be placed in almost any position to guard the desired area

SZ-01S SZ-04M

Configuring zones with conventional scanners is unforgiving and inflexible. The simple, intuitive drawing tools of the SZ Configurator software make it easy to create protection zones to the left, right or directly along the scanner's centerline. This allows the user to choose the most convenient location to mount the scanner.



SZ series

Collision Prevention

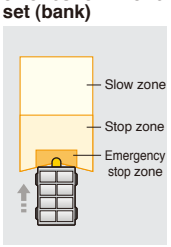
A type 3 safety laser scanner can be mounted on an automated guided vehicle.

Up to 16 zone sets (banks) with 3 zones for a total of 48 zones can be configured

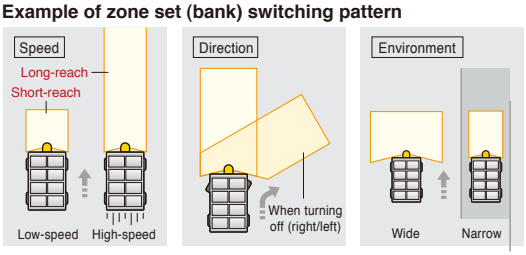
SZ-16V SZ-16D

One protection zone (emergency stop) and two warning zones (stop/slow), can be configured per zone set (bank) with up to 16 zone sets (banks) available. External inputs enable simple switching between the 16 zone sets according to the speed, direction, and environment.

3 zones for 1 zone set (bank)



Example of zone set (bank) switching pattern



Distance based operation detects even matte black targets

SZ-01S SZ-04M SZ-16V SZ-16D

Conventional obstacle detection could fail due to something as simple as wearing a dark pair of pants. The SZ Series ensures reliable detection by limiting the influence of color and surface finish.

No need to worry about dark colored work clothes.

User-friendly operation and diagnostics

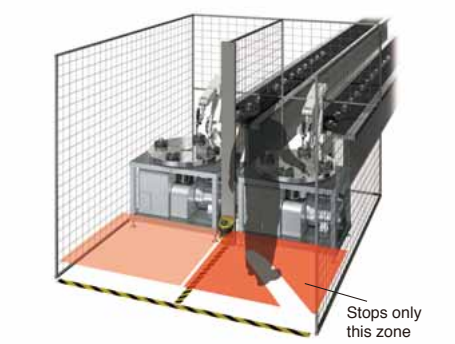
Simultaneous control of two individual protection zones: One unit provides the capability of two devices

INDUSTRY FIRST SZ-04M

Unlike conventional scanners which use a single set of safety signals (OSSD1,2) requiring external input signals to toggle between protection zones, the SZ-04M features true simultaneous protection of two independent zones. No switching is required since two sets of safety signals (OSSD1,2 and OSSD3,4) are provided.

Protection zone 1	Protection zone 2
OSSD output 1 OSSD output 2	OSSD output 3 OSSD output 4

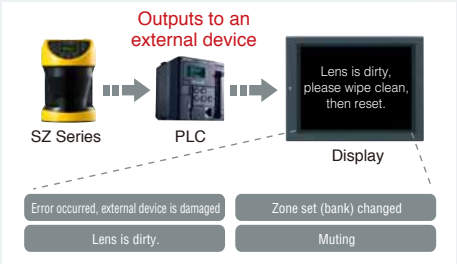
* Independent EDM and Reset inputs are also available for each zone.



Sends the current status to external devices: State Information Output

INDUSTRY FIRST SZ-04M SZ-16V SZ-16D

This function can send a signal to a PLC or other non-safety device in order to display real-time status information on an HMI or other interface. For example "Lens is dirty, please wipe clean, then reset" or "EDM Error. Please check external devices".



Protection zones/warning zones can be configured directly on the unit, without the need for a PC

INDUSTRY FIRST SZ-01S SZ-04M

Rectangular zones can be configured without a PC when using the information display. Configuration no longer requires a PC for on-site operation.

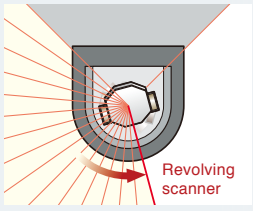
OPERATING PRINCIPLE

Distance measurement using the TOF (Time of Flight) method

Calculates the time during which a pulse-emitted beam returns after hitting a detected target.

Measurement at high-resolution of 0.36° pitch

A 270° range is achieved through use of the TOF method at a 0.36° pitch by rotating the internal reflective mirror at the speed of 30 ms/per revolution.



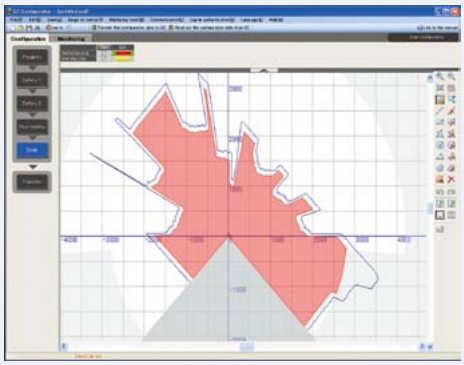
The easiest, most intuitive, step-by-step scanner configuration software you will ever use

SZ-H1S configuration software is fast, easy, and loaded with useful, time-saving tools

SZ-01S SZ-04M SZ-16V SZ-16D

Automatic-Drawing function

For the ultimate in ease of use, simply mount the SZ in the desired location, clear the area, and click the "Automatic Drawing" tool. Immediately, the SZ draws a zone around existing obstacles.



Setup navigation function

Guides the user through a step-by-step setup of functions.

PC configuration software

Safety device configurator (free download)

DOWNLOAD SITE
www.keyence.com/safety_soft

OTHER FUNCTIONS

INDUSTRY FIRST

Suspension in Teaching mode

This function temporarily overrides safety functions during the robot's "teach" mode. It can only be activated when the SZ receives the teach mode signal from the robot.

INDUSTRY FIRST

Output connectable to either NPN/PNP

Regardless of the OSSD output type (NPN, PNP), all non-safety outputs can be wired for either NPN or PNP operation depending on input device polarity.

INDUSTRY FIRST

Interference reduction function

The SZ Series has two scanning cycles, which makes it possible to reduce mutual interference between multiple SZ units installed in near proximity.

INDUSTRY FIRST

Background hold function

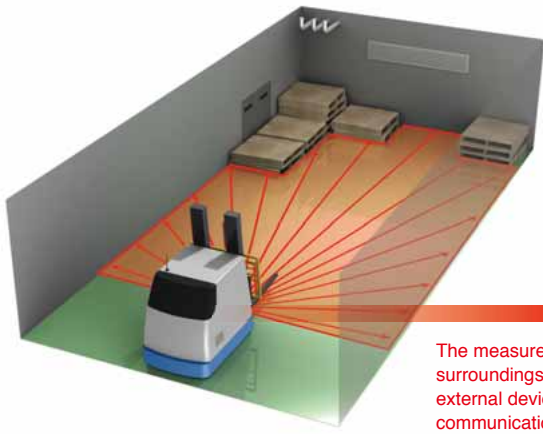
Using the Background Hold function, the SZ-16D can scan its surroundings during a test run of the AGV. Based on the profile data acquired during the test run, the user can configure appropriate zones for safe operation. This function eliminates the need to create tentative zones and adjust them each time a malfunction occurs, thus significantly reducing labor hours required for setup.

*For the SZ Series when using the SZ-H1S (Version 2) software.

Measurement Data Output

Distance measurement data of the entire zone can be output in real time.

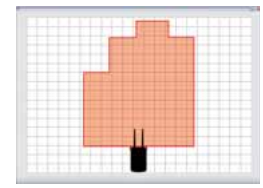
SZ-16D



The SZ-16D outputs distance measurement data between the target and each beam axis via RS-422A interface. This allows users to create a map of the surroundings (16 m 52.49' radius), based on the distance and angle information acquired from the SZ-16D, which is useful in AGV navigation and error analysis.

NOTE There is no change in the following specifications:
Maximum protection zone = 4.2 m 13.78' Maximum warning zone = 10 m 32.81'

The measurement data from the surroundings can be output to external devices via RS-422A communication.



AGV Navigation

The measurement output data of the SZ-16D allows users to map out the surroundings for use during AGV path planning and collision prevention.

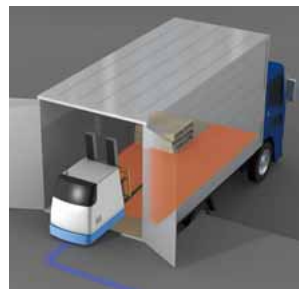
Error analysis support

The SZ-16D acquires distance data when the AGV stops, which can be used for error analysis. In addition, it can also output SZ Series status information (protective maintenance status/error status).

APPLICATIONS

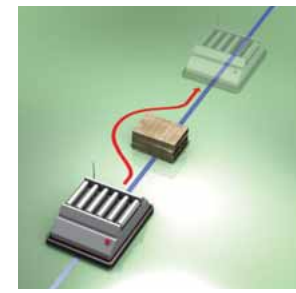
Automatic operation during the loading process

Using the measurement output data acquired from the SZ-16D, users can program the AGV to operate independently throughout the loading process.



Collision prevention

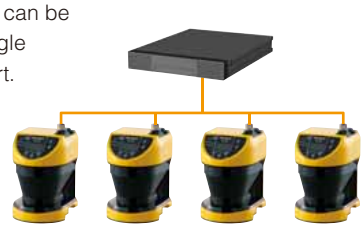
Users can change such conditions as speed and direction according to the surroundings (obstacles, etc.) based on the measurement output data from the SZ-16D, making it possible to navigate the AGV safely.



OTHER FUNCTIONS INDUSTRY FIRST

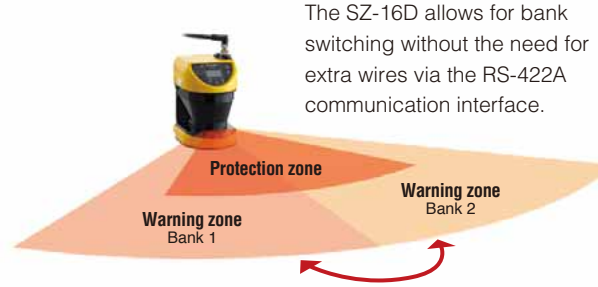
Multidrop connection allows for communication with more than one scanner via a single communication port.

Up to four SZ units can be connected to a single communication port.



Warning zones can be switched through the communication interface.

The SZ-16D allows for bank switching without the need for extra wires via the RS-422A communication interface.



Product Lineup

Main unit

* Cables and brackets are not included. Select separately.

Appearance	Type	# of zone sets (# of banks)	Model	Weight
	Simple function type 	1	**SZ-01S**	Approx. 1.6 kg
	Multi-function type 	4	**SZ-04M**	
	Multi-zone sets (banks) type 	16	**SZ-16V**	
	Measurement data output type 	16	**SZ-16D**	

Cable

Appearance	Compatible with	Length	Output	Model	Weight
	**SZ-01S**	5 m 16.4'	PNP	**SZ-P5PS**	Approx. 280 g
			NPN	**SZ-P5NS**	
		10 m 32.81'	PNP	**SZ-P10PS**	Approx. 530 g
			NPN	**SZ-P10NS**	
		20 m 65.62'	PNP	**SZ-P20PS**	Approx. 1040 g
			NPN	**SZ-P20NS**	
		30 m 98.43'	PNP	**SZ-P30PS**	Approx. 1550 g
			NPN	**SZ-P30NS**	
	SZ-04M SZ-16V SZ-16D	5 m 16.4'	PNP	**SZ-P5PM**	Approx. 360 g
			NPN	**SZ-P5NM**	
		10 m 32.81'	PNP	**SZ-P10PM**	Approx. 720 g
			NPN	**SZ-P10NM**	
		20 m 65.62'	PNP	**SZ-P20PM**	Approx. 1400 g
			NPN	**SZ-P20NM**	
		30 m 98.43'	PNP	**SZ-P30PM**	Approx. 2080 g
			NPN	**SZ-P30NM**	
	**SZ-16D**	5 m 16.4'	—	**SZ-C5D**	Approx. 360 g

* Connector colors; PNP:Black, NPN:Gray

USB Cable (Optional)

Appearance	Name	Length	Model	Weight
	USB cable	5 m 16.4'	**OP-86941**	Approx. 200 g

Brackets (Appearance when mounted)

Standard mounting bracket

OP-86935 Horizontal mount

OP-86936 Vertical mount

Mounting bracket with angle alignment

OP-86937 Horizontal mount

OP-86938 Vertical mount

OP-86939 L-shaped mount

Mounting bracket (Optional)

Standard mounting bracket

Appearance	Type	Model	Weight
	Horizontal mounting bracket	**OP-86935**	Approx. 250 g
	Vertical mounting bracket	**OP-86936**	Approx. 180 g

Mounting bracket with angle alignment

Appearance	Type	Model	Weight
	Horizontal mounting bracket with angle alignment	**OP-86937**	Approx. 690 g
	Vertical mounting bracket with angle alignment	**OP-86938**	Approx. 850 g
	L-shaped mounting bracket with angle alignment	**OP-86939**	Approx. 960 g

Specifications

Type3 | SIL2 | Category3 | PLd

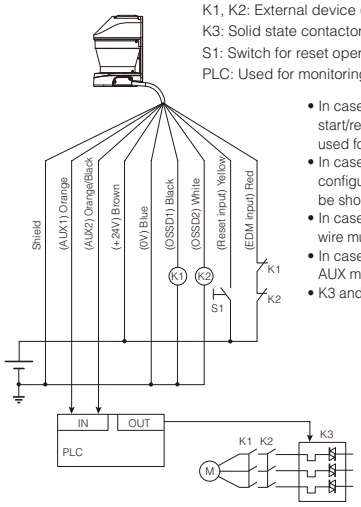
Model			SZ-01S	SZ-04M	SZ-16V	SZ-16D
Type			Simple function type	Multi-function type	Multi-zone sets (banks) type	Measurement data output type
Detection capability	Minimum detectable object size		Diameter 30 mm 1.18"/40 mm 1.58", 50 mm 1.97", 70 mm 2.76", 150 mm 5.91" (depends on the setting) Reflectance 1.8% min., Speed 1.6 m/s 5.25 ft/s max.			
	Detectable angle		270° (-45° to 225°)			
	Response time (ON to OFF)	General scan cycle (Scan cycle A)	60 ms (2 scans) to 480 ms (16 scans)			
		Specific scan cycle (Scan cycle B)	66 ms (2 scans) to 528 ms (16 scans)			
	Response time (OFF to ON)	General scan cycle (Scan cycle A)	Response time of ON to OFF + 125 ms			
		Specific scan cycle (Scan cycle B)				
	Maximum protection zone	Minimum detectable object size: 70 mm 2.76"/150 mm 5.91"	4.2 m 13.78' (-5° to 185°), 2.8 m 9.19' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 50 mm 1.97"	3.0 m 9.84' (-5° to 185°), 2.0 m 6.56' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 40 mm 1.58"	2.4 m 7.87' (-5° to 185°), 1.6 m 5.25' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 30 mm 1.18"	1.8 m 5.91' (-5° to 185°), 1.2 m 3.94' (-45° to -5°, 185° to 225°)			
	Maximum warning zone*1 (non safety related)	Minimum detectable object size: 70 mm 2.76"/150 mm 5.91"	10.0 m 32.81' (-5° to 185°), 7.0 m 22.97' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 50 mm 1.97"	7.5 m 24.61' (-5° to 185°), 5.0 m 16.4' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 40 mm 1.58"	6.0 m 19.69' (-5° to 185°), 4.0 m 13.12' (-45° to -5°, 185° to 225°)			
		Minimum detectable object size: 30 mm 1.18"	4.5 m 14.76' (-5° to 185°), 3.0 m 9.84' (-45° to -5°, 185° to 225°)			
	Additional safety distance		100 mm 3.94" *2			
Light source	Type, wavelength		Infrared laser diode, 905 nm			
	Laser class		Class 1 Laser Product (IEC 60825-1, FDA (CDRH) Part 1040.10 *3)			
Rating	Power voltage		24 V DC ±10% (Ripple P-P 10% or less): When using a converter power supply 24 V DC +20%/-30%: When using a battery			
	Power consumption		Max. 9.5 W (without load) Max. 39 W (with load)	Max. 9.5 W (without load) Max. 50 W (with load)	Max. 10.5 W (without load) Max. 43 W (with load)	
OSSD output	Output		PNP or NPN (Selectable according to the connector cable)			
			2 outputs	4 outputs	2 outputs	
	Max. load current		500 mA *4			
	Residual voltage (during ON)		Max. 2.5 V (with a cable length of 5 m 16.4')			
	OFF-state voltage		Max. 2.0 V (with a cable length of 5 m 16.4')			
	Leakage current		Max. 1 mA *5			
	Max. capacitive load		2.2 µF (with a load resistance of 100Ω)			
	Load wiring resistance		Max. 2.5Ω *6			
Input (safety-related)	Input resistance		4.4 kΩ (for Input 1) 2.2 kΩ (for Input 2)	4.4 kΩ (for Input 1,3, 4, and 5) 2.2 kΩ (for Input 2 and 6)	4.4 kΩ (for Input 1 and 3 to 10) 2.2 kΩ (for Input 2)	
Non safety-related output (AUX output)	Output type		PNP/NPN totem pole output			
			2 outputs	6 outputs	4 outputs	
	Max. load current		50mA			
	Residual voltage (during ON)		Max. 2.5 V (with a cable length of 5 m 16.4')			
Muting lamp output	(AUX6 output can be assigned for the muting lamp output)		—	Can be connected to the incandescent lamp (24V DC, 1 to 5.5W) and LED lamp (load current 10 to 230 mA)	—	
RS-422A Communication (SZ-16D only)	Communication method		—	—	—	Full duplex
	Synchronization method					Start-stop
	Baud rate					9600/19200/38400/ 57600/125k/250k bps
	Data bit length					8 bit
	Parity check					None
	Stop bit length					1 bit
	Maximum number of connectable units					4 units (multi-drop link)
	Transmission distance					Max. 30 m 98.43'
	Data transfer direction					LSB
Environmental resistance	Enclosure protection		IP65 (IEC60529) *7			
	Operating ambient temperature		–10 to +50°C 14 to 122°F (No freezing)			
	Storage ambient temperature		–25 to +60°C –13 to 140°F (No freezing)			
	Operating relative humidity		35 to 85% RH (No condensation)			
	Storage relative humidity		35 to 95% RH			
	Surrounding light		Incandescent lamp: 1500 lx or less *8			
	Vibration		10 to 55 Hz, 0.7 mm 0.03" compound amplitude, 20 sweeps each in X, Y, and Z directions			
	Shock		100 m/s² (Approx. 10 G) 16 ms pulse in X, Y, Z directions, 1000 times each axis			
Materials	Main unit case		Aluminum die casting, SPHC (Bottom)			
	Window		Polycarbonate			
Cable length			30 m 98.43' or less *9			
Approved standards	EMC	EMS	IEC61496-1, EN61496-1, UL 61496-1			
		EMI	EN55011 Class A, FCC Part15B Class A			
	Safety		IEC61496-1, EN61496-1, UL 61496-1 (Type 3 ESPE), IEC61496-3, EN61496-3 (Type 3 AOPDDR) IEC61508, EN61508, IEC62061, EN62061 (SIL2), EN ISO13849-1:2008 (PL d, Category 3) UL508, UL1998			

*1 20% or more reflectance is necessary for the minimum detectable object in the warning zone.
*2 If there is a high reflective background within 1.5 m 49.21' from the boundary of the protection zone, 200 mm 7.87" must be added as supplementary necessary distance to the protection zone in case of calculation of the minimum safety distance.
*3 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
*4 For the load current calculation of the OSSD output and the AUX output, make sure it is 1.5 A or less when using converter power supply (or 1.0 A or less when the cable length is 25 m 82.02' or more), and 1.0 A or less when using a battery (or 0.5 A or less when the cable length is 5 m 16.40' or more)
*5 This also takes into account the situations when power is either off or disconnected.
*6 The wiring resistance between the OSSD output and the connected equipment (excluding the resistance of the cable) must be 2.5 Ω or less to ensure operation. However, it must be 1.0 Ω or less if the load current is 300 mA or more.
*7 The SZ doesn't fulfill the requirements of IP65 degree of protection with the setting cover opened or the connector cable unattached. In addition, the SZ-16D doesn't fulfill the requirements of IP65 degree of protection with the connector cable for the RS422A communication unattached.
*8 The SZ should not be installed so as to have light interference within ±5° to the detection plane.
*9 It must be 10 m 32.81' or less if the power is supplied by the battery.

Example of wiring

Example of wiring for simple function type (SZ-01S) Configuration of start/restart mode: Manual/Manual

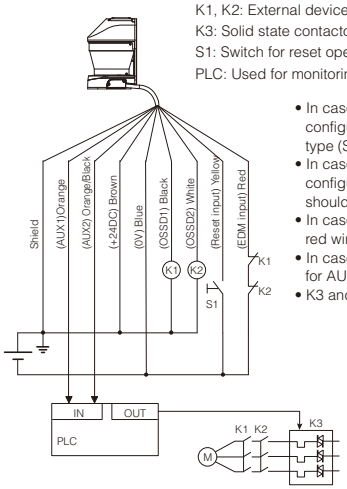
For the PNP output type cable



K1, K2: External device (Safety relay, magnet contactor, etc.)
K3: Solid state contactor
S1: Switch for reset operation (N.O.)
PLC: Used for monitoring, not for control systems related to safety.

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, the yellow wire should be short-circuited to +24 V.
- In case of NOT applying the EDM function, the red wire must be insulated (open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K3 and PLC are NON SAFETY-RELATED systems.

For the NPN output type cable

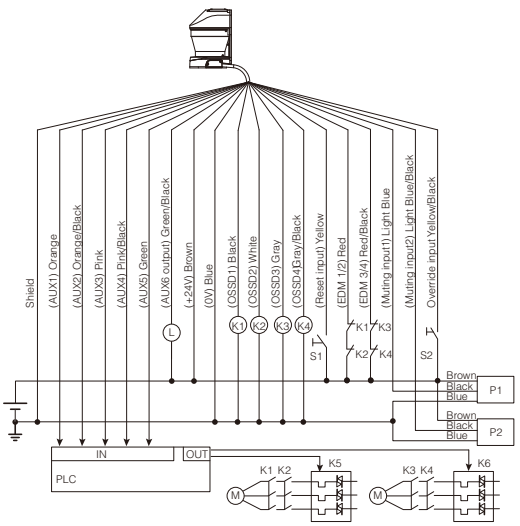


K1, K2: External device (Safety relay, magnet contactor, etc.)
K3: Solid state contactor
S1: Switch for reset operation (N.O.)
PLC: Used for monitoring, not for control systems related to safety.

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, the yellow wire should be short-circuited to 0 V.
- In case of NOT applying the EDM function, the red wire must be insulated (open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K3 and PLC are NON SAFETY-RELATED systems.

Example of wiring for multi-function type (SZ-04M) Multi-OSSD function: Mode A, B, C and Not use, configuration of start/restart mode: Manual/Manual in case of applying the muting function

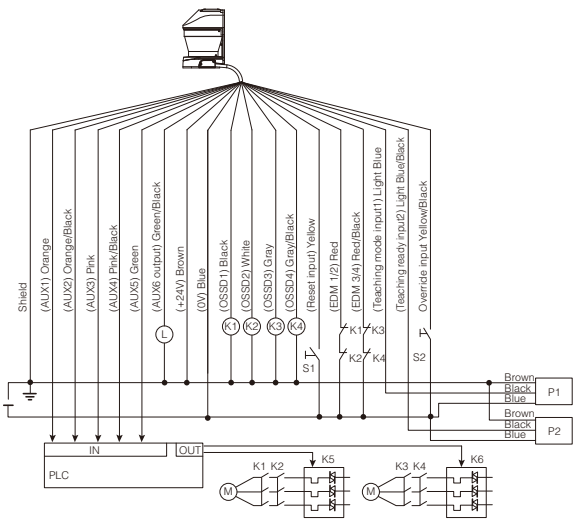
For the PNP output type cable



K1, K2, K3, K4: External device (Safety relay, magnet contactor, etc.)
K5, K6: Solid state contactor
S1: Switch for reset operation (N.O.)
S2: Switch for override (N.O.)
PLC: Used for monitoring, not for control systems related to safety.
P1, P2: Muting devices (ex. PZ series with PNP output, Keyence Corp.)
M: 3-phase motor
L: Muting lamp

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, yellow wire should be short-circuited to +24 V.
- When "Not use" is applied as the operation mode for OSSD3/4, the gray and gray/black wire must be insulated (open-circuit)
- In case of NOT applying the EDM function, both red wire and red/black must be insulated (open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K5, K6 and PLC are NON SAFETY-RELATED systems.

For the NPN output type cable

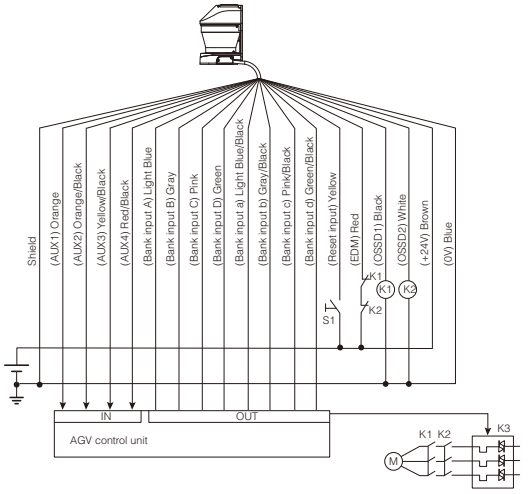


K1, K2, K3, K4: External device (Safety relay, magnet contactor, etc.)
K5, K6: Solid state contactor
S1: Switch for reset operation (N.O.)
S2: Switch for override (N.O.)
PLC: Used for monitoring, not for control systems related to safety.
P1, P2: Muting devices (ex. PZ series with NPN output, Keyence Corp.)
M: 3-phase motor
L: Muting lamp

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, yellow wire should be short-circuited to 0 V.
- When "Not use" is applied as the operation mode for OSSD3/4, the gray and gray/black wire must be insulated (open-circuit)
- In case of NOT applying the EDM function, both red wire and red/black must be insulated(open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K5, K6 and PLC are NON SAFETY-RELATED systems.

Example of wiring for multi-bank type (SZ-16V) and communication type (SZ-16D) Configuration of start/restart mode: Manual/Manual

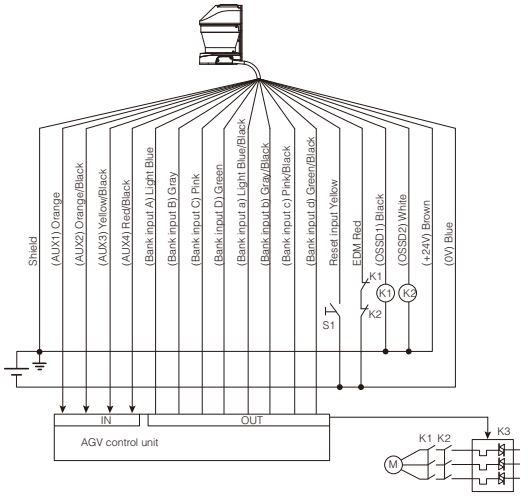
For the PNP output type cable



K1, K2: External device (Safety relay, magnet contactor, etc.)
K3: Solid state contactor
S1: Switch for reset operation (N.O.)

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, yellow wire should be short-circuited to +24 V.
- In case of NOT applying the EDM function, red wire must be insulated (open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K3 is NON SAFETY-RELATED system.

For the NPN output type cable



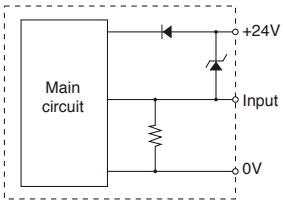
K1, K2: External device (Safety relay, magnet contactor, etc.)
K3: Solid state contactor
S1: Switch for reset operation (N.O.)

- In case of "Manual/Automatic" on the configuration of start/restart, the switch with N.C. type (S1) should be used for reset operation.
- In case of "Automatic/Automatic" on the configuration of start/restart, yellow wire should be short-circuited to 0 V.
- In case of NOT applying the EDM function, red wire must be insulated (open-circuit).
- In case of NOT applying the AUX output, the wire for AUX must be insulated (open-circuit).
- K3 is NON SAFETY-RELATED system.

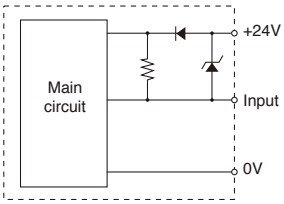
Input / output circuit

Input circuit

• For the PNP output type cable

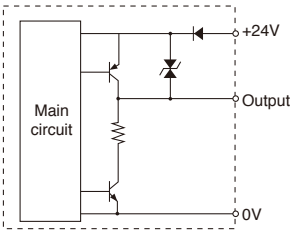


• For the NPN output type cable

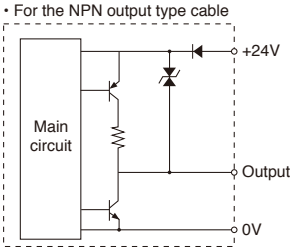


OSSD output circuit (Safety output)

• For the PNP output type cable

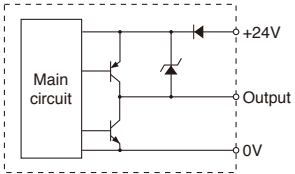


• For the NPN output type cable



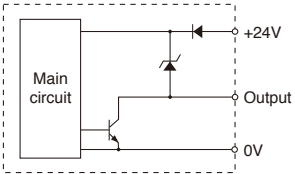
AUX output circuit (Non-safety output)

• Common for the PNP output type cable / NPN output type cable



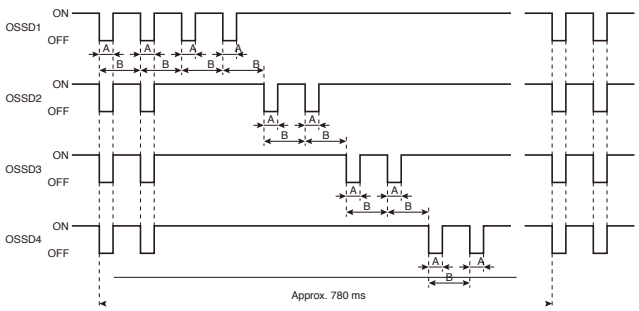
Muting lamp output

• Common for the PNP output type cable / NPN output type cable



Example of wiring

OSSD Time chart for self-diagnosis pulse



A : approx. 20 µs (If a capacitive load is connected, max. 200 µs can apply.)
B : approx. 30 ms

When the SZ detects an object (someone or something) in the protection zone, the OSSD goes to the OFF-state.
The OSSD is a safety output for safety-related part of a machine control system.
OSSD 1/2 is a pair of safety outputs that performs the output of same state. Similarly, OSSD 3/4 is also a pair of safety outputs that performs the output of same state.
The SZ generates self-diagnosis signals on its internal control circuit to perform diagnostics on the OSSD. These signals periodically force the OSSD into a temporary OFF-state when the OSSD is in the ON-state (when the SZ detects no object in the protection zone.).
The internal control circuit receives a feed-back signal (OFF-signal) based on the self-diagnosis, the SZ determines that its OSSD is in the normal operation. If the OFF-signal is not returned to the internal control circuit, the SZ determines that there is a problem in its OSSD or wiring and goes to the error state.

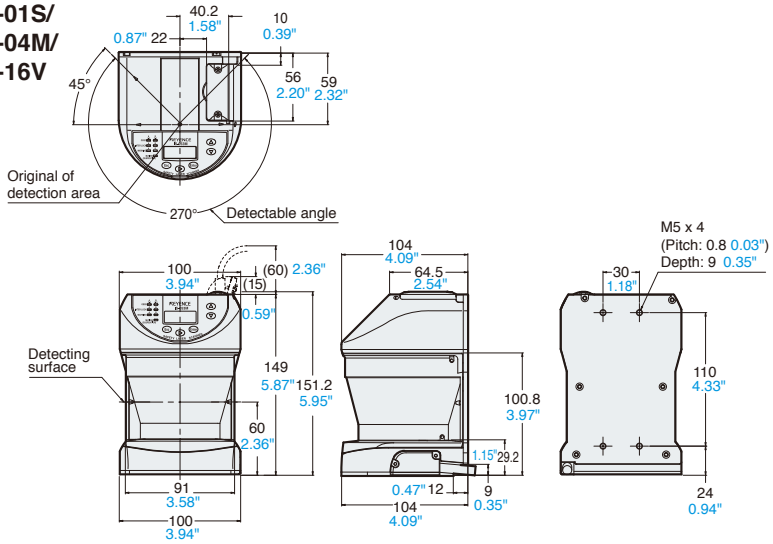
NOTE The devices connected to the OSSD, such as safety relay or contactor, should not respond to these temporary, self-diagnostic OFF-signals.

Dimensions

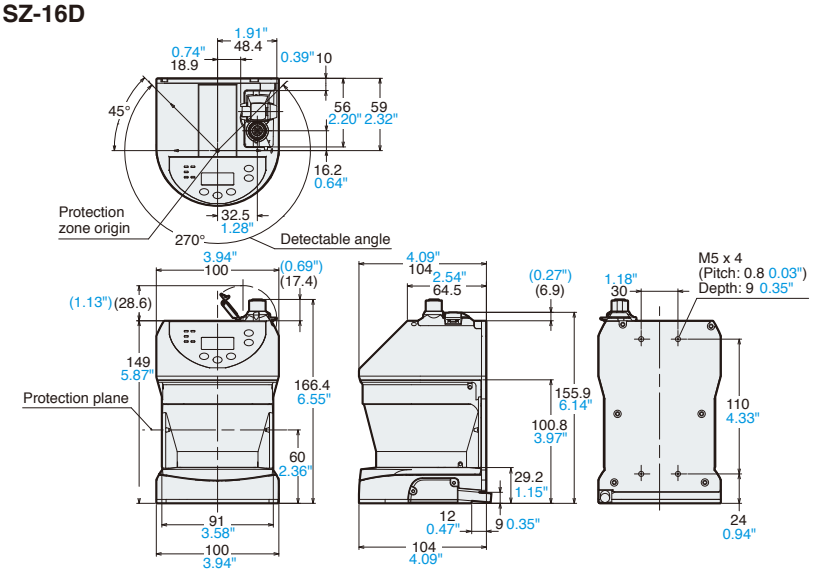
SZ Main units

Unit: mm inch

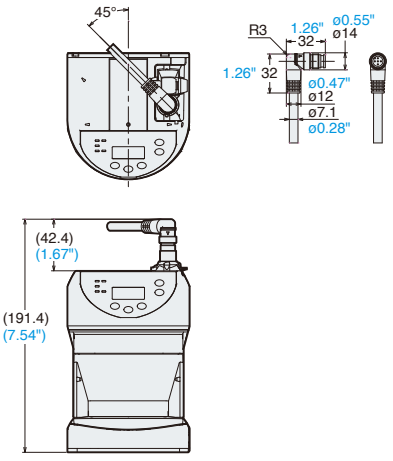
SZ-01S/ SZ-04M/ SZ-16V



SZ-16D



SZ-16D + SZ-C5D

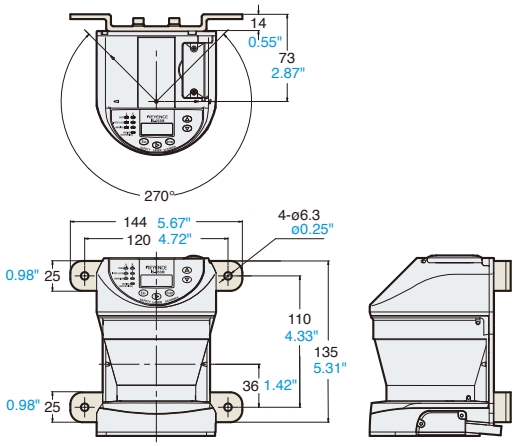


Dimensions

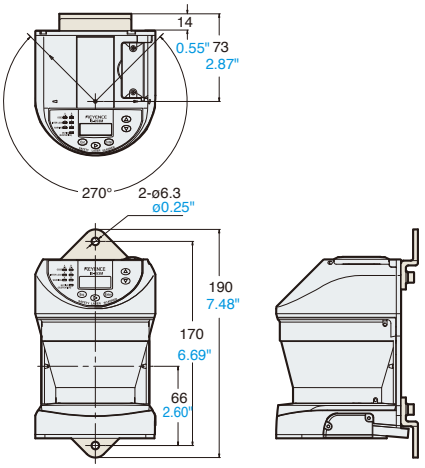
When using mounting brackets

Unit: mm inch

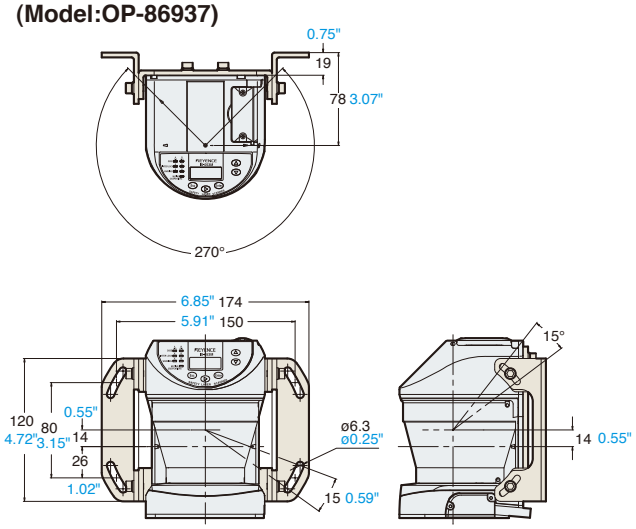
Horizontal mounting bracket (Model: OP-86935)



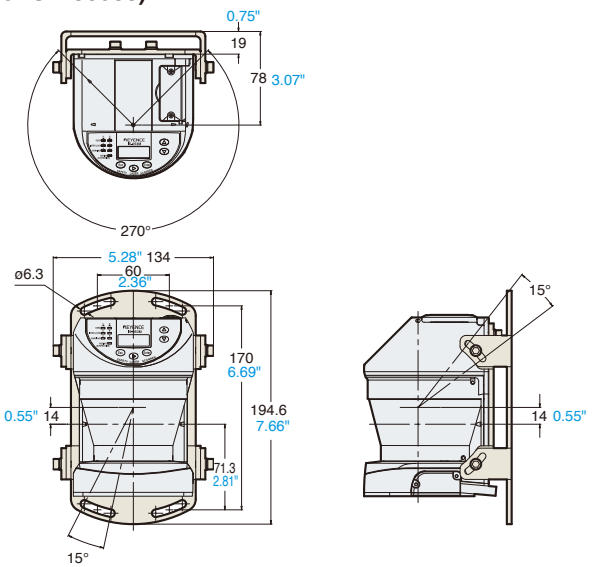
Vertical mounting bracket (Model: OP-86936)



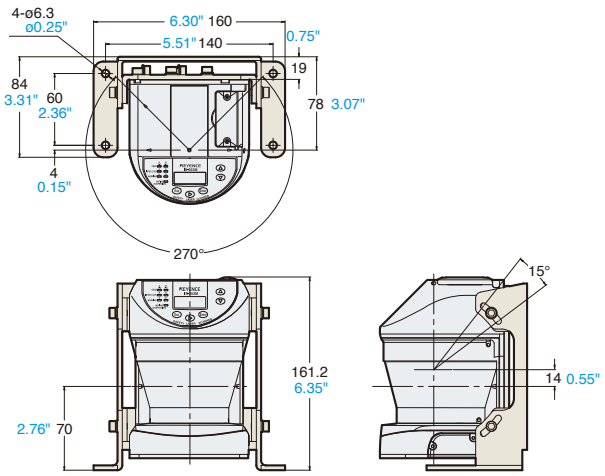
Horizontal mounting bracket with angle alignment (Model:OP-86937)



Vertical mounting bracket with angle alignment (Model:OP-86938)



L-shaped mounting bracket with angle alignment (Model: OP-86939)



Safety Light Curtain GL Series

GL-R SERIES

ROBUST

The GL-R's design features a heavy-duty, waterproof housing with a recessed lens which allows it to stand up to almost any industrial environment.

HIGH POWER

With a maximum operating distance that is nearly twice that of previous models, the GL-R Series has the power to not only span long ranges, but also to maintain consistent, stable operation, even when buildup is present.

BUILT-IN FUNCTIONALITY

KEYENCE safety light curtains provide complete safety solutions by equipping each unit with the functionality to satisfy both basic, and advanced safety applications.

STANDARD TYPE

GL-RF (Detection capability: ø**14** mm ø0.55")

GL-RH (Detection capability: ø**25** mm ø0.98")

GL-RL (Detection capability: ø**45** mm ø1.77")

GL-S SERIES

COMPACT DESIGN

The GL-S lineup features two space-saving designs that are roughly half the size of conventional light curtains. These designs facilitate unobtrusive integration into areas where both safety and space are major concerns.

EFFORTLESS INSTALLATION

Installation has never been easier with pre-attached mounting brackets that secure each curtain in place with only two screws. These curtains also offer tool-free cable connections and reduced wiring to further minimize installation time.

HIGHLY VISIBLE INDICATORS

The GL-S Series light curtains are equipped with innovative, three-color indicators that can display the operational status of the light curtains. In addition, they may also be controlled externally through input signals to completely replace conventional work-instruction lights.

SLIM TYPE

GL-SS (Detection capability: ø**25** mm ø0.98")

FLAT TYPE

GL-SF (Detection capability: ø**25** mm ø0.98")

KEYENCE

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SAFETY INFORMATION
Please read the instruction manual carefully in order to safely operate any KEYENCE product.

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