Light Curtains SF4D series

Compact & Robust Safety Light Curtain [Type 4 PLe SIL3]

SF4D series

FEATURES

- **Type 4 with very robust aluminum housing :** Compared to the SF4B<V2> series, the internal unit has been downsized considerably. The volume of the internal unit has been reduced by 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.
- **Extreme long sensing range up to 15m** : The SF4D series combines both a Shot and an Long mode operating range in one unit. These series designed to increase power of emitter element and high resistance to dust, dirt contributes to the reduction of maintenance frequency.
- helps to reduce the number of different models and costs.
- **Status and stability indicators for easy installation and maintenance :** Thanks to a higher emission power, the SF4D not only works reliably on shorter distances, but also covers a longer sensing range than previous models.
- **Integrated PNP and NPN outputs :** The SF4D series combines both a PNP and an NPN transistor output in a single model. This helps to reduce the number of different models and costs.
- **Complies with all common norms and standards :** The safety light curtain has IP67 and IP65 (IEC) degree of protection and complies with NEMA Type 13 (NEMA: National Electrical Manufacturers Association), a standard to determine how well the enclosures of electronic components resist the infiltration of dust and moisture. For details refer to NEMA 250 "Enclosures for Electrical Equipment (1000 volts Maximum)".
- **No dead zones :** The SF4D inherits the no-dead zone design of the SF4B series. Even in an L-shaped or U-shaped layout, the beam pitch does not change (excluding finger protection type). This makes the calculation of the safety distance easier.
- **Finger, hand and arm protection type available in heights of up to 1.9m :** The length of the main unit equals the protective height so that installation is possible in places where space is limited. The SF4D can be connected in series up to 5 units.
- **Digital indicator for stable light reception :** The incident beam intensity indicator (also called stable-light-reception indicator) helps to adjust the beam during installation and to control the light quality during operation. The amount and quality of the light received is indicated by the LED color and a one-digit display. When the LED lights up in orange, the light is unstable. Stable light is indicated by a green LED. The numbers displayed range from 1 to 3. The higher the number, the more stable the light. This way, it is easy to discover and remove errors caused by dirt on the detection surface or beam misalignment.

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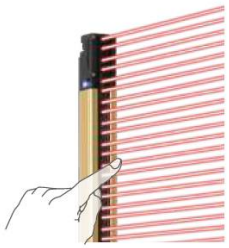
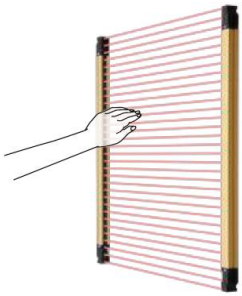
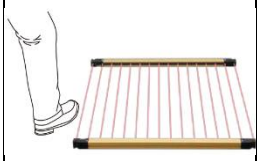
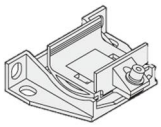
SPECIFICATIONS

Type		Appearance	Operation range	Model no.	Number of beam channels	Protective height
Finger protection type	Min. sensing object ø14 mm (10 mm beam pitch)		0.2 to 7 m (Short mode) 0.8 to 12 m (Long mode) (selectable by DIP switch)	SF4D-F15	15	150 mm
				SF4D-F23	23	230 mm
				SF4D-F31	31	310 mm
				SF4D-F39	39	390 mm
				SF4D-F47	47	470 mm
				SF4D-F55	55	550 mm
				SF4D-F63	63	630 mm
				SF4D-F71	71	710 mm
				SF4D-F79	79	790 mm
				SF4D-F95	95	950 mm
				SF4D-F111	111	1110 mm
				SF4D-F127	127	1270 mm
Hand protection type	Min. sensing object ø25 mm (20 mm beam pitch)		0.2 to 9 m (Short mode) 0.8 to 15 m (Long mode) (selectable by DIP switch)	SF4D-H8	8	150 mm
				SF4D-H12	12	230 mm
				SF4D-H16	16	310 mm
				SF4D-H20	20	390 mm
				SF4D-H24	24	470 mm
				SF4D-H28	28	550 mm
				SF4D-H32	32	630 mm
				SF4D-H36	36	710 mm
				SF4D-H40	40	790 mm
				SF4D-H48	48	950 mm
				SF4D-H56	56	1110 mm
				SF4D-H64	64	1270 mm
				SF4D-H72	72	1430 mm
				SF4D-H80	80	1590 mm
				SF4D-H88	88	1750 mm
				SF4D-H96	96	1910 mm
Arm protection type	(40 mm beam pitch) Min. sensing object ø45 mm		0.2 to 9 m (Short mode) 0.8 to 15 m (Long mode) (selectable by DIP switch)	SF4D-A4	4	150 mm
				SF4D-A6	6	230 mm
				SF4D-A8	8	310 mm
				SF4D-A10	10	390 mm
				SF4D-A12	12	470 mm
				SF4D-A14	14	550 mm
				SF4D-A16	16	630 mm
				SF4D-A18	18	710 mm
				SF4D-A20	20	790 mm
				SF4D-A24	24	950 mm
				SF4D-A28	28	1110 mm
				SF4D-A32	32	1270 mm
				SF4D-A36	36	1430 mm
				SF4D-A40	40	1590 mm
				SF4D-A44	44	1750 mm
				SF4D-A48	48	1910 mm

- **Mounting brackets**

<table>
<tr><th>Type</th><th>Appearance</th><th>Model no.</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">Beam adjustment mounting bracket</td><td rowspan="3">  </td><td>MS-SFD-1-5</td><td>For mounting with M5 / M8 hexagon-socket head bolt</td><td rowspan="3">Mounting bracket for rear or side installation of safety light curtain.
4 pcs./set for emitter and receiver
Material: Cold rolled carbon steel (SPCC)</td></tr>
<tr><td>MS-SFD-1-6</td><td>For mounting with M6 hexagon-socket head bolt</td></tr>
<tr><td>MS-SFD-1-8</td><td>For mounting with M8 hexagon-socket head bolt</td></tr>
<tr><td>Dead zoneless beam adjustment mounting bracket</td><td>  </td><td>MS-SFD-3-6</td><td colspan="2">Dead zoneless mounting is possible in which mounting brackets do not extend beyond the protective height.
(4 pcs./set for emitter and receiver)
Material: Die-cast zinc alloy</td></tr>
<tr><td>Intermediate supporting bracket</td><td>  </td><td>MS-SFB-2</td><td colspan="2">This bracket holds the safety light curtain at the middle.
(2 pcs./set for emitter and receiver)
Use when installing the safety light curtain in a location subject to vibration
Material: Die-cast zinc alloy</td></tr>
<tr><td>SF4B-G compatible mounting bracket</td><td>  </td><td>MS-SFD-4BG</td><td colspan="2">Mounting bracket for replacement of previous SF4B-□G□<V2> model with this device.
(4 pcs./set for emitter and receiver)
There is no need to change the mounting hole pitch.
Material: Cold rolled carbon steel (SPCC)</td></tr>
</table>

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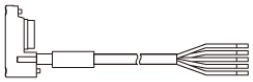
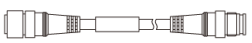
- **Mating cable / Extension cable**

<table>
<tr><th colspan="3">Type</th><th>Appearance</th><th>Model no.</th><th colspan="3">Description</th></tr>
<tr><td rowspan="11">Standard components (8-core cable)</td><td rowspan="4">Bottom cap cable</td><td rowspan="4">Discrete wire</td><td rowspan="4">  </td><td>SFD-CCB3</td><td>Length: 3 m
Net weight: 290 g approx. (2 cables)</td><td colspan="2" rowspan="4">Used for connecting to the safety light curtain and to other cables or the SF-C13 / SF-C21 control unit.
2 cables/set for emitter and receiver</td></tr>
<tr><td>SFD-CCB7</td><td>Length: 7 m
Net weight: 620 g approx. (2 cables)</td></tr>
<tr><td>SFD-CCB10</td><td>Length: 10 m
Net weight: 900 g approx. (2 cables)</td></tr>
<tr><td>SFD-CCB15</td><td>Length: 15 m
Net weight: 1,300 g approx. (2 cables)</td></tr>
<tr><td rowspan="3">Connector</td><td rowspan="3">  </td><td>SFD-CB05</td><td>Length: 0.5 m
Net weight: 80 g approx. (2 cables)</td><td colspan="2" rowspan="3">Used for connecting to the safety light curtain and to an extension cable or the SF-C11 control unit.
2 cables/set for emitter and receiver
Connector outer diameter: ø14 mm max.</td></tr>
<tr><td>SFD-CB5</td><td>Length: 5 m
Net weight: 480 g approx. (2 cables)</td></tr>
<tr><td>SFD-CB10</td><td>Length: 10 m
Net weight: 950 g approx. (2 cables)</td></tr>
<tr><td rowspan="7">Extension cable</td><td rowspan="2">With connector on one end</td><td rowspan="2">  </td><td>SFD-CC3</td><td>Length: 3 m
Net weight: 290 g approx. (2 cables)</td><td colspan="2" rowspan="2">Used for connecting to an extension cable or the SF-C13 / SF-C21 control unit.
2 cables/set for emitter and receiver
SFD-CC10 Connector outer diameter: ø14 mm max.</td></tr>
<tr><td>SFD-CC10</td><td>Length: 10 m
Net weight: 900 g approx. (2 cables)</td></tr>
<tr><td rowspan="5">With connectors on both ends</td><td rowspan="2">For emitter</td><td rowspan="5">  </td><td>SFB-CCJ3E</td><td>Length: 3 m
Net weight: 190 g approx. (2 cables)</td><td rowspan="2">1 cable for emitter
Connector color: Gray</td><td rowspan="5">Used for connecting to an extension cable or the SF-C11 control unit.
Connector outer diameter: ø14 mm max.</td></tr>
<tr><td>SFB-CCJ10E</td><td>Length: 10 m
Net weight: 580 g approx. (2 cables)</td></tr>
<tr><td rowspan="3">For receiver</td><td>SFB-CCJ3D</td><td>Length: 3 m
Net weight: 210 g approx. (2 cables)</td><td rowspan="3">1 cable for receiver
Connector color: Black</td></tr>
<tr><td>SFB-CCJ10D</td><td>Length: 10 m
Net weight: 600 g approx. (2 cables)</td></tr>
</table>

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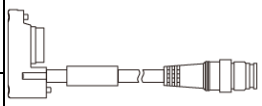
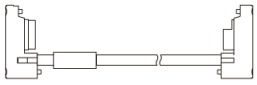
Type		Appearance	Model no.	Description	
Compatible cable	For SF4-AH□ (PNP type)		SFD-CB05-A-P	Length: 0.5 m Net weight: 80 g approx. (2 cables)	8-core bottom cap cables. The connector cables (on control circuit side) used with previous safety light curtains can be connected without any modification, thus enabling easy replacement of the existing devices with the SF4D series products. 2 cables/set for emitter and receiver Connector outer diameter: ø14 mm max.
	For SF4-AH□-N (NPN type)		SFD-CB05-A-N		
Cable for series connection			SFD-CSL005	Length: 0.05 m Net weight: 35 g approx. (2 cables)	Used to connect safety light curtains in series. 2 cables/set for emitter and receiver (common for emitter and receiver) Cable color: Gray with black line (common for emitter and receiver)
			SFD-CSL01	Length: 0.1 m Net weight: 40 g approx. (2 cables)	
			SFD-CSL05	Length: 0.5 m Net weight: 80 g approx. (2 cables)	
			SFD-CSL1	Length: 1 m Net weight: 130 g approx. (2 cables)	
			SFD-CSL5	Length: 5 m Net weight: 480 g approx. (2 cables)	
			SFD-CSL10	Length: 10 m Net weight: 950 g approx. (2 cables)	

OPTIONS

- **Control units**

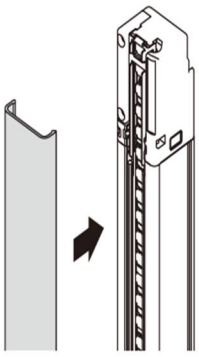
Type	Appearance	Model no.	Application cable	Description
Safety control unit		SF-C21	Safety light curtain Bottom cap cable: SFD-CCB□ Extension cable: SFD-CC□	Use a discrete wire cable to connect to the safety light curtain. Logic customization, monitoring, and simulation functions are also provided. Compatible with up to Control Category 4.
Safety control unit		SF-C11	Safety light curtain Bottom cap cable: SFD-CB□ Extension cable: SFB-CCJ□	Use 8-core cable with connector to connect to the safety light curtain. Muting function cannot be used. Compatible with up to Control Category 4. Supports presses used in Japan when combined with SF4D-□-01 (shearing machines not supported)
Safety control unit		SF-C13	Safety light curtain Bottom cap cable: SFD-CCB□ Extension cable: SFD-CC□	Use a discrete wire cable to connect to the safety light curtain. Muting function can be used. Compatible with up to Control Category 4. Supports presses used in Japan when combined with SF4D-□-01 (shearing machines not supported)

- **Communication module**

Type	Appearance	Model no.	Description
Communication module		SF4D-TM1	The setting software, Configurator Light Curtain, is required when using the SF4D-TM1 communication module. The setting software can be downloaded free from our website. USB cable is not provided with the product. USB2.0 cable (A: Mini-B) must be prepared by the user. <In the case of SF4D-F□/H□/A□> The communication module serves as a conversion module for the connection of a PC to the SF4D series for changing function settings and monitoring statuses (light incidence / light blockage, lockout, etc.). The communication module can also be used to copy settings from SF4D series products without the connection of a PC. <In the case of SF4D-□-01> The communication module serves as a conversion module for the connection of a PC to the SF4D series for monitoring statuses (light incidence / light blockage, lockout, etc.). The communication module cannot be used by itself.

- **Front protection cover**

Designation / Applicable beam axes			Appearance	Front protection cover (wide type)	Description
Finger	Hand	Arm / Foot		Model no.	
15	8	4		FC-SFDH-8	
23	12	6		FC-SFDH-12	
31	16	8		FC-SFDH-16	
39	20	10		FC-SFDH-20	
47	24	12		FC-SFDH-24	
55	28	14		FC-SFDH-28	
63	32	16		FC-SFDH-32	
71	36	18		FC-SFDH-36	
79	40	20		FC-SFDH-40	
95	48	24		FC-SFDH-48	
111	56	28		FC-SFDH-56	
127	64	32		FC-SFDH-64	
----	72	36		FC-SFDH-72	
----	80	40		FC-SFDH-80	
----	88	44	Material: Polycarbonate	FC-SFDH-88	
----	96	48		FC-SFDH-96	



The model numbers in the table refer to a single unit, not a pair of units. If you wish to protect both the emitter and the receiver, you need to order two pieces.

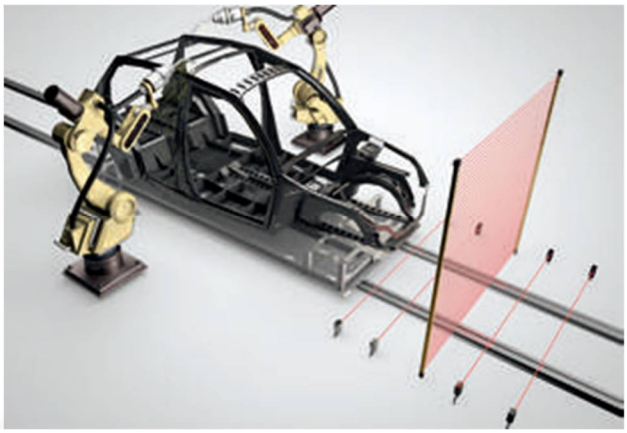
Light Curtains

SF4D series

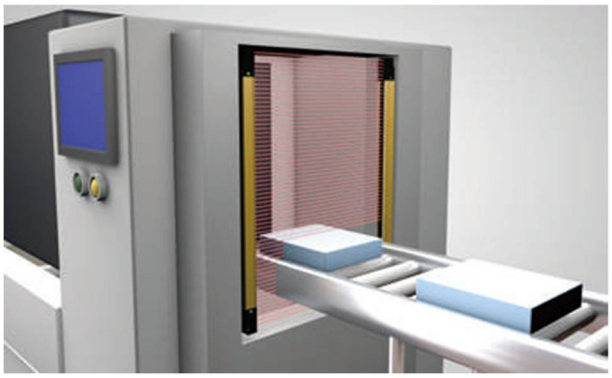
APPLICATIONS

Complete housing of a robot

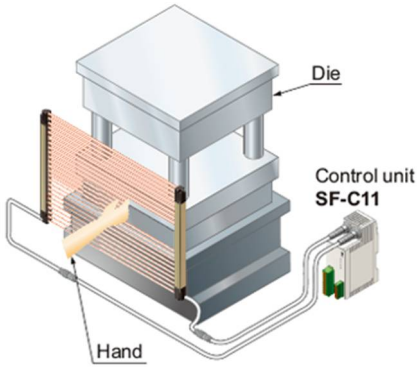
Safety Control in Assembly Process



Protection for small openings

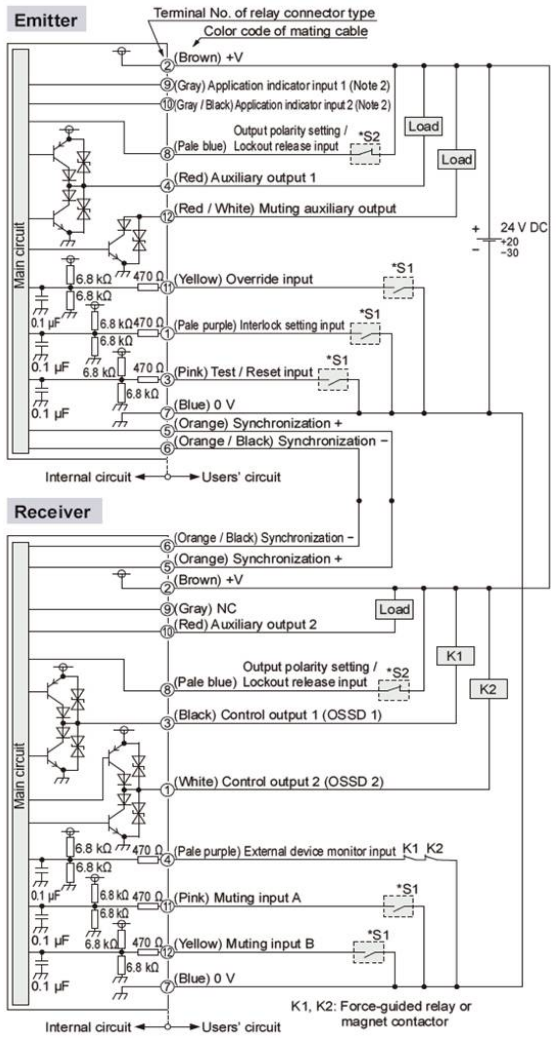


Safeguard for press machine



I/O circuit diagram
(using line synchronization setting and 12-core or 8-core cable, not connected in series/parallel)

- **NPN output type**



Notes: 1) The above diagram is when using a 12-core cable. If an 8-core cable is used, the yellow, gray, red / white, gray / black, red (receiver side), pink (receiver side) lead wires are absent.
2) 0 to +2.5 V (sink current: 5 mA or less): ON, Open: OFF

*S1

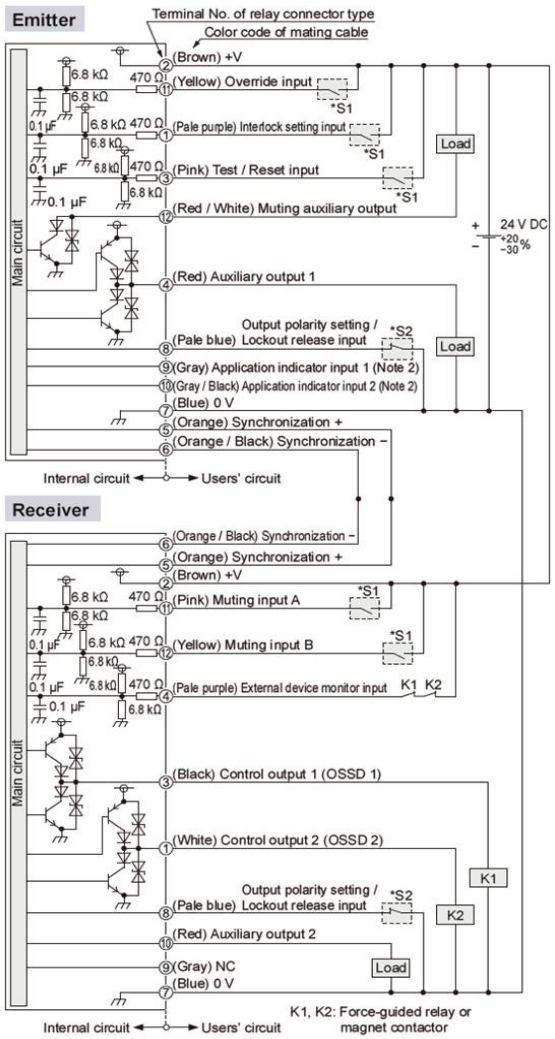
Switch S1
- Test / Reset input
  <Manual reset>
  0 to +2.5 V (source current 5 mA or less): Emission halt
  Open: Emission
  <Auto reset>
  0 to +2.5 V (source current 5 mA or less): Emission
  Open: Emission halt
- Interlock setting input, Override input, Muting input A / B, External device monitor input
  0 to +2.5 V (source current 5 mA or less): Valid
  Open: Invalid

*S2

Switch S2
- Output polarity setting/lockout release input
  Vs to Vs − 2.5 V (sink current: 5 mA or less): NPN output (Note 3)
  Short-circuited within 150 ms to 4 s approx. after released from short-circuiting condition: Lockout release

Notes: 3) Vs is the applying supply voltage.

- **PNP output type**



Notes: 1) The above diagram is when using a 12-core cable. If an 8-core cable is used, the yellow, gray, red / white, gray / black, red (receiver side), pink (receiver side) lead wires are absent.
2) Vs to Vs - 2.5 V (sink current: 5 mA or less): ON (Note 3), Open: OFF

*S1

Switch S1
- Test / Reset input
  <Manual reset>
  Vs to Vs − 2.5 V (sink current 5 mA or less): Emission halt (Note 3)
  Open: Emission
  <Auto reset>
  Vs to Vs − 2.5 V (sink current 5 mA or less): Emission (Note 3)
  Open: Emission halt
- Interlock setting input, Override input, Muting input A / B, External device monitor input
  Vs to Vs − 2.5 V (sink current 5 mA or less): Valid (Note 3)
  Open: Invalid

*S2

Switch S2
- Output polarity setting/lockout release input
  0 to +2.5 V (source current: 5 mA or less): PNP output
  Short-circuited within 150 ms to 4 s approx. after released from short-circuiting condition: Lockout release

Notes: 3) Vs is the applying supply voltage.