Panasonic

Sensors

INDUSTRIAL SAFETY PRODUCTS

Safety worldwide with safety sensors from Panasonic

Single-beam safety sensors, safety laser scanners, and safety switches. With all these product categories, Panasonic ensures the safety of persons working with machines in industrial manufacturing. Without exception, Panasonic safety products fulfill all international safety regulations. For machine builders who export their machines, this can reduce costs significantly: country-specific device types no longer need to be considered during the design phase; rather one and the same device is approved for all countries, everywhere.

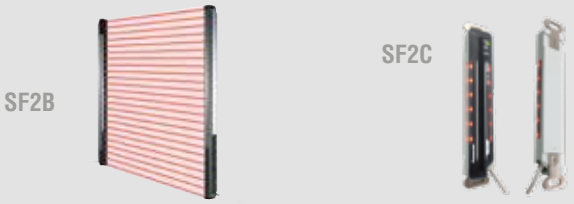
Global safety from Panasonic

Safety light curtains (type 4)

SF4D
SF4B<V2>
SF4B-C
SF4C

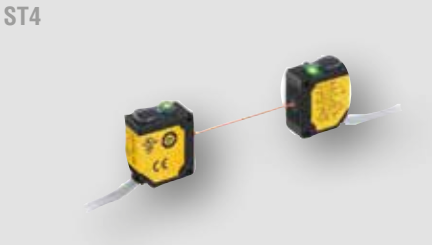
Safety light curtains (type 2)

SF2B
SF2C



Safety beam sensor (type 4)

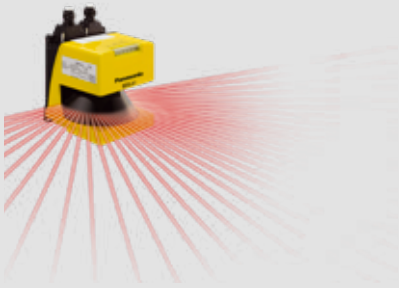
ST4



Safety laser scanner (type 3)

SD3-A1

SD3-A1



Industrial safety switches

SG-B1
SG-A1
SG-B2
SG-D1
SG-E1
SG-C1

SG-E1

SG-D1

SG-B1/SG-A1

SG-C1

SG-B2

Safety control units (type 4)

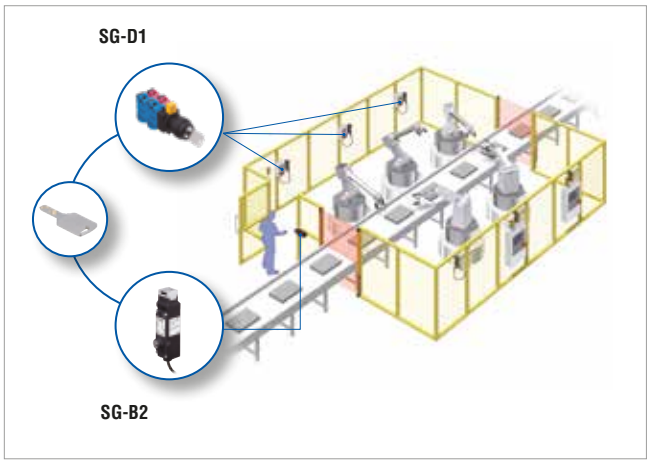
SF-C10
SF-C21

SF-C21

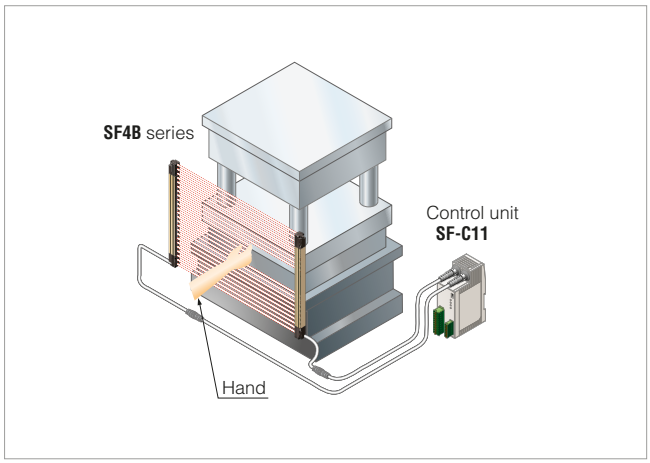
SF-C10

Typical applications

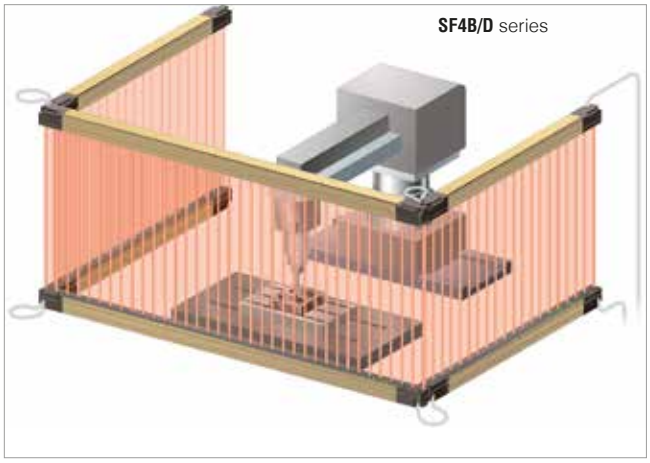
Safety door switches



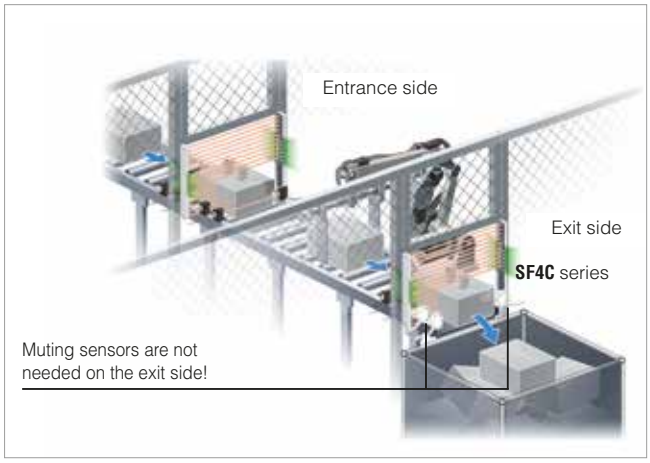
Safeguard for press machine



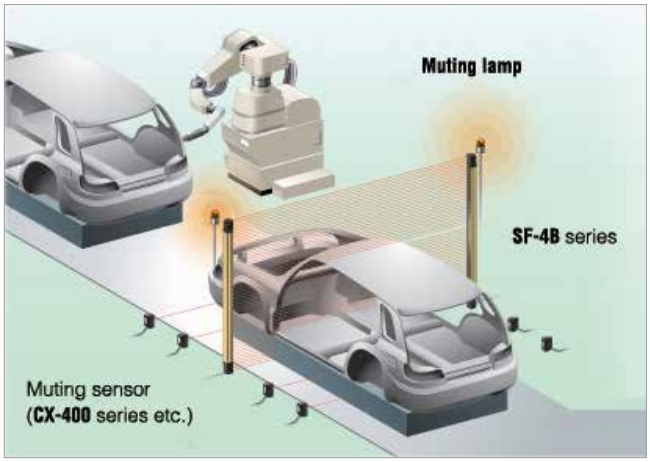
Safeguard for robots



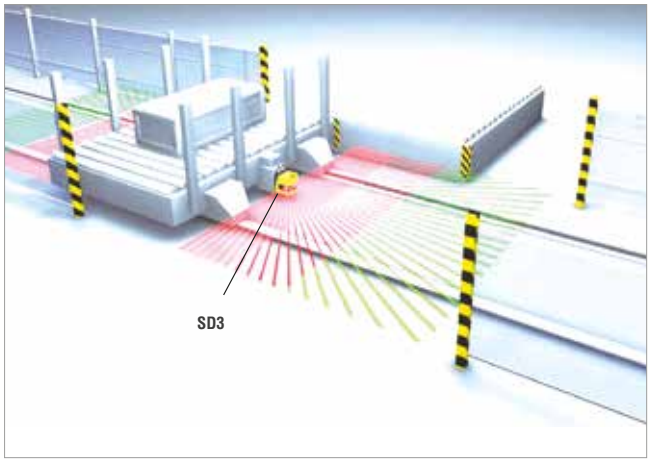
Safety measures for machine exits (muting function for exit control)



Intrusion detection in areas with robots



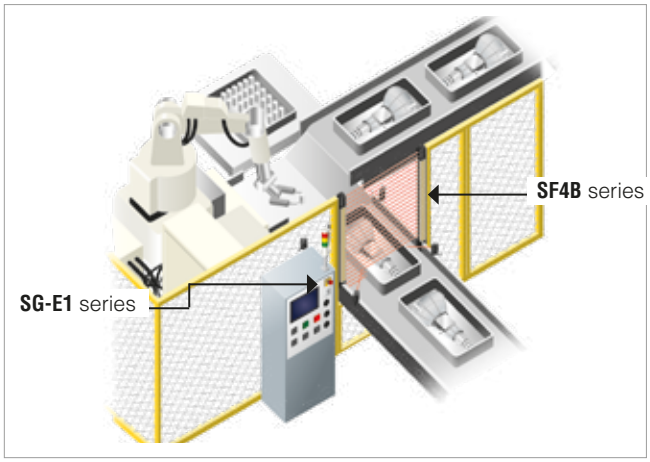
Ensuring safety around automatic guided vehicles



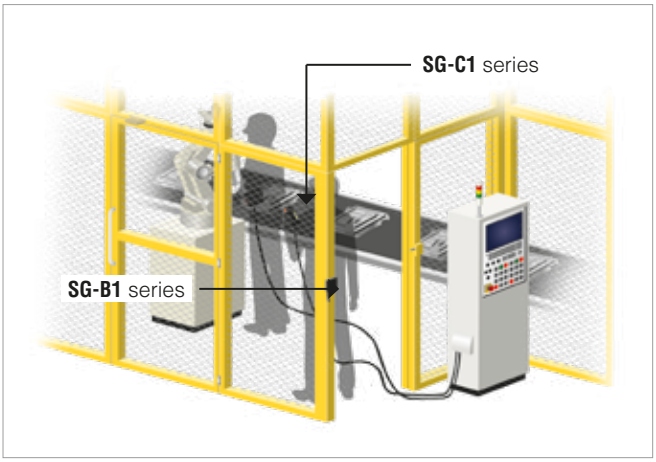
Overview

Series		SF2B	SF2C	SF4D	SF4B	SF4B-C	SF4C	SD3	ST4
									
Protective height	Up to 640mm		■				■		
	Up to 1900mm	■		■	■	■			
Operating range	0 to max. 3m		■				■		
	3 to max. 9m				■	■			
	9 to max. 15m	■		■				■	■
Safety category	2	■	■						
	3							■	
	4			■	■	■	■		■
Type	Arm protection 40mm beam pitch	■		■	■	■			
	Hand protection 20mm beam pitch	■	■	■	■	■	■		
	Finger protection 10mm beam pitch			■	■		■		

■ Parallel muting



■ OR control with 2 safety switches



SF4D

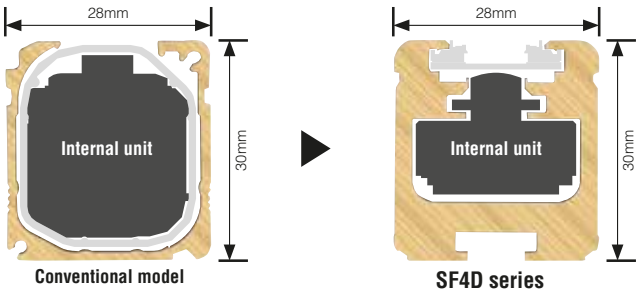
Type 4 · PLe · SIL3

The most robust light curtain from Panasonic

Features

Higher stability than SF4B

Compared to the SF4B<V2> series, the internal unit of the **SF4D** has been downsized more than 60%. The volume gained has been used to strengthen the case structure, making it more rigid without changing the outer dimensions. This makes the SF4D compatible with the SF4B<V2> series in terms of dimensions.



Twisting- and bending-resistant design

The new interior design makes the safety light curtain more rigid and thus more robust. The SF4D does not bend or twist as easily when it comes into contact with other objects.

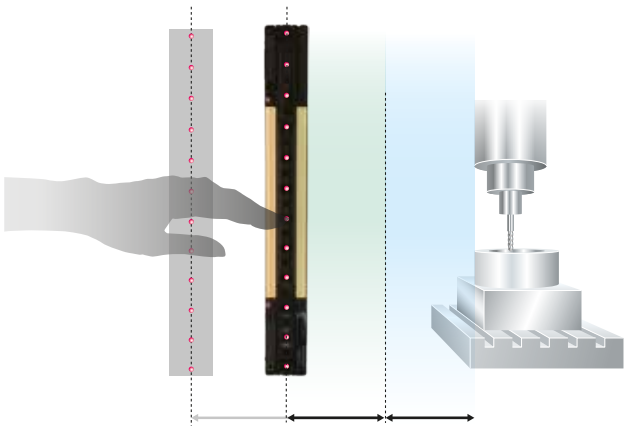
Resists twisting

Resists bending

Resists shock

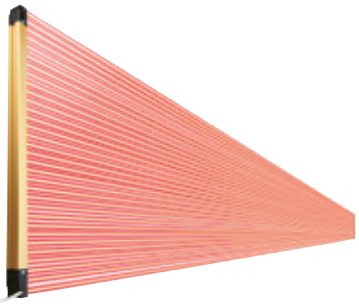
Response time max. 10ms for single light curtain

When only one light curtain is installed, the OFF response time of the control outputs (OSSD1, OSSD2) is max. 10ms, the fastest in its class. For multiple safety light curtains mounted in series, the response time is max. 18ms. Thanks to the fast response it is possible to mount the safety light curtain much closer to the dangerous area.



Easy installation of emitter and receiver thanks to improved optical properties

Thanks to a higher emission power, the SF4D not only works reliably on shorter distances, but also covers a longer sensing range up to 15m.



Setting software

Configurator Light Curtain

The handy controller software, which was well-received by users of our previous models, has evolved. The new setting software, **Configurator Light Curtain**, allows visually intuitive operation. Apart from providing powerful support during setup of the **SF4D** series, it helps to maintain stable operation and perform troubleshooting. The software saves the error history and allows real-time monitoring of the incident beam intensity.

Main functions

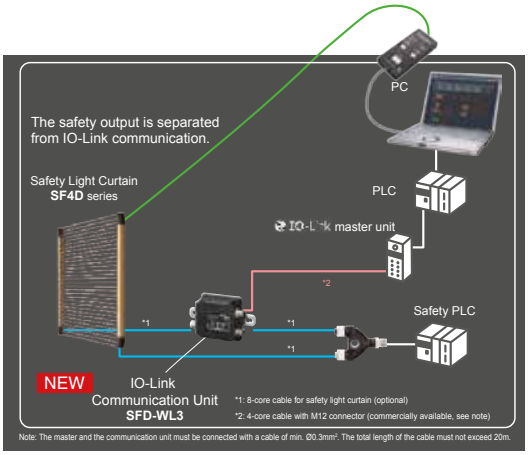
Which functions are available depends on the synchronization method and the type of cables (5-core, 8-core, 12-core) used.

- Operation monitoring
  - Monitoring of the incident beam intensity and extraneous light
  - I/O monitoring
- Error history display
- Light blockage history, unstable light incidence history
-

- Muting setting function
- Override setting function
- Blanking setting function (both fixed and floating blanking)
- External device monitoring setting function
- Auxiliary output setting function

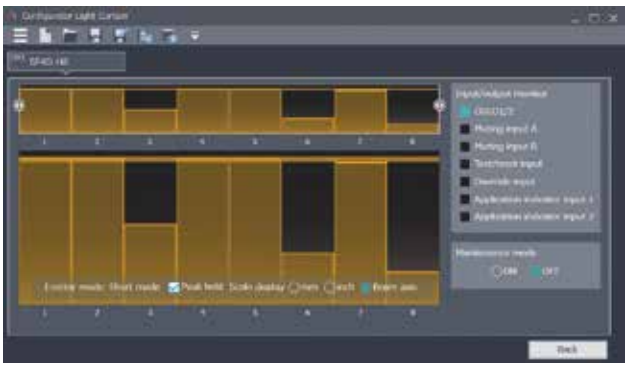
USB2.0 cable
(not included,
connectors A and Mini-B)

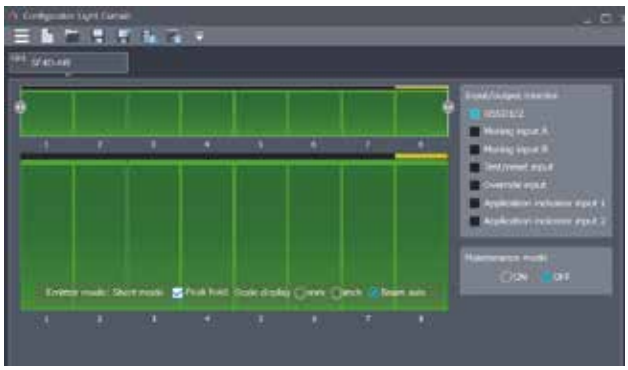
Communication unit
SF4D-TM1 (optional)



Monitoring of received light intensity and extraneous light during operation

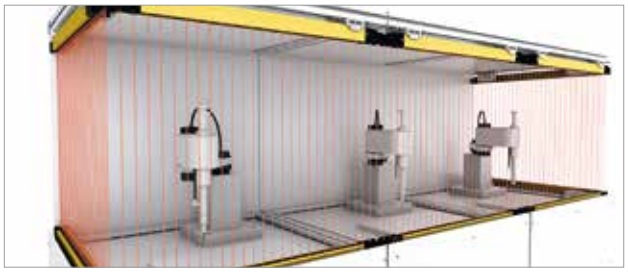
This function displays the incident beam intensity of the individual beams in real time. The function makes setup much easier and streamlines the maintenance planning as you can see at a glance whether the beams have become misaligned or the light reception has deteriorated, e.g. because the detection surface of the receiver is dirty. In addition, the function also monitors whether a beam of the safety light curtain is influenced by extraneous light to prevent malfunctions in advance.



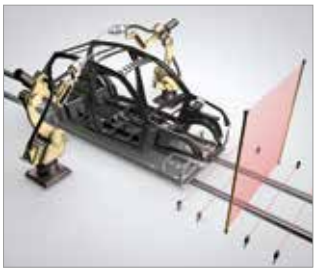


Typical applications

Serial connection of 5 safety light curtains for roboter housing



Automobile production with muting



Specifications

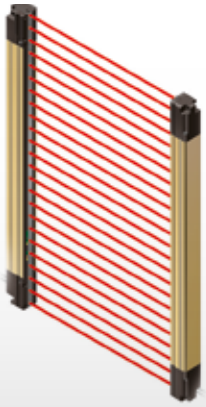
Type	Sensing range	Model no.	PFHd	Number of beams	Protective height
Finger protection type (beam pitch 10mm)	0 to 12m	SF4D-F15	1.21E-09	15	150mm
		SF4D-F23	1.48E-9	23	230mm
		SF4D-F31	1.80E-9	31	310mm
		SF4D-F39	2.07E-9	39	390mm
		SF4D-F47	2.40E-9	47	470mm
		SF4D-F55	2.66E-9	55	550mm
		SF4D-F63	2.99E-9	63	630mm
		SF4D-F71	3.25E-9	71	710mm
		SF4D-F79	3.58E-9	79	790mm
		SF4D-F95	4.17E-9	95	950mm
		SF4D-F111	4.76E-9	111	1110mm
		SF4D-F127	5.36E-9	127	1270mm
Hand protection tyoe (beam pitch 20mm)	0 to 15m	SF4D-H8	9.57E-10	8	150mm
		SF4D-H12	1.12E-9	12	230mm
		SF4D-H16	1.26E-9	16	310mm
		SF4D-H20	1.40E-9	20	390mm
		SF4D-H24	1.56E-9	24	470mm
		SF4D-H28	1.73E-9	28	550mm
		SF4D-H32	1.87E-9	32	630mm
		SF4D-H36	2.04E-9	36	710mm
		SF4D-H40	2.17E-9	40	790mm
		SF4D-H48	2.48E-9	48	950mm
		SF4D-H56	2.78E-9	56	1,110mm
		SF4D-H64	3.09E-9	64	1,270mm
		SF4D-H72	3.39E-9	72	1,430mm
		SF4D-H80	3.69E-9	80	1,590mm
		SF4D-H88	4.00E-9	88	1,750mm
		SF4D-H96	4.30E-9	96	1,910mm

Type	Sensing range	Model no.	PFHd	Number of beams	Protective height
Arm / foot protection type (beam pitch 40mm)	0 to 15m	SF4D-A4	8.29E-10	4	150mm
		SF4D-A6	9.34E-10	6	230mm
		SF4D-A8	1.01E-9	8	310mm
		SF4D-A10	1.11E-9	10	390mm
		SF4D-A12	1.18E-9	12	470mm
		SF4D-A14	1.29E-9	14	550mm
		SF4D-A16	1.36E-9	16	630mm
		SF4D-A18	1.46E-9	18	710mm
		SF4D-A20	1.54E-9	20	790mm
		SF4D-A24	1.71E-9	24	950mm
		SF4D-A28	1.89E-9	28	1110mm
		SF4D-A32	2.07E-9	32	1270mm
		SF4D-A36	2.24E-9	36	1430mm
		SF4D-A40	2.42E-9	40	1590mm
		SF4D-A44	2.60E-9	44	1750mm
		SF4D-A48	2.77E-9	48	1910mm

Specifications

Type	Finger protection type	Hand protection type	Arm / foot protection type
Model number	SF4-F□	SF4-H□	SF4-A□
MTTFd	Min. 100 years		
Applicable standards	IEC 61496-1/2 (Type 4), ISO 13849-1 (Category 4, PLe), IEC 61508-1 to 7 (SIL3)		
Sensing range	0 to 12m	0 to 15m	
Protective height	150 to 1270mm	150 to 1910mm	
Minimum sensing object	Ø14mm opaque object	Ø25mm opaque object	Ø45mm opaque object
Power supply voltage	24V DC (+20-30%)		
Control output	OSSD 1 and OSSD 2 (2 x PNP or 2 x NPN, switchable by wiring), max. 350mA		
Response time	OFF-response time: Max. 10ms, ON-response time: 50ms		
Dimensions	Width 28 x protective height x depth 30mm		

□Number of beam channels



SF4B<V2>

Type 4 · PLe · SIL3

New concepts combining greater safety and higher productivity!

Features

More safety with no loss in productivity

Supports both NPN and PNP outputs in a single model

- Fast response time of 14ms for all models
- IP67 degree of protection
- Digital error indicator
- Muting
- ZERO blind zone
- Unit length = protective height

Slim body with IP67 degree of protection

Optimized environmental resistance and easy installation. The new design is nearly seamless and prevents blind zones. The inner unit is sealed by a cylindrical inner case. Small particles such as oil mists and dust are prevented from getting in, raising the device's environmental resistance performance.

Cylindrical inner case protects the inner unit

This new structure does not use seals on the joints like the previous models. There is no need to worry about water penetration or corrosion of the seams, e.g. due to coolant causing the adhesive to strip off.

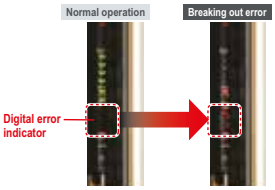
New concept 'ZERO' Blind zone

Unit length = Protective height

Easy-to-read digital error indicator

The system constantly checks the light curtain for problems such as incorrect wiring, short-circuits, internal circuit problems, and extraneous light. Details of any electrical problems such as at equipment startup will appear on the digital display. Previously, the only way to diagnose an error was to count the number of LED blinks. This is no longer necessary.

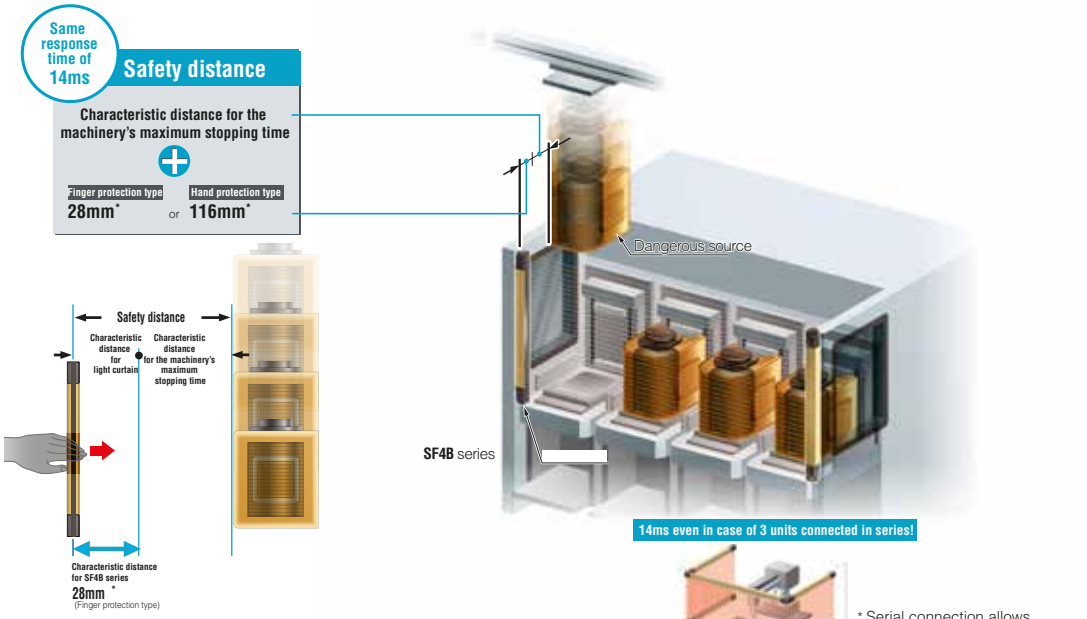
Smooth telephone supports thanks to error codes



IP67 degree of protection in a very slim body

A unified response time of 14ms for all models makes setup easy

A fast response time of 14ms has been achieved regardless of the number of beam channels, the beam axis pitches and the number of units connected in series. This reduces the time and work needed for calculating the necessary safety distance.



* This is the characteristic safety distance for the light curtain as defined by ISO 13855. Calculate the safety distance by including the machinery's maximum stopping time. Furthermore refer to the relevant standards of the region where this device is to be used, and then install this device.

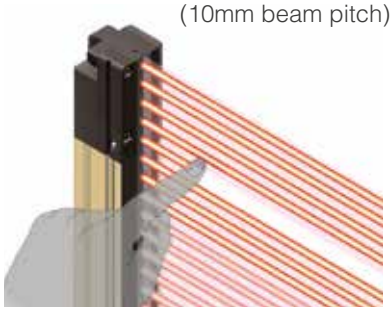
* Serial connection allows max. 3 sets and a total of up to 192 beam channels.

It is possible to select from among three types according to the worksite

A wide range of variations are available with protective heights of 230 to 1910mm (1270mm for the finger protection type). Mixing three types in a series connection is also possible.

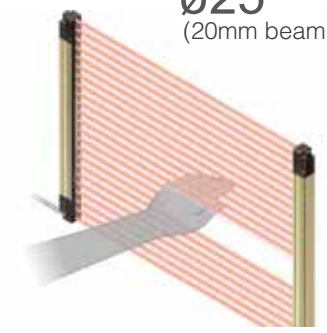
Finger protection type SF4B-F□

ø14
(10mm beam pitch)



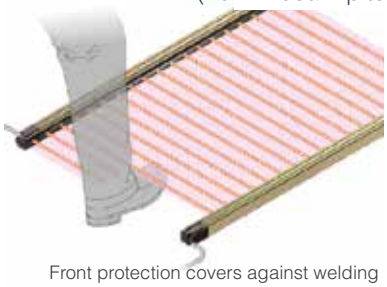
Hand protection type SF4B-H□

ø25
(20mm beam pitch)



Arm/Foot protection type SF4B-A□

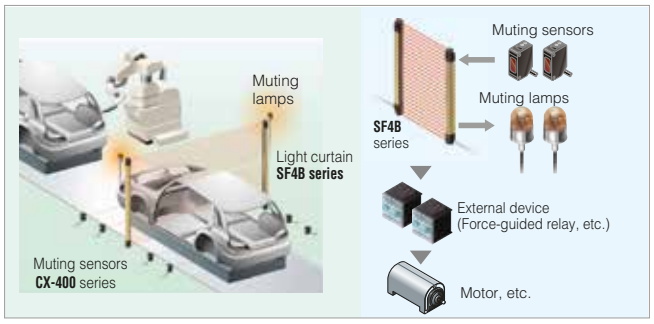
Minimum
ø45
(40mm beam pitch)



Front protection covers against welding spatter are available.

Mutual interference suppression without additional wiring

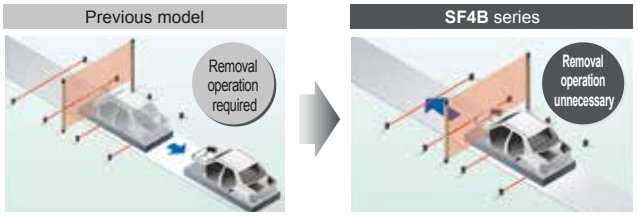
The light curtain is equipped with the ELCA (*Extraneous Light Check & Avoid*) function. Because it automatically shifts the scan timing of the light curtain in order to avoid interferences, it is not necessary to add interference prevention wiring to the machinery.



Override function

In case the power turns off while the light curtain has been interrupted by an object or in case the line stops before the muting conditions have been established (if only one muting sensor has been interrupted), the line can be restarted smoothly without having to remove the object that is interrupting the light curtain.

(e.g.) When power turns off while light curtain was interrupted



Object must be removed before restart

Smooth restart

A muting control function is provided to increase both safety and productivity

The light curtain is equipped with a muting control function that causes the line to stop only when a person passes through the light curtain, and does not stop the line when an object passes through. The muting sensors and muting lamps can be connected directly to the light curtain so that there is no need for an exclusive controller for muting. This both reduces costs and increases safety and productivity.

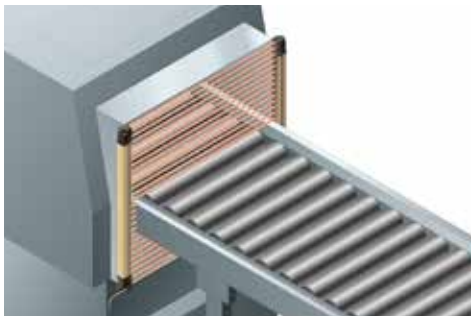
Reducing the number of malfunctions caused by extraneous light

Double scanning method and retry processing are two new functions exclusive to Panasonic, which are effective in eliminating the effects of momentary extraneous light from peripheral equipment. The reduction in operating errors caused by extraneous light reduces frequent stopping of machinery.

Any beam channel can be selected for blanking

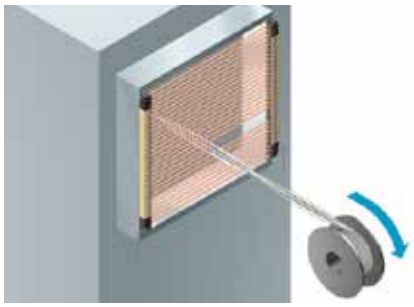
The **SF4B** series is equipped with a fixed blanking function which allows specific beam channels to be selectively interrupted without causing the control output (OSSD) to output the OFF signal. This function is convenient for use with applications in which some beam channels are continuously blocked by fixed obstacles.

Furthermore, this function provides greater safety as the control output (OSSD) will automatically output the OFF signal if the fixed obstacles are subsequently removed from the sensing area.



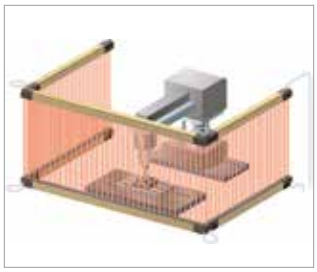
Flexible deactivation of beam channels

In addition, users can disable a variable number of non-specified beam channels (1, 2 or 3). If the number of beam channels that are blocked is less than or equal to the set number of beam channels, then the control output (OSSD) will not output the OFF signal. This function is useful in the event that the position of obstacles within the sensing area is not static, or when an object may pass through the light curtain's sensing area.

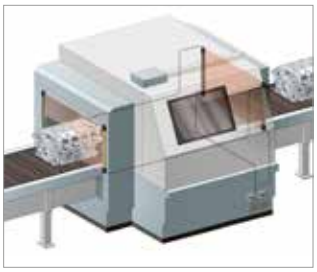


Typical applications

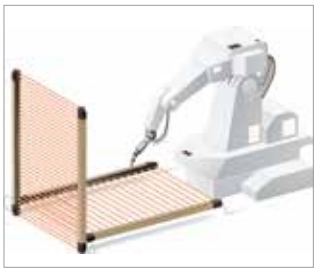
Blanking function



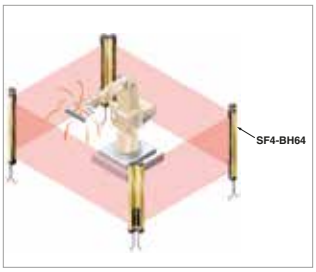
Muting function



Series connection



Guarding space around welding robot



Specifications

Type	Sensing range	Model no.	PFHd	Number of beams	Protective height (mm)
Finger protection type (beam pitch 10mm)	0 to 7m	SF4B-F23<V2>	2.56E-09	23	230
		SF4B-F31<V2>	2.96E-09	31	310
		SF4B-F39<V2>	3.36E-09	39	390
		SF4B-F47<V2>	3.75E-09	47	470
		SF4B-F55<V2>	4.15E-09	55	550
		SF4B-F63<V2>	4.55E-09	63	630
		SF4B-F71<V2>	4.95E-09	71	710
		SF4B-F79<V2>	5.35E-09	79	790
		SF4B-F95<V2>	6.15E-09	95	950
		SF4B-F111<V2>	6.94E-09	111	1110
		SF4B-F127<V2>	7.74E-09	127	1270
Hand protection type (beam pitch 20mm)	0 to 9m	SF4B-H12<V2>	2.01E-09	12	230
		SF4B-H16<V2>	2.21E-09	16	310
		SF4B-H20<V2>	2.41E-09	20	390
		SF4B-H24<V2>	2.61E-09	24	470
		SF4B-H28<V2>	2.81E-09	28	550
		SF4B-H32<V2>	3.01E-09	32	630
		SF4B-H36<V2>	3.21E-09	36	710
		SF4B-H40<V2>	3.41E-09	40	790
		SF4B-H48<V2>	3.80E-09	48	950
		SF4B-H56<V2>	4.20E-09	56	1110
		SF4B-H64<V2>	4.60E-09	64	1270
	0 to 7m	SF4B-H72<V2>	5.00E-09	72	1430
		SF4B-H80<V2>	5.40E-09	80	1590
		SF4B-H88<V2>	5.80E-09	88	1750
		SF4B-H96<V2>	6.20E-09	96	1910
Arm/foot protection type (beam pitch 40mm)	0 to 9m	SF4B-A6<V2>	1.71E-09	6	230
		SF4B-A8<V2>	1.81E-09	8	310
		SF4B-A10<V2>	1.91E-09	10	390
		SF4B-A12<V2>	2.01E-09	12	470
		SF4B-A14<V2>	2.11E-09	14	550
		SF4B-A16<V2>	2.21E-09	16	630
		SF4B-A18<V2>	2.31E-09	18	710
		SF4B-A20<V2>	2.41E-09	20	790
		SF4B-A24<V2>	2.61E-09	24	950
		SF4B-A28<V2>	2.81E-09	28	1110
		SF4B-A32<V2>	3.01E-09	32	1270
	0 to 7m	SF4B-A36<V2>	3.21E-09	36	1430
		SF4B-A40<V2>	2.41E-09	40	1590
		SF4B-A44<V2>	3.61E-09	44	1750
		SF4B-A48<V2>	3.80E-09	48	1910

Specifications

Type	Finger protection type	Hand protection type	Arm / foot protection type
Model number	SF4B-F□□<V2>	SF4B-H□□<V2>	SF4B-A□□<V2>
MTTFd	Min. 100 years		
Applicable standards	IEC 61496 1/2 (Typ 4), EN ISO 13849 (PLe), IEC61508 (SIL3)		
Beam pitch	10mm	20mm	40mm
Sensing range	0 to 7m	0 to 9m (72 beam channels or more: 0.3 to 7m)	0 to 9m (36 beam channels or more: 0.3 to 7m)
Protective height	230 to 1270mm	230 to 1910mm	230 to 1910mm
Minimum sensing object	Ø 14mm, opaque object	Ø 25mm, opaque object	Ø 45mm, opaque object
Supply voltage	24V DC±10%		
Control output	PNP or NPN open-collector transistor (selection by wiring)		
Response time	OFF response time: max. 14ms, ON response time: 80 to 90 ms		
Dimensions	Width 28 x protective height x depth 30mm		

□□Number of beam channels

Minimum equipment without muting		
Model number	MS-SFB-1	SFBCCB3
Description	Standard mounting bracket	Pigtailed type for SF4B, 3m

Minimum equipment with muting				
Model number	MS-SFB-1	SFBCCB3MU	SFBHC	SFC-WNC1
Description	Standard mounting bracket	Pigtailed type for SF4B, for muting function, 3m	Handy controller for SF4B	Connection cable for muting

Options

- Corner mirrors
- Front protection covers
- Mounting brackets
- Cables
- Safety control units (safety relays)
- Alignment tool
- Handy controller

SF4B-C

Type 4 · PLe · SIL3

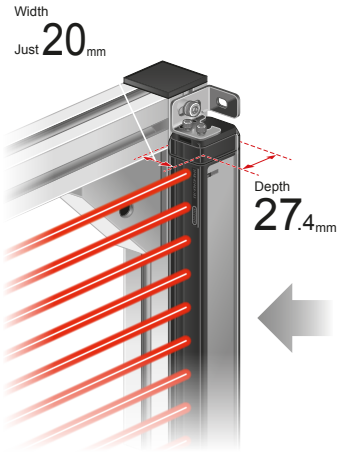
Compact light curtain (type 4).
Mounts flush on aluminum frames

Features

Compact design

The **SF4B-C** series has been designed to mount flush with the aluminum frame, leaving the access to the machine as wide as possible. It can even be installed with zero blind zone.

- Side mounting
- The light curtain does not protrude beyond the aluminum frame
- The light curtain's thin design allows protuberances to be minimized during mounting



Extraneous light check & avoid (ELCA) function

The ELCA function reduces interference without the need for an interference prevention line.

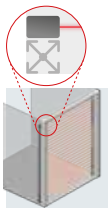
Beam alignment indicator

A beam alignment indicator divides the light curtain beams into four equal displays, allowing you to see at a glance where light is being received.

Easy mounting on aluminum frame

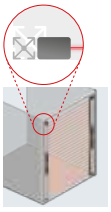
Buried mounting (side)

The light curtain mounts flush, even in embedded installations.



- The light curtain protrudes neither into the machinery opening nor outside the frame
- There's no risk of workpieces bumping into the light curtain

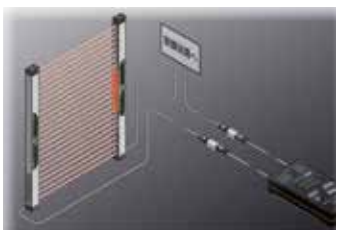
Rear mounting



- The light curtain fits onto a 20 x 20mm aluminum frame perfectly
- It does not protrude beyond the frame

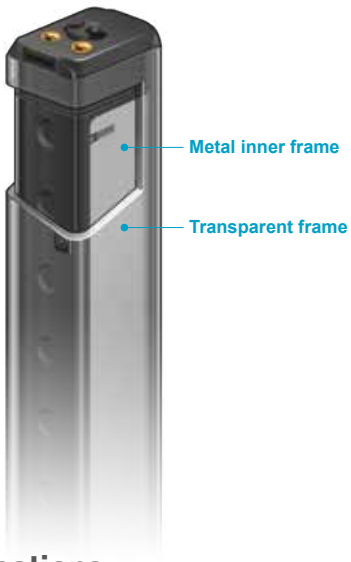
The handy controller SFB-HC (optional)

Offers easy access to settings for a range of functionality



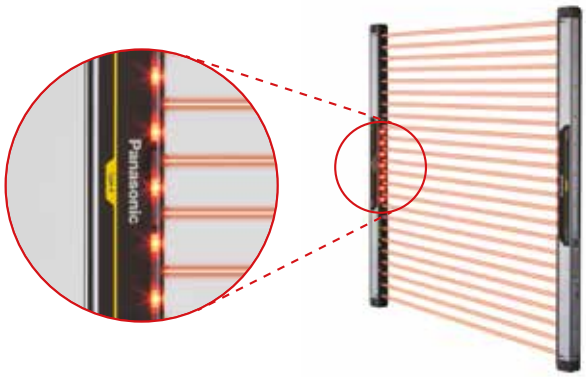
Plastic and metal

Double structure with light weight polycarbonate body & robust inner metal frame. Compared to conventional models with aluminum frame, the weight could be reduced by 45% (compared with SF4B-H80<V2> & SF4B-H80CA-J05). The reduced weight is of great advantage when it comes to transport and shipping overseas the system.



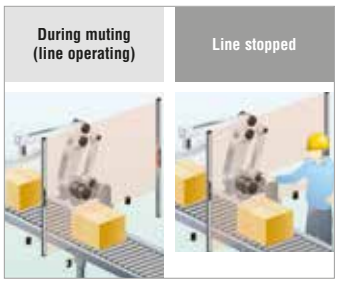
Large indicator of the pigtailed type is easy to see from the side

The SF4B-C series incorporates a large multi-purpose indicator (orange) positioned at workers' eye level. The indicator signals the presence of the light curtain, helping to prevent stoppages due to inadvertent interruption of its beams. The indicator can be used in a variety of applications, including as a muting indicator or operation indicator. The large multi-purpose indicator shines brightly through the plastic body to ensure exceptional visibility from the side.



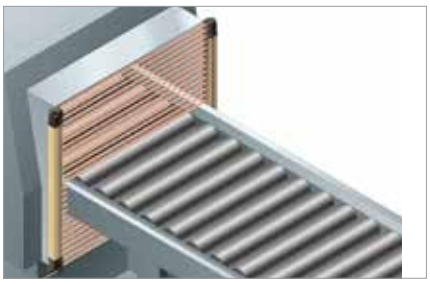
Typical applications

Muting control function for individual beams: Limit the muting area



The SFB-HC handy-controller (optional) allows you to perform muting control for certain beams only. Since you can specify the beams, there is no need to install a separate guard to prevent incursions. For example, if you use muting control from the lowermost beam to the 10th beam, the light curtain will detect any interruption of the 11th or higher beam as a person and stop the machinery.

Fixed blanking function: Choose active beams



The SFB-HC handy controller provides a fixed blanking function that prevents control output (OSSD) from turning off even if certain beams are interrupted. This capability is convenient in applications where an obstruction always interrupts certain beams. Additionally, a high level of safety is provided since control output (OSSD) is forcibly turned off in the event the obstruction moves outside the detection area.

Floating blanking function: Disable unspecified beams

The floating blanking function allows you to disable up to three unspecified beams. Control output (OSSD) will not turn off as long as the number of interrupted beams is less than the set number of beams. This capability is convenient when a moving obstacle is allowed to enter the light curtain's detection area, e.g. for changing the setup or delivering materials.

Specifications

Type	Sensing range	Model number*	PFHd	Number of beams	Protective height (mm)
Hand protection type (beam pitch 20mm)	0 to 7m	SF4B-H12C(A-J05)	1.9E-09	12	263.4
		SF4B-H16C(A-J05)	2.1E-09	16	343.4
		SF4B-H20C(A-J05)	2.4E-09	20	423.4
		SF4B-H24C(A-J05)	2.6E-09	24	503.4
		SF4B-H28C(A-J05)	2.8E-09	28	583.4
		SF4B-H32C(A-J05)	3.0E-09	32	663.4
		SF4B-H36C(A-J05)	3.3E-09	36	743.4
		SF4B-H40C(A-J05)	3.5E-09	40	823.4
		SF4B-H48C(A-J05)	3.9E-09	48	983.4
		SF4B-H56C(A-J05)	4.4E-09	56	1143.4
		SF4B-H64C(A-J05)	4.8E-09	64	1303.4
		SF4B-H72C(A-J05)	5.3E-09	72	1463.4
		SF4B-H80C(A-J05)	5.7E-09	80	1623.4
		SF4B-H88C(A-J05)	6.2E-09	88	1783.4
		SF4B-H96C(A-J05)	6.6E-09	96	1943.4
Arm protection type (40mm beam pitch)	0 to 7m	SF4B-A8C(A-J05)	1.7E-09	8	343.4
		SF4B-A12C(A-J05)	1.9E-09	12	503.4
		SF4B-A16C(A-J05)	2.2E-09	16	663.4
		SF4B-A20C(A-J05)	2.4E-09	20	823.4
		SF4B-A24C(A-J05)	2.7E-09	24	983.4
		SF4B-A28C(A-J05)	2.9E-09	28	1143.4
		SF4B-A32C(A-J05)	3.2E-09	32	1303.4
		SF4B-A36C(A-J05)	3.4E-09	36	1463.4
		SF4B-A40C(A-J05)	3.7E-09	40	1623.4
		SF4B-A44C(A-J05)	3.9E-09	44	1783.4
		SF4B-A48C(A-J05)	4.2E-09	48	1943.4

*) Products with the model number extension A-J05 are equipped with a 0.5m cable and a connector.

Type	SF4B-C pigtailed type (with muting function)		SF4B-C cable type	
Beam pitch	Hand protection type 20 mm	Arm protection type 40mm	Hand protection type 20 mm	Arm protection type 40 mm
MTTFd	Min. 100 years			
Applicable standards	EN 61496-1 (Type 4), EN ISO 13849-1 (category 4, PLe), EN 61508-1 to 7 (SIL3), EN 55011, EN 50178, EN 61000-6-2			
Sensing range	0 to 7m			
Protective height	263.4mm to 1634.4mm			
Minimum sensing object	Ø 25mm, opaque object	Ø 45mm, opaque object	Ø 25mm, opaque object	Ø 45mm, opaque object
Supply voltage	24V DC (±10%)			
Control output	OSSD1 and OSSD2 (2 x PNP or 2 x NPN, switchable), max. 200mA			
Response time	OFF response time: max 14ms, ON response time: 80 to 90ms			
Dimensions	Width 20mm x protective height x depth 27.4mm			
Connection method	Cable with connector, 0.5m		Cable 5m	

Minimum equipment without muting		
Model number	**MS-SF4BC-1**	**MS-SF4BC-5**
Description	Standard mounting bracket for SF4B-C (4 pieces/set)	Intermediate supporting bracket for use with standard mounting bracket for SF4B-C (2 pieces / set) up to a height of 800mm 1 set, up to a height of 1300mm 2 sets.

Minimum equipment with muting					
Model number	**MS-SF4BC-1**	**MS-SF4BC-5**	**SFBCC3MU**	**SFBHC**	**SFC-WNC1**
Description	Standard mounting bracket for SF4B-C (4 pieces/set)	Intermediate supporting bracket for use with standard mounting bracket for SF4B-C (2 pieces / set) up to a height of 800mm 1 set, up to a height of 1300mm 2 sets.	Extension cable for SF4B, with muting function, with connector on one end, 3m	Handy controller for SF4B-C	Connection cable for connector type

Options

- Mounting brackets
- Safety control units (safety relays)
- Handy controller
- Metal protection case

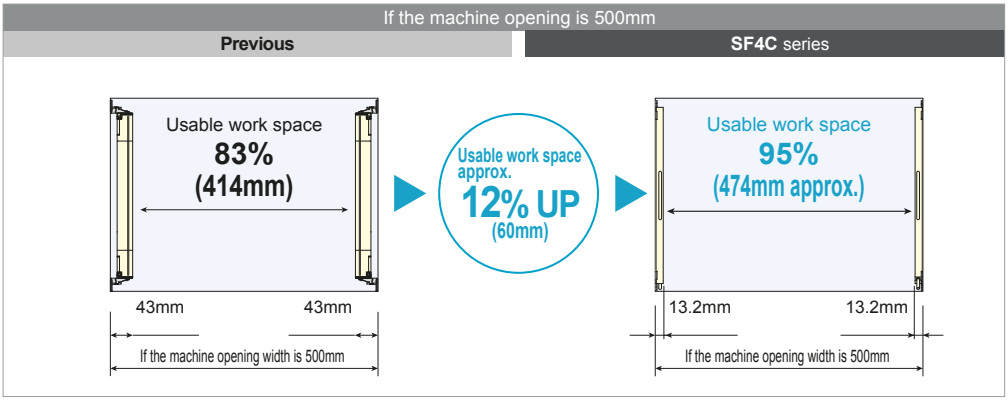
SF4C

Type 4 · PLe · SIL3

The world's slimmest safety light curtain

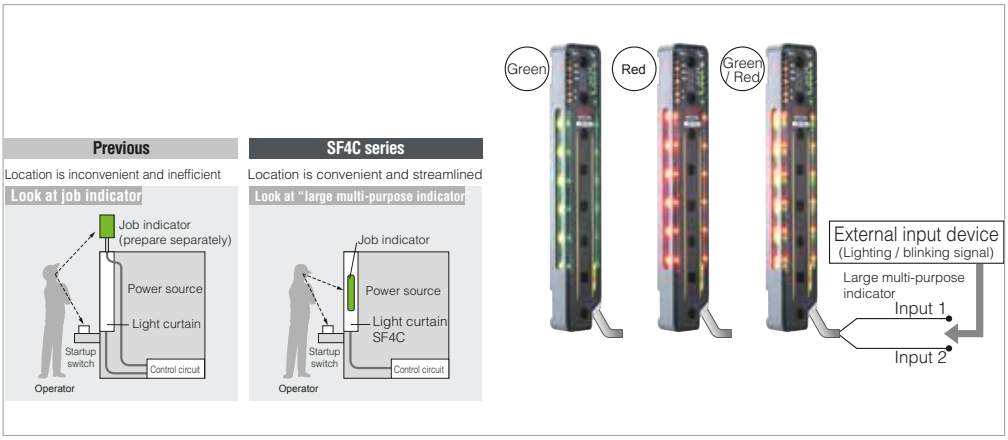
Features

The **SF4C** series leaves a bigger work space compared to previous models, thereby making access to the machine easier.



Large multi-purpose indicators for external inputs

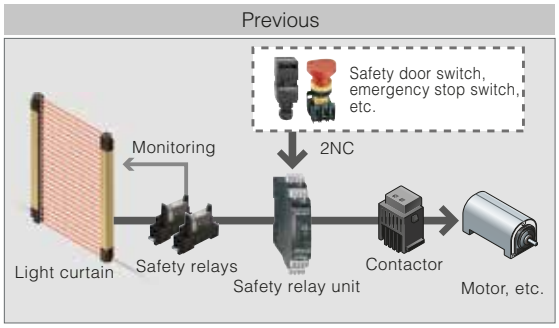
The bright LED indicators located in the center of both sides of each light curtain can be illuminated green or red by using external inputs. There is no need to set up a separate indicator e. g. muting lamp.



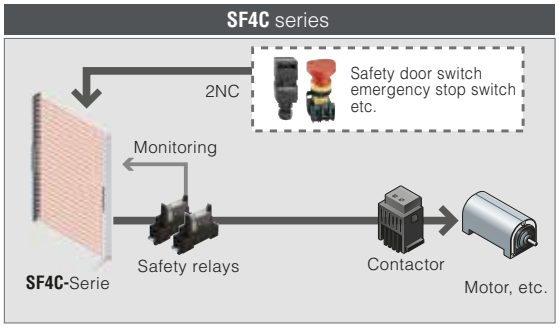
Wire-saving connection to additional safety devices (safety input functions)

Contact outputs such as emergency stop switches or safety door switches can be connected to the light curtain. Also, by using the handy-controller SFC-HC, up to three sets of light curtains can be connected in cascade to consolidate safety outputs.

Direct connection of safety devices



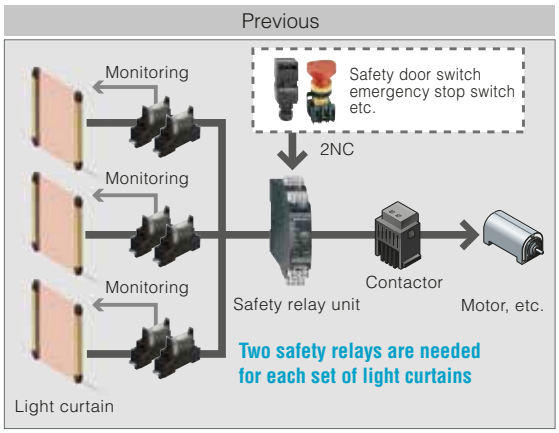
A safety relay unit is needed to connect safety devices other than light curtains.



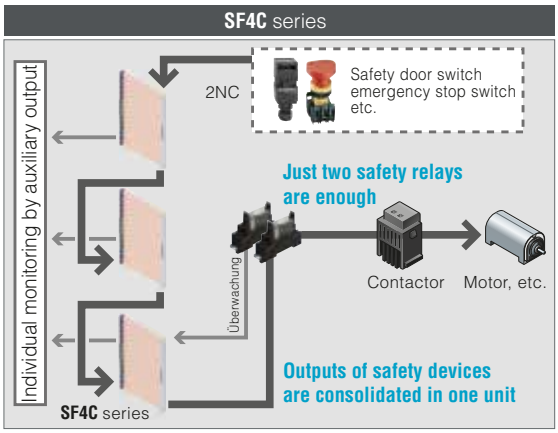
Direct connection of various safety devices is possible for a simplified safety circuit.

Cascade connection

HC



Three sets of light curtains require three sets of safety relays.



Individual monitoring on light curtains is possible while the outputs of three sets of light curtains and other safety devices are consolidated in one unit.

IP67 degree of protection

The ultra-slim size has IP67 (IEC / JIS) degree of protection and is suitable for use in very rough environmental conditions.

Mutual interference suppression without additional wiring

The light curtain is equipped with the ELCA (Extraneous Light Check & Avoid) function, which protects the light curtains from mutual interference. Because it automatically shifts the scan timing of the light curtain in order to avoid interferences, it is not necessary to add interference prevention wiring to the machinery.

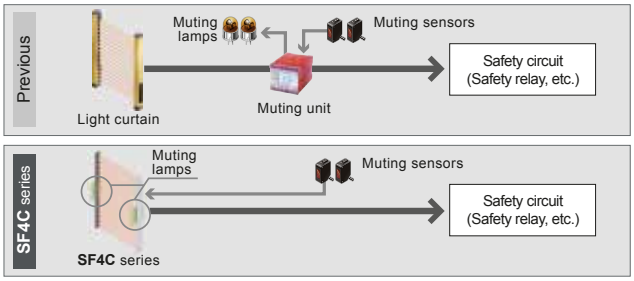
Safety, productivity, and cost reduction [muting control function]

The light curtain is equipped with a muting control function that causes the line to stop only when a person passes through the light curtain, and does not stop the line when an object passes through. The muting sensors and muting lamps can be connected directly to the light curtain. Furthermore, the large multi-purpose indicators can be used as muting lamps. which contribute to less wiring troubles, improvement of safety and productivity, and cost reduction.

A fast response time of 7ms* for all models

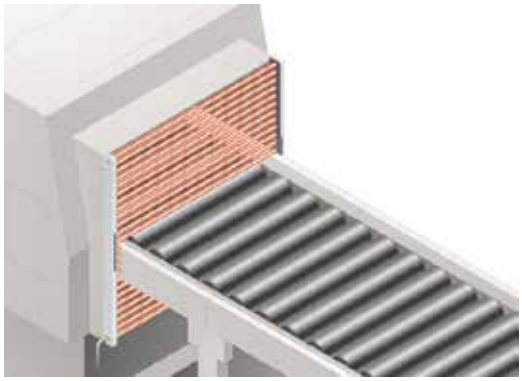
A fast response time of 7ms* is possible for all models regardless of the number of beam channels. This reduces the safety distance as well as the calculation work required for the safety distance among models with different beam channels.

* When connecting safety sensors (light curtains, etc.) to the safety input, the response time will be the total time of the connected units.

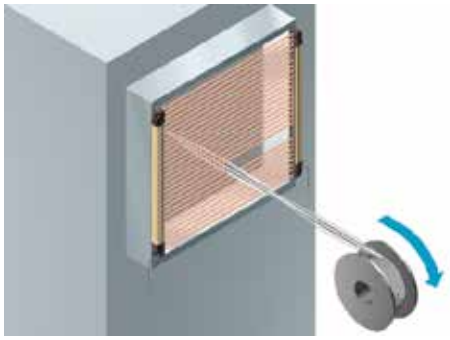


* If a failure diagnosis of the muting lamp is needed as a result of risk assessment, use the handy-controller **SFC-HC** to change the setting, and connect the muting lamp output wire (red) of this light curtain to an incandescent lamp separately.

Activate blanking function for selected beam channels only depending on application requirements

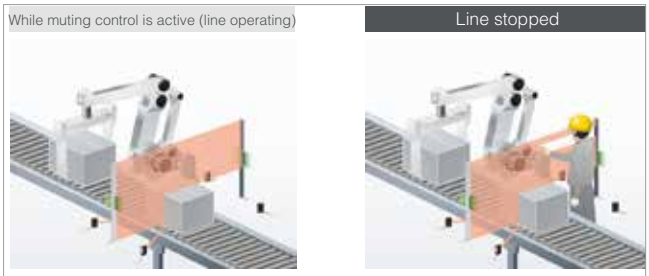


Activate floating blanking function over several non-specified beam channels to optimize productivity



Selective muting area (separate muting function for each beam channel) HC

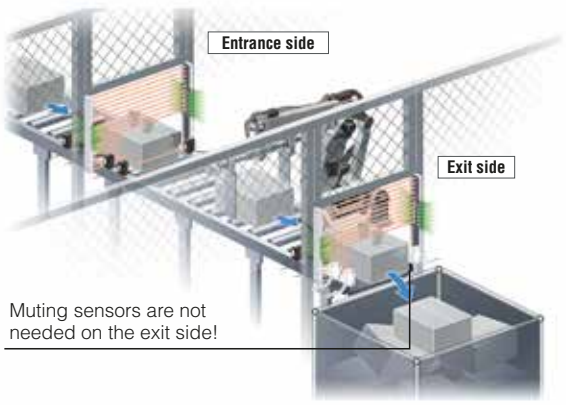
The handy controller SFC-HC can be used to carry out muting control for selected beam channels only. Because individual beam channels can be selected depending on the shape of the object, separate guards to prevent entry do not need to be set up.



For example, depending on the height of the object, the muting function can be activated for 10 beam channels starting from the bottom most so that if the 11th or subsequent beam channels are interrupted, it is judged that a person has entered the area and the line stops.

Safety measures when objects exit (exit muting control function) HC

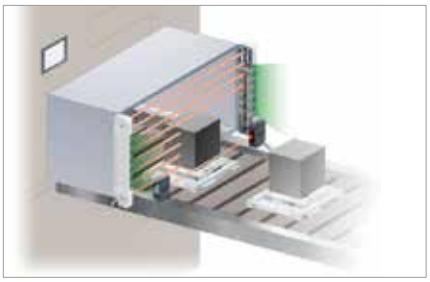
Muting at the exit of a machine is now possible using the handy controller SFC-HC. Simply set a delay time of max. 4s for the muting sensor.



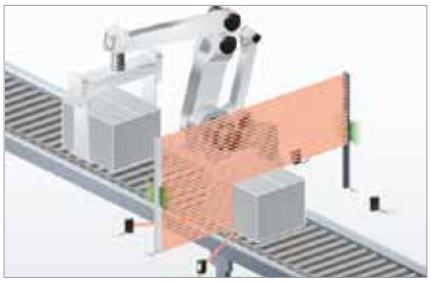
By installing muting sensors only within the dangerous zone and setting up a delay time on the sensor, muting control is made possible even on the exit side where muting sensors cannot be installed.

Typical applications

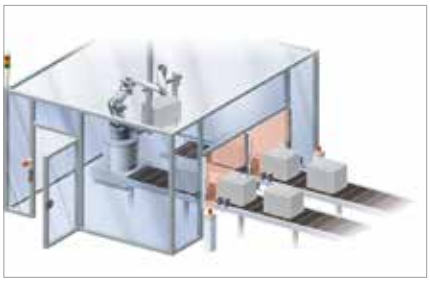
Use existing LEDs as muting lamps



Specific selection of muting area



Perfect for industrial production. Direct connection of safety devices



Specifications

Type	Sensing range	Model number*	PFHd	Number of beams	Protective height (mm)
Finger protection type (beam pitch 10mm)	0 to 3m	SF4C-F15(-J05)	2.29E-09	15	160
		SF4C-F23(-J05)	2.73E-09	23	240
		SF4C-F31(-J05)	3.18E-09	31	320
		SF4C-F39(-J05)	3.62E-09	39	400
		SF4C-F47(-J05)	4.06E-09	47	480
		SF4C-F55(-J05)	4.50E-09	55	560
		SF4C-F63(-J05)	4.95E-09	63	640
Hand protection type (beam pitch 20mm)	0 to 3m	SF4CH8(-J05)	1.66E-09	8	160
		SF4CH12(-J05)	1.90E-09	12	240
		SF4CH16(-J05)	2.10E-09	16	320
		SF4CH28(-J05)	2.33E-09	20	400
		SF4CH24(-J05)	2.54E-09	24	480
		SF4CH28(-J05)	2.77E-09	28	560
		SF4CH32(-J05)	2.98E-09	32	640

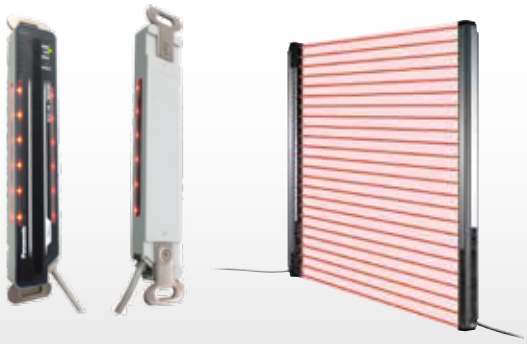
*) Products with the model number extension -J05 are equipped with a 0.5m cable and a connector.

Type	SF4C pigtailed type	SF4C cable type	SF4C pigtailed type	SF4C cable type
Beam pitch	Finger protection 10mm		Hand protection 20mm	
MTTFd	Min. 100 years			
Applicable standards	EN 61496-1 (Type 4), ISO 13849-1 (Category 4, PLe), EN 61508-1 to 7 (SIL 3), EN 55011, EN 50178, EN 61000-6-2			
Sensing range	0 to 3m			
Protective height	160mm to 640mm			
Minimum sensing object	ø14mm, opaque object		ø25mm, opaque object	
Supply voltage	24V DC (+10/-15%)			
Control output	OSSD1 and OSSD2 (2 x PNP or 2 x NPN, switchable), max. 200mA			
Response time	OFF response time: max. 9ms, ON response time: max. 90ms		OFF response time: max. 7ms, ON response time: max. 90ms	
Dimensions	Width 13.2mm x protective height x depth 30mm			
Connection method	Cable with connector, 0.5m	Cable 5m	Cable with connector, 0.5m	Cable 5m

Minimum equipment with muting for pigtailed type (SF4-□□-J05)			
Model number	SFBCC3MU	SFC-HC	SFC-WNC1
Description	Extension cable for SF4B, with muting function, with connector on one end, 3m	Handy controller for SF4C	Connection cable for pigtailed type

Options

- Protective metal case
- Mounting brackets
- Cables
- Connectors
- Control units (safety relay)
- Handy controller



SF2B / SF2C

Safety category 2

Features

We also offer safety light curtains with safety category 2

- Protective height: 160 to 1912mm
- Sensing range: 0 to 13m
- Response time: max. 15ms (ON ➔ OFF)
- Arm and hand protection type
- Integrated status LEDs and display
- Series connection without blind zone
- Features: Interference suppression, series connection, emission halt function

Arm / foot protection type SF2B-A□

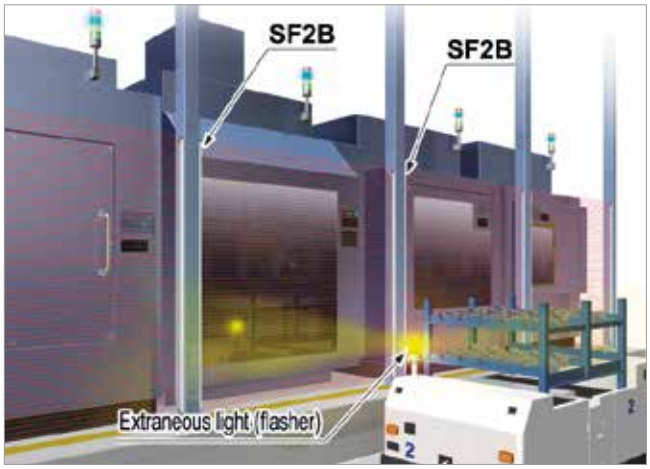
Min. sensing object ø 47mm
(beam pitch 40mm)

Hand protection type SF2B-H□

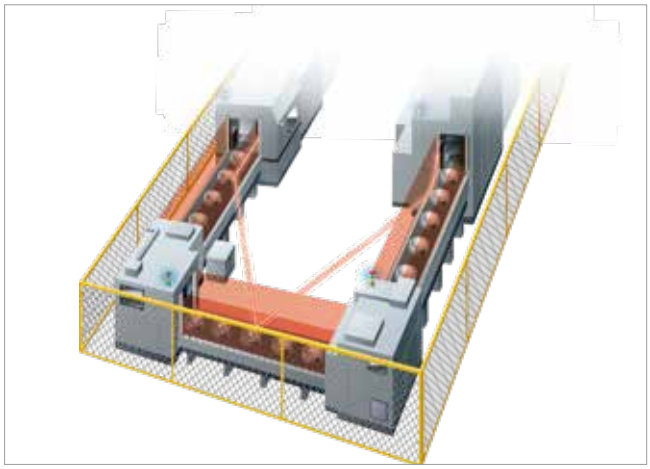
Min. sensing object ø 27mm
(beam pitch 20mm)

Typical applications

Protection against malfunction caused by extraneous light



Protection against mutual interference thanks to interference prevention



ST4

Type 4 · PLe · SIL3

Safety single beam sensor with different muting patterns

Features

Series connection with six sensor heads to only one controller

Panasonic's new concept of connecting six sets of sensor heads of the **ST4** series to one controller in series offers you maximum flexibility to solve your safety applications.

Beam axis alignment and operation confirmation

The beam interruption indicator is incorporated in both the emitter and receiver. This indicator can be used not only to confirm operation, but also to align the beam axis.

Compact sensor head saves space

The size of the type 4 long sensing range type is similar to general purpose photoelectric sensors.

IP67 degree of protection

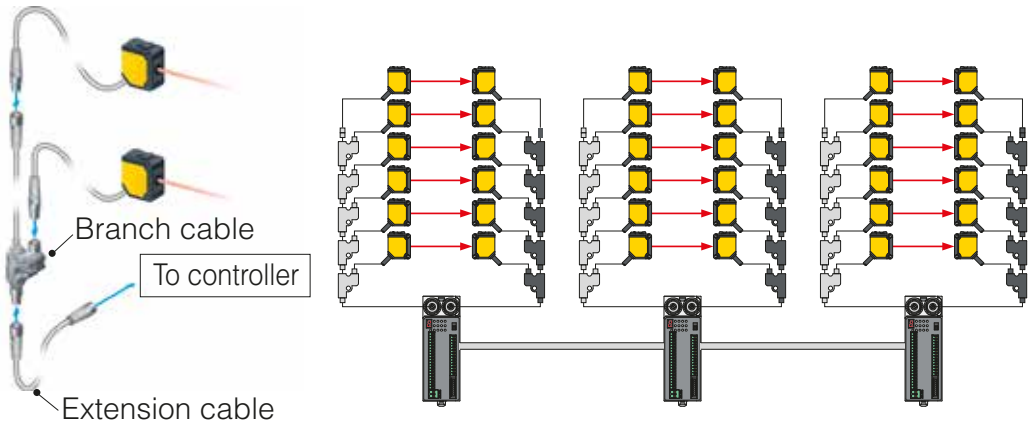
The sensor heads can be used safely even on lines where water splashes.

Interference prevention function

The emission amount adjuster can be used to prevent interference to the surrounding sensors.

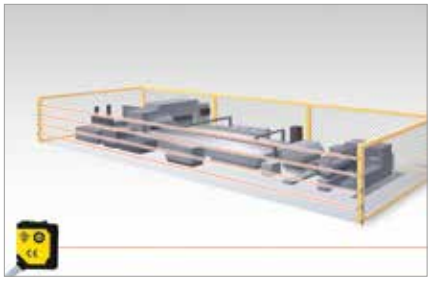
Supports both PNP and NPN polarities

A single unit supports both PNP and NPN polarities, easing stock management.



Typical applications

Protection of long sensing ranges



Protection of small openings

Protection against non-authorized entry

Specifications

Sensor heads	Cable length 0.2m		Cable length 1m	
	-	With emission amount adjuster	-	With emission amount adjuster
Model number	ST4-A1-J02	ST4-A1-J02V	ST4-A1-J1	ST4-A1-J1V
Applicable standards*	EN 61496-1/2 (type 4), ISO 13849-1 (PLe), JEC 61508 (SIL3)			
Sensing range	0 to 15m			
Minimum sensing object	Ø 9mm, opaque object			
Supply voltage	Supplied by controller			
Current consumption	Emitter: max. 11mA, receiver: max. 9mA			
Degree of protection	IP67			
Weight	45g		100g	
Ambient temperature	-10 to +55°C (no dew condensation or ice), storage: -25 to +70°C			
Emitting element	Infrared LED (peak emission wavelength: 870nm)			
Material	Enclosure: PBT, lens: Acrylic, indicator cover: acrylic			
Cables	Shielded cable with connector, 0.2m long		Shielded cable with connector, 1m long	

Sensor type	Controller						High-functional controller					
	ST4-C11						ST4-C12EX					
No. of ST4-□□(V) sensor heads used	1	2	3	4	5	6	1	2	3	4	5	6
PFHd	1.19E-09	1.35E-09	1.50E-09	1.66E-09	1.82E-09	1.97E-09	1.55E-09	1.71E-09	1.86E-09	2.02E-09	2.18E-09	2.33E-09
MTTFd	Min. 100 years											
Applicable standards*	IEC 61496 1/2 (Type 4), EN ISO 13849 (PLd), IEC 61508 (SIL 3)											
Supply voltage	24V DC +10/-15%, ripple P-P max. 10%											
Current consumption	Max. 100mA (excluding sensor heads)						Max. 120mA (excluding sensor heads)					
Transistor output	OSSD1 and OSSD2 (PNP or NPN, switchable), max. 200mA											
Response time	ON -> OFF: max. 25ms OFF response time: max. 90ms (automatic reset), max. 140ms (manual reset)											
Degree of protection	Housing: IP40 (IEC), Terminal: IP20 (IEC)											
Ambient temperature	-10 to +55°C (no dew condensation or ice), storage: -25 to +70°C											
Material	Enclosure: ABS											
Weight	180g						240g					

* Compliant with the applicable standards only if the sensor head is used together with the controllers ST4-C11 or ST4-C12EX.

SD3-A1

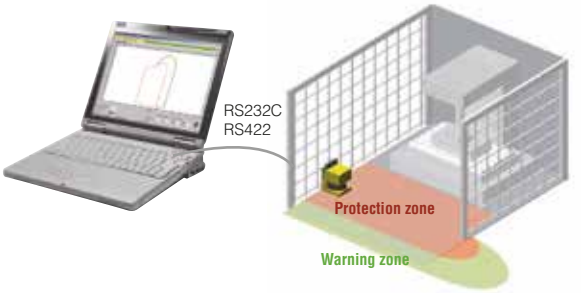
Type 3 · PLd · SIL2

Monitor dangerous areas for unauthorized entry using flexible detection zones!

Features

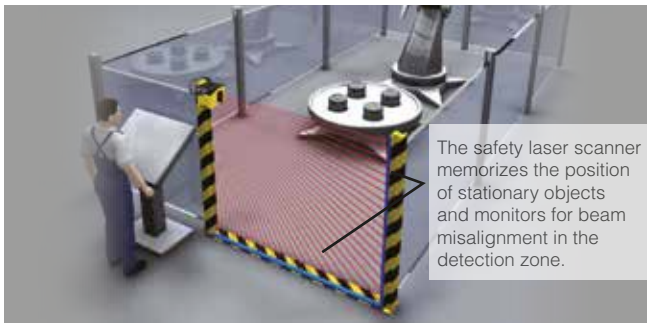
Freely configurable zones

Two zones can be monitored with the **SD3-A1**: the warning zone within a radius of 15m, and the protection zone within a radius of 4m. You can configure the contours of these zones to perfectly accommodate any application. You can configure up to eight zone patterns and switch between them at any given time, even during operation. This flexible zone configuration can be done by PC.



Monitors beam misalignment after installation of safety laser scanner

After the reference boundary function has been activated, the stationary objects will be monitored constantly. The safety laser scanner memorizes the position of the stationary objects and checks for beam misalignment after installation.



Adjustment of response times enables interference prevention

The response time can be adjusted from 80 to 640ms. Mutual interference can be prevented by adjusting the response time when setting up multiple safety laser scanners in close vicinity.

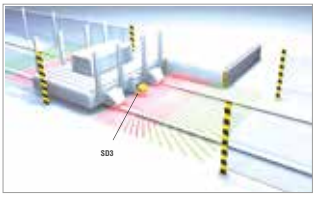
Memorized configurations make post-maintenance recovery easy (optional)

Configurations can be saved in the optional configuration plug's built-in memory and reloaded after maintenance or exchanging safety laser scanners.

Typical applications

Detecting entry into dangerous areas around stationary machines

Ensuring safety around automatic guided vehicles



Protecting workers near conveyor belts

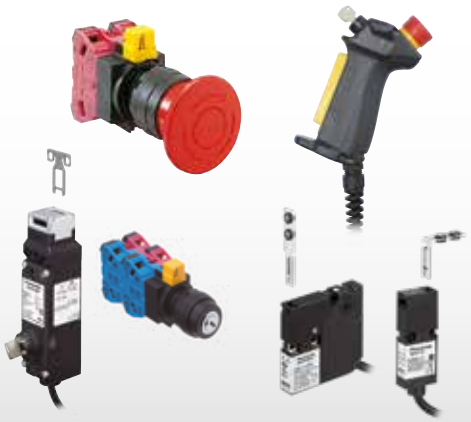
Guarding the sides of automatic guided vehicles (AGV)

Detecting entry into dangerous areas of rotary indexing tables

Detecting entry into areas with robots

Specifications

Type	**Safety laser scanner**					
Model number	**SD3-A1**					
MTTFd	Min. 100 years					
Applicable standards	IEC 61496 1/2 (Type 3), EN ISO 13849 (PLd), IEC 61508 (SIL 2)					
PFHd	$1.5X10^{-7}$ 1/h					
Protection zone	Minimum sensing object	Ø 150mm	Ø 70mm	Ø 50mm	Ø 40mm	Ø 30mm
	Sensing range (radius)	0 to 4.0m	0 to 4.0m	0 to 2.8m	0 to 2.2m	0 to 1.6m
Warning zone	Minimum sensing object	Ø 150mm (fixed)				
	Sensing range (radius)	0 to 15m				
Scanning angle	190° / 180° (by setting)					
Measurement zone	Max. measurement range (radius) 50m (fixed)					
Number of zone settings	Max. 7 + 1 (without detection zone)					
Min. zone setting range	200mm					
Supply voltage	24V DC+20/-30%					
Current consumption	Approx. 300mA (excluding externally connected load)					
Control output (OSSD 1, OSSD 2)	PNP open-collector transistor, 2 outputs Rated operating voltage: supply voltage (U_B) -3.2V Max. source current: 250mA Residual voltage: max. 3.2V					
Laser protection class	Class 1 (IEC 60825)					
Degree of protection	IP65					
Ambient temperature	0 to +50°C, storage: -20 to + 60°C					
Material	Main body: die-cast aluminum, scanner window: thermoplastic resin					
Accessories	SD3-PS (15-pin connector): 1 pc., SD3-RS232 (9-pin connector): 1 pc., Mounting screws (M5 – length 20 mm) hexagon-socket-head bolt: 2 pcs., Mounting screws (M5 – length 16mm) hexagon-socket-head bolt: 2 pcs. (attached to SD3-PS), Instruction manual: 1 copy, Installation CD-ROM (includes additional manual): 1 CD					
Weight	Net weight: approx. 2.1kg, gross weight: approx. 2.9kg					



Safety switches

Safety switches round off
the safety portfolio

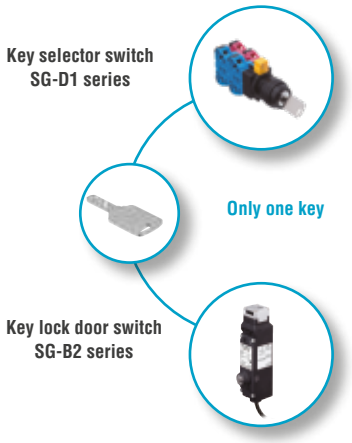
Features

Safety door switches

The SG-B1 series and the SG-A1 series are among the world's thinnest safety door switches. The SG-B1 series features a solenoid interlock and five built-in contacts. The SG-A1 series safety door switch comes with three built-in contacts. Different types of actuators available.

Key lock door switches

Key selector switches protect workers in larger areas that could be hazardous. The **SG-B2** series safety door switch and the **SG-D1** series key selector switch can be used in tandem to add multiple layers of protection.



Emergency stop switches

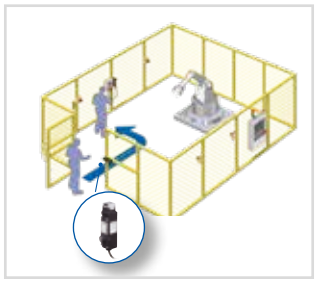
The **SG-E1** series is an emergency stop (E-Stop) switch with push-to-lock and turn-to-reset functionality. For use as an emergency shutoff for the semiconductor industry, models are adhering to SEMI standards (EMO) are also available.

Grip switches

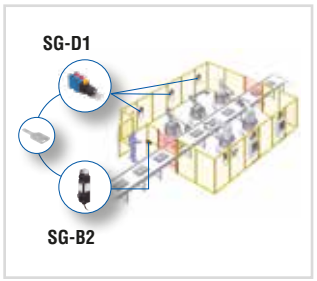
The **SG-C1** series is a grip switch which allows operators who are currently in a hazardous area to operate machines safely. With three grip positions and multiple operating patterns, the SG-C1 series can be used in many different applications.

Typical applications

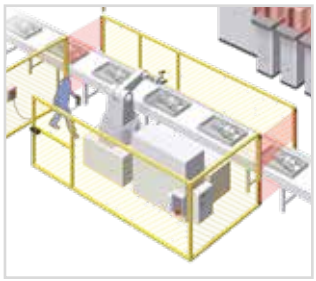
Safety door switch with key



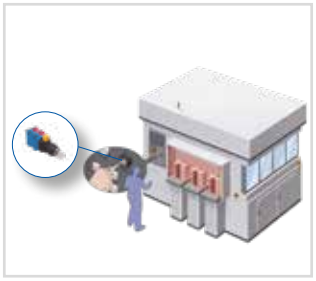
Safety door switch with key for selective area control



Grip switch with a lightweight design for enhanced mobility



Changing settings with a key



Specifications

Model number	SG-A1	SG-B1	SG-B2	SG-D1	SG-E1	SG-C1
Type	Safety door switch			Key lock door switch	Emergency stop switch	Grip switch
Applicable standards	EN 1088, IEC 60947-5-1, EN 60947-5-1, GS-ET-15, UL 508, CSA C22.2 No. 14	EN 1088, IEC 60947-5-1, EN 60947-5-1, GS-ET-19, UL 508, CSA C22.2 No.14		JIS C 8201-5-1, IEC 60947-5-1, EN 60947-5-1, UL 508 (UL listed Certification), CSA 22.2 No.14 (c-UL listed Certification)		IEC 60947-5-1, EN 60947-5-1, JIS C 8201-5-1, GS-ET-22, UL 508, CSA C22.2 No.14
Mechanical lifetime	Min. 1000000 switching cycles			Min. 100000 switching cycles	Min. 500000 switching cycles	Position 1➔2➔1: min. 1000000 switching cycles, Position 1➔2➔3➔1: 100000 switching cycles
Electrical switching life	Min. 1000000 switching cycles			Min. 100000 switching cycles	Min. 500000 switching cycles	Min. 100000 switching cycles
Max. operating frequency	1200 switching cycles/hour	900 switching cycles/hour		1200 switching cycles/hour	900 switching cycles/ hour	1200 switching cycles/hour
Startup speed actuator	0.05 to 1.0m/s			-	-	-
Torque	Min. 60N	Min. 60N	Min. 80N	-	-	-
Ambient temperature	-25 to +70°C	-25 to +50°C	-25 to +70°C	-25 to +60°C		
Degree of protection	IP67 (IEC)		IP65 (IEC)	Front: IP65 (IEC)	Front: IP65 (IEC)	IP66 / IP67: with additional switches and display, IP65: with additional switch and /or display
Degree of pollution	3 (inside 2)			3		3 (inside 2)
Dimensions (H x W x D)	78 x 30 x 15mm	75 x 75 x 15mm	152 x 35 x 40mm	63.8 x 41.4 x 29.4mm 2 contact blocks (without key), 83.8 x 41.4 x 29.4mm 4 contact blocks (without key)	81 x 41.4 x 29, 4mm 2 contact blocks, 101.4 x 41.4 x 29, 4mm 3 contact blocks	198 x 62 x 83mm (with cable gland)

SF-C10

Type 4 · PLe

Fast installation and maintenance for safety light curtains

Features

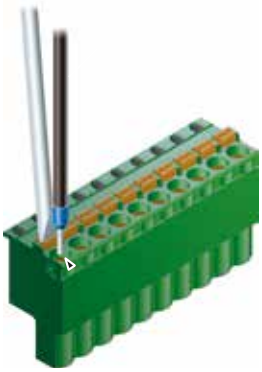
SF-C11 / SF-C14EX

Plug-in type control unit

Quick connection

Connecting to the light curtain is done using plug-in connections, which shortens setup and replacement time.

Easy setup with spring terminals



Reduced maintenance time

Removable terminal blocks help to reduce the time needed for re-wiring during maintenance.

Compact size

SF-C12

Metal enclosure with an IP65 degree of protection

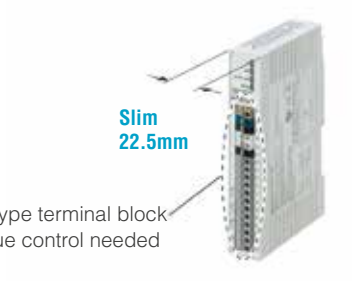
The strong metal enclosure has a built-in safety relay. It has an IP65 protective structure so that it can be set up individually without needing to be inserted into a control panel.

Slim design

SF-C13

Slim control unit

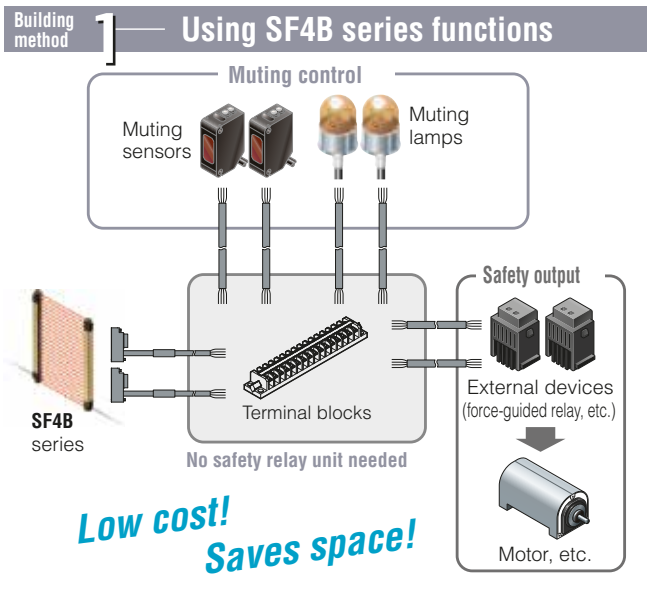
With a width of only 22.5mm, the control unit can be mounted even into narrow spaces inside panels.

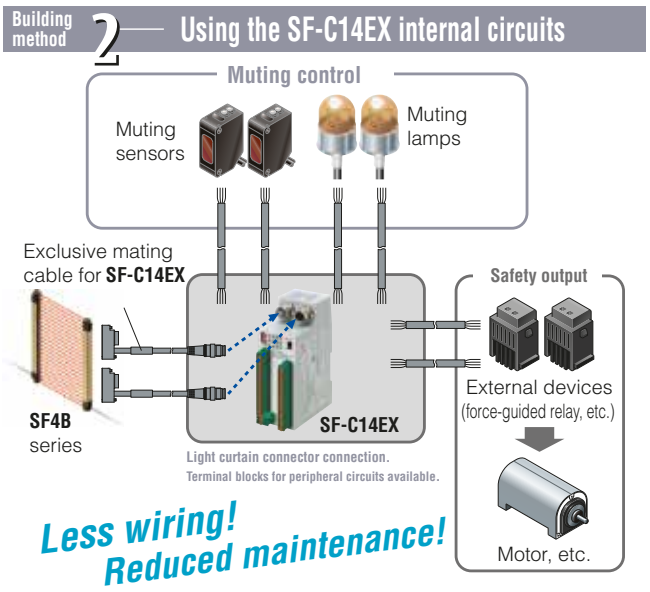


Easy-to-configure muting control circuits

SF-C14EX

It is possible to build muting control circuits using a stand-alone light curtain from the SF4B series. The newly-released application expansion unit allows the light curtain, muting sensors and muting lamps to be connected together directly so that muting control circuits can be built very easily.





Specifications

Model number	SF-C11	SF-C12	SF-C13	SF-C14EX
Description	Plug-in type control unit	Robust control unit	Slim control unit	Application expansion unit
Connectable light curtains	SF4B/SF2B series	SF4B series	Light curtains manufactured by Panasonic (including SD3-A1)	SF4B series
MTTFd	Min. 100 years			
Applicable standards	IEC 61496/1 (type 4), EN ISO 13849 (PLe)			
Category	Compliant with the category 4 standards ISO 13849-1 (EN 954-1, JIS B 9705-1)			
Supply voltage	12V DC ±10% ripple, P-P max. 10%			
Current consumption	Max. 100mA (excluding light curtain and other external devices)			Max. 200mA
OFF response time	Max. 10ms	Max. 14ms	Max. 10ms	Max. 14ms
Degree of protection	IP40, terminal IP20	IP65	IP40, terminal IP20	IP40, terminal IP20

* This type is equipped with the muting control function and an emergency stop input. It can be connected to SF4B safety light curtains.

SF-C21

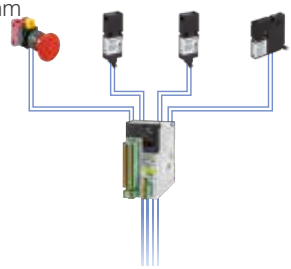
Type 4 · PLe

Multiple safety solutions combined in one control unit

Features

Space-saving and easy to wire

- One **SF-C21** can do the work of four safety relay units. 10 inputs and 8outputs
- Compact size
  height 97mm x width 45mm

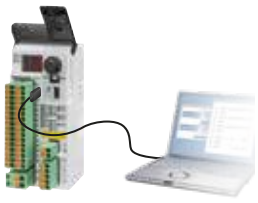


Absolutely no programming skills required

- Eight preset logics, safety-certified and compatible to control category 4 PLe
- The OFF delay time can be easily set by turning the rotary switch
- Password protection prevents inadvertent changes to the logic

Easy to monitor status with a PLC

- Four auxiliary outputs are provided
- RS485 communications (MODBUS RTU)



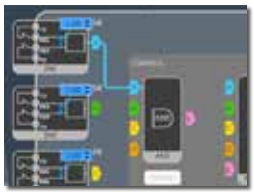
Application-based software customization

All possible logic combinations are integrated in the SF-C control unit. The logic function blocks are predefined in the software and easy to combine. The software has been safety-certified by the certification authorities. With the help of a simulation mode it is possible to test in advance whether the safety functions work as intended.

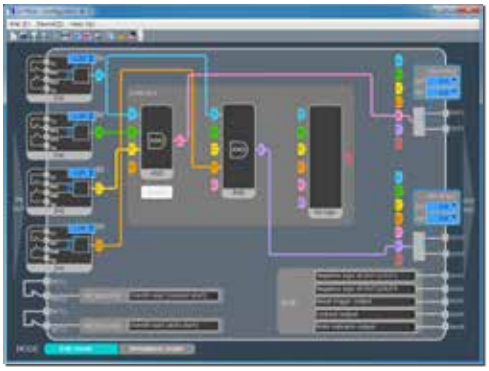
Easy configuration in 3 steps

1) Select device to be connected

2) Select output operation

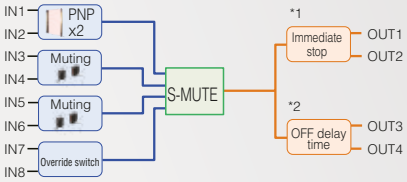


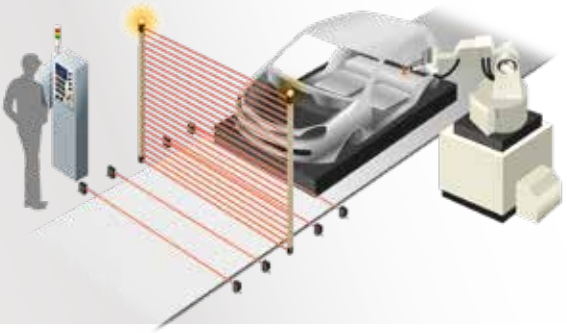
3) Connect



Sequential muting control

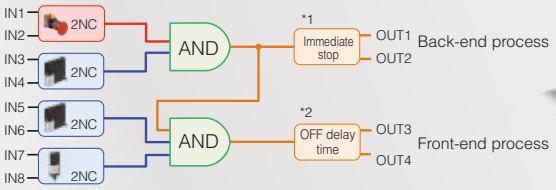
The light curtain will be muted temporarily if the muting input switches to ON in the predefined sequence.

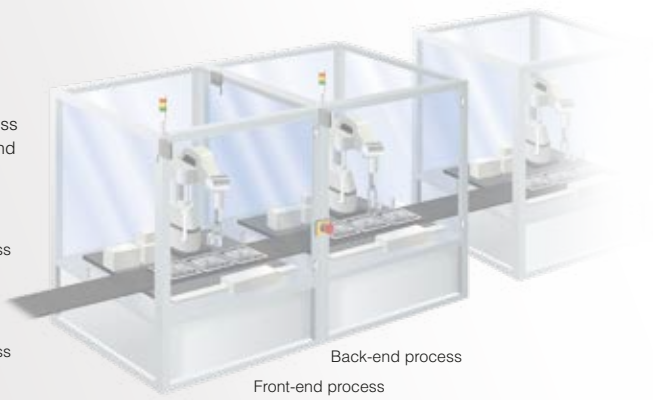




Partial stop control 2

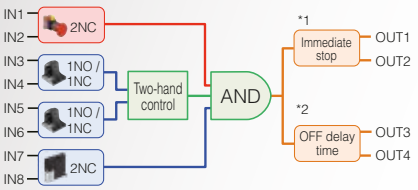
When the emergency stop input or the input from the back-end process turn OFF, all control outputs turn OFF. When the input from the front-end process turns OFF, only the corresponding control output turns OFF.





Two-hand control

This output operation is used for two-hand control. Only when both switches of the two-hand control are operated within 0.5 seconds, will the control output turn ON.



*1 The time delay can be set with **Configurator SF-C**.
*2 The initial OFF delay is set to 0 seconds.

Specifications

Safety standards	IEC 61508-1 to 7, EN 61508-1 to 7 (SIL3), ISO 13849-1 (up to category 4, PLe), IEC 61131-2, IEC 61010-2-201, IEC 62061 (SILCL3), UL 61010-1, UL 61010-2-201	
EMC standards	IEC 61000-6-2, IEC 61326-3-1, EN 55011	
Related standards	IEC 60947-1, IEC 60947-5-1, IEC 60947-5-2, IEC 60947-5-5, IEC 60947-5-8, IEC 61496-1, IEC TS 62046, ISO 13851	
Safety input	2 x 4 inputs (OFF response time max. 0.7ms; ON response time max. 10ms)	
Safety control output	PNP open-collector transistor with 2 outputs x 2 (OFF response time max. 10ms; ON response time max. 100ms)	
Auxiliary output	PNP open-collector transistor with 1 output x 4 (Any of the auxiliary outputs can be customized using the software tool)	
Logic selection function	No. 0: Customization control No. 2: Parallel muting control No. 4: Partial stop control 1 No. 6: Two-hand control No. 8: Operation mode selection control	No. 1: Overall stop control No. 3: Sequential muting control No. 5: Partial stop control 2 No. 7: OR control
Interfaces	RS485: Detachable spring-cage terminal block, USB: Mini-B male	

Global Network

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Panasonic Electric Works

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