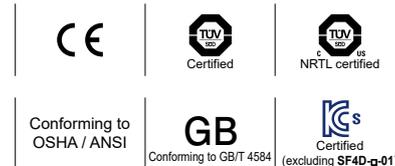


Type4 PLe SIL3

Compact & Robust

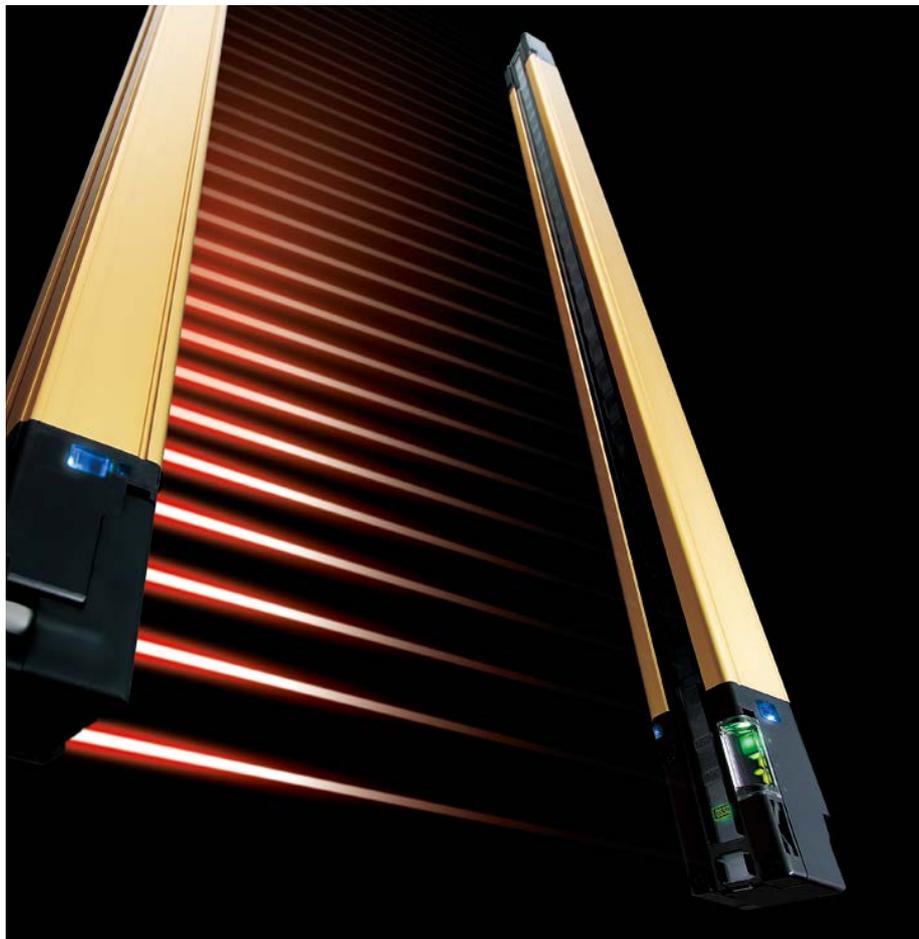
## Safety Light Curtain

SF4D SERIES



### Experience the Ease of Use!

Slim & Robust Unit Body, New High Power Optical System, Functional Design



2022.7

# Slim & Robust Unit Body

## Combined with New Optical System

Experience the ease of use achieved by reflecting the opinions of people involved in installation design, installation, operation and maintenance

**Compact** **Robust** **Safety Light Curtain**

## Introducing the

# SF4D

## Series

Perfect  
fit to

**30 mm × 30 mm**

**1.181 in × 1.181 in**

aluminum frame

\* When installed on back side

# Slim & Robust

Robust unit body for reliable operation even under harsh conditions

# New Optical System

Ample power and easy beam adjustment

**Evolved Performance and Functional Design**  
**Experience the Ease of Use!**

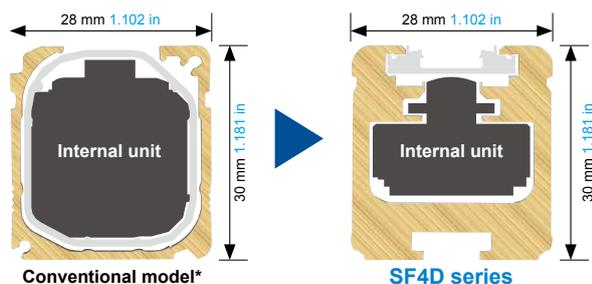
28 mm  
1.102 in

30 mm  
1.181 in

# Slim & Robust Unit Body + New High Power Optical System = Stable Operation Even under Harsh Environment

The SF4D series features a slim and robust unit body and new high power optical system. The tough unit body prevents entry of liquids and dust. The new series ensures stable and reliable operation of safety light curtain even under an inhospitable environment.

## Slim and robust unit body resists twisting, warping and impact

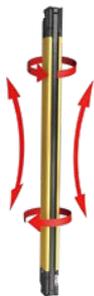


### Downsized internal unit, increased case thickness

The internal unit was redesigned and downsized extensively. The internal unit was downsized to less than 40% (volume ratio) as compared to the conventional model while achieving higher performance. The case structure was also optimized and offers high rigidity without any change in external dimensions. The SF4D series provides high performance and high reliability while maintaining the installation and wiring compatibility with the previous models.

\*SF4B series Ver. 2 (excluding robust type SF4B-□G□ <V2>)

### Resists twisting and bending!



### Resists shock!



Perfect fit to 30 mm × 30 mm 1.181 in × 1.181 in aluminum frame  
\* When installed on back side

■ Unit size (width × depth)

28 mm × 30 mm  
1.102 in × 1.181 in

■ Width of detection surface

8.1 mm  
0.319 in

Narrower sensing surface for improved protection against collisions



## Mounting brackets feature both rigidity and ease of handling

Completely new mounting brackets and structure. In addition to strengthening the rigidity of the mounting brackets, we have also improved the method of attachment to the safety light curtain unit to significantly increase the mount strength. The dead zoneless mounting bracket and the optional mounting bracket\* that does not extend from aluminum frame are also available for easier use.

\*in case of rear mounting



Beam adjustment mounting bracket

M5 × 2 tightening type: MS-SFD-1-5  
M6 × 1 tightening type: MS-SFD-1-6  
M8 × 1 tightening type: MS-SFD-1-8



Dead zoneless mounting bracket MS-SFD-3-6



SF4B-G compatible mounting bracket MS-SFD-4BG



Conventional model

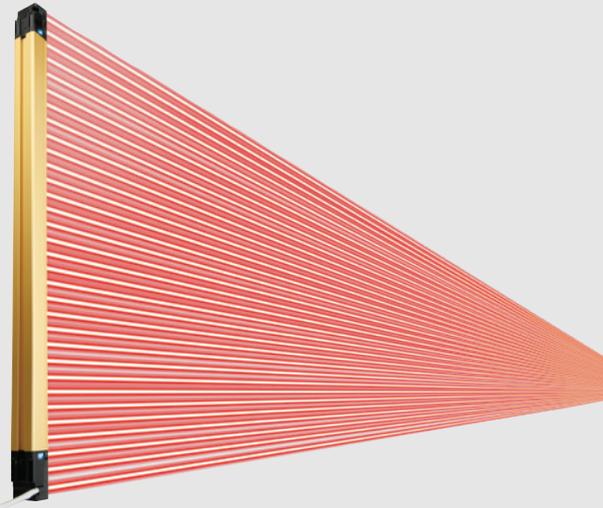
Mounting brackets are attached to the top case and bottom case. When the unit was subjected to intense shock, a large load was occasionally placed on the aluminum case joint.



SF4D series

The mounting brackets is attached to the back of the rigid aluminum case. This reduces the load on the top case and bottom case, and helps prevent beam misalignment and failure due to shock.

## New high power optical system offering stable operation even for long distance setup



### Increased power of emitter element

The power of the emitter has been increased significantly. The high resistance to dust and dirt contributes to the reduction of maintenance frequency.

#### Operating range

##### ■Short mode (factory setting)

• Finger protection type

0.2 to 7 m

0.656 to 22.966 ft

• Hand protection type

• Arm / Foot protection type

0.2 to 9 m

0.656 to 29.528 ft

##### ■Long mode

• Finger protection type

0.8 to 12 m

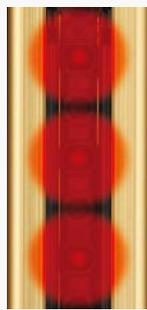
2.625 to 39.370 ft

• Hand protection type

• Arm / Foot protection type

0.8 to 15 m

2.625 to 49.213 ft

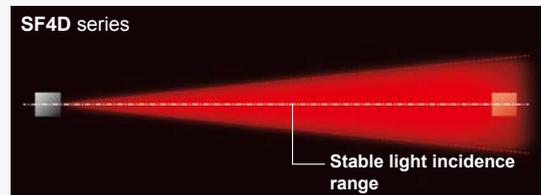


### Minimization of deviations among elements

We incorporated the element alignment technology that we cultivated for fiber sensors in the safety light curtain. This minimizes curves due to emitter and receiver mounting deviations and quality deviations due to differences in individual elements.

### Redesigned emitter element layout and structure

The scattering light energy from each emitter element is guided efficiently through the lens. The light energy of the emitter element is utilized fully, and the light distribution characteristics were optimized for the specific aperture angle.



\* The aperture angle of a Type 4 safety light curtain is specified as a maximum of 2.5° each on the right and left at a detection distance of 3 m 9.843 ft or more.

#### Other benefits

"Slim & robust unit body" and "new high power optical system"

**mean easy alignment of beam axes even over a long distance.**

The **SF4D** series offers improved resistance to twisting and warping to enable easier adjustment of beam axes over a long distance. Combined with the new high power optical system featuring the redesigned emitter element, light distribution characteristics and layout, the new series has realized the ease of beam axis adjustment.

Furthermore, the **SF4D** series is equipped with an application indicator to further facilitate beam axis adjustment as well as a digital indicator with a numeric display of light incidence margin, thus helping reduce the time required for beam axis adjustment.

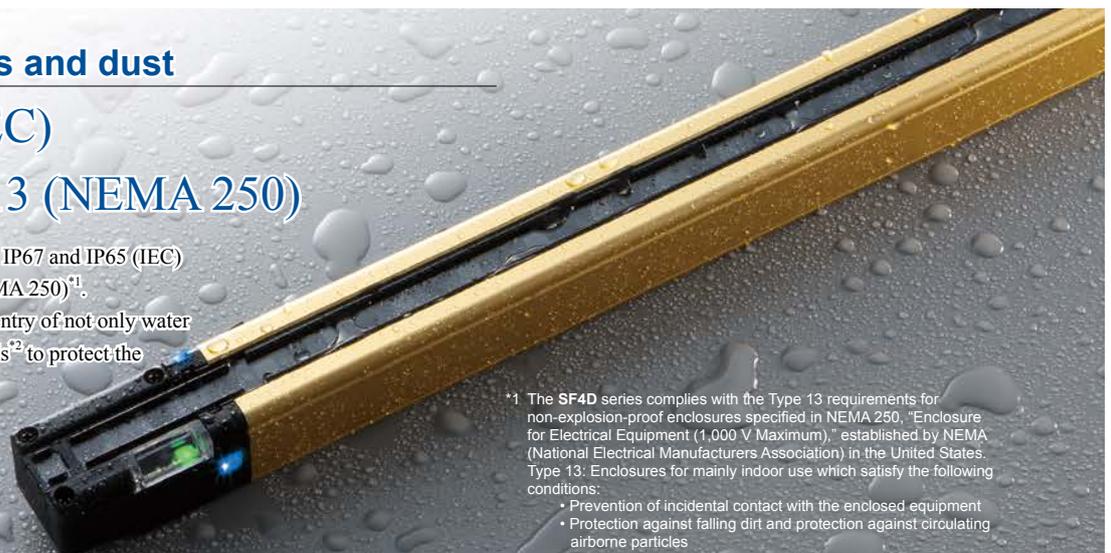
## Shuts out liquids and dust

IP67, IP65 (IEC)

NEMA Type 13 (NEMA 250)

The **SF4D** series complies with IP67 and IP65 (IEC) as well as NEMA Type 13 (NEMA 250)<sup>\*1</sup>.

The unit structure prevents the entry of not only water but also coolant and other liquids<sup>\*\*2</sup> to protect the internal unit.



\*1 The **SF4D** series complies with the Type 13 requirements for non-explosion-proof enclosures specified in NEMA 250, "Enclosure for Electrical Equipment (1,000 V Maximum)," established by NEMA (National Electrical Manufacturers Association) in the United States. Type 13: Enclosures for mainly indoor use which satisfy the following conditions:

- Prevention of incidental contact with the enclosed equipment
- Protection against falling dirt and protection against circulating airborne particles
- Protection against spraying, splashing and seepage of water and noncorrosive lubricants

\*\*2 If used in a place where cutting fluid can splash, additives in the fluid may cause degradation. Please check in advance whether the **SF4D** series is resistant to the specific cutting fluid used by your company.

# Experience the Ease of Installation, Construction and Maintenance!

**Multifunctional indicators** for an at-a-glance understanding of the status of safety light curtain

## Digital indicator with a numeric display of light incidence margin facilitates beam axis adjustment and preventive maintenance.

The light incidence margin is indicated by the “stable light incidence indicator” and “digital indicator”. This function enables appropriate beam adjustment and work quality control during installation of the device. The indicators also show whether there is dirt on the detection surface or beam misalignment due to play. This enables the numeric display to be used for startup inspection and preventative maintenance.

\* When optical synchronization is set, only the indicator on the receiver lights up.



### Stable light incidence indicator

- Stable light incidence: Lights **green**
- Unstable light incidence: Lights **orange**
- Light blocked: Off

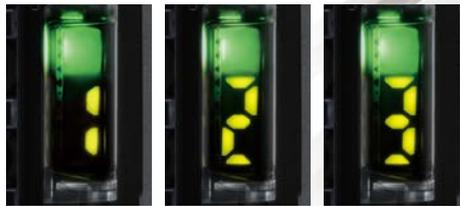
### Digital indicator

- Incident light level 3: Lights green “3”
- Incident light level 2: Lights green “2”
- Incident light level 1: Lights green “1”
- Light blocked: Off

### Unstable light incidence



### Stable light incidence



← Low Margin of incident light intensity High →

Other features!

### Well-thought-out indicators

The indicators show stable light incidence status and notify various conditions. The OSSD indicator, interlock indicator and function setting indicator are arranged between the beam axes for easy visibility.

Light emission intensity control indicator

Test indicator

Operation indicator



Emitter

Stable light incidence indicator

Digital indicator



Receiver

Function setting indicator

Interlock indicator

OSSD indicator

### Light incidence intensity indication

The indicator shows the light incidence margin with a numeric display (1 to 3). The displayed number decreases when there is dirt on the detection surface or beam axis misalignment occurs due to a loose mounting condition. This provides useful information during pre-operation inspection and preventive maintenance.

\* Only the indicator on the receiver lights up when optical synchronization is set.

### Polarity indication

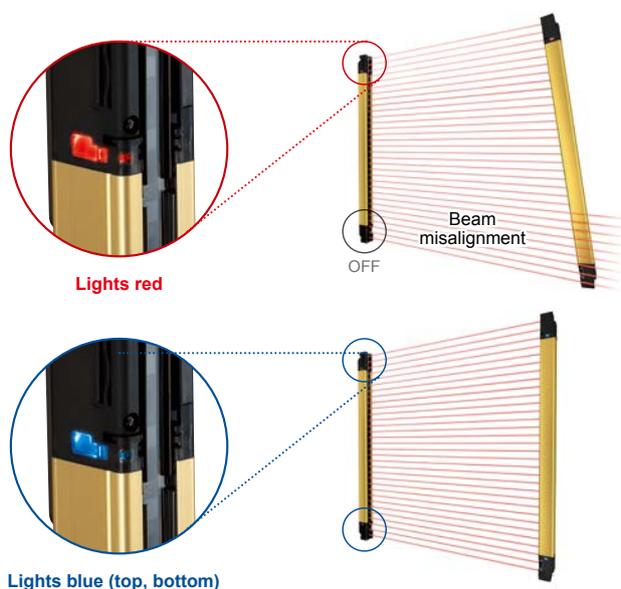
The indicator shows the set polarity when power is turned on. This makes it easy to confirm proper operation after wiring.

### Error indication

The new series is also equipped with the error indication function, a well-received feature of our previous models. In an environment where a PC cannot be brought in or when a problem occurs at a remote location, the displayed error number lets you identify the cause of problem. This facilitates restoration work.

## Indicator for improved work efficiency

The application indicator improves work efficiency in a variety of ways by providing support to work activities ranging from daily equipment operation to installation and maintenance. The indicator function can be switched between two options.



### Beam axis adjustment mode

The color of the indicator notifies whether the beam axes of both top and bottom ends are aligned properly. The indicator is easy to see from any direction so mistakes can be prevented in a long-distance setup.

**When beam axes of both top and bottom ends are aligned properly:**  
All application indicators light blue.

**When beam axis of either of top end or bottom end is aligned:**  
The indicators of only the aligned side light red.

**When beam axes of both top and bottom ends are misaligned:**  
All application indicators are OFF.

\* When optical synchronization is set, only the indicator on the receiver lights up.

Tidbit

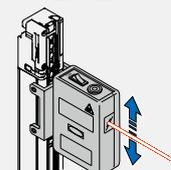
### Laser alignment tool enables pre-operation adjustment

The optional laser alignment tool, **SF-LAT-2N**, enables the adjustment of beam axes by emitting a laser spot light.

Since it is powered by batteries, adjustment can be made before power is supplied to the equipment, thus reducing the pre-operation setup time.

### Laser alignment tool

• SF-LAT-2N



### Application indicator mode

Can light and blink in three colors (green, red, and orange) according to an external input. The indicator can be used to indicate work instructions or equipment status.

\*When optical synchronization is set, only the indicator on the receiver lights up.

\*The DIP switches in the unit must be set to use this function.

For details, see the manual.

The manual can be downloaded from our website.



**Green** When indicator input 1 is ON and indicator input 2 is OFF



**Red** When indicator input 1 is OFF and indicator input 2 is ON



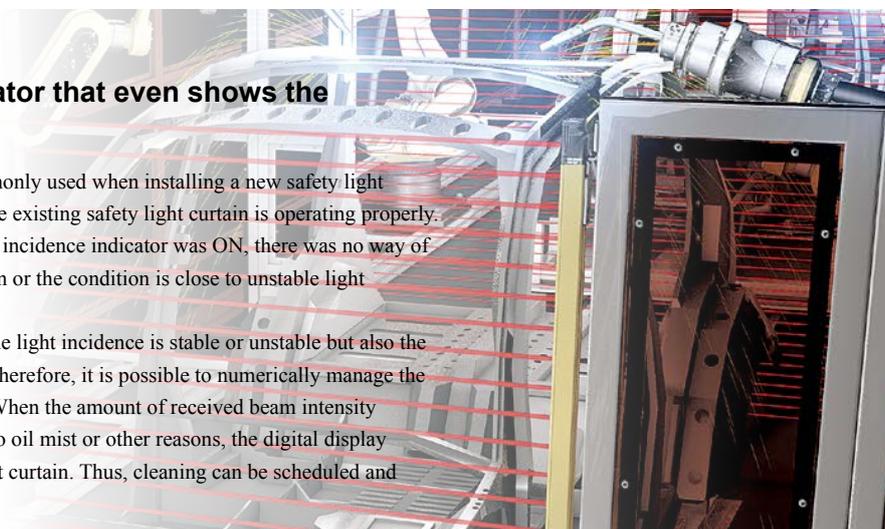
**Orange** When both indicator inputs 1 and 2 are ON

## COLUMN

### Stable light incidence indicator that even shows the amount of margin

The stable light incidence indicator is commonly used when installing a new safety light curtain to equipment or when checking if the existing safety light curtain is operating properly. Previously, however, even if the stable light incidence indicator was ON, there was no way of knowing whether there was an ample margin or the condition is close to unstable light incidence.

The **SF4D** series not only shows whether the light incidence is stable or unstable but also the amount of margin with a numeric display. Therefore, it is possible to numerically manage the stability margin of the safety light curtain. When the amount of received beam intensity decreases during equipment operation due to oil mist or other reasons, the digital display shows the stability margin of the safety light curtain. Thus, cleaning can be scheduled and conducted at the most suitable timing.



# Experience the Ease of Installation Designing, Installation and Construction!

## Evolved **performance** and **functional design**

We paid careful attention to details during the product design stage, ranging from the calculation of safety distance to installation, wiring and additional installation ease.

We improved the performance and achieved the functional design so that users can appreciate the "ease of use" in any situations.

### Fast response time 10 ms or less

The OFF response time of the control outputs (OSSD 1, OSSD 2) of the **SF4D** series is 10 ms or less (when not connected in series or in parallel). [18 ms or less when connected in series or in parallel] The **SF4D** series contributes to the reduction of equipment size.

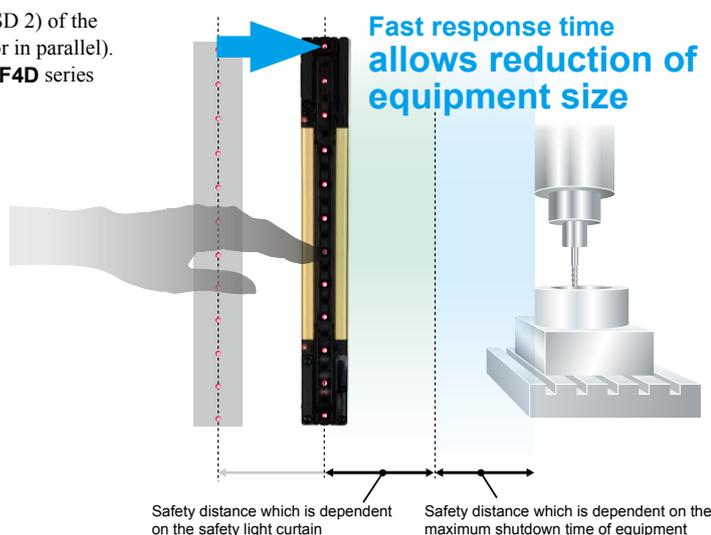
Not connected in series / parallel

10 ms or less

Connected in series / parallel

18 ms or less

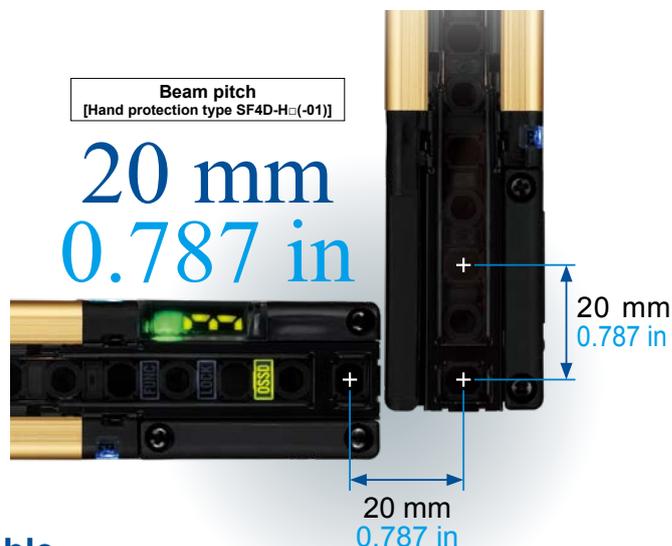
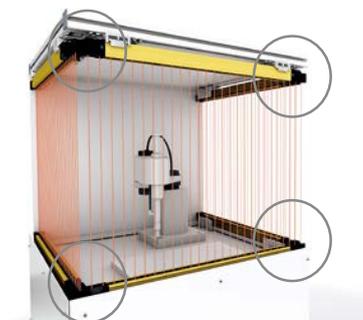
Regarding the response time by number of beams, see "Control output (OSSD 1, OSSD 2) OFF response times" (p.27).



### Dead zoneless design enables easy calculation of safe distance.

Inherits the dead zoneless design of the previous **SF4B** series. Even in an L-shaped layout or a U-shaped layout, the beam pitch does not change\*, making calculation of the safe distance easier.

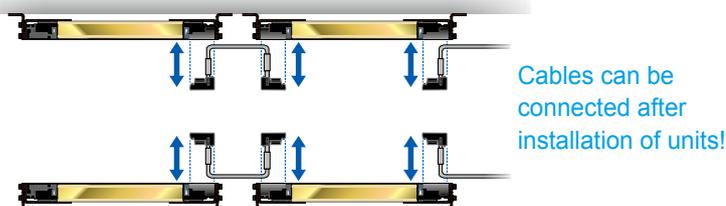
\* Excluding the finger protection type **SF4D-F**-(01)



### Easy to attach / detach front access cable



Uses the well-received front access cable of previous models. The cable can be attached and detached after the safety light curtain is installed on the equipment. This allows easy replacement in the event that the cable is damaged.



## Series connection of up to 5 units

Up to five units (1 main sensor and 4 sub-sensors) can be connected in series, and the maximum number of beams has been increased to 256. This provides extra convenience when installing additional equipment, when increasing the detection width (protection height), and when using one system for protection of multiple locations.

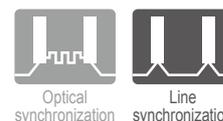
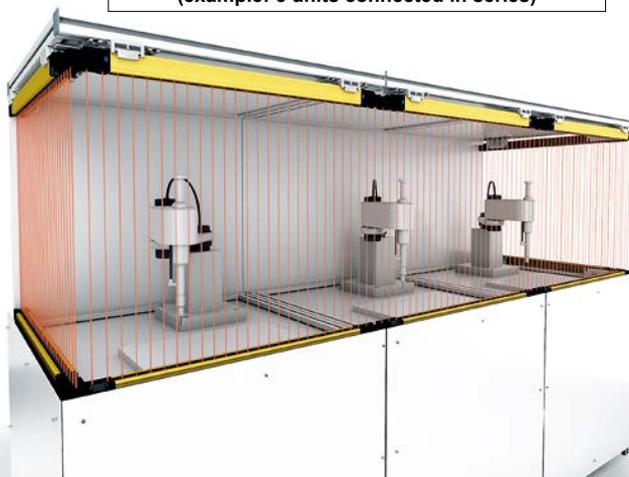
Present (example: 3 units connected in series)



Adapts to additional equipment installation and safety area enlargement.



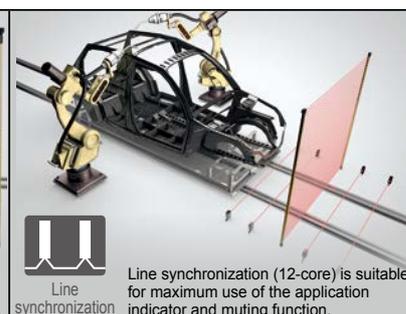
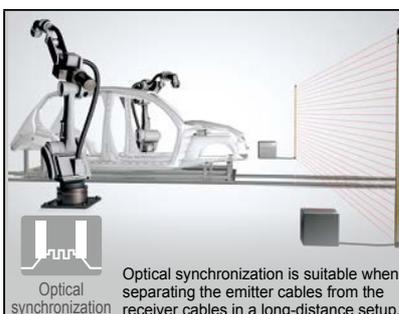
After equipment addition / safety area enlargement (example: 5 units connected in series)



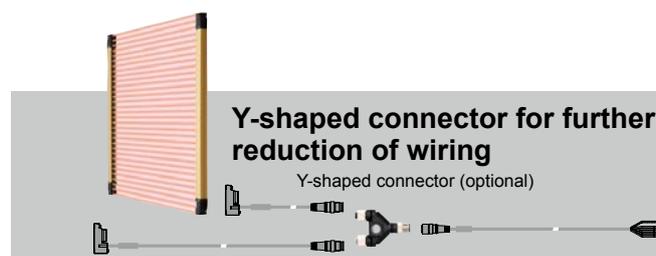
## Selectable synchronization method and cable to suit various applications

When choosing and installing a safety light curtain, the synchronization method and cable can be selected flexibly according to the customer's specific application and needs, such as the basic configuration or safety-enhanced configuration with improved operability.

- : Functional by default
- (Software): Functional when setting software is used
- (Software): Functional by default. Function can be expanded when setting software is used



| Cable type                 |   | 5-core   | 12-core      | 8-core       | 12-core      |
|----------------------------|---|----------|--------------|--------------|--------------|
| Function                   | Interlock function                            |          | Software     | ○ (Software) | ○ (Software) |
|                            | Lockout release function                      | ○        | ○            | ○            | ○            |
|                            | Test input function                           | ○        | ○            | ○            | ○            |
|                            | Auxiliary output (non-safety output) function |          | ○ (Software) | ○ (Software) | ○ (Software) |
|                            | External device monitor function              |          | ○ (Software) | ○ (Software) | ○ (Software) |
|                            | Muting / Override function                    |          | Software     |              | ○ (Software) |
|                            | Application indicator function                | Software | ○ (Software) | Software     | ○ (Software) |
|                            | Parallel interference prevention function     |          |              |              | Software     |
|                            | Fix blanking function                         | Software | Software     | Software     | Software     |
| Floating blanking function | Software                                      | Software | Software     | Software     |              |



When 8-core cables and line synchronization are used, connection of only five cables is required when the Y-shaped connector (optional) is used. This allows easy connection to a safety PLC or other devices, and also helps eliminate wiring mistakes and reduce the man-hours required for wiring.

▶ For details, see p.22.

# Experience the Ease of Setting!

## Simple setup of complex safety control

### 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.

It provides powerful support to maintaining stable operation and troubleshooting by allowing the internal setup of the **SF4D** series product, collection of error history, planning of corrective measures and real-time monitoring of light incidence condition.

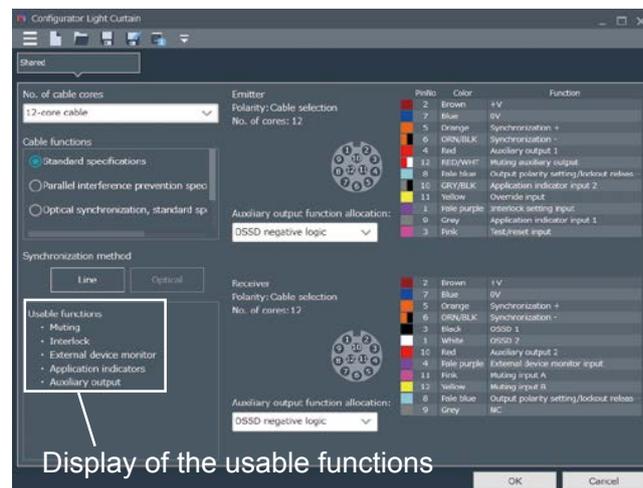
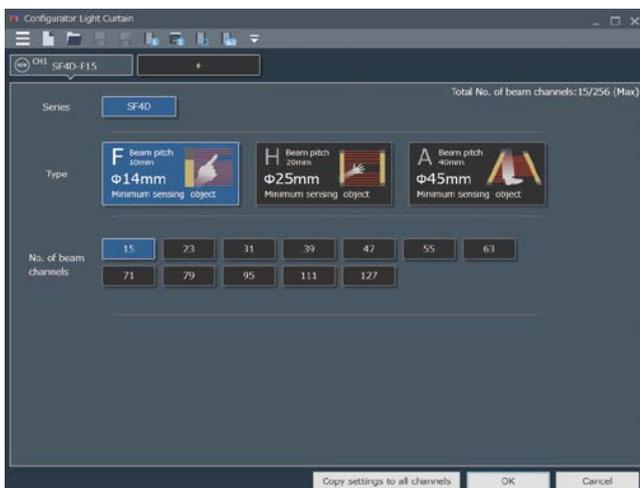
#### Main functions

- Operation monitoring function
  - Monitoring of received light intensity / extraneous light of individual beam
  - I/O monitoring
- Error history display
- Light blockage history, unstable light incidence history
- Muting setting function
- Override setting function
- Blanking setting function
  - Fixed blanking setting function
  - Floating blanking setting function
- External device monitoring setting function
- Auxiliary output setting function

\* Note that the usable functions vary depending on the synchronization method (optical synchronization, line synchronization) and the type of cables (5-core, 8-core, 12-core) used. For details, refer to "Selectable synchronization method and cable to suit various applications" (p.9) and the manual. The manual can be downloaded from our website.



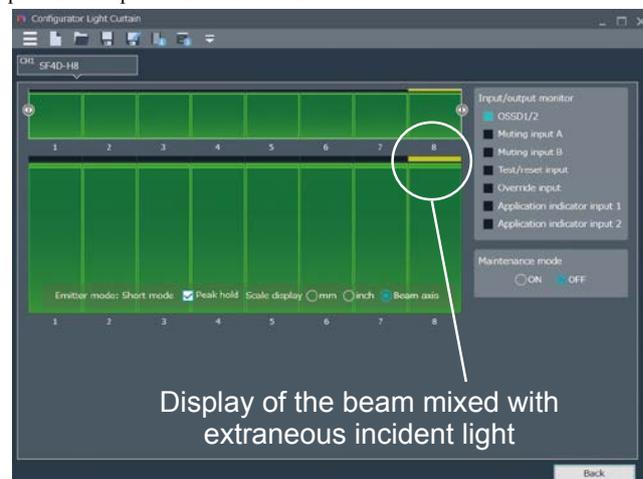
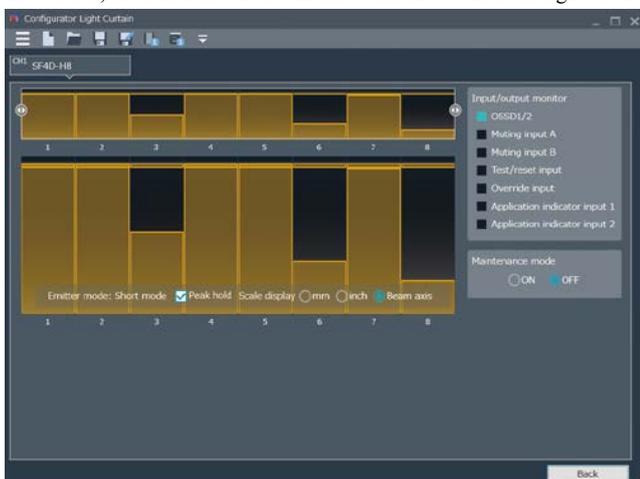
Safety light curtain SF4D series



Display of the usable functions

### Operation monitoring function (monitoring of received light intensity / extraneous light of individual beam)

This function displays the light incidence conditions of individual beams in real time. It facilitates the setup work and streamlines the maintenance planning by enabling visual confirmation of changes in the light incidence intensity resulting from dirty detection surface or beam misalignment. In addition, the function can also monitor extraneous incident lights. It helps prevent unexpected malfunction in advance.



Display of the beam mixed with extraneous incident light

## Muting setting function \*Excluding SF4D-□-01

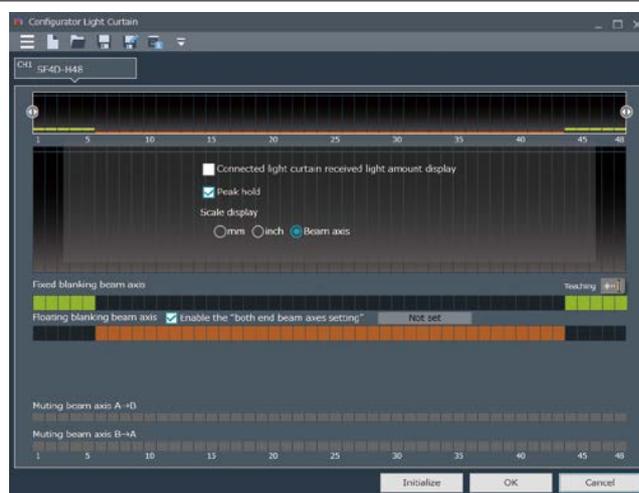
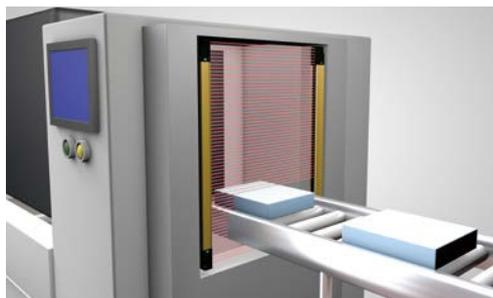
This function is used to set the arrangement of muting sensors and select the most suitable settings using the application. It is also equipped with a time chart function, which obtains actual input timing to facilitate adjustment work.

| Muting sensor arrangement model                            | Description   |
|--|---|
| Exit-only  | This is used when a muting input cannot be set up at the outlet side such as a workpiece discharge section. Since the workpiece passing time can be set in the timer, muting input on the outlet side is not required.  |
| Simultaneous input   | This is used when there is no space for acquiring the muting input time difference between two systems. There is no need to provide a time difference for muting inputs.<br>* When the muting sensor output is NO / NC. |
| Parallel 4-sensor<br>Cross 2-sensor<br>Invalid when rising | The input time difference between the muting inputs of two systems is detected and the muting condition is controlled.  |



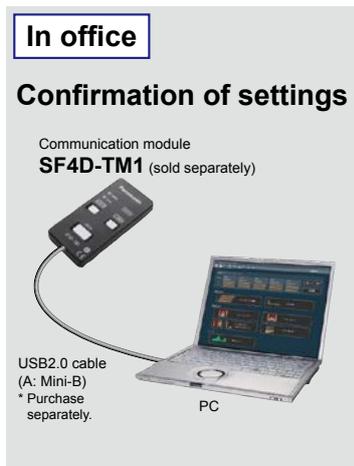
## Blanking setting function \*Excluding SF4D-□-01

The blanking setting function has also advanced. It supports not only manual setting while allowing the user to check the light reception condition in real time and but also batch setting based on teaching. Furthermore, fixed blanking and floating blanking can be set using the same screen. It alleviates the cumbersome setting work.



## Communication module copy function \*Excluding SF4D-□-01

When a PC cannot be brought in, the communication module can be used to write the setting data of the safety light curtain and also to read error information.



\* USB cable is not supplied with the product.  
USB2.0 cable (A: Mini-B) must be procured by the user.



**At installation site**      **Using only the communication module**

**Communication module → SF4D series**  
Use the WRITE button on the communication module to write settings.

**WRITE**      Write data to another system.

---

**SF4D series → Communication module**  
Use the READ button to read settings or error information.

**READ**

Configuration Light Curtain can be downloaded free from our website.

# IO-Link Communication Unit for "Visualization" of Safety Light Curtains

Easy add-on!  
No alteration of safety circuit necessary

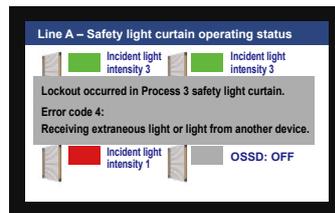
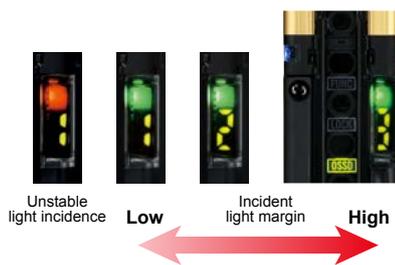
IO-Link Communication Unit  
SFD-WL3



\* For SF4D series only  
\* Above photo shows a unit with all indicators turned on.

\* Above photo shows a unit with all indicators turned on.

## Remote monitoring of safety light curtain status



## Storage of setting data, restoration of settings



### Confirmation of light intensity margin

Incident light intensity information enables the determination of whether maintenance is necessary or not. This helps prevent shut-down of the line due to light beam deviation or dirty sensor. The information is also useful in conducting remote inspection or the like at the start of work.

### Confirmation of error history

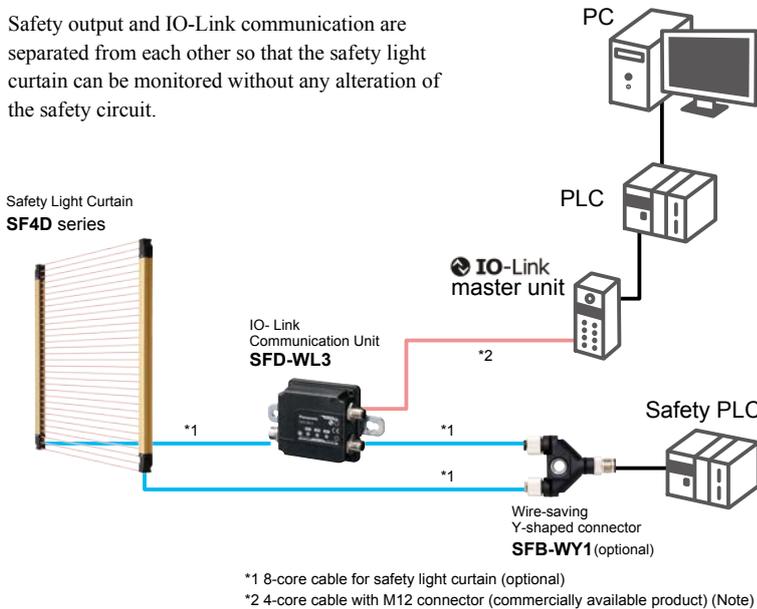
If an error occurs, the source of the error and its detail can be checked remotely, thus facilitating the identification of the problem location and analysis of the cause.

### One-touch setting after replacement

The setting data stored in the communication unit allows one-touch restoration of the settings when the safety light curtain is replaced.

### Example of configuration

Safety output and IO-Link communication are separated from each other so that the safety light curtain can be monitored without any alteration of the safety circuit.



Note: The product and IO-Link master unit must be connected with a cable of 0.3 mm<sup>2</sup> or more. The total length of the cable must not exceed 20 m 65.517 ft.

### Example of IO-Link data output

#### Process data

- Light received / blocked information
- Stable / unstable incident light information
- Extraneous light information
- Emitter / receiver lockout information
- Incident light intensity information (OFF, 1, 2, 3)
- OSSD output information
- Communication control status
- Number of units in series connection

#### Service data

- Safety light curtain main unit information
- SFD-WL3 main unit information
- Incident light intensity information of individual beams (32 levels)
- Error code

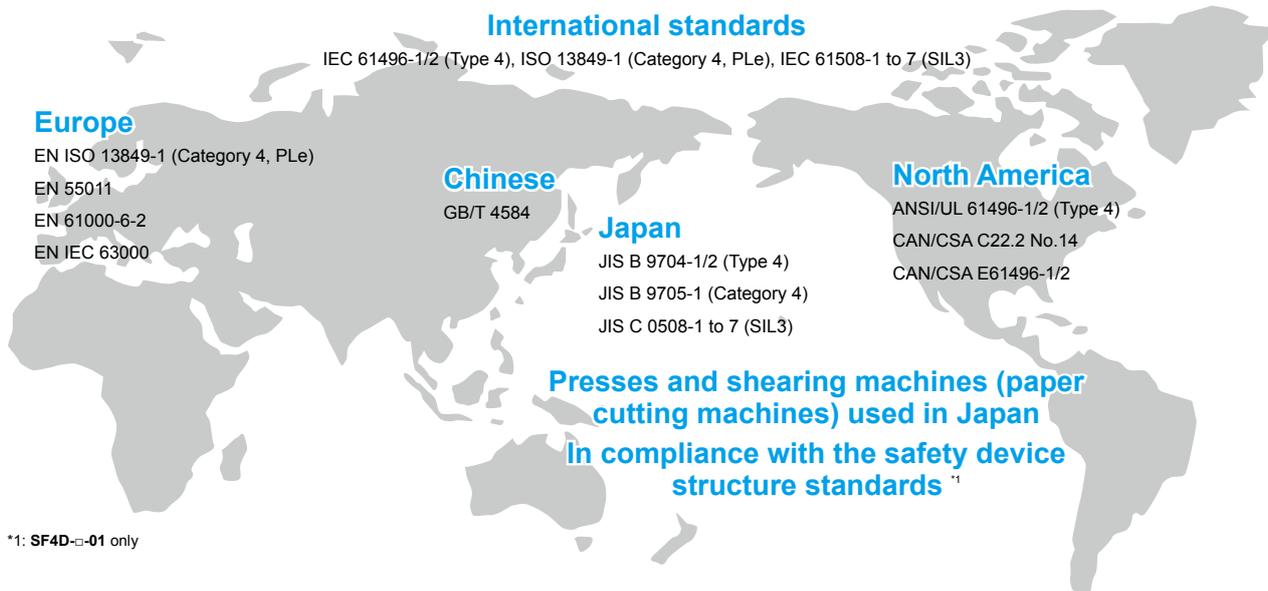


Use the safety light curtain monitoring information obtained via IO-Link only for diagnostic purposes. Do not use it for safety control purposes.

# Global Specifications for Easy Use Anywhere in the World

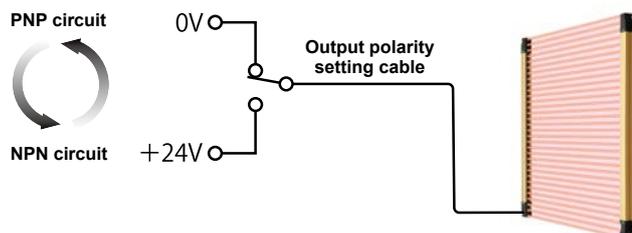
## Global specifications for anywhere use in the world

The **SF4D** series' global specifications comply with the following standards.



### Supports both PNP and NPN polarities

Every model in the **SF4D** series supports both PNP transistor output and NPN transistor output. Thus, the **SF4D** series products adapt to any control circuits used around the world, making it possible to use the product when PNP is installed overseas, when NPN sensors are replaced, when the positive pole is grounded in the factory, when moving equipment to overseas facilities, etc.



**PNP / NPN polarity indicator**

At the time of power ON, the indicator shows the selected polarity (PNP or NPN).

### Easy change of polarity by simple cable connection

Connecting the output polarity setting cable to 0 V results in PNP output.  
Connecting the output polarity setting cable to +24 V results in NPN output.

## Configuration of simple safety circuit by combining a control unit

**SF-C21** Easy compliance with control category 4 specifications.  
Designed for optimum control of SF4D series.



### Safety control unit

This safety controller does not require a knowledge of programming. The simple settings only require selection of an internal logic. A free software tool allows intuitive operation. Logic customization, monitoring, and simulation functions are also provided to enable surprisingly easy circuit building.

- Supports up to control category 4
- Supports PNP polarity

**SF-C11**

### Connector connection control unit

The wiring with the light curtain can be done easily with 8-core cable with connector. It reduces time for installation and replacement.

- Supports up to control category 4
- Supports presses used in Japan (shearing machines not supported)
- Supports both PNP and NPN



**SF-C13**

### Thin control unit

22.5 mm 0.886 in thickness has been realized. Possible to install in a small space of the board.

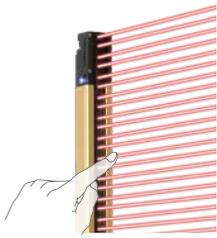
- Supports up to control category 4
- Supports presses used in Japan (shearing machines not supported)
- Supports both PNP and NPN



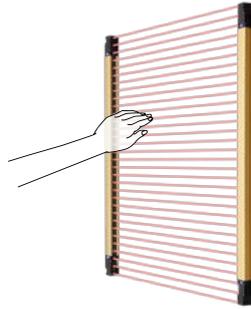
# List of Options for Safety Light Curtain

## Safety light curtain

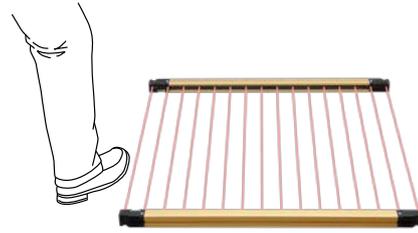
1 P.16



Finger protection type  
Min. sensing object  $\varnothing 14 \text{ mm}$   $\varnothing 0.551 \text{ in}$   
(10 mm  $0.394 \text{ in}$  beam pitch)



Hand protection type  
Min. sensing object  $\varnothing 25 \text{ mm}$   $\varnothing 0.984 \text{ in}$   
(20 mm  $0.787 \text{ in}$  beam pitch)



Arm / Foot protection type  
Min. sensing object  $\varnothing 45 \text{ mm}$   $\varnothing 1.772 \text{ in}$   
(40 mm  $1.575 \text{ in}$  beam pitch)

## Sold separately

## Mounting bracket

2 P.17



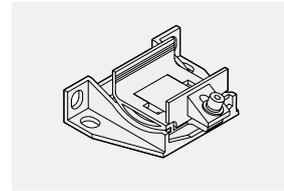
Beam adjustment mounting bracket



Dead zoneless mounting bracket



SF4B-G compatible mounting bracket



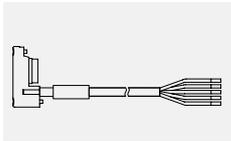
Intermediate supporting bracket

## Sold separately

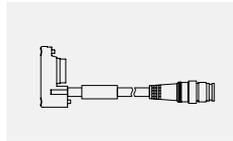
## Cable / protective tube

3 4 5 6 7 8 9 10 P.18~

### Bottom cap cable

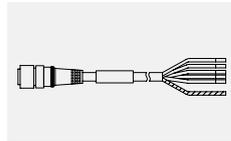


Discrete wire

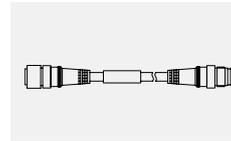


Connector

### Extension cable

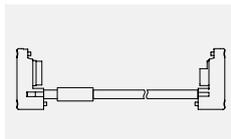


With connector on one end



With connectors on both ends

### Cable for series connection



### Protective tube



## Sold separately

## Options

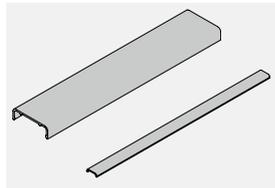
P.20~



Communication module



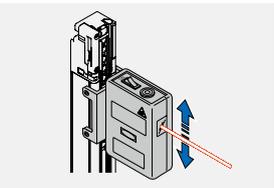
IO-Link communication unit



Front protection cover



Corner mirror



Laser alignment tool



Y-shaped connector



SF4D conversion adapter  
(For replacing SF4B series with SF4D series)



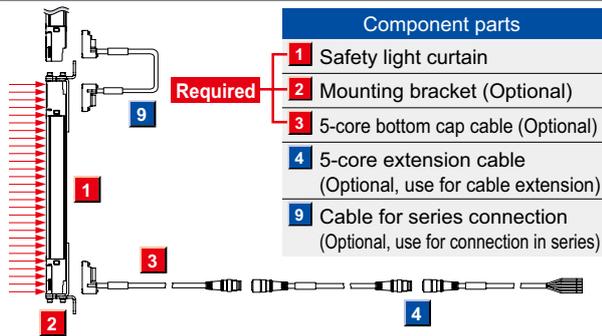
Control unit

# PRODUCT CONFIGURATION

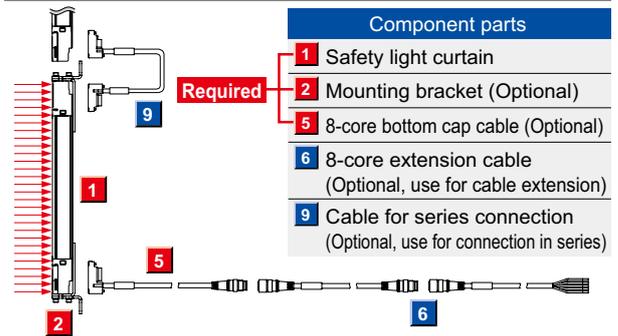


Mounting bracket, mating cable and protective tube are sold separately.

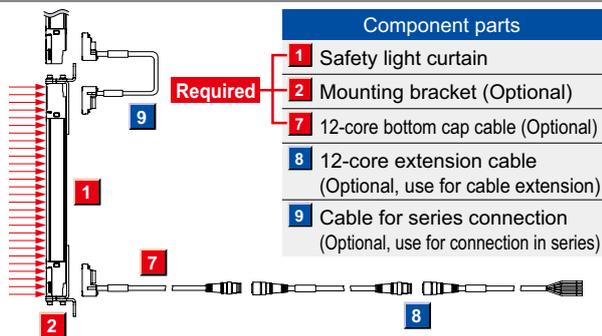
## Standard components (5-core cable)



## Standard components (8-core cable)

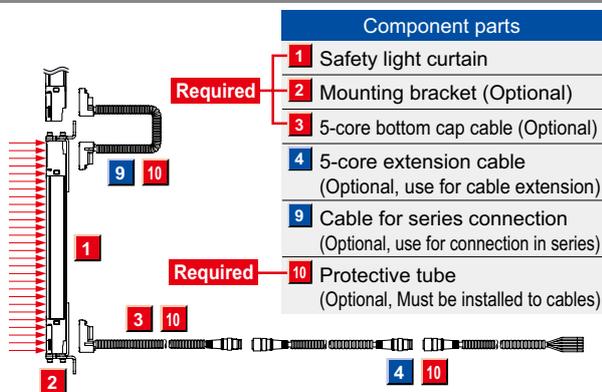


## Muting control components (12-core cable)

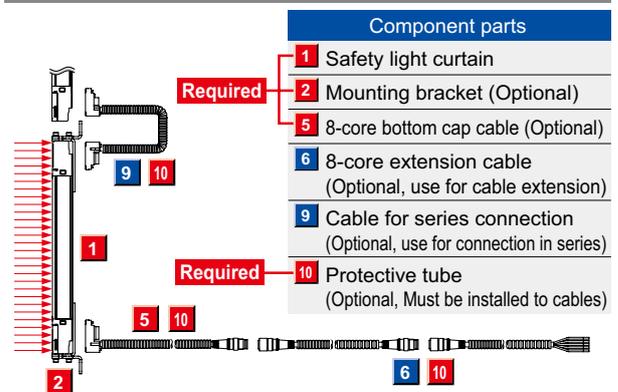


## Using SF4D-□-01 as a safety device for a press or shearing machine (paper cutting machine) in Japan (See the above when using SF4D-□-01 as a safety device for other types of machine)

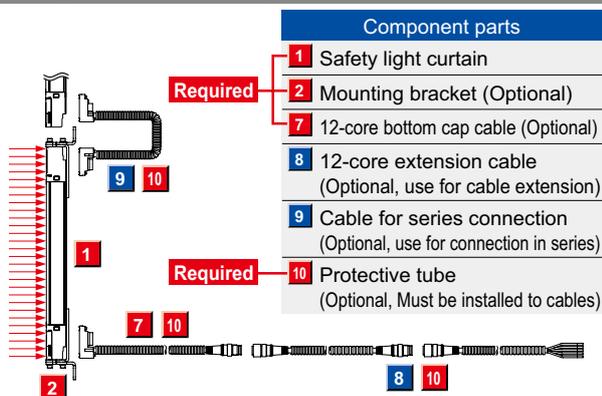
### Standard components (5-core cable)



### Standard components (8-core cable)



### Muting control components (12-core cable)



When using SF4D-□-01 as a safety device for a press machine or paper shearing machine in Japan, always attach the protective tube SFPD-A10 (tube length: 10 m 32.808 ft) (optional) to the cable.

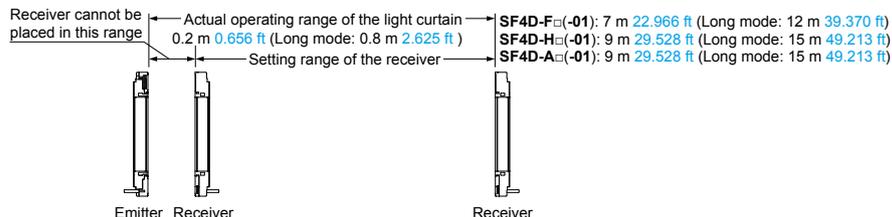
# ORDER GUIDE

## 1 Safety Light Curtain

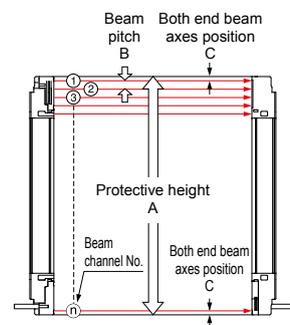
Mounting bracket and bottom cap cable are not supplied with the safety light curtain. Be sure to order them separately.

| Type  | Model No. | Japanese press machine or paper shearing machine compliant | Operating range (Note 1)                         | Number of beam channels | Protective height (Note 2) | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | Beam pitch        | Both end beam axes position |
|---|-----------|--|--|-------------------------|----------------------------|---|-------------------|-----------------------------|
|   |           |  |  |                         | A                          |   | B                 | C                           |
| Finger protection type<br>Min. sensing object $\phi 14$ mm $\phi 0.551$ in<br>(10 mm $0.394$ in beam pitch)     | SF4D-F15  | SF4D-F15-01  | 0.2 to 7 m<br>0.656 to 22.966 ft<br>(Short mode) | 15                      | 150 mm 5.906 in            | 140 mm 5.512 in   | 10 mm<br>0.394 in | 5 mm<br>0.197 in            |
|   | SF4D-F23  | SF4D-F23-01  |  | 23                      | 230 mm 9.055 in            | 220 mm 8.661 in   |                   |                             |
|   | SF4D-F31  | SF4D-F31-01  |  | 31                      | 310 mm 12.205 in           | 300 mm 11.811 in  |                   |                             |
|   | SF4D-F39  | SF4D-F39-01  |  | 39                      | 390 mm 15.354 in           | 380 mm 14.961 in  |                   |                             |
|   | SF4D-F47  | SF4D-F47-01  |  | 47                      | 470 mm 18.504 in           | 460 mm 18.110 in  |                   |                             |
|   | SF4D-F55  | SF4D-F55-01  |  | 55                      | 550 mm 21.654 in           | 540 mm 21.260 in  |                   |                             |
|   | SF4D-F63  | SF4D-F63-01  |  | 63                      | 630 mm 24.803 in           | 620 mm 24.409 in  |                   |                             |
|   | SF4D-F71  | SF4D-F71-01  |  | 71                      | 710 mm 27.953 in           | 700 mm 27.559 in  |                   |                             |
|   | SF4D-F79  | SF4D-F79-01  |  | 79                      | 790 mm 31.102 in           | 780 mm 30.709 in  |                   |                             |
|   | SF4D-F95  | SF4D-F95-01  |  | 95                      | 950 mm 37.402 in           | 940 mm 37.008 in  |                   |                             |
|   | SF4D-F111 | SF4D-F111-01   |  | 111                     | 1,110 mm 43.701 in         | 1,100 mm 43.307 in  |                   |                             |
|   | SF4D-F127 | SF4D-F127-01   |  | 127                     | 1,270 mm 50.000 in         | 1,260 mm 49.606 in  |                   |                             |
| Hand protection type<br>Min. sensing object $\phi 25$ mm $\phi 0.984$ in<br>(20 mm $0.787$ in beam pitch)       | SF4D-H8   | SF4D-H8-01   | 0.2 to 9 m<br>0.656 to 29.528 ft<br>(Short mode) | 8                       | 150 mm 5.906 in            | 140 mm 5.512 in   | 20 mm<br>0.787 in | 5 mm<br>0.197 in            |
|   | SF4D-H12  | SF4D-H12-01  |  | 12                      | 230 mm 9.055 in            | 220 mm 8.661 in   |                   |                             |
|   | SF4D-H16  | SF4D-H16-01  |  | 16                      | 310 mm 12.205 in           | 300 mm 11.811 in  |                   |                             |
|   | SF4D-H20  | SF4D-H20-01  |  | 20                      | 390 mm 15.354 in           | 380 mm 14.961 in  |                   |                             |
|   | SF4D-H24  | SF4D-H24-01  |  | 24                      | 470 mm 18.504 in           | 460 mm 18.110 in  |                   |                             |
|   | SF4D-H28  | SF4D-H28-01  |  | 28                      | 550 mm 21.654 in           | 540 mm 21.260 in  |                   |                             |
|   | SF4D-H32  | SF4D-H32-01  |  | 32                      | 630 mm 24.803 in           | 620 mm 24.409 in  |                   |                             |
|   | SF4D-H36  | SF4D-H36-01  |  | 36                      | 710 mm 27.953 in           | 700 mm 27.559 in  |                   |                             |
|   | SF4D-H40  | SF4D-H40-01  |  | 40                      | 790 mm 31.102 in           | 780 mm 30.709 in  |                   |                             |
|   | SF4D-H48  | SF4D-H48-01  |  | 48                      | 950 mm 37.402 in           | 940 mm 37.008 in  |                   |                             |
|   | SF4D-H56  | SF4D-H56-01  |  | 56                      | 1,110 mm 43.701 in         | 1,100 mm 43.307 in  |                   |                             |
|   | SF4D-H64  | SF4D-H64-01  |  | 64                      | 1,270 mm 50.000 in         | 1,260 mm 49.606 in  |                   |                             |
|   | SF4D-H72  | SF4D-H72-01  |  | 72                      | 1,430 mm 56.299 in         | 1,420 mm 55.906 in  |                   |                             |
|   | SF4D-H80  | SF4D-H80-01  |  | 80                      | 1,590 mm 62.598 in         | 1,580 mm 62.205 in  |                   |                             |
|   | SF4D-H88  | SF4D-H88-01  |  | 88                      | 1,750 mm 68.898 in         | 1,740 mm 68.504 in  |                   |                             |
|   | SF4D-H96  | SF4D-H96-01  |  | 96                      | 1,910 mm 75.197 in         | 1,900 mm 74.803 in  |                   |                             |
| Arm / Foot protection type<br>Min. sensing object $\phi 45$ mm $\phi 1.772$ in<br>(40 mm $1.575$ in beam pitch) | SF4D-A4   | SF4D-A4-01   | 0.2 to 9 m<br>0.656 to 29.528 ft<br>(Short mode) | 4                       | 150 mm 5.906 in            | 120 mm 4.724 in   | 40 mm<br>1.575 in | 15 mm<br>0.591 in           |
|   | SF4D-A6   | SF4D-A6-01   |  | 6                       | 230 mm 9.055 in            | 200 mm 7.874 in   |                   |                             |
|   | SF4D-A8   | SF4D-A8-01   |  | 8                       | 310 mm 12.205 in           | 280 mm 11.024 in  |                   |                             |
|   | SF4D-A10  | SF4D-A10-01  |  | 10                      | 390 mm 15.354 in           | 360 mm 14.173 in  |                   |                             |
|   | SF4D-A12  | SF4D-A12-01  |  | 12                      | 470 mm 18.504 in           | 440 mm 17.323 in  |                   |                             |
|   | SF4D-A14  | SF4D-A14-01  |  | 14                      | 550 mm 21.654 in           | 520 mm 20.472 in  |                   |                             |
|   | SF4D-A16  | SF4D-A16-01  |  | 16                      | 630 mm 24.803 in           | 600 mm 23.622 in  |                   |                             |
|   | SF4D-A18  | SF4D-A18-01  |  | 18                      | 710 mm 27.953 in           | 680 mm 26.772 in  |                   |                             |
|   | SF4D-A20  | SF4D-A20-01  |  | 20                      | 790 mm 31.102 in           | 760 mm 29.921 in  |                   |                             |
|   | SF4D-A24  | SF4D-A24-01  |  | 24                      | 950 mm 37.402 in           | 920 mm 36.220 in  |                   |                             |
|   | SF4D-A28  | SF4D-A28-01  |  | 28                      | 1,110 mm 43.701 in         | 1,080 mm 42.520 in  |                   |                             |
|   | SF4D-A32  | SF4D-A32-01  |  | 32                      | 1,270 mm 50.000 in         | 1,240 mm 48.819 in  |                   |                             |
|   | SF4D-A36  | SF4D-A36-01  |  | 36                      | 1,430 mm 56.299 in         | 1,400 mm 55.118 in  |                   |                             |
|   | SF4D-A40  | SF4D-A40-01  |  | 40                      | 1,590 mm 62.598 in         | 1,560 mm 61.417 in  |                   |                             |
|   | SF4D-A44  | SF4D-A44-01  |  | 44                      | 1,750 mm 68.898 in         | 1,720 mm 67.717 in  |                   |                             |
|   | SF4D-A48  | SF4D-A48-01  |  | 48                      | 1,910 mm 75.197 in         | 1,880 mm 74.016 in  |                   |                             |

Notes: 1) The operating range is the possible setting distance between the emitter and the receiver.



2) In the case of "When used as safety device for presses in China" or "When SF4D-□-01 is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height.



# ORDER GUIDE

## 2 Mounting brackets Mounting bracket is not supplied with the safety light curtain. Be sure to order it separately.

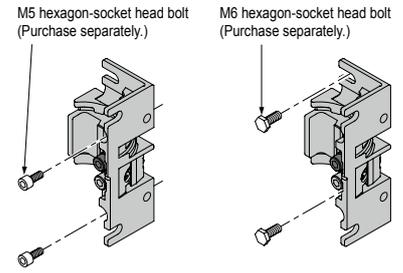
| Designation   | Model No.         | Description   |   |
|---|-------------------|---|---|
| Beam adjustment mounting bracket                        | <b>MS-SFD-1-5</b> | For mounting with M5 / M8 hexagon-socket head bolt  | Mounting bracket for rear or side installation of safety light curtain.<br>4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

Notes: 1) The required numbers of emitters and receivers vary depending on the number of beam channels. For details, refer to **DIMENSIONS** (p.42).  
2) When the number of beam channels is **SF4D-F□(-01)**: 111 or more beam channels, **SF4D-H□(-01)**: 56 or more beam channels, **SF4D-A□(-01)**: 28 or more beam channels, one set is required.

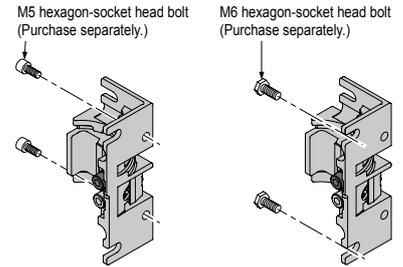
### Dead zoneless beam adjustment mounting bracket

- **MS-SFD-3-6** (4 pcs./set for emitter and receiver)

#### <Rear mounting>



#### <Side mounting>

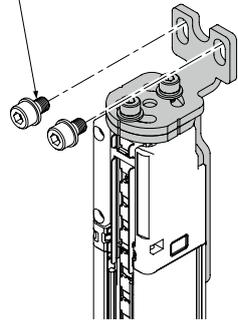


### Beam adjustment mounting bracket

- **MS-SFD-1-5** (4 pcs./set for emitter and receiver)

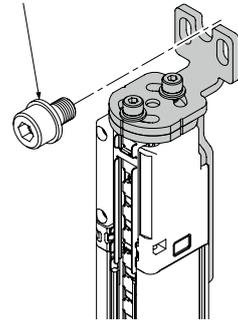
When using M5 hexagon-socket head bolt

M5 hexagon-socket head bolt (Purchase separately.)



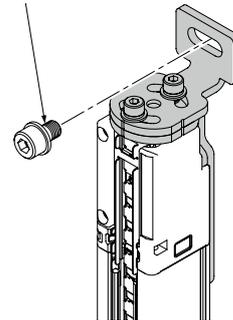
When using M8 hexagon-socket head bolt

M8 hexagon-socket head bolt (Purchase separately.)



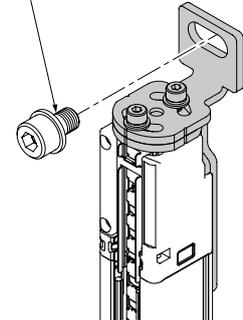
- **MS-SFD-1-6** (4 pcs./set for emitter and receiver)

M6 hexagon-socket head bolt (Purchase separately.)



- **MS-SFD-1-8** (4 pcs./set for emitter and receiver)

M8 hexagon-socket head bolt (Purchase separately.)

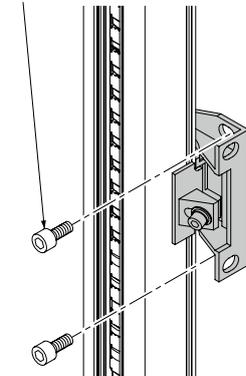


### Intermediate supporting bracket

- **MS-SFB-2** (2 pcs./set for emitter and receiver)

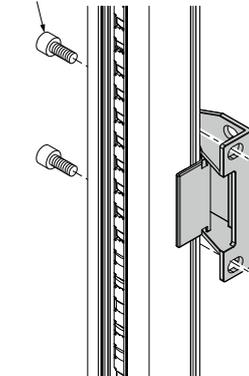
#### <Rear mounting>

M5 hexagon-socket head bolt (Purchase separately.)



#### <Side mounting>

M5 hexagon-socket head bolt (Purchase separately.)

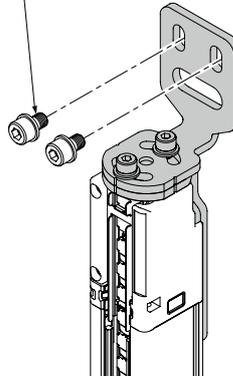


### SF4B-G compatible mounting bracket

- **MS-SFD-4BG** (4 pcs./set for emitter and receiver)

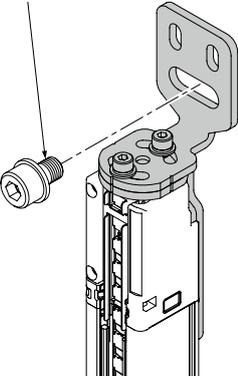
When using M5 hexagon-socket head bolt

M5 hexagon-socket head bolt (Purchase separately.)



When using M8 hexagon-socket head bolt

M8 hexagon-socket head bolt (Purchase separately.)



# ORDER GUIDE

**3 4 5 6** Mating cable / Extension cable Mating cable is not supplied with the safety light curtain. Be sure to order it separately.



When using **SF4D-□-01** as a safety device for a press machine or paper shearing machine in Japan, always attach the protective tube **SFPD-A10** (tube length: 10 m **32.808 ft**) (optional) to the cable.

| Type                               |                                    | Appearance  | Model No.   | Description (Note)   |   |   |
|------------------------------------|------------------------------------|---|---|--|---|---|
| Standard components (5-core cable) | Bottom cap cable                   |   | <b>SFD-CCB5-S</b>   | Length: 5 m <b>16.404 ft</b><br>Net weight: 420 g approx.<br>(2 cables)  | Used for connecting to the safety light curtain and to other cables or the <b>SF-C13</b> / <b>SF-C21</b> control unit.<br>2 cables/set for emitter and receiver   |   |
|                                    |                                    |   | <b>SFD-CCB10-S</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 830 g approx.<br>(2 cables)   |   |   |
|                                    | Connector                          |   | <b>SFD-CB05-S</b>   | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 75 g approx.<br>(2 cables)  |   | Used for connecting to the safety light curtain and to an extension cable.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 14 mm <b>0.551 in</b> max.<br>M12 male connector |
|                                    |                                    |   | With connector on one end   |  |   |   |
|                                    | With connectors on both ends       | For emitter   |   |  |   |   |
|                                    |                                    |   | For receiver  | <b>SFD-CCJ10E-S</b>  |   |   |
| For receiver                       | <b>SFD-CCJ10D-S</b>                | Length: 10 m <b>32.808 ft</b><br>Net weight: 440 g approx.<br>(1 cable) |   | 1 cable for receiver<br>Connector color: Black   | Used for cable extension<br>Connector outer diameter:<br>$\varnothing$ 14 mm <b>0.551 in</b> max.<br>M12 female-male connector  |   |
|                                    | Standard components (8-core cable) | Bottom cap cable  |   | <b>SFD-CCB3</b>  | Length: 3 m <b>9.843 ft</b><br>Net weight: 290 g approx.<br>(2 cables)  | Used for connecting to the safety light curtain and to other cables or the <b>SF-C13</b> / <b>SF-C21</b> control unit.<br>2 cables/set for emitter and receiver   |
| <b>SFD-CCB7</b>                    |                                    |   |   | Length: 7 m <b>22.966 ft</b><br>Net weight: 620 g approx.<br>(2 cables)  |   |   |
| <b>SFD-CCB10</b>                   |                                    |   |   | Length: 10 m <b>32.808 ft</b><br>Net weight: 900 g approx.<br>(2 cables)   |   |   |
| <b>SFD-CCB15</b>                   |                                    |   |   | Length: 15 m <b>49.213 ft</b><br>Net weight: 1,300 g approx.<br>(2 cables)   |   |   |
| Connector                          |                                    |   | <b>SFD-CB05</b>   | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 80 g approx.<br>(2 cables)  | Used for connecting to the safety light curtain and to an extension cable or the <b>SF-C11</b> control unit.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 14 mm <b>0.551 in</b> max.<br>M12 male connector |   |
|                                    |                                    |   | <b>SFD-CB5</b>  | Length: 5 m <b>16.404 ft</b><br>Net weight: 480 g approx.<br>(2 cables)  |   |   |
|                                    |                                    |   | <b>SFD-CB10</b>   | Length: 10 m <b>32.808 ft</b><br>Net weight: 950 g approx.<br>(2 cables)   |   |   |
| With connector on one end          |                                    |   | <b>SFD-CC3</b>  | Length: 3 m <b>9.843 ft</b><br>Net weight: 290 g approx.<br>(2 cables)   | Used for connecting to an extension cable or the <b>SF-C13</b> / <b>SF-C21</b> control unit.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 14 mm <b>0.551 in</b> max.<br>M12 female connector               |   |
|                                    |                                    |   | <b>SFD-CC10</b>   | Length: 10 m <b>32.808 ft</b><br>Net weight: 900 g approx.<br>(2 cables)   |   |   |
| With connectors on both ends       |                                    | For emitter   |   | <b>SFB-CCJ3E</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 190 g approx.<br>(1 cable)   | 1 cable for emitter<br>Connector color: Gray  |
|                                    |                                    |   |   | <b>SFB-CCJ10E</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 580 g approx.<br>(1 cable)   |   |
|                                    |                                    | For receiver  |   | <b>SFB-CCJ3D</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 210 g approx.<br>(1 cable)   | 1 cable for receiver<br>Connector color: Black  |
|                                    | <b>SFB-CCJ10D</b>                  |   |   | Length: 10 m <b>32.808 ft</b><br>Net weight: 600 g approx.<br>(1 cable)  |   |   |
| Compatible cable                   |                                    | <b>SFD-CB05-A-P</b>   | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 80 g approx.<br>(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 <b>SF4D</b> series products.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 14 mm <b>0.551 in</b> max.<br>M12 male connector |   |   |
|                                    |                                    | <b>SFD-CB05-A-N</b>   |   |  |   |   |

Note: Where the cable color has not been specified, it is gray for emitter, gray with black line for receiver, outer diameter is  $\varnothing$ 5.7 mm **0.224 in** or  $\varnothing$ 6 mm **0.236 in**, min. bending radius is R6 mm **R0.236 in**.  
The minimum bending radius of the cable with the protective tube **SFPD-A10** attached is R55 mm **R2.165 in**.

# ORDER GUIDE

## 7 8 9 10 Mating cable / Extension cable / Cables for series connection / Protective tube

Mating cable is not supplied with the safety light curtain. Be sure to order it separately.



When using **SF4D-□-01** as a safety device for a press machine or paper shearing machine in Japan, always attach the protective tube **SFPD-A10** (tube length: 10 m **32.808 ft**) (optional) to the cable.

| Type  | Appearance  | Model No.  | Description (Note)  |   |   |  |
|---|---|--|---|---|---|--|
| Standard components (12-core cable)   | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">7</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Bottom cap cable</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Discrete wire</div> </div> | <b>SFD-CCB3-MU</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 340 g approx.<br>(2 cables)  | Used for connecting to the safety light curtain and to other cables or the <b>SF-C13 / SF-C21</b> control unit.<br>2 cables/set for emitter and receiver  |   |  |
|   |   | <b>SFD-CCB7-MU</b>   | Length: 7 m <b>22.966 ft</b><br>Net weight: 700 g approx.<br>(2 cables)   |   |   |  |
|   |   | <b>SFD-CCB10-MU</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 980 g approx.<br>(2 cables)  |   |   |  |
|   | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">8</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Extension cable</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Connector</div> </div>      | <b>SFD-CB05-MU</b>   | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 95 g approx.<br>(2 cables)   | Used for connecting to the safety light curtain and to an extension cable.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 16 mm <b><math>\varnothing</math>0.630 in</b> max.<br>M14 male connector |   |  |
|   |   | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">9</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Cable for series connection</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">With connector on one end</div> </div>   | <b>SFD-CC3-MU</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 340 g approx.<br>(2 cables)  | Used for cable extension or connecting to the <b>SF-C13 / SF-C21</b> control unit.<br>2 cables/set for emitter and receiver<br>Connector outer diameter: $\varnothing$ 16 mm <b><math>\varnothing</math>0.630 in</b> max.<br>M14 female connector |  |
|   |   |  | <b>SFD-CC7-MU</b>   | Length: 7 m <b>22.966 ft</b><br>Net weight: 700 g approx.<br>(2 cables)   |   |  |
|   |   |  | <b>SFD-CC10-MU</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 980 g approx.<br>(2 cables)  |   |  |
|   |   | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">10</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Protective tube</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">With connectors on both ends</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">8</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Extension cable</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">For emitter</div> </div> | <b>SFB-CCJ3E-MU</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 190 g approx.<br>(1 cable)   | 1 cable for emitter<br>Connector color: Gray  |  |
|   |   |  | <b>SFB-CCJ10E-MU</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 660 g approx.<br>(1 cable)   |   |  |
|   |   |  | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">For receiver</div> </div>  | <b>SFB-CCJ3D-MU</b>   | Length: 3 m <b>9.843 ft</b><br>Net weight: 210 g approx.<br>(1 cable)   | 1 cable for receiver<br>Connector color: Black |
|   |   |  |   | <b>SFB-CCJ10D-MU</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 680 g approx.<br>(1 cable)   |  |
|   |   | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">9</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Cable for series connection</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">With connector on both ends</div> </div>   | <b>SFD-CSL005</b>   | Length: 0.05 m <b>0.164 ft</b><br>Net weight: 35 g approx.<br>(2 cables)  | Used to connect safety light curtains in series.<br>2 cables/set for emitter and receiver (common for emitter and receiver)<br>Cable color: Gray with black line<br>(common for emitter and receiver)   |  |
| <b>SFD-CSL01</b>  |   |  | Length: 0.1 m <b>0.328 ft</b><br>Net weight: 40 g approx.<br>(2 cables)   |   |   |  |
| <b>SFD-CSL05</b>  | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 80 g approx.<br>(2 cables)   |  |   |   |   |  |
| <b>SFD-CSL1</b>   | Length: 1 m <b>3.281 ft</b><br>Net weight: 130 g approx.<br>(2 cables)  |  |   |   |   |  |
| <b>SFD-CSL5</b>   | Length: 5 m <b>16.404 ft</b><br>Net weight: 480 g approx.<br>(2 cables)   |  |   |   |   |  |
| <b>SFD-CSL10</b>  | Length: 10 m <b>32.808 ft</b><br>Net weight: 950 g approx.<br>(2 cables)  |  |   |   |   |  |
| <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">10</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">Protective tube</div> </div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">With connector on both ends</div> </div> | <b>SFPD-A10</b>   | Tube length: 10 m <b>32.808 ft</b><br>Net weight: 220 g approx.<br>(1 tube)  | Protective tubes must be installed to the cables when <b>SF4D-□-01</b> is used as a safety device for a press or shearing machine (paper cutting machine) in Japan.<br>Outside diameter: $\varnothing$ 13 mm <b><math>\varnothing</math>0.512 in</b> approx.,<br>Inside diameter: $\varnothing$ 9 mm <b><math>\varnothing</math>0.354 in</b><br>Material: Polypropylene |   |   |  |

Note: Where the cable color has not been specified, it is gray for emitter, gray with black line for receiver, outer diameter is  $\varnothing$ 5.7 mm  **$\varnothing$ 0.224 in** or  $\varnothing$ 6 mm  **$\varnothing$ 0.236 in**, min. bending radius is R6 mm **R0.236 in**. The minimum bending radius of the cable with the protective tube **SFPD-A10** attached is R5 mm **R2.165 in**.

### Spare parts (Accessories for safety light curtain)

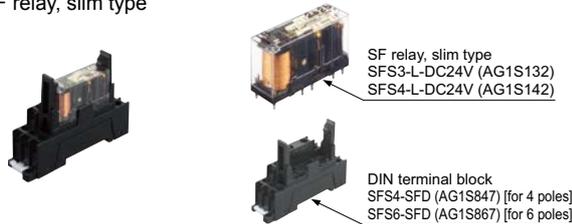
| Designation               | Model No.        | Description  |
|---------------------------|------------------|--|
| Test rod $\varnothing$ 14 | <b>SF4B-TR14</b> | Min. sensing object for regular checking ( $\varnothing$ 14 mm <b><math>\varnothing</math>0.551 in</b> ), with finger protection type (min. sensing object $\varnothing$ 14 mm <b><math>\varnothing</math>0.551 in</b> ) |
| Test rod $\varnothing$ 25 | <b>SF4B-TR25</b> | Min. sensing object for regular checking ( $\varnothing$ 25 mm <b><math>\varnothing</math>0.984 in</b> ), with hand protection type (min. sensing object $\varnothing$ 25 mm <b><math>\varnothing</math>0.984 in</b> )   |

**Control units**

| Type   | Appearance  | Model No.     | Application cable   | Description (Note)  |
|--|---|---------------|---|---|
| Safety control unit  |  | <b>SF-C21</b> | Safety light curtain<br>Bottom cap cable: <b>SFD-CCB</b> □<br>Extension cable: <b>SFD-CC</b> □                    | Use a discrete wire cable to connect to the safety light curtain.<br>Logic customization, monitoring, and simulation functions are also provided.<br>Compatible with up to Control Category 4.  |
| Connector connection type control unit<br>(Supports presses used in Japan) |  | <b>SF-C11</b> | Safety light curtain<br>Bottom cap cable: <b>SFD-CB</b> □<br>Extension cable: <b>SFB-CCJ</b> □<br>(M12 connector) | Use 8-core cable with connector to connect to the safety light curtain. Muting function cannot be used.<br>Compatible with up to Control Category 4.<br>Supports presses used in Japan when combined with <b>SF4D</b> -□- <b>01</b> (shearing machines not supported) |
| Slim type control unit<br>(Supports presses used in Japan)                 |  | <b>SF-C13</b> | Safety light curtain<br>Bottom cap cable: <b>SFD-CCB</b> □<br>Extension cable: <b>SFD-CC</b> □                    | Use a discrete wire cable to connect to the safety light curtain.<br>Muting function can be used.<br>Compatible with up to Control Category 4.<br>Supports presses used in Japan when combined with <b>SF4D</b> -□- <b>01</b> (shearing machines not supported)       |

**Recommended safety relays**

SF relay, slim type



Note: Please contact our sales office for details on the recommended products.

| Item                             | Type      | With LED indicator   |                     |
|----------------------------------|-----------|--|---------------------|
|                                  | Model No. | <b>SFS3-L-DC24V</b>  | <b>SFS4-L-DC24V</b> |
|                                  | Part No.  | AG1S132  | AG1S142             |
| Contact arrangement              |           | 3a1b   | 4a2b                |
| Rated nominal switching capacity |           | 6 A / 250 V AC, 6 A / 30 V DC                                |                     |
| Min. switching capacity          |           | 1 mA / 5 V DC  |                     |
| Coil rating                      |           | 15 mA / 24 V DC  | 20.8 mA / 24 V DC   |
| Rated power consumption          |           | 360 mW   | 500 mW              |
| Operation time                   |           | 20 ms or less  |                     |
| Release time                     |           | 20 ms or less  |                     |
| Ambient temperature              |           | -40 to +85 °C <b>-40 to +185 °F</b> (Humidity: 5 to 85 % RH) |                     |
| Applicable standards             |           | UL, C-UL, TÜV, Korea's S-mark                                |                     |

**Communication module**

| Type                 | Appearance  | Model No.       | Description   |
|----------------------|---|-----------------|---|
| Communication module |  | <b>SF4D-TM1</b> | The setting software, <b>Configurator Light Curtain</b> , is required when using the <b>SF4D-TM1</b> 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.<br><b>&lt;In the case of SF4D-F□/H□/A□&gt;</b><br>The communication module serves as a conversion module for the connection of a PC to the <b>SF4D</b> 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 <b>SF4D</b> series products without the connection of a PC.<br><b>&lt;In the case of SF4D-□-01&gt;</b><br>The communication module serves as a conversion module for the connection of a PC to the <b>SF4D</b> series for monitoring statuses (light incidence / light blockage, lockout, etc.). The communication module cannot be used by itself. |

**IO-Link communication unit**

| Type                       | Appearance  | Model No.      | Description   |
|----------------------------|---|----------------|---|
| IO-Link communication unit |  | <b>SFD-WL3</b> | For use with <b>SF4D</b> series<br>This unit enables the confirmation of various settings and operating status of the <b>SF4D</b> series from a host device using IO-Link communication. It can also save the setting information of the connected <b>SF4D</b> series unit. |

# OPTIONS

## Front protection cover / Corner mirror

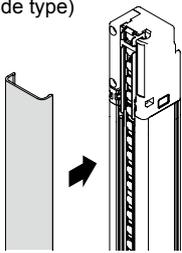
| Designation          |      |            | Front protection cover (wide type) (Note 1) | Front protection cover (slim type) (Note 1) | Corner mirror (Note 1, 2) |  |
|----------------------|------|------------|---|---|---------------------------|--|
| Applicable beam axes |      |            |   |   | Model No.                 | Model No.                              |
| Finger               | Hand | Arm / Foot | Model No.                                   | Model No.                                   | Model No.                 | Effective reflective surface           |
| 15                   | 8    | 4          | <b>FC-SFDH-8</b>                            | <b>FC-SFDH-8-S</b>                          | <b>RF-SFBH-8</b>          | 173 × 72 mm <b>6.811 × 2.835 in</b>    |
| 23                   | 12   | 6          | <b>FC-SFDH-12</b>                           | <b>FC-SFDH-12-S</b>                         | <b>RF-SFBH-12</b>         | 236 × 72 mm <b>9.291 × 2.835 in</b>    |
| 31                   | 16   | 8          | <b>FC-SFDH-16</b>                           | <b>FC-SFDH-16-S</b>                         | <b>RF-SFBH-16</b>         | 316 × 72 mm <b>12.441 × 2.835 in</b>   |
| 39                   | 20   | 10         | <b>FC-SFDH-20</b>                           | <b>FC-SFDH-20-S</b>                         | <b>RF-SFBH-20</b>         | 396 × 72 mm <b>15.591 × 2.835 in</b>   |
| 47                   | 24   | 12         | <b>FC-SFDH-24</b>                           | <b>FC-SFDH-24-S</b>                         | <b>RF-SFBH-24</b>         | 476 × 72 mm <b>18.740 × 2.835 in</b>   |
| 55                   | 28   | 14         | <b>FC-SFDH-28</b>                           | <b>FC-SFDH-28-S</b>                         | <b>RF-SFBH-28</b>         | 556 × 72 mm <b>21.890 × 2.835 in</b>   |
| 63                   | 32   | 16         | <b>FC-SFDH-32</b>                           | <b>FC-SFDH-32-S</b>                         | <b>RF-SFBH-32</b>         | 636 × 72 mm <b>25.039 × 2.835 in</b>   |
| 71                   | 36   | 18         | <b>FC-SFDH-36</b>                           | <b>FC-SFDH-36-S</b>                         | <b>RF-SFBH-36</b>         | 716 × 72 mm <b>28.189 × 2.835 in</b>   |
| 79                   | 40   | 20         | <b>FC-SFDH-40</b>                           | <b>FC-SFDH-40-S</b>                         | <b>RF-SFBH-40</b>         | 796 × 72 mm <b>31.339 × 2.835 in</b>   |
| 95                   | 48   | 24         | <b>FC-SFDH-48</b>                           | <b>FC-SFDH-48-S</b>                         | <b>RF-SFBH-48</b>         | 956 × 72 mm <b>37.638 × 2.835 in</b>   |
| 111                  | 56   | 28         | <b>FC-SFDH-56</b>                           | <b>FC-SFDH-56-S</b>                         | <b>RF-SFBH-56</b>         | 1,116 × 72 mm <b>43.937 × 2.835 in</b> |
| 127                  | 64   | 32         | <b>FC-SFDH-64</b>                           | <b>FC-SFDH-64-S</b>                         | <b>RF-SFBH-64</b>         | 1,276 × 72 mm <b>50.236 × 2.835 in</b> |
| —                    | 72   | 36         | <b>FC-SFDH-72</b>                           | <b>FC-SFDH-72-S</b>                         | <b>RF-SFBH-72</b>         | 1,436 × 72 mm <b>56.535 × 2.835 in</b> |
| —                    | 80   | 40         | <b>FC-SFDH-80</b>                           | <b>FC-SFDH-80-S</b>                         | <b>RF-SFBH-80</b>         | 1,596 × 72 mm <b>62.835 × 2.835 in</b> |
| —                    | 88   | 44         | <b>FC-SFDH-88</b>                           | <b>FC-SFDH-88-S</b>                         | <b>RF-SFBH-88</b>         | 1,756 × 72 mm <b>69.134 × 2.835 in</b> |
| —                    | 96   | 48         | <b>FC-SFDH-96</b>                           | <b>FC-SFDH-96-S</b>                         | <b>RF-SFBH-96</b>         | 1,916 × 72 mm <b>75.433 × 2.835 in</b> |

Notes: 1) The model Nos. given above denote a single unit, not a pair of units. 2 units are required for use in mounting to the emitter / receiver. (Except for corner mirror)  
 2) The corner mirror has not received type examination by the Ministry of Health, Labour and Welfare; therefore, it cannot be used for presses or shearing machines (paper cutting machines) in Japan.

### Front protection cover

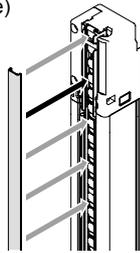
Protects sensing surface of the safety light curtain from flying objects such as welding spatter. The operating range reduces when the front protection cover is used.

#### • FC-SFDH-□ (wide type)



Material: Polycarbonate

#### • FC-SFDH-□-S (slim type)



Material: Polycarbonate

### • Operating range

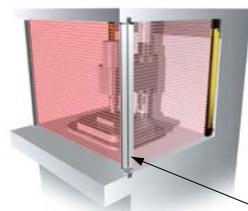
| Front protection cover |  |                                     | Operating range (Note)                    |   |
|------------------------|--|-------------------------------------|---|---|
|                        |  |                                     | Short mode                                | Long mode                                 |
| Finger                 | FC-SFDH-□ (wide type)<br>FC-SFDH-□-S (slim type) | Only emitter installed              | 0.2 to 6 m<br><b>0.656 to 19.685 ft</b>   | 0.8 to 9.5 m<br><b>2.625 to 31.168 ft</b> |
|                        |  | Only receiver installed             | 0.2 to 6 m<br><b>0.656 to 19.685 ft</b>   | 0.8 to 9.5 m<br><b>2.625 to 31.168 ft</b> |
|                        |  | Both emitter and receiver installed | 0.2 to 5.5 m<br><b>0.656 to 18.045 ft</b> | 0.8 to 9 m<br><b>2.625 to 29.528 ft</b>   |
| Hand, Arm / Foot       | FC-SFDH-□ (wide type)<br>FC-SFDH-□-S (slim type) | Only emitter installed              | 0.2 to 7.5 m<br><b>0.656 to 24.606 ft</b> | 0.8 to 12 m<br><b>2.625 to 39.370 ft</b>  |
|                        |  | Only receiver installed             | 0.2 to 7.5 m<br><b>0.656 to 24.606 ft</b> | 0.8 to 12 m<br><b>2.625 to 39.370 ft</b>  |
|                        |  | Both emitter and receiver installed | 0.2 to 7 m<br><b>0.656 to 22.966 ft</b>   | 0.8 to 11 m<br><b>2.625 to 36.089 ft</b>  |

Note: The operating range is the possible setting distance between the emitter and the receiver.

### Corner mirror

#### • RF-SFBH-□

Normally for L-shaped or U-shaped installation, 2 or 3 sets of safety light curtains are needed. With the use of a corner mirror reflecting the light, one set of safety light curtain is possible for L-shaped or U-shaped installation.



Corner mirror  
RF-SFBH-□

### • Operating range

|                       |                  |
|-----------------------|------------------|
| With 1 corner mirror  | Declined to 90 % |
| With 2 corner mirrors | Declined to 80 % |
| With 3 corner mirrors | Declined to 70 % |

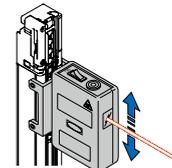
\* The corner mirror has not received type examination by the Ministry of Health, Labour and Welfare; therefore, it cannot be used for presses or shearing machines (paper cutting machines) in Japan.

## Test rod / Laser alignment tool

| Type                 | Model No.        | Description   |
|----------------------|------------------|---|
| Test rod ø45         | <b>SF4B-TR45</b> | Min. sensing object for regular checking (ø45 mm <b>ø1.772 in</b> ), with arm / foot protection type (min. sensing object ø45 mm <b>ø1.772 in</b> ) |
| Laser alignment tool | <b>SF-LAT-2N</b> | Allows easy beam axis alignment using easy-to-see laser beam  |

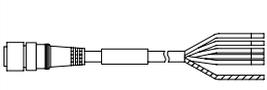
### Laser alignment tool

#### • SF-LAT-2N



## OPTIONS

### Y-shaped connector

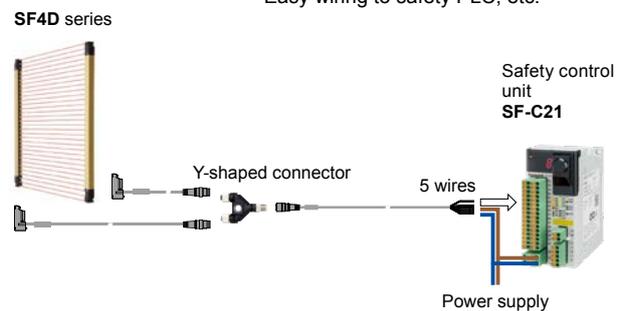
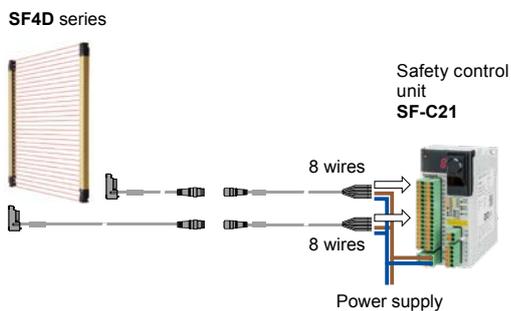
| Type                             | Appearance  | Model No.        | Description   |
|----------------------------------|---|------------------|---|
| Wire-saving Y-shaped connector   |  | <b>SFB-WY1</b>   | Wire-saving connector for standard components (8-core cable). Cables of emitter and receiver are consolidated into one cable for wire-saving. Wiring has +24 V, 0 V, OSSD 1, OSSD 2, output polarity setting wire, and lockout release input. [Power wire and synchronization wire are connected inside the connector.] [Interlock is disabled (automatic reset).] Net weight: 35 g approx. M12 female-male connector |
| Cable with connector on one side |  | <b>WY1-CCN3</b>  | Cable length: 3 m <b>9.843 ft</b><br>Net weight: 200 g approx. (1 cable)  |
|                                  |   | <b>WY1-CCN10</b> | Cable length: 10 m <b>32.808 ft</b><br>Net weight: 620 g approx. (1 cable)  |
|                                  |   |                  | Mating cable for Y-shaped connector<br>Cable color: Gray (with black line)<br>Connector color: Black<br>The min. bending radius: R6 mm <b>R0.236 in</b><br>Connector outer diameter: $\varnothing$ 14 mm <b><math>\varnothing</math>0.551 in</b><br>M12 female connector  |

By using the Y-shaped connector, the least required wires such as power or safety output are consolidated into one cable. Man-hours taken for wiring is eliminated to the minimum. Construction times as well as wiring mistakes are greatly reduced.

**Previous** A total of 16 wires (8-core cable)

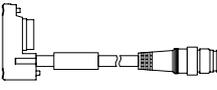
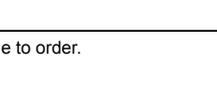
**Y-shaped connector**

- Only 5 wires
- Less wiring mistakes! Reduced wiring time!
- Easy wiring to safety PLC, etc.



Refer to the instruction manual of Y-shaped connector and safety control unit for more detail such as installation of Y-shaped connector, terminal wiring, and wiring example.

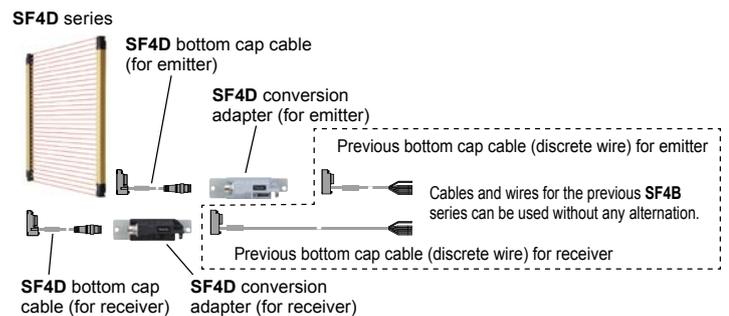
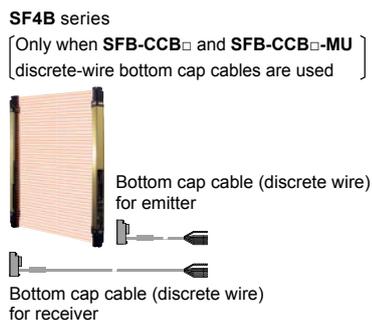
### SF4D conversion adapter (For replacing SF4B series with SF4D series)

| Type                           | Appearance   | Model No.          | Description  |
|--------------------------------|--|--------------------|--|
| SF4D conversion adapter (Note) | For 8-core cable<br>For emitter<br>   | <b>SFD-J4B</b>     | This unit replaces the previous SF4B series (only when SFB-CCB□ and SFB-CCB□-MU discrete-wire bottom cap cables are used). The existing mounting holes, discrete-wire bottom cap cables and other wires for the previous SF4B series can be used to allow for easy and smooth installation. 1 set (one for emitter and one for receiver)<br>Female connector (8-core: M12, 12-core: M14) |
|                                | For 12-core cable<br>For receiver<br> | <b>SFD-J4B-MU</b>  |  |
| SF4D bottom cap cable          | For 8-core cable<br>                  | <b>SFD-CB05</b>    | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 80 g approx. (2 cables)   |
|                                | For 12-core cable<br>                 | <b>SFD-CB05-MU</b> | Length: 0.5 m <b>1.640 ft</b><br>Net weight: 95 g approx. (2 cables)   |
|                                |  |                    | Used for connecting to the SF4D series main unit and to SF4D conversion adapter.<br>2 cables/set for emitter and receiver<br>Cable color: Gray for emitter<br>Gray with black line for receiver<br>Min. bending radius: R6 mm<br>Male connector (8-core: M12, 12-core: M14)  |

Note: This product is made to order.

**Previous**

**Replacing existing unit with SF4D series using SF4D conversion adapter**



# SPECIFICATIONS

## Safety light curtain individual specifications

### SF4D-F□(-01) (Finger protection type)

| Type                                       |   | Min. sensing object ø14 mm ø0.551 in type (10 mm 0.394 in beam pitch) |                                     |   |   |
|--|---|---|-------------------------------------|---|---|
| Item                                       | Model No.   | SF4D-F15(-01)   | SFD-F23(-01)                        | SF4D-F31(-01)                                     | SF4D-F39(-01)                                     |
| Number of beam channels                    |   | 15  | 23                                  | 31  | 39  |
| Protective height (Note 2)                 |   | 150 mm 5.906 in   | 230 mm 9.055 in                     | 310 mm 12.205 in                                  | 390 mm 15.354 in                                  |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 140 mm 5.512 in   | 220 mm 8.661 in                     | 300 mm 11.811 in                                  | 380 mm 14.961 in                                  |
| Current consumption                        |   | Emitter: 110 mA or less, Receiver: 130 mA or less                     |                                     | Emitter: 120 mA or less, Receiver: 130 mA or less | Emitter: 120 mA or less, Receiver: 140 mA or less |
| PFH <sub>D</sub> / MTTFD                   |   | 1.21 × 10 <sup>-9</sup> / 1,031 years                                 | 1.48 × 10 <sup>-9</sup> / 833 years | 1.80 × 10 <sup>-9</sup> / 672 years               | 2.07 × 10 <sup>-9</sup> / 582 years               |
| Net weight (Total of emitter and receiver) |   | 270 g approx.   | 470 g approx.                       | 680 g approx.                                     | 890 g approx.                                     |

| Item                                       | Model No.   | SF4D-F47(-01)                                     | SF4D-F55(-01)                       | SF4D-F63(-01)                                     | SF4D-F71(-01)                       |
|--|---|---|-------------------------------------|---|-------------------------------------|
| Number of beam channels                    |   | 47  | 55                                  | 63  | 71                                  |
| Protective height (Note 2)                 |   | 470 mm 18.504 in                                  | 550 mm 21.654 in                    | 630 mm 24.803 in                                  | 710 mm 27.953 in                    |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 460 mm 18.110 in                                  | 540 mm 21.260 in                    | 620 mm 24.409 in                                  | 700 mm 27.559 in                    |
| Current consumption                        |   | Emitter: 120 mA or less, Receiver: 140 mA or less |                                     | Emitter: 120 mA or less, Receiver: 150 mA or less |                                     |
| PFH <sub>D</sub> / MTTFD                   |   | 2.40 × 10 <sup>-9</sup> / 498 years               | 2.66 × 10 <sup>-9</sup> / 447 years | 2.99 × 10 <sup>-9</sup> / 396 years               | 3.25 × 10 <sup>-9</sup> / 363 years |
| Net weight (Total of emitter and receiver) |   | 1,100 g approx.                                   | 1,300 g approx.                     | 1,500 g approx.                                   | 1,700 g approx.                     |

| Item                                       | Model No.   | SF4D-F79(-01)                                     | SF4D-F95(-01)                                     | SF4D-F111(-01)                                    | SF4D-F127(-01)                                    |
|--|---|---|---|---|---|
| Number of beam channels                    |   | 79  | 95  | 111   | 127   |
| Protective height (Note 2)                 |   | 790 mm 31.102 in                                  | 950 mm 37.402 in                                  | 1,110 mm 43.701 in                                | 1,270 mm 50.000 in                                |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 780 mm 30.709 in                                  | 940 mm 37.008 in                                  | 1,100 mm 43.307 in                                | 1,260 mm 49.606 in                                |
| Current consumption                        |   | Emitter: 120 mA or less, Receiver: 150 mA or less | Emitter: 120 mA or less, Receiver: 160 mA or less | Emitter: 120 mA or less, Receiver: 170 mA or less | Emitter: 120 mA or less, Receiver: 180 mA or less |
| PFH <sub>D</sub> / MTTFD                   |   | 3.58 × 10 <sup>-9</sup> / 328 years               | 4.17 × 10 <sup>-9</sup> / 281 years               | 4.76 × 10 <sup>-9</sup> / 245 years               | 5.36 × 10 <sup>-9</sup> / 217 years               |
| Net weight (Total of emitter and receiver) |   | 1,900 g approx.                                   | 2,300 g approx.                                   | 2,800 g approx.                                   | 3,200 g approx.                                   |

### SF4D-H□(-01) (Hand protection type)

| Type                                       |   | Min. sensing object ø25 mm ø0.984 in type (20 mm 0.787 in beam pitch) |                                       |                                     |                                     |
|--|---|---|---------------------------------------|-------------------------------------|-------------------------------------|
| Item                                       | Model No.   | SF4D-H8(-01)  | SF4D-H12(-01)                         | SF4D-H16(-01)                       | SF4D-H20(-01)                       |
| Number of beam channels                    |   | 8   | 12                                    | 16                                  | 20                                  |
| Protective height (Note 2)                 |   | 150 mm 5.906 in   | 230 mm 9.055 in                       | 310 mm 12.205 in                    | 390 mm 15.354 in                    |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 140 mm 5.512 in   | 220 mm 8.661 in                       | 300 mm 11.811 in                    | 380 mm 14.961 in                    |
| Current consumption                        |   | Emitter: 100 mA or less, Receiver: 120 mA or less                     |                                       |                                     |                                     |
| PFH <sub>D</sub> / MTTFD                   |   | 9.57 × 10 <sup>-10</sup> / 1,340 years                                | 1.12 × 10 <sup>-9</sup> / 1,119 years | 1.26 × 10 <sup>-9</sup> / 988 years | 1.40 × 10 <sup>-9</sup> / 881 years |
| Net weight (Total of emitter and receiver) |   | 270 g approx.   | 470 g approx.                         | 680 g approx.                       | 890 g approx.                       |

| Item                                       | Model No.   | SF4D-H24(-01)                                     | SF4D-H28(-01)                                     | SF4D-H32(-01)                       | SF4D-H36(-01)                                     |
|--|---|---|---|-------------------------------------|---|
| Number of beam channels                    |   | 24  | 28  | 32                                  | 36  |
| Protective height (Note 2)                 |   | 470 mm 18.504 in                                  | 550 mm 21.654 in                                  | 630 mm 24.803 in                    | 710 mm 27.953 in                                  |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 460 mm 18.110 in                                  | 540 mm 21.260 in                                  | 620 mm 24.409 in                    | 700 mm 27.559 in                                  |
| Current consumption                        |   | Emitter: 100 mA or less, Receiver: 130 mA or less | Emitter: 110 mA or less, Receiver: 130 mA or less |                                     | Emitter: 120 mA or less, Receiver: 130 mA or less |
| PFH <sub>D</sub> / MTTFD                   |   | 1.56 × 10 <sup>-9</sup> / 782 years               | 1.73 × 10 <sup>-9</sup> / 701 years               | 1.87 × 10 <sup>-9</sup> / 647 years | 2.04 × 10 <sup>-9</sup> / 591 years               |
| Net weight (Total of emitter and receiver) |   | 1,100 g approx.                                   | 1,300 g approx.                                   | 1,500 g approx.                     | 1,700 g approx.                                   |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.

PFH<sub>D</sub>: Probability of dangerous failure per hour, MTTFD: Mean time to dangerous failure (in years)

2) In the case of "When used as safety device for presses in China" or "When SF4D-□-01 is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height.

## SPECIFICATIONS

| Type                                       |   | Min. sensing object $\varnothing 25$ mm $\varnothing 0.984$ in type (20 mm $0.787$ in beam pitch) |                                   |                                   |   |
|--|---|---|-----------------------------------|-----------------------------------|---|
| Item                                       | Model No.   | SF4D-H40(-01)   | SF4D-H48(-01)                     | SF4D-H56(-01)                     | SF4D-H64(-01)                                     |
| Number of beam channels                    |   | 40  | 48                                | 56                                | 64  |
| Protective height (Note 2)                 |   | 790 mm $31.102$ in  | 950 mm $37.402$ in                | 1,110 mm $43.701$ in              | 1,270 mm $50.000$ in                              |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 780 mm $30.709$ in  | 940 mm $37.008$ in                | 1,100 mm $43.307$ in              | 1,260 mm $49.606$ in                              |
| Current consumption                        |   | Emitter: 120 mA or less, Receiver: 140 mA or less   |                                   |                                   | Emitter: 120 mA or less, Receiver: 150 mA or less |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $2.17 \times 10^{-9}$ / 552 years   | $2.48 \times 10^{-9}$ / 481 years | $2.78 \times 10^{-9}$ / 426 years | $3.09 \times 10^{-9}$ / 383 years                 |
| Net weight (Total of emitter and receiver) |   | 1,900 g approx.   | 2,300 g approx.                   | 2,800 g approx.                   | 3,200 g approx.                                   |

| Type                                       |   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in type (40 mm $1.575$ in beam pitch) |                                   |   |                                   |
|--|---|---|-----------------------------------|---|-----------------------------------|
| Item                                       | Model No.   | SF4D-H72(-01)   | SF4D-H80(-01)                     | SF4D-H88(-01)                                     | SF4D-H96(-01)                     |
| Number of beam channels                    |   | 72  | 80                                | 88  | 96                                |
| Protective height (Note 2)                 |   | 1,430 mm $56.299$ in  | 1,590 mm $62.598$ in              | 1,750 mm $68.898$ in                              | 1,910 mm $75.197$ in              |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 1,420 mm $55.906$ in  | 1,580 mm $62.205$ in              | 1,740 mm $68.504$ in                              | 1,900 mm $74.803$ in              |
| Current consumption                        |   | Emitter: 120 mA or less, Receiver: 150 mA or less   |                                   | Emitter: 120 mA or less, Receiver: 160 mA or less |                                   |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $3.39 \times 10^{-9}$ / 347 years   | $3.69 \times 10^{-9}$ / 318 years | $4.00 \times 10^{-9}$ / 293 years                 | $4.30 \times 10^{-9}$ / 272 years |
| Net weight (Total of emitter and receiver) |   | 3,600 g approx.   | 4,000 g approx.                   | 4,400 g approx.                                   | 4,800 g approx.                   |

### SF4D-A□(-01) (Arm / Foot protection type)

| Type                                       |   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in type (40 mm $1.575$ in beam pitch) |                                      |                                     |                                     |
|--|---|---|--------------------------------------|-------------------------------------|-------------------------------------|
| Item                                       | Model No.   | SF4D-A4(-01)  | SF4D-A6(-01)                         | SF4D-A8(-01)                        | SF4D-A10(-01)                       |
| Number of beam channels                    |   | 4   | 6                                    | 8                                   | 10                                  |
| Protective height (Note 2)                 |   | 150 mm $5.906$ in   | 230 mm $9.055$ in                    | 310 mm $12.205$ in                  | 390 mm $15.354$ in                  |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 120 mm $4.724$ in   | 200 mm $7.874$ in                    | 280 mm $11.024$ in                  | 360 mm $14.173$ in                  |
| Current consumption                        |   | Emitter: 100 mA or less, Receiver: 120 mA or less   |                                      |                                     |                                     |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $8.29 \times 10^{-10}$ / 1,577 years  | $9.34 \times 10^{-10}$ / 1,378 years | $1.01 \times 10^{-9}$ / 1,267 years | $1.11 \times 10^{-9}$ / 1,136 years |
| Net weight (Total of emitter and receiver) |   | 270 g approx.   | 470 g approx.                        | 680 g approx.                       | 890 g approx.                       |

| Type                                       |   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in type (40 mm $1.575$ in beam pitch) |                                   |                                   |                                   |
|--|---|---|-----------------------------------|-----------------------------------|-----------------------------------|
| Item                                       | Model No.   | SF4D-A12(-01)   | SF4D-A14(-01)                     | SF4D-A16(-01)                     | SF4D-A18(-01)                     |
| Number of beam channels                    |   | 12  | 14                                | 16                                | 18                                |
| Protective height (Note 2)                 |   | 470 mm $18.504$ in  | 550 mm $21.654$ in                | 630 mm $24.803$ in                | 710 mm $27.953$ in                |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 440 mm $17.323$ in  | 520 mm $20.472$ in                | 600 mm $23.622$ in                | 680 mm $26.772$ in                |
| Current consumption                        |   | Emitter: 100 mA or less, Receiver: 130 mA or less   |                                   |                                   |                                   |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $1.18 \times 10^{-9}$ / 1,060 years   | $1.29 \times 10^{-9}$ / 966 years | $1.36 \times 10^{-9}$ / 910 years | $1.46 \times 10^{-9}$ / 840 years |
| Net weight (Total of emitter and receiver) |   | 1,100 g approx.   | 1,300 g approx.                   | 1,500 g approx.                   | 1,700 g approx.                   |

| Type                                       |   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in type (40 mm $1.575$ in beam pitch) |   |                                   |   |
|--|---|---|---|-----------------------------------|---|
| Item                                       | Model No.   | SF4D-A20(-01)   | SF4D-A24(-01)                                     | SF4D-A28(-01)                     | SF4D-A32(-01)                                     |
| Number of beam channels                    |   | 20  | 24  | 28                                | 32  |
| Protective height (Note 2)                 |   | 790 mm $31.102$ in  | 950 mm $37.402$ in                                | 1,110 mm $43.701$ in              | 1,270 mm $50.000$ in                              |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 760 mm $29.921$ in  | 920 mm $36.220$ in                                | 1,080 mm $42.520$ in              | 1,240 mm $48.819$ in                              |
| Current consumption                        |   | Emitter: 100 mA or less, Receiver: 130 mA or less   | Emitter: 100 mA or less, Receiver: 140 mA or less |                                   | Emitter: 110 mA or less, Receiver: 140 mA or less |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $1.54 \times 10^{-9}$ / 798 years   | $1.71 \times 10^{-9}$ / 710 years                 | $1.89 \times 10^{-9}$ / 640 years | $2.07 \times 10^{-9}$ / 582 years                 |
| Net weight (Total of emitter and receiver) |   | 1,900 g approx.   | 2,300 g approx.                                   | 2,800 g approx.                   | 3,200 g approx.                                   |

| Type                                       |   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in type (40 mm $1.575$ in beam pitch) |                                   |                                   |   |
|--|---|---|-----------------------------------|-----------------------------------|---|
| Item                                       | Model No.   | SF4D-A36(-01)   | SF4D-A40(-01)                     | SF4D-A44(-01)                     | SF4D-A48(-01)                                     |
| Number of beam channels                    |   | 36  | 40                                | 44                                | 48  |
| Protective height (Note 2)                 |   | 1,430 mm $56.299$ in  | 1,590 mm $62.598$ in              | 1,750 mm $68.898$ in              | 1,910 mm $75.197$ in                              |
|  | When using as safety equipment for Chinese press machine or when using SF4D-□-01 for Japanese press machine or paper shearing machine | 1,400 mm $55.118$ in  | 1,560 mm $61.417$ in              | 1,720 mm $67.717$ in              | 1,880 mm $74.016$ in                              |
| Current consumption                        |   | Emitter: 110 mA or less, Receiver: 150 mA or less   |                                   |                                   | Emitter: 110 mA or less, Receiver: 160 mA or less |
| PFH <sub>D</sub> / MTTFD <sub>D</sub>      |   | $2.24 \times 10^{-9}$ / 534 years   | $2.42 \times 10^{-9}$ / 493 years | $2.60 \times 10^{-9}$ / 458 years | $2.77 \times 10^{-9}$ / 428 years                 |
| Net weight (Total of emitter and receiver) |   | 3,600 g approx.   | 4,000 g approx.                   | 4,400 g approx.                   | 4,800 g approx.                                   |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.

PFH<sub>D</sub>: Probability of dangerous failure per hour, MTTFD<sub>D</sub>: Mean time to dangerous failure (in years)

2) In the case of "When used as safety device for presses in China" or "When SF4D-□-01 is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height.

# SPECIFICATIONS

## Safety light curtain common specifications

| Item  | Type   | Min. sensing object $\varnothing 14$ mm $\varnothing 0.551$ in<br>(10 mm $0.394$ in beam pitch) | Min. sensing object $\varnothing 25$ mm $\varnothing 0.984$ in<br>(20 mm $0.787$ in beam pitch)   | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in<br>(40 mm $1.575$ in beam pitch) |
|---|--|---|---|---|
|   | Model No.  | SF4D-F□   | SF4D-H□   | SF4D-A□   |
|   | Japanese press machine<br>or paper shearing<br>machine compliant   | SF4D-F□-01  | SF4D-H□-01  | SF4D-A□-01  |
| Applicable standards                                  | International standards  | IEC 61496-1/2 (Type 4), ISO 13849-1 (Category 4, PL <sub>e</sub> ), IEC 61508-1 to 7 (SIL3)     |   |   |
|   | Japan  | JIS B 9704-1/2 (Type 4), JIS B 9705-1 (Category 4), JIS C 0508-1 to 7 (SIL3)                    |   |   |
|   | Europe   | EN ISO 13849-1 (Category 4, PL <sub>e</sub> ), EN 55011, EN 61000-6-2, EN IEC 63000             |   |   |
|   | North America  | ANSI/UL 61496-1/2 (Type 4), CAN/CSA C22.2 No.14, CAN/CSA E61496-1/2                             |   |   |
|   | China  | GB/T 4584   |   |   |
| Applicable regulations and certifications             | CE Marking (Machinery Directive, EMC Directive, RoHS Directive), TÜV SÜD certification, TÜV SÜD NRTL certification (U.S.A., Canada), OSHA 1910.212, OSHA 1910.217(C), ANSI B11.1 to B11.19, ANSI/RIA 15.06, Korea KCs mark (Note 2)  |   |   |   |
| Operating range (Note 3)                              | Short mode: 0.2 to 7 m $0.656$ to $22.966$ ft<br>Long mode: 0.8 to 12 m $2.625$ to $39.370$ ft<br>(selectable by DIP switch)   |   | Short mode: 0.2 to 9 m $0.656$ to $29.528$ ft<br>Long mode: 0.8 to 15 m $2.625$ to $49.213$ ft<br>(selectable by DIP switch)  |   |
| Min. sensing object (Note 4)                          | $\varnothing 14$ mm $\varnothing 0.551$ in opaque object   | $\varnothing 25$ mm $\varnothing 0.984$ in opaque object  | $\varnothing 45$ mm $\varnothing 1.772$ in opaque object  |   |
| Effective aperture angle                              | $\pm 2.5^\circ$ or less at a sensing range of 3 m $9.843$ ft or longer (based on IEC 61496-2)  |   |   |   |
| Supply voltage  | 24 V DC <sup>+20</sup> / <sub>-30</sub> % Ripple P-P 10 % or less (excluding voltage drop due to cable) (Note 5)   |   |   |   |
| Control outputs<br>(OSSD 1, OSSD 2)                   | PNP open-collector transistor / NPN open collector transistor (selectable)   |   |   |   |
|   | <PNP output selected>  |   | <NPN output selected>   |   |
|   | <ul style="list-style-type: none"> <li>• Maximum source current: 350 mA</li> <li>• Applied voltage: Same as supply voltage<br/>(between control output and +V)</li> <li>• Residual voltage: 2 V or less (source current 350 mA)<br/>(excluding voltage drop due to cable)</li> <li>• Leakage current: 0.2 mA or less (including power OFF state)</li> <li>• Maximum load capacity: 2.2 <math>\mu</math>F</li> <li>• Load wiring resistance: 3 <math>\Omega</math> or less</li> </ul>   |   | <ul style="list-style-type: none"> <li>• Maximum sink current: 350 mA</li> <li>• Applied voltage: Same as supply voltage<br/>(between control output and 0 V)</li> <li>• Residual voltage: 2 V or less (sink current 350 mA)<br/>(excluding voltage drop due to cable)</li> <li>• Leakage current: 0.2 mA or less (including power OFF state)</li> <li>• Maximum load capacity: 2.2 <math>\mu</math>F</li> <li>• Load wiring resistance: 3 <math>\Omega</math> or less</li> </ul> |   |
|   | Operation mode: ON when all beams are received, OFF when one or more beams are blocked<br>(Also OFF when internal sensor error or synchronization signal error occurs) (Note 6)  |   |   |   |
|   | Protection circuit: Incorporated   |   |   |   |
|   | Response time: OFF response: 10 ms or less (Not connected in series / parallel), 18 ms or less (Connected in series / parallel) (Note 7)<br>ON response: 50 ms or less (Note 8) (Note 9)   |   |   |   |
| Auxiliary output (AUX)<br>(Non-safety output)         | PNP open-collector transistor / NPN open collector transistor (selectable)   |   |   |   |
|   | <PNP output selected>  |   | <NPN output selected>   |   |
|   | <ul style="list-style-type: none"> <li>• Maximum source current: 60 mA</li> <li>• Applied voltage: Same as supply voltage<br/>(between auxiliary output and +V)</li> <li>• Residual voltage: 2 V or less (source current 60 mA)<br/>(excluding voltage drop due to cable)</li> <li>• Leakage current: 0.2 mA or less (including power OFF state)</li> </ul>  |   | <ul style="list-style-type: none"> <li>• Maximum sink current: 60 mA</li> <li>• Applied voltage: Same as supply voltage<br/>(between auxiliary output and 0 V)</li> <li>• Residual voltage: 2 V or less (sink current 60 mA)<br/>(excluding voltage drop due to cable)</li> <li>• Leakage current: 0.2 mA or less (including power OFF state)</li> </ul>  |   |
|   | Operation mode: Control output ON: OFF, Control output OFF: ON (Note 6)  |   |   |   |
|   | Protection circuit: Incorporated   |   |   |   |
|   | Response time: OFF response: 60 ms or less, ON response: 60 ms or less   |   |   |   |
| Synchronization method                                | Line synchronization / optical synchronization (selectable by DIP switch)  |   |   |   |
| Interference prevention function                      | <ul style="list-style-type: none"> <li>&lt;Not connected in series/parallel&gt; <ul style="list-style-type: none"> <li>• Line synchronization: 2 units or less (auto)</li> <li>• Optical synchronization: 2 units or less (selectable by DIP switch)</li> </ul> </li> <li>&lt;Connected in series/parallel&gt; <ul style="list-style-type: none"> <li>• Series connection: 5 units or less (total number of beam channels 256 or less)</li> <li>• Parallel connection: 3 units or less (total number of beam channels 192 or less) (Note 6)</li> <li>• Series / parallel connection mixed: 5 units or less (total number of beam channels 144 or less) (Note 6)</li> </ul> </li> </ul> |   |   |   |
| Test input function                                   | Incorporated   |   |   |   |
| Interlock function                                    | Incorporated [Manual reset / auto reset (selectable by wiring)] (8-core cable or 12-core cable)  |   |   |   |
| Lockout release function                              | Incorporated   |   |   |   |
| External device monitor function                      | Incorporated (8-core cable or 12-core cable)   |   |   |   |
| Application indicator function                        | Incorporated (only the receiver lights up when optical synchronization is used)  |   |   |   |
| Muting function                                       | Incorporated (12-core cable)   |   |   |   |
| Override function                                     | Incorporated (12-core cable)   |   |   |   |
| Power save function                                   | Incorporated   |   |   |   |
| Optional functions (Note 10)<br>(Excluding SF4D-□-01) | Fixed blanking function, floating blanking function, interlock setting function, external device monitoring setting function, auxiliary output setting function, application indicator setting function, muting setting function, override setting function, protect function, I/O setting function  |   |   |   |

## SPECIFICATIONS

| Item                           | Type   | Min. sensing object $\varnothing 14$ mm $\varnothing 0.551$ in<br>(10 mm $0.394$ in beam pitch)  | Min. sensing object $\varnothing 25$ mm $\varnothing 0.984$ in<br>(20 mm $0.787$ in beam pitch) | Min. sensing object $\varnothing 45$ mm $\varnothing 1.772$ in<br>(40 mm $1.575$ in beam pitch) |
|--------------------------------|--|--|---|---|
|                                | Model No.  | SF4D-F□  | SF4D-H□   | SF4D-A□   |
|                                | Japanese press machine<br>or paper shearing<br>machine compliant | SF4D-F□-01   | SF4D-H□-01  | SF4D-A□-01  |
| Pollution degree               |  | 3  |   |   |
| Operating altitude             |  | 2,000 m $6,561.68$ ft or less (Note 11)  |   |   |
| Environmental resistance       | Degree of protection   | IP67, IP65 (IEC), NEMA Type 13 (NEMA 250)  |   |   |
|                                | Ambient temperature  | -10 to +55 °C $+14$ to $+131$ °F (No dew condensation or icing allowed), Storage: -25 to +60 °C $-13$ to $+140$ °F   |   |   |
|                                | Ambient humidity   | 30 to 85 % RH, Storage: 30 to 95 % RH  |   |   |
|                                | Ambient illumination   | Incandescent light: 5,000 lx or less at the light-receiving surface  |   |   |
|                                | Dielectric strength voltage                                      | 1,000 V AC for one minute, between all supply terminals connected together and enclosure   |   |   |
|                                | Insulation resistance  | 20 M $\Omega$ , or more, with 500 V DC megger, between all supply terminals connected together and enclosure   |   |   |
|                                | Vibration resistance   | 10 to 55 Hz, 0.75 mm $0.030$ in double amplitude in X, Y, and Z directions for two hours each<br>Malfunction resistance 10 to 55 Hz, 0.75 mm $0.030$ in double amplitude in X, Y, and Z directions twenty times each |   |   |
|                                | Shock resistance   | 300 m/s <sup>2</sup> acceleration (30 G approx.) in X, Y, and Z directions three times each<br>Malfunction resistance 100 m/s <sup>2</sup> acceleration (10 G approx.) in X, Y, and Z directions 1,000 times each    |   |   |
| SFF (Safe Failure Fraction)    |  | 99 %   |   |   |
| HFT (Hardware Fault Tolerance) |  | 1  |   |   |
| Subsystem type                 |  | Type B (IEC 61508-2)   |   |   |
| T1 (proof test interval)       |  | 20 years   |   |   |
| Failure response time          |  | Within response time (OFF response)  |   |   |
| Safety state                   |  | Control output (OSSD 1 / 2) OFF state  |   |   |
| Emitter element                |  | Infrared LED (peak emission wavelength: 850 nm $0.034$ mil)  |   |   |
| Material                       |  | Enclosure: Aluminum, Detection surface: Polycarbonate resin and stainless steel (SUS304), Upper cap / lower cap: Nylon   |   |   |
| Connecting method              |  | By connector   |   |   |
| Cable extension                |  | Total length of emitter / receiver can be extended up to 70 m $229.659$ ft each using optional mating cable (including the length of cables for series connection) (Note 5)  |   |   |
| Accessories                    |  | SF4B-TR14 (test rod): 1 pc.  | SF4B-TR25 (test rod): 1 pc.   | _____   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C  $+68$  °F.  
2) Except for SF4D-□-01, Korea KCs mark is acquired.  
3) The operating range is the possible setting distance between the emitter and the receiver.  
4) When the floating blanking function is used, the size of the minimum sensing object varies. For the detail, refer to the section on **Safety distance** (p.36).  
5) In consideration of the voltage drop caused by the cable, use **Control output (OSSD 1, OSSD 2) source / sink current and cable length** (p.27) as a guideline.  
6) The setting can be changed when the SF4D-TM1 (optional) and **Configurator Light Curtain** setting software are used. Note that the setting cannot be changed when SF4D-□-01 is used.  
7) For response times by number of beams, refer to the **Control output (OSSD 1, OSSD 2) OFF response times** (p.27).  
8) Because the control output (OSSD 1, OSSD 2) must be OFF for at least 80 ms, the ON response will be delayed more than 50 ms when the light blocked time is less than 30 ms.  
9) When optical synchronization is selected, if the beam axes of both the top end and bottom end are blocked, the ON response speed decreases by as much as 1 sec.  
10) To use optional functions, the SF4D-TM1 (optional) and **Configurator Light Curtain** setting software are required. Note that optional functions cannot be used when SF4D-□-01 is used.  
11) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0 m.

# SPECIFICATIONS

## Control output (OSSD 1, OSSD 2) source / sink current and cable length

| Number of sub-sensors       | Control output (OSSD 1, OSSD 2) source / sink current | Power supply cable length<br>Length of cable for series connection<br>(Total cable length) | Cable                     |                                    |
|-----------------------------|---|--|---------------------------|------------------------------------|
|                             |   |  | Power supply cable length | Cable length for series connection |
| 0<br>(No series connection) | 100 mA  | 70 m <b>229.659 ft</b> or less   | —                         | —                                  |
|                             | 200 mA  |  |                           |                                    |
|                             | 350 mA  |  |                           |                                    |
| 1                           | 100 mA  | 50 m <b>164.042 ft</b> or less   | —                         | —                                  |
|                             | 200 mA  |  |                           |                                    |
|                             | 350 mA  |  |                           |                                    |
| 2                           | 100 mA  | 50 m <b>164.042 ft</b> or less   | —                         | —                                  |
|                             | 200 mA  |  |                           |                                    |
|                             | 350 mA  |  |                           |                                    |
| 3                           | 100 mA  | 50 m <b>164.042 ft</b> or less   | —                         | —                                  |
|                             | 200 mA  |  |                           |                                    |
|                             | 350 mA  |  |                           |                                    |
| 4                           | 100 mA  | 25.5 m <b>83.661 ft</b> or less  | —                         | —                                  |
|                             | 200 mA  |  |                           |                                    |
|                             | 350 mA  |  |                           |                                    |

Cable length obtained by subtracting power supply cable length from total cable length

\* Power supply cable: Cable consisting of the bottom cap cable (optional) and extension cable (optional)

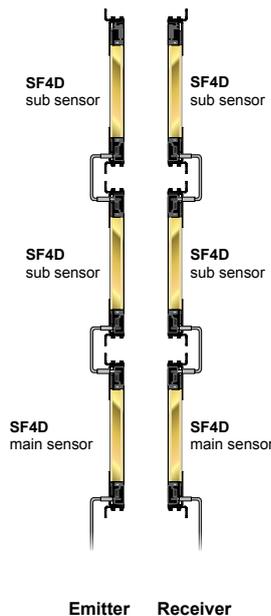
## Control output (OSSD 1, OSSD 2) OFF response times

|                                       | OFF response time |            |         |         |         |         |         |        |         |         |         |         |       |
|---------------------------------------|-------------------|------------|---------|---------|---------|---------|---------|--------|---------|---------|---------|---------|-------|
|                                       | Main sensor       | Sub sensor |         |         |         |         |         |        |         |         |         |         |       |
| Number of units connected in series   | 1 unit            | 1 unit     | 2 units | 3 units | 4 units | 0 units | 0 units | 1 unit | 1 unit  | 2 units | 2 units | 3 units |       |
| Number of units connected in parallel |                   | 0 units    | 0 units | 0 units | 0 units | 1 unit  | 2 units | 1 unit | 2 units | 1 unit  | 2 units | 1 unit  |       |
| Total number of beams                 | 4 to 48           | 6 ms       | 10 ms   | 10 ms   | 12 ms   | 12 ms   | 14 ms   | 14 ms  | 14 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms |
|                                       | 49 to 96          | 8 ms       | 10 ms   | 10 ms   | 12 ms   | 12 ms   | 14 ms   | 14 ms  | 14 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms |
|                                       | 97 to 127         | 10 ms      | 12 ms   | 12 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms  | 14 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms |
|                                       | 128 to 144        | —          | 12 ms   | 12 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms  | 14 ms   | 14 ms   | 14 ms   | 14 ms   | 14 ms |
|                                       | 145 to 192        | —          | 14 ms   | 14 ms   | 16 ms   | 16 ms   | 14 ms   | 14 ms  | —       | —       | —       | —       | —     |
| 193 to 256                            | —                 | 16 ms      | 16 ms   | 18 ms   | 18 ms   | —       | —       | —      | —       | —       | —       | —       |       |

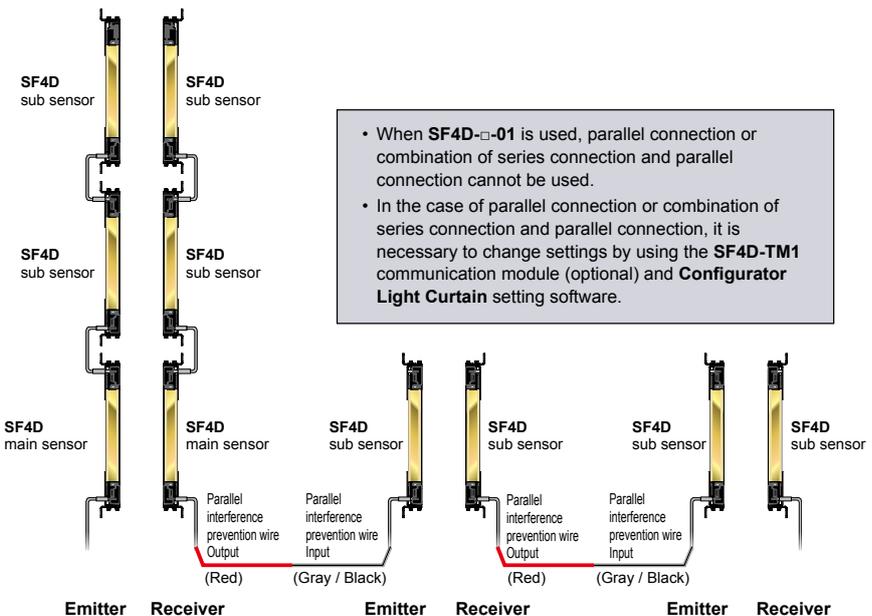
• **Example of series connection**  
5 units or fewer (Total number of beam channels must be 256 or less.)

• **Example of combination of series connection and parallel connection**  
5 units or fewer (Total number of beam channels must be 144 or less.)

when using 1 main sensor and 2 sub-sensors



when using 1 main sensor, 2 sub-sensors connected in series and 2 sub-sensors connected in parallel



Note: Refer to the instruction manual for details.

# SPECIFICATIONS

## Control units

| Product name   |   | Safety control unit  |  |
|--|---|--|--|
| Item   | Model No.   | SF-C21   |  |
| Applicable standards   | Safety  | IEC 61508-1 to 7, EN 61508-1 to 7(SIL3), ISO 13849-1 (Up to Category 4, PL e)<br>IEC 61131-2, IEC 61010-2-201, IEC 62061(SILCL3), UL 61010-1, UL 61010-2-201, UL 1998  |  |
|  | EMC   | 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<br>IEC 60947-5-8, IEC 61496-1, IEC TS 62046, ISO 13851  |  |
| Applicable regulations   |   | CE Marking (EMC Directive, RoHS Directive)   |  |
| Supply voltage (Note 1, 2)   | Power supply for internal   | 24 V DC $\begin{matrix} +10\% \\ -15\% \end{matrix}$ Ripple P-P10 % or less  |  |
|  | Power supply for external   | 24 V DC $\begin{matrix} +10\% \\ -15\% \end{matrix}$ Ripple P-P10 % or less  |  |
| Current consumption (Note 1, 2)  | Power supply for internal   | 200 mA or less   |  |
|  | Power supply for external   | 100 mA or less   |  |
| Safety input (IN1 to IN8)  |   | 2 × 4 inputs, Rated voltage: Same as the voltage of the power supply for internal  |  |
| ON level / OFF level   |   | Input voltage: 18 V, Input current: 3.5 mA / Input voltage: 5 V, Input current: 1.0 mA   |  |
| Rated input current / Input impedance  |   | 5 mA approx. / 4.7 KΩ approx.  |  |
| Duration of detectable ON state  |   | 10 ms or more  |  |
| Duration of undetectable OFF state   |   | 0.7 ms or less   |  |
| Control output (OUT1 to OUT4)  |   | PNP open-collector transistor with 2 outputs × 2<br>• Maximum source current: 300 mA / output<br>• Residual voltage: 2.5 V or less<br>• Applied voltage: Same as the voltage of the power supply for external<br>• Leakage current: 100 μA or less (Including power supply OFF condition)  |  |
| Output mode  |   | True: ON, False: OFF   |  |
| ON delay function / OFF delay function   |   | Incorporated / Incorporated  |  |
| Short-circuit protection / Response time   |   | Incorporated / OFF response: 10 ms or less, ON response: 100 ms or less  |  |
| Auxiliary output (AUX1 to AUX4) (Non-safety output)                                  |   | PNP open-collector transistor with 1 output × 4<br>• Maximum source current: 60 mA / output<br>• Residual voltage: 2.5 V or less<br>• Applied voltage: Same as the voltage of the power supply for external<br>• Leakage current: 100 μA or less (Including power supply OFF condition)  |  |
| Output mode (Factory defaults)   |   | AUX1: Negative logic of OUT1 / OUT2 (ON when OUT1 / OUT2 is OFF)<br>AUX3: Reset trigger output (ON under reset release wait condition)   | AUX2: Negative logic of OUT3 / OUT4 (ON when OUT3 / OUT4 is OFF)<br>AUX4: Lockout output (OFF when lockout)  |
| Output mode (Any of the auxiliary outputs can be customized using the software tool) |   | Negative logic of OUT1 / OUT2 (ON when OUT1 / OUT2 is OFF)<br>Positive logic of OUT1 / OUT2 (ON when OUT1 / OUT2 is ON)<br>Outputs A, B, C, and D of diagnosis results of input blocks (ON when logic is true)<br>Reset trigger output (ON under reset release wait condition)<br>Muting indicator output (ON when muting / override)<br>No output (normally OFF)              | Negative logic of OUT3 / OUT4 (ON when OUT3 / OUT4 is OFF)<br>Positive logic of OUT3 / OUT4 (ON when OUT3 / OUT4 is ON)<br>Outputs E, F, and G of internal logic circuit diagnostic results (ON when logic is true)<br>Lockout output (OFF when lockout)<br>Monitor output in response to IN1 to IN8 (ON when input) |
| Short-circuit protection / Response time   |   | Incorporated / 10 ms or less   |  |
| Muting indicator output  |   | Semiconductor photo MOS relay output × 1<br>• Maximum load current: 60 mA<br>• Residual voltage: 2.5 V or less<br>• Supply voltage: Same as the voltage of the power supply for internal<br>• Leakage current: 100 μA or less (Including power supply OFF condition)   |  |
| Output mode  |   | ON when muting / override  |  |
| Short-circuit protection / Response time   |   | Incorporated / 10 ms or less   |  |
| Interlock function / Lockout release function  |   | Incorporated / Incorporated  |  |
| External device monitor function   |   | Incorporated   |  |
| Communication function (MODBUS RTU)  |   | Interface: RS-485, Protocol: MODBUS RTU, Maximum transmission distance: 100 m <b>328.084 ft</b> , Maximum number of units that can be connected: 8 units (slaves)  |  |
| Logic selection function   |   | No.0: Customization control<br>No.3: Sequential muting control<br>No.6: Two-hand control   | No.1: Overall stop control<br>No.4: Partial stop control 1<br>No.7: OR control<br>No.2: Parallel muting control<br>No.5: Partial stop control 2<br>No.8: Operation mode selection control  |
| Logic setting function   |   | Input mode, control mode, output mode, reset mode, auxiliary output mode   |  |
| Pollution degree / Excess voltage category   |   | 2 / II   |  |
| Usable altitude (Note 3)   |   | 2,000 m <b>6561.680 ft</b> or less   |  |
| Startup time after power on  |   | 2 sec. or less   |  |
| Environmental resistance   | Degree of protection  | IP20 (IEC) (must be installed in a control panel with protection IP54 or higher)   |  |
|  | Ambient temperature   | -10 to +55 °C <b>+14 to +131 °F</b> (No dew condensation or icing allowed), Storage: -25 to +60 °C <b>-13 to +140 °F</b>   |  |
|  | Ambient humidity  | 30 to 85% RH, Storage: 30 to 85% RH  |  |
|  | Dielectric strength voltage   | 1,000 V AC for one min.<br>(All inputs connected together - USB port, all inputs connected together - RS-485 port, USB port - RS-485 port, between all supply terminals connected together and enclosure, all outputs connected together - all input connected together, all outputs connected together - USB port, all outputs connected together - RS-485 port)              |  |
|  | Insulation resistance   | 20 MΩ, or more, with 500 V DC megger<br>(All inputs connected together - USB port, all inputs connected together - RS-485 port, USB port - RS-485 port, between all supply terminals connected together and enclosure, all outputs connected together - all input connected together, all outputs connected together - USB port, all outputs connected together - RS-485 port) |  |
|  | Vibration resistance  | 5 to 8.4 Hz frequency, 3.5 mm <b>0.138 in</b> half amplitude, 8.4 to 150 Hz frequency, Max. acceleration 9.8 m/s <sup>2</sup> (1 G), in X, Y and Z directions for two hours each (IEC / EN 60068-2-6)  |  |
| Shock resistance   | 147 m/s <sup>2</sup> (15 G) 11 ms in X, Y and Z directions three times each (IEC/EN 60068-2-27) |  |  |
| Connection method  |   | Input / output and power supply: Detachable spring cage terminal blocks, RS-485: Detachable spring-cage terminal block, USB: Mini-B male   |  |
| Maximum cable length   |   | 100 m <b>328.084 ft</b> or less  |  |
| Material   |   | Main unit enclosure: Polycarbonate / ABS polymer alloy, Enclosure: Polycarbonate   |  |
| Weight   |   | Net weight: 190 g approx., Gross weight: 320 g approx.   |  |

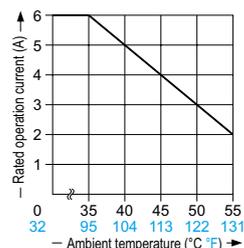
- Notes: 1) "Power supply for internal" is the power supply for safety input. "Power supply for external" is the power supply for control output / auxiliary output. The power supplies for internal and external are insulated.
- 2) The power supply unit connected to this device must satisfy the conditions below.
- Output voltage within 20.4 V to 26.4 V DC (Ripple P-P: 10% or less.)
  - Power supply unit SELV (safety extra low voltage) / PELV (protected extra low voltage) conforming to the EMC Directive and Low Voltage Directive (In case CE Marking conformity is required.)
  - Power supply unit conforming to the Low Voltage Directive and with an output of 100 VA or less
  - Power supply unit with an output holding time of 20 ms or more.
  - Power supply unit corresponding to CLASS 2 (In case C-TUV US Listing Mark conformity is required.)
- 3) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0 m.

# SPECIFICATIONS

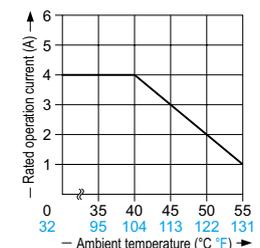
| Product name  | Connector connection control unit (Japanese press machine compliant)  | Thin control unit (Japanese press machine compliant)   |   |
|---|---|--|---|
| Item  | Model No.   | SF-C11   | SF-C13  |
| Connectable safety light curtains                           | SF4D / SF4B / SF2B series   |  | Safety light curtains manufactured by our company   |
| Applicable standards  | EN 61496-1 (Type 4), EN 55011, EN ISO 13849-1 (Category 4, PLe), IEC 61496-1 (Type 4), ISO 13849-1 (Category 4, PLe), JIS B 9704-1 (Type 4), JIS B 9705-1 (Category 4), ANSI/UL 61496-1 (Type 4), UL 1998 (Class 2) (Note 2)  |  |   |
| Applicable regulations                                      | CE Marking (Machinery Directive, EMC Directive, RoHS Directive)   |  |   |
| Supply voltage  | 24 V DC $\pm 10\%$ Ripple P-P 10% or less   |  |   |
| Current consumption   | 100 mA or less (without safety light curtain)   |  |   |
| Fuse rating   | Built-in electronic fuse, Triggering current: 0.5 A or more, Reset after power down   |  |   |
| Enabling path   | NO contact $\times 3$ (13-14, 23-24, 33-34)   |  |   |
| Utilization   | AC-15, DC-13 (IEC 60947-5-1)  |  |   |
| Rated operation voltage (Ue) / Rated operation current (Ie) | 30 V DC / 6 A, 230 V AC / 6 A, resistive load<br>(For inductive load, during contact protection)<br>Min. applicable load: 10 mA (at 24 V DC) (Note 3)   | 30 V DC / 4 A, 230 V AC / 4 A, resistive load<br>(For inductive load, during contact protection)<br>Min. applicable load: 10 mA (at 24 V DC) (Note 3)  |   |
| Contact material / contacts                                 | Silver tin oxide (AgSnO), self cleaning, positively driven  |  |   |
| Contact resistance  | 100 m $\Omega$ or less (initial value)  |  |   |
| Contact protection fuse rating                              | 6 A (slow blow)   | 4 A (slow blow)  |   |
| Mechanical lifetime   | 10,000,000 times or more (open/close frequency of 180 times/min) (Note 4)   |  |   |
| Electrical lifetime   | 100,000 times or more (open/close frequency of 20 times/min, 230 V AC, 3 A, using resistance load) (Note 4)   |  |   |
| Pick-up delay (Auto reset / Manual reset)                   | 80 ms or less / 90 ms or less   |  |   |
| Response time   | 10 ms or less   |  |   |
| Auxiliary output  | Safety relay contact (NC contact) $\times 1$ (41-42) (Related to enabling path)   |  |   |
| Rated operation voltage / current                           | 24 V DC / 2 A, Min. applicable load: 10 mA (at 24 V DC)   |  |   |
| Contact protection fuse rating                              | 2 A (slow blow)   |  |   |
| Semiconductor auxiliary output (AUX)                        | <Minus ground (Setting for PNP)><br>PNP open-collector transistor<br>• Maximum source current: 60 mA<br>• Applied voltage: same as supply voltage (between the auxiliary output and +V)<br>• Residual voltage: 2.3 V or less (at 60 mA source current)<br>• Leakage current: 2 mA or less | <Plus ground (Setting for NPN)><br>NPN open-collector transistor<br>• Maximum sink current: 60 mA<br>• Applied voltage: same as supply voltage (between the auxiliary output and 0V)<br>• Residual voltage: 1.5 V or less (at 60 mA sink current)<br>• Leakage current: 2 mA or less | PNP open-collector transistor<br>• Maximum source current: 60 mA<br>• Applied voltage: same as supply voltage (between the auxiliary output and +V)<br>• Residual voltage: 2.3 V or less (at 60 mA source current)<br>• Leakage current: 2 mA or less |
| Output operation  | Related to auxiliary output of safety light curtain   |  | ON when the safety light curtain is interrupted   |
| Excess voltage category                                     | II  |  |   |
| Indicators  | Power supply (Ui)   | Green LED (lights up when the power is ON)   |   |
|   | Enabling path (OUT)   | Green LED (lights up when the enabling contacts are closed)  |   |
|   | Interlock (INTER_LOCK)  | Yellow LED (lights up when the enabling contacts are opened)   |   |
|   | Fault (FAULT)   | Yellow LED (blinks when fault occurs)  |   |
| External relay monitor function                             | Incorporated  |  |   |
| Trailing edge function                                      | Incorporated  |  |   |
| Polarity selection function (Note 5)                        | Incorporated (Sliding switch allows selection of plus / minus ground)<br>Minus ground: Correspond to PNP output safety light curtain<br>Plus ground: Correspond to NPN output safety light curtain  | Incorporated (Cable connection allows selection of plus / minus ground)<br>Minus ground: Correspond to PNP output safety light curtain<br>Plus ground: Correspond to NPN output safety light curtain   |   |
| Pollution degree  | 2   |  |   |
| Environmenta resistance                                     | Degree of protection  | Enclosure: IP40, Terminal: IP20  |   |
|   | Ambient temperature   | -10 to +55 °C +14 to +131 °F (No dew condensation or icing allowed), Storage: -25 to +70 °C -13 to +158 °F   |   |
|   | Ambient humidity  | 30 to 85% RH, Storage: 30 to 95% RH  |   |
|   | Vibration resistance  | Malfunction resistance 10 to 55Hz, 0.35 mm 0.014 in double amplitude 20 times each in X, Y, and Z directions   |   |
| Connection terminal   | Detachable spring-cage terminal   | Spring-cage terminal   |   |
| Enclosure material  | ABS   |  |   |
| Weight  | Net weight: 320 g approx.   |  | Net weight: 200 g approx.   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.  
 2) SF-C11 and SF-C13 comply with UL 1998 (Class 2).  
 3) If several SF-C11 or SF-C13 units are being used in a line together, leave a space of 5 mm 0.197 in or more between each unit. If the units are touching each other, reduce the rated operating current for safety output in accordance with the ambient operating temperature as shown in the graphs at right.  
 4) The life expectancy of the relay varies depending on the type of load, open / close frequency, ambient conditions and others.  
 5) Please switch the sliding switch to the PNP side for minus ground and to the NPN side for plus ground.

**< Dilating when SF-C11 units are mounted close together >**



**< Dilating when SF-C13 units are mounted close together >**



# SPECIFICATIONS

## Communication module

| Model No.            | SF4D-TM1   |
|----------------------|--|
| Item                 |  |
| Communication system | Safety light curtain side: RS-485 bilateral communication (dedicated protocol)<br>PC side: USB                           |
| Connection system    | Safety light curtain side: Connector<br>PC side: USB (Mini-B male)   |
| Usable altitude      | 2,000 m <b>6,561.68 ft</b> or lower (Note 2)   |
| Protection           | IP40 (IEC)   |
| Ambient temperature  | -10 to +55 °C <b>+14 to +131 °F</b> (No dew condensation or icing allowed), Storage: -25 to +60 °C <b>-13 to +140 °F</b> |
| Ambient humidity     | 30 to 85% RH, Storage: 30 to 95% RH  |
| Cable                | 1.5 m <b>4.921 ft</b> cable with connector (safety light curtain side) (Note 3)  |
| Weight               | Net weight: 75 g approx.   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C **+68 °F**.  
 2) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0 m.  
 3) USB cable is not provided with the product. USB2.0 cable (A: Mini-B) must be prepared by the user.

## Laser alignment tool

| Model No.           | SF-LAT-2N   |
|---------------------|---|
| Item                |   |
| Supply voltage      | 3 V (LR6 battery × 2 pcs.)  |
| Battery             | 1.5 V (LR6 battery) × 2 pcs. (replaceable)  |
| Battery lifetime    | 30 hours approx. of continuous operation (LR6 battery, at +25 °C <b>+77 °F</b> ambient temperature)                                 |
| Light source        | Red semiconductor laser: Class 2 (IEC / JIS / FDA) (Max. output: 1 mW, Peak emission wavelength: 650 nm <b>0.026 mil</b> ) (Note 2) |
| Spot diameter       | 10 mm <b>0.394 in</b> approx. (at 5 m <b>16.404 ft</b> distance)  |
| Ambient temperature | 0 to +40 °C <b>+32 to +104 °F</b> (No dew condensation), Storage: 0 to +55 °C <b>+32 to +131 °F</b>                                 |
| Ambient humidity    | 35 to 85 % RH, Storage: 35 to 85 % RH   |
| Material            | Enclosure: ABS, Mounting part: Aluminum   |
| Weight              | Net weight: 200 g approx. (including batteries)   |
| Accessories         | LR6 battery: 2 pcs.   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C **+68 °F**.  
 2) As for FDA regulation, the product complies with 21 CFR 1040.10 and 1040.11 based on Laser Notice No. 50, dated June 24, 2007, issued by CDRH under the FDA.

## SF4D conversion adapter

| Model No.                   | SFD-J4B (For 8-core cable)<br>SFD-J4B-MU (For 12-core cable)   |
|-----------------------------|--|
| Item                        |  |
| Protection                  | IP64 (IEC)   |
| Ambient temperature         | -10 to +55 °C <b>+14 to +131 °F</b> (No dew condensation or icing allowed), Storage: -25 to +60 °C <b>-13 to +140 °F</b>   |
| Ambient humidity            | 30 to 85% RH, Storage: 30 to 95% RH  |
| Dielectric strength voltage | 1,000 V AC for one min. between all supply terminals connected together and enclosure  |
| Insulation resistance       | 20 MΩ, or more, with 500 V DC megger, between all supply terminals connected together and enclosure  |
| Vibration resistance        | 10 to 55 Hz, 0.75 mm <b>0.030 in</b> double amplitude in X, Y, and Z directions for two hours each<br>Malfunction resistance 10 to 55 Hz, 0.75 mm <b>0.030 in</b> double amplitude in X, Y, and Z directions twenty times each |
| Shock resistance            | 300 m/s <sup>2</sup> acceleration (30 G approx.) in X, Y, and Z directions three times each<br>Malfunction resistance 100 m/s <sup>2</sup> acceleration (10 G approx.) in X, Y, and Z directions 1,000 times each              |
| Material                    | Enclosure: Nylon, Mounting part: Cold rolled carbon steel (SPCC)   |
| Weight                      | Net weight: 270 g approx. , Gross weight: 300 g approx.  |

Note: Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C **+68 °F**.

## IO-Link communication unit

| Model No.                                  | SFD-WL3   |
|--|---|
| Item                                       |   |
| Connectable safety light curtains          | <b>SF4D series</b>  |
| Applicable regulations                     | CE Marking (EMC Directive, RoHS Directive)  |
| Communication method                       | Safety light curtain communication side<br>IO-Link communication side   |
| Supply voltage                             | Safety light curtain communication side<br>IO-Link communication side   |
| Current consumption                        | Safety light curtain communication side<br>IO-Link communication side   |
| Functions                                  | • IO-Link communication function<br>• Safety light curtain setting data copy function (Note 2, 3, 4)  |
| Number of connectable units                | This product<br>Safety light curtains in series connection  |
| Pollution degree / Excess voltage category | 3 / I   |
| Operating altitude                         | 2,000 m <b>6561.68 ft</b> or less (Note 5)  |
| Environmental resistance                   | Protection<br>Ambient temperature<br>Ambient humidity<br>Dielectric strength voltage<br>Insulation resistance<br>Vibration resistance<br>Shock resistance |
| Material                                   | Main unit case: PA66 (with glass), Base plate: SPCC + Plating, Product model nameplate: Polyester, External connection connector: Brass + Plating         |
| Connection method                          | Safety light curtain communication side<br>IO-Link communication side   |
| Weight                                     | Net weight: 270 g approx., Gross weight: 340 kg approx.   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C **+68 °F**.  
 2) This function is designed for use in maintenance and replacement of safety light curtain. If different setting information is written, the unit may not operate properly.  
 3) The internal memory (nonvolatile) of this product has a service life. Settings cannot be configured more than 100,000 times.  
 4) This function cannot be used unless the product is connected with the IO-Link master unit and IO-Link communication is used.  
 5) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0 m.  
 6) The product and IO-Link master unit must be connected with a cable of 0.3 mm<sup>2</sup> or more. The total length of the cable must not exceed 20 m **65.62 ft**.

## Corner mirror

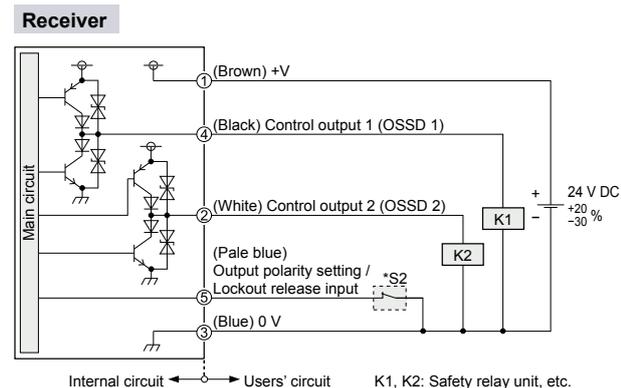
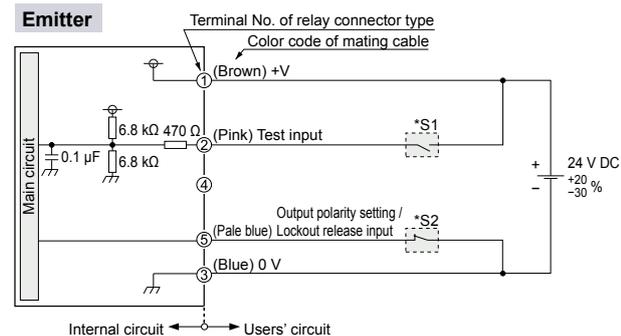
| Model No.                           | RF-SFBH-□  |
|-------------------------------------|--|
| Item                                |  |
| Attenuation rate of operating range | With one corner mirror: Declined to 90 %, With two corner mirrors: Declined to 80 %, With three corner mirrors: Declined to 70 % (When used in combination with the <b>SF4D series</b> ) |
| Environmental resistance            | Ambient temperature<br>Ambient humidity<br>Vibration resistance<br>Shock resistance  |
| Material                            | Enclosure: Aluminum, Mounting bracket: Stainless steel, Mirror (rear surface mirror): Glass, Side cover: EPDM  |
| Accessories                         | Intermediate supporting bracket: 1 set<br><b>(RF-SFBH-40/48/56/64)</b> , 2 sets <b>(RF-SFBH-72/80/88/96)</b>   |

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C **+68 °F**.  
 2) The corner mirror has not received type examination by the Ministry of Health, Labour and Welfare; therefore, it cannot be used for presses or shearing machines (paper cutting machines) in Japan.

# I/O CIRCUIT DIAGRAMS

## I/O circuit diagram (using optical synchronization setting and 5-core cable, Not connected in series / parallel)

### <In case of using I/O circuit for PNP output>



\*S1

Switch S1

- Test input
- Vs to Vs - 2.5 V (sink current 5 mA or less): Emission halt (Note)
- Open: Emission

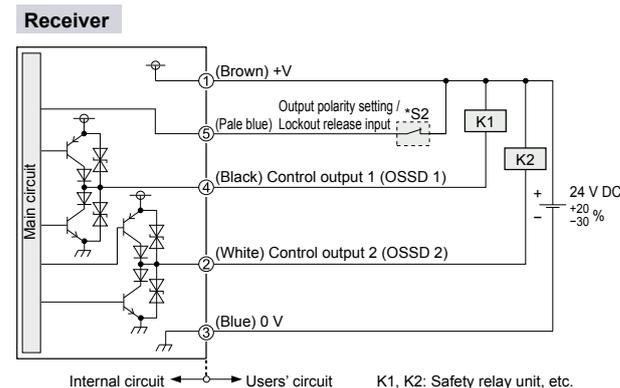
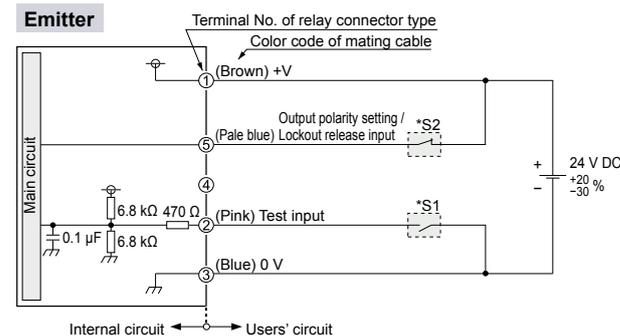
\*S2

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

Note: Vs is the applying supply voltage.

### <In case of using I/O circuit for NPN output>



\*S1

Switch S1

- Test input
- 0 to +2.5 V (source current 5 mA or less): Emission halt
- Open: Emission

\*S2

Switch S2

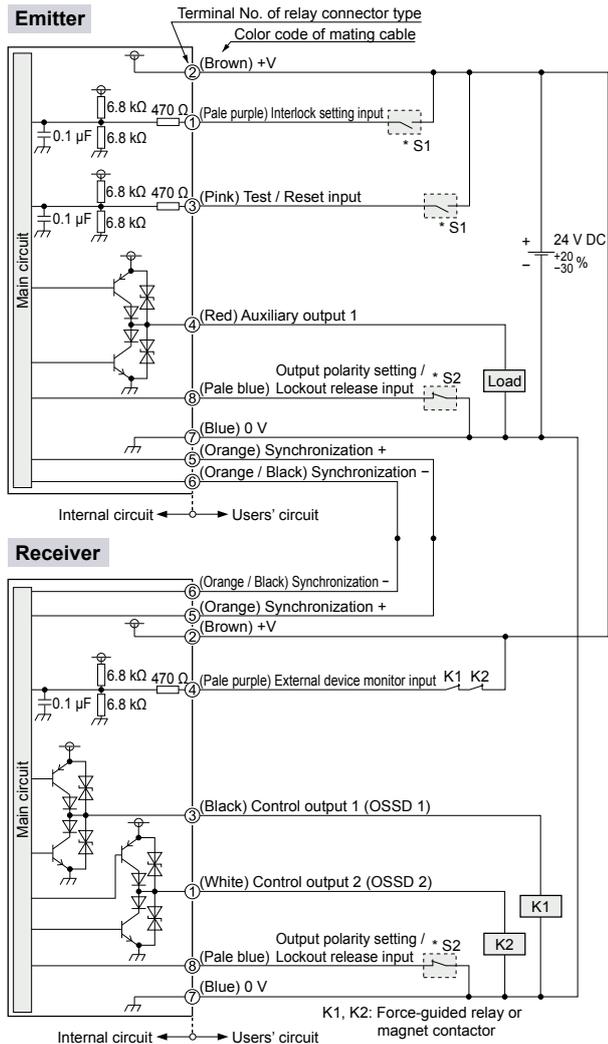
- Output polarity setting / lockout release input
- Vs to Vs - 2.5 V (sink current: 5 mA or less): NPN output (Note)
- Short-circuited within 150 ms to 4 s approx. after released from short-circuiting condition: Lockout release

Note: Vs is the applying supply voltage.

## I/O CIRCUIT DIAGRAMS

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

#### <In case of using I/O circuit for PNP output>



\* S1

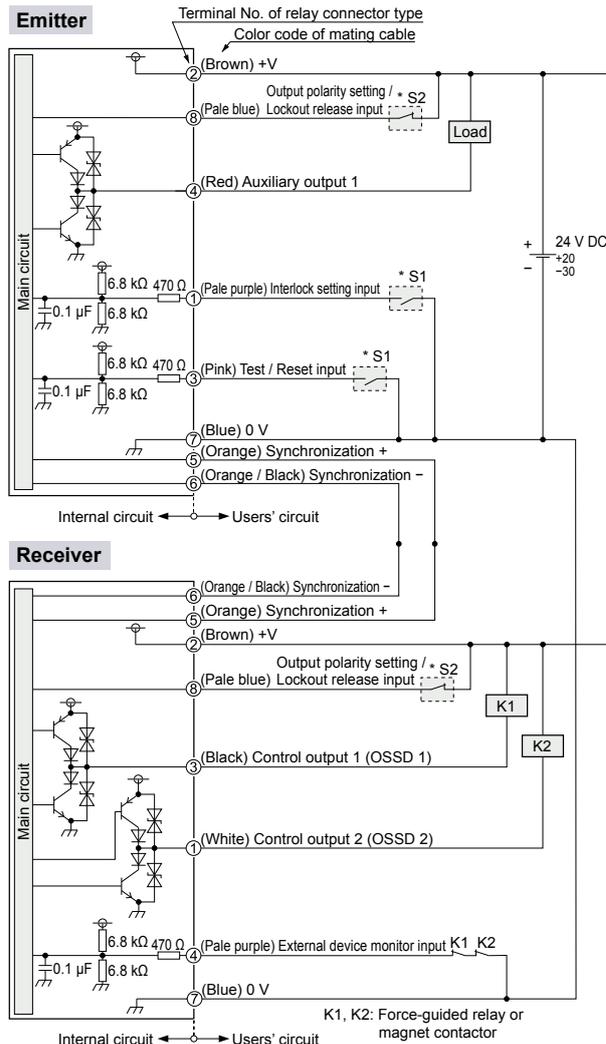
| Switch S1  |                |
|--|----------------|
| • Test / Reset input   | <Manual reset> |
| Vs to Vs - 2.5 V (sink current 5 mA or less): Emission halt (Note) |                |
| Open: Emission   |                |
| <Auto reset>   |                |
| Vs to Vs - 2.5 V (sink current 5 mA or less): Emission (Note)      |                |
| Open: Emission halt  |                |
| • Interlock setting input  |                |
| Vs to Vs - 2.5 V (sink current 5 mA or less): Valid (Note)         |                |
| 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 |  |

Note: Vs is the applying supply voltage.

#### <In case of using I/O circuit for NPN output>



\* 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                                |                |
| 0 to +2.5 V (source current 5 mA or less): Valid         |                |
| Open: Invalid  |                |

\* S2

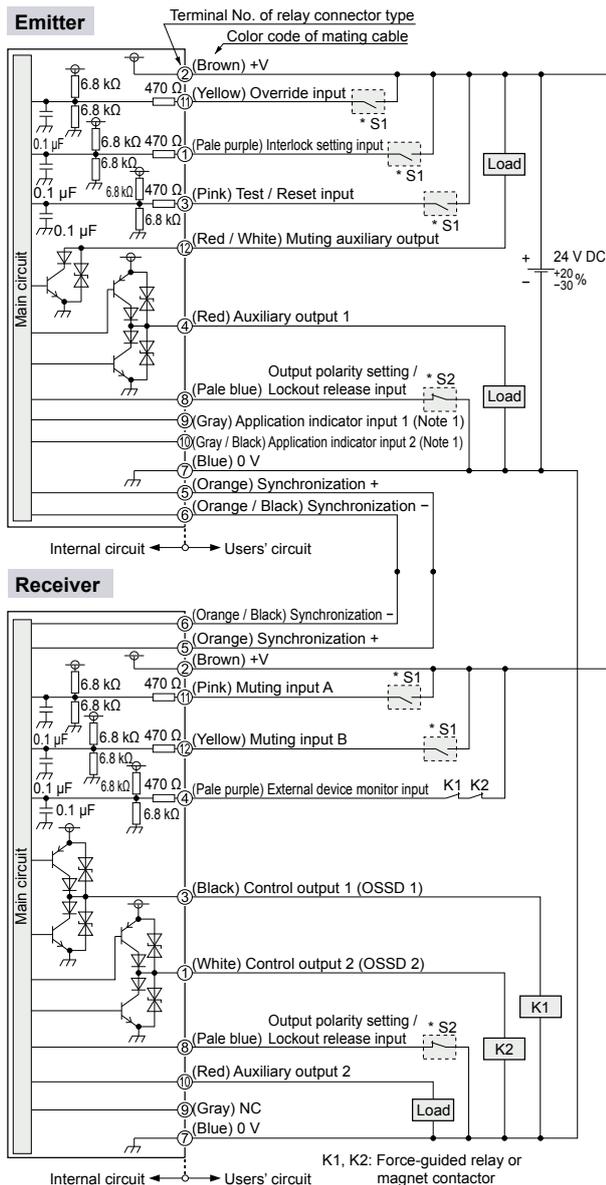
| Switch S2  |  |
|--|--|
| • Output polarity setting / lockout release input  |  |
| Vs to Vs - 2.5 V (sink current: 5 mA or less): NPN output (Note)   |  |
| Short-circuited within 150 ms to 4 s approx. after released from short-circuiting condition: Lockout release |  |

Note: Vs is the applying supply voltage.

# I/O CIRCUIT DIAGRAMS

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

### <In case of using I/O circuit for PNP output>



**\* S1**

Switch S1

- Test / Reset input  
<Manual reset>  
Vs to Vs - 2.5 V (sink current 5 mA or less): Emission halt (Note 2)  
Open: Emission  
<Auto reset>  
Vs to Vs - 2.5 V (sink current 5 mA or less): Emission (Note 2)  
Open: Emission halt
- Interlock setting input, Override input, Muting input A / B  
Vs to Vs - 2.5 V (sink current 5 mA or less): Valid (Note 2)  
Open: Invalid

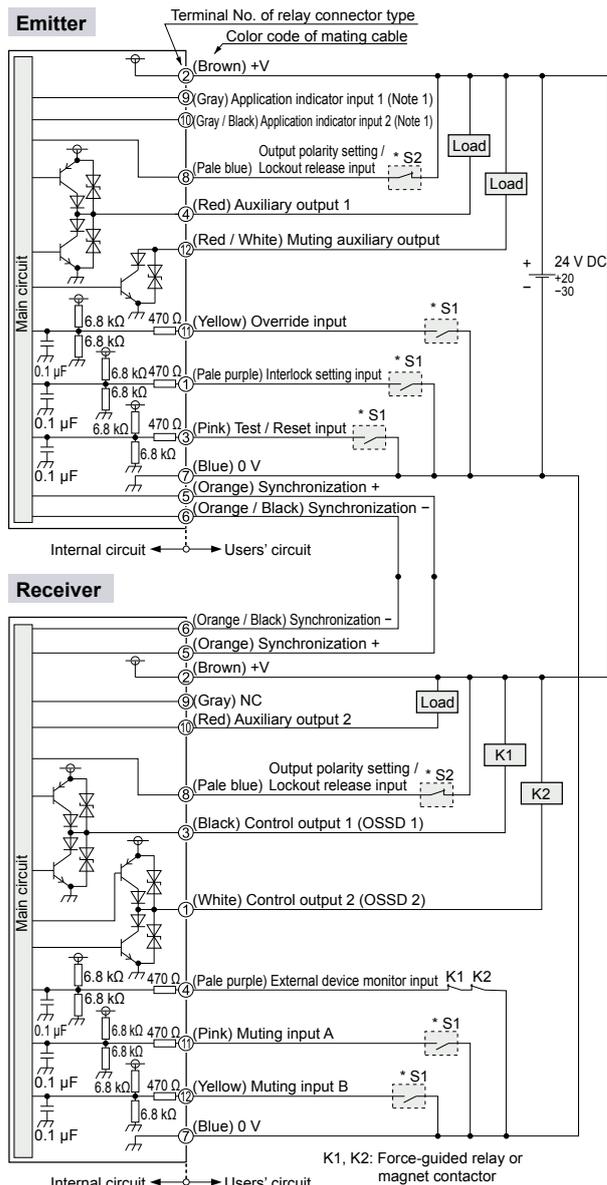
**\* S2**

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: 1) Vs to Vs - 2.5 V (sink current: 5 mA or less): ON (Note 2), Open: OFF  
2) Vs is the applying supply voltage.

### <In case of using I/O circuit for NPN output>



**\* 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  
0 to +2.5 V (source current 5 mA or less): Valid  
Open: Invalid

**\* S2**

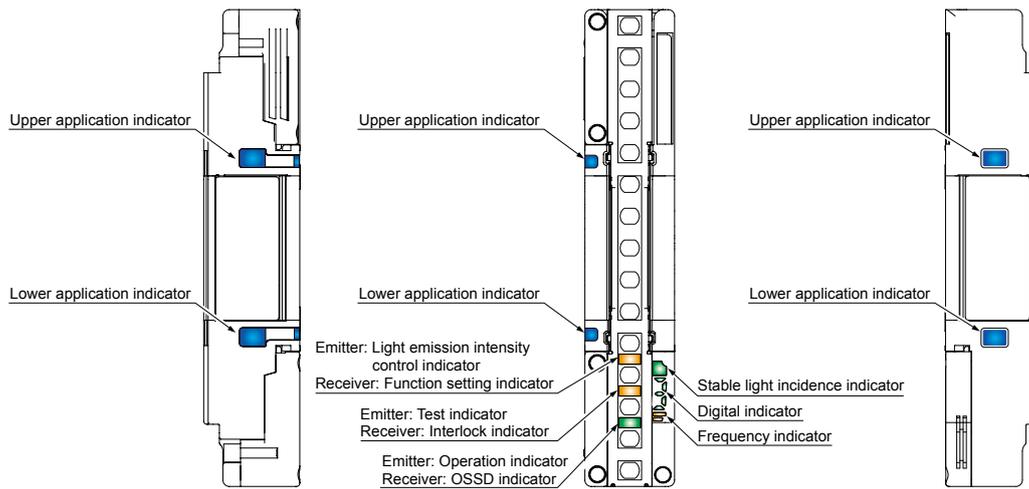
Switch S2

- Output polarity setting / lockout release input  
Vs to Vs - 2.5 V (sink current: 5 mA or less): NPN output (Note 2)  
Short-circuited within 150 ms to 4 s approx. after released from short-circuiting condition: Lockout release

Notes: 1) 0 to +2.5 V (sink current: 5 mA or less): ON, Open: OFF  
2) Vs is the applying supply voltage.

## PRECAUTIONS FOR PROPER USE

### Description and function of each part



#### Emitter / receiver common

| Designation  |                                       | Function  |         |  |         |
|--|---------------------------------------|---|---------|--|---------|
|  |                                       | Line synchronization  |         | Optical synchronization  |         |
|  |                                       | Receiver  | Emitter | Receiver   | Emitter |
| Upper application indicator<br>(Blue / Green / Red / Orange) | When beam axis adjustment mode is set | All beams received [Control output (OSSD 1, OSSD 2) ON]: Lights blue<br>Top beam received: Lights red, Top beam blocked: Turns OFF  |         | Turns OFF  |         |
|  | When application mode is set          | When application indicator input 1 is ON: Lights green<br>When application indicator input 2 is ON: Lights red<br>When application indicator input 1 / 2 are ON: Lights orange<br>When application indicator input 1 / 2 are OFF: Turns OFF |         | Turns OFF  |         |
| Lower application indicator<br>(Blue / Green / Red / Orange) | When beam axis adjustment mode is set | All beams received [Control output (OSSD 1, OSSD 2) ON]: Lights blue<br>Bottom beam received: Lights red, Bottom beam blocked: Turns OFF  |         | Turns OFF  |         |
|  | When application mode is set          | When application indicator input 1 is ON: Lights green<br>When application indicator input 2 is ON: Lights red<br>When application indicator input 1 / 2 are ON: Lights orange<br>When application indicator input 1 / 2 are OFF: Turns OFF |         | Turns OFF  |         |
| Stable light incidence indicator<br>(Green / Orange)         |                                       | When light reception is stable: Lights green<br>When light reception is unstable: Lights orange<br>When light is blocked: Turns OFF   |         | Turns OFF  |         |
| Digital indicator<br>(Green / Yellow)                        | Light receiving intensity (Green)     | Incident light level 3: Lights green "3", Incident light level 2: Lights green "2",<br>Incident light level 1: Lights green "1", When light is blocked: Turns OFF   |         | Turns OFF  |         |
|  | Error (Yellow)                        | Normal operation: Turns OFF, Error: Yellow number blinks or lights "E"  |         |  |         |
|  | Polarity (Yellow)                     | When PNP output is set: Lights yellow "P" (only during startup)<br>When NPN output is set: Lights yellow "N" (only during startup)  |         |  |         |
| Frequency indicator (Orange)                                 |                                       | —————   |         | When frequency 1 is set: Lights orange "1"<br>When frequency 2 is set: Lights orange "2" |         |

#### Emitter

| Designation<br>(Note 1)                                    | Function  |   |
|--|---|---|
|  | Line synchronization  | Optical synchronization                             |
| Light emission intensity control indicator (Orange) [CTRL] | Short mode: Turns OFF, Long mode: Lights orange   |   |
| Test indicator (Orange) [TEST]                             | During test: Lights orange, Normal operation: Turns OFF                                     |   |
| Operation indicator (Green / Red) [OP]                     | Control output (OSSD 1 / 2) ON: Lights green<br>Control output (OSSD 1 / 2) OFF: Lights red | Normal operation: Lights green<br>Error: Lights red |

#### Receiver

| Designation<br>(Note 1)                    | Function   |                         |
|--|--|-------------------------|
|  | Line synchronization   | Optical synchronization |
| Function setting indicator (Orange) [FUNC] | When communication module is connected: Blinks orange, When blanking function or parallel connection is used: Lights orange (Note 2) |                         |
| Interlock indicator (Yellow) [LOCK]        | Interlock activated: Lights yellow, All other times: Turns OFF   |                         |
| OSSD indicator (Green / Red) [OSSD]        | Control output (OSSD 1 / 2) ON: Lights green<br>Control output (OSSD 1 / 2) OFF: Lights red  |                         |

Notes: 1) Designations in brackets [ ] are names that are indicated on the device.  
2) For the details of blanking function and parallel connection, refer to the instruction manual.

## PRECAUTIONS FOR PROPER USE



- When this device is used in the “PSDI mode”, an appropriate control circuit must be configured between this device and the machinery. For details, be sure to refer to the standards or regulations applicable in each region or country.
- Do not use **SF4D-□** as a safety device for a press in Japan. For presses and shearing machines (paper cutting machines) in Japan, use **SF4D-□-01**.
- Do not use **SF4D-□-01** as a safety device for a press in South Korea.
- To use this product in the U.S.A., refer to OSHA 1910. 212 and OSHA 1910. 217 for installation, and in Europe, refer to EN ISO 13855 as well. Observe your national and local requirements before installing this product.

- This catalog is a guide to select a suitable product. Be sure to read instruction manual attached to the product prior to its use.

- Make sure to carry out the test run before regular operation.
- This safety system is for use only on machinery in which the dangerous parts can be stopped immediately, either by an emergency stop unit or by disconnecting the power supply. Do not use this system with machinery which cannot be stopped at any point in its operation cycle.

### When using SF4D-□-01 as a safety device for a press or shearing machine (paper cutting machine) in Japan



- Abide by the Standards for Power Press Structures, the Standards for the Structures of Safety Devices for Presses or Shearing Machines (Paper Cutting Machines) and the Guidelines on Management of Safety Devices for Presses announced by the Japanese Ministry of Health, Labour and Welfare.
- Be sure to install the protective tube, **SFPD-A10** (tube length: 10 m **32.808 ft**) (optional), to the cables.

### About machines for which SF4D-□-01 is used

- When using **SF4D-□-01** as a safety device for a press or shearing machine (paper cutting machine) in Japan, make sure that the press or shearing machine (paper cutting machine) satisfies the following specification requirements. Do not use **SF4D-□-01** if the machine does not meet the specification requirements.

#### Press machine

| Item                    | Specifications  |
|-------------------------|---|
| Machine type            | Press equipped with immediate stopping mechanism and restart prevention mechanism |
| Pressing capacity       | 50,000 kN or less   |
| Immediate stopping time | 500 ms or less  |
| Stroke length           | Within (Protective height – Die height)   |
| Die size                | Within bolster width  |

#### Shearing machine (paper cutting machine)

| Item              | Specifications   |
|-------------------|--|
| Machine type      | Shearing machine (paper cutting machine) equipped with immediate stopping mechanism and restart prevention mechanism |
| Cutting thickness | 200 mm <b>7.874 in</b> or less   |
| Cutting width     | 5,000 mm <b>196.850 in</b> or less   |
| Cutter length     | 5,500 mm <b>216.535 in</b> or less   |

### Others

- This device has been developed / produced for industrial use only.
- Do not use during the initial transient time (2 sec.) after the power supply is switched on.
- Avoid dust, dirt and steam.
- Take care that the safety light curtain does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- Take care that the safety light curtain is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- Do not use this device with mobile equipment such as an automated guided vehicle (AGV).

### Communication module



The use of the communication module, **SF4D-TM1** (optional), enables setting of various functions of the device. (Note that settings cannot be changed when **SF4D-□-01** is used.)

Details related to the safety distance, such as the minimum size of detectable objects, varies for some of the functions. When making individual settings, calculate the safety distance and provide a space greater than the safety distance when setting up the device. Unless a sufficient space is provided, the machine will not stop before the dangerous parts of the machine is touched and death or serious injury can occur.

- For the details of function settings made using the **SF4D-TM1** communication module (optional), see the manual for the communication module.

### Corner mirror



- The corner mirror has not received type examination by the Ministry of Health, Labour and Welfare; therefore, it cannot be used for presses or shearing machines (paper cutting machines) in Japan.
- Be sure to carry out maintenance while referring to the instruction manual for the safety light curtain **SF4D** series.
- Do not use if dirt, water, or oil, etc. is attached to the reflective surface of this product. Appropriate sensing range may not be maintained due to diffusion or refraction.
- Make sure that you have read the instruction manual for the corner mirror thoroughly before setting up the corner mirrors and safety light curtains, and follow the instructions given. If the equipment is not set up correctly as stipulated in the instruction manual, incident light errors may result in unexpected situations which may result in serious injury or death.
- Please download the instruction manuals from our website.
- Safety light curtain **SF4D** series cannot be used as a retroreflective type. Avoid installing the safety light curtain as a retroreflective type when this product is applied.
- The mirror part of this product is made of glass. Note that if it is broken, the glass shards may fly apart.
- Do not use if crack or breakage appears on the reflective surface of this product. Proper sensing range may not be maintained due to diffusion or refraction. If crack or breakage appears on the reflective surface of this product, replace the product.
- When adjusting beam channels with a laser alignment tool, etc., take sufficient care that the laser beam reflected by this product does not enter the eyes.
- Failure to follow the above items may result in death or serious injury.

## PRECAUTIONS FOR PROPER USE

### IO-Link communication unit



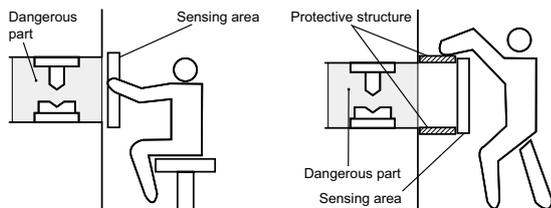
- Do not use the IO-Link data for safety control.
- This product cannot be used to directly enter settings from the IO-Link master unit to a safety light curtain using IO-Link communication.
- Safety light curtain setting information copy function is a function assuming maintenance of safety light curtain. Please use only when writing the safety light curtain before replacement to the light curtain after replacement. If you write to non-replacement parts, it may not operate properly.

### Sensing area

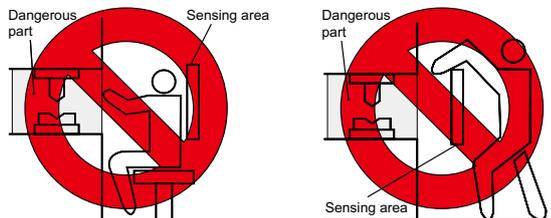


- Make sure to install this product such that any part of the human body must pass through its sensing area in order to reach the dangerous parts of the machinery. If the human body is not detected, there is a danger of serious injury or death.
- Do not use any reflective type or retroreflective type arrangement.
- Multiple receivers (emitters) cannot be connected for use with a single emitter (receiver).

#### Example of correct sensing area setup



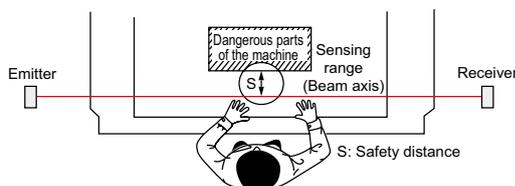
#### Example of incorrect sensing area setup



### Safety distance



- Calculate the safety distance correctly, and always maintain a distance which is equal to or greater than the safety distance, between the sensing area of this safety light curtain and the dangerous parts of the machinery. (Please check the latest standards for the equation.) If the safety distance is miscalculated or if sufficient distance is not maintained, there is a danger of serious injury or death.
- Before designing the system, refer to the relevant standards of the region where this device is to be used and then install this device.



The sizes of the minimum sensing objects for this device vary depending on whether or not the floating blanking function is being used. Calculate the safety distance with the proper size of the minimum sensing object and appropriate equation.

Size of minimum sensing object when applying floating blanking function

|                 | Min. sensing object when applying floating blanking function |                     |                      |                      |                      |                      |
|-----------------|--|---------------------|----------------------|----------------------|----------------------|----------------------|
|                 | Not set  | Setting (Note)      |                      |                      |                      |                      |
|                 |  | 1 beam channel      | 2 beam channels      | 3 beam channels      | 4 beam channels      | 5 beam channels      |
| <b>SF4D-F</b> □ | ø14 mm<br>ø0.551 in  | ø24 mm<br>ø0.945 in | ø34 mm<br>ø1.339 in  | ø44 mm<br>ø1.732 in  | ø54 mm<br>ø2.126 in  | ø64 mm<br>ø2.520 in  |
| <b>SF4D-H</b> □ | ø25 mm<br>ø0.984 in  | ø45 mm<br>ø1.772 in | ø65 mm<br>ø2.559 in  | ø85 mm<br>ø3.346 in  | ø105 mm<br>ø4.134 in | ø125 mm<br>ø4.921 in |
| <b>SF4D-A</b> □ | ø45 mm<br>ø1.772 in  | ø85 mm<br>ø3.346 in | ø125 mm<br>ø4.921 in | ø165 mm<br>ø6.496 in | ø205 mm<br>ø8.071 in | ø245 mm<br>ø9.646 in |

Note: When **SF4D**□-01 is used, the floating blanking function cannot be used.

- The safety distance is calculated using the equations given on the following pages when a person moves perpendicularly (normal intrusion) into the sensing area of the device. If the intrusion direction is not perpendicular, always check the related standards (regional, machine standards, etc.)

#### For use based on EN ISO 13855 / ISO 13855 / JIS B 9715

##### For intrusion perpendicular to the sensing area

**<When the minimum sensing object is ø40 mm ø1.575 in or less>**

- Equation (1)  $S = K \times T + C$   
 S: Safety distance (mm)  
 Minimum required distance between the sensing area plane and the dangerous part of the machine  
 K: Intrusion speed of person or object (mm/sec.)  
 Normally 2,000 (mm/sec.) is used.  
 T: Response time of overall system  
 $T = T_m + T_{SF4D}$   
 T<sub>m</sub>: Maximum response time of machine (sec.)  
 T<sub>SF4D</sub>: Response time of device (sec.)  
 C: Additional distance calculated from the minimum sensing object of the device (mm)  
 The value of C cannot be less than 0.  
 $C = 8 \times (d - 14)$   
 d: Diameter of minimum sensing object (mm)

- When calculating the safety distance S, the following five cases must be considered. First calculate using K = 2,000 (mm/sec.) in the above equation. Consider these three cases for the result: 1) S < 100, 2) 100 ≤ S ≤ 500, and 3) S > 500. If the result of the calculation is 3) S > 500, calculate again using K = 1,600 (mm/sec.). Consider these two cases for the result: 4) S ≤ 500 and 5) S > 500. For details, refer to the manual.
- When the device is used in "PSDI mode", an appropriate safety distance S must be calculated. For details, refer to the standards and regulations that apply in your region or country.

**<When the minimum sensing object is greater than ø40 mm ø1.575 in>**

- Equation  $S = K \times T + C$   
 S: Safety distance (mm)  
 Minimum required distance between the sensing area plane and the nearest dangerous part of the machine  
 K: Intrusion speed of person or object (mm/sec.)  
 Normally 1,600 (mm/sec.) is used.  
 T: Overall response time of system  
 $T = T_m + T_{SF4D}$   
 T<sub>m</sub>: Maximum response time of machine (sec.)  
 T<sub>SF4D</sub>: Response time of device (sec.)  
 C: Additional distance calculated from the minimum sensing object of the device (mm)  
 C = 850 (mm) (Constant)

## PRECAUTIONS FOR PROPER USE

### Error display of digital indicator

- If an error occurs, check the cause of the problem and take appropriate corrective action according to the following tables. Refer to the instruction manual for details.

#### Emitter / receiver common

| Error display / Cause   |  | Remedy  |
|---|--|---|
|  lights.<br>Error in device settings.  | Error in settings.   | Check the noise environment of the device.<br><b>&lt;Using SF4D-F□/H□/A□&gt;</b><br>• If you used the communication module <b>SF4D-TM1</b> (optional) and <b>Configurator Light Curtain</b> software, initialize the function.  |
|   | Internal failure   | Contact our office.   |
|  blinks.<br>Series connection error, error in total number of beam channels                      | The number of sensors in series connection exceeds the specified limit.  | Limit the number of sensors in series connection to 5 or less.  |
|   | The total number of beam channels of the sensors in series connection exceeds the specified limit.   | Limit the total number of beam channels to 256 or less.   |
|   | Incorrect emitter and receiver connection when connected in a series connection.   | Connect emitters to emitters and receivers to receivers using a series connection cable.  |
|   | In a series connection, the DIP switches 1 / 2 (synchronization method) are not all set to the same state.   | Set all DIP switches 1 / 2 (synchronization method) to the same state.  |
|   | End cap is not attached.   | Make sure the end cap is installed correctly.   |
|   | Cable for series connection is disconnected.   | • Make sure the series connection cable is connected correctly.<br>• Replace the series connection cable.   |
|   | Another error has generated.   | Check the operation of other sensors in series connection.  |
|  blinks.<br>Error in wiring of output polarity setting / lockout release input wire (pale blue). | Output polarity setting / lockout release input wire (pale blue) is broken or shorted to another input / output wire. Incorrect connection of output polarity setting / lockout release input wire (pale blue) on receiver side of emitter / receiver. | <b>&lt;Using PNP output&gt;</b><br>• Connect the output polarity setting / lockout release input wire (pale blue) to 0 V (blue).<br><b>&lt;Using NPN output&gt;</b><br>• Connect the output polarity setting / lockout release input wire (pale blue) to + V (brown). |
|  blinks.<br>Power supply voltage error   | The voltage of the power supplied to the device exceeds the specified range.   | Make sure the power supply voltage conforms to the specification.   |

#### Emitter

| Error display / Cause   |  | Remedy  |   |
|---|--|---|---|
|  blinks.<br>Error in the number of beam channels                           | The device is affected by noise or the power supply. An internal circuit has failed. | • Check the noise environment of the device.<br>• Check the connections, supply voltage, and power supply capacity.<br>• Replace the device.  |   |
|  blinks.<br>Emitter and receiver system mismatch.                          | The emitter system and receiver system do not match.                                 | • Make sure the beam pitch, number of sensors and number of beam channels of the emitter and receiver match.<br>• Connect the output polarity setting / lockout release input wires (pale blue) of the emitter and receiver in the same way.<br>• Using PNP output: Connect to 0 V (blue)<br>• Using NPN output: Connect to + V (brown)   |   |
|  blinks.<br>Muting auxiliary output error                                  | Output is shorted to another input / output wire.                                    | Use the muting auxiliary output at a current from 250 mA or less.   |   |
|   | Excessive rush current in the muting auxiliary output.                               |   |   |
|  lights.<br>Synchronization error  | Output circuit error.  | Output circuit damage.<br>Replace the device.   |   |
|   | Mismatch between synchronization method and wiring.                                  | The wiring and synchronization method (line synchronization, optical synchronization) must be made to match.  |   |
|   | Line synchronization   | Synchronization + wire (orange) or synchronization - wire (orange / black) is shorted or broken.  | Make sure that the synchronization + wire (orange) and synchronization - wire (orange / black) are connected correctly. |
|   | Optical synchronization  | The receiver has generated an error.  | Check the operation of the receiver.  |
| Significant noise outside the specified range is being received.  |  | Check the noise environment of the device.  |   |
|  blinks.<br>Emitter error  | Cable for series connection has failed.  | Replace the cable for series connection.  |   |
|   | The other emitter connected in series is locked out.                                 | Check the digital indicator (yellow) of the other emitter connected in series.  |   |
|  blinks.<br>Effects of noise or power supply, or internal circuit failure. | The device is affected by noise or the power supply. An internal circuit has failed. | • Check the noise environment of the device.<br>• Check the connections, supply voltage, and power supply capacity.<br>• If you are extending the synchronization + wire (orange) and synchronization - wire (orange / black) using a cable other than the special-use cable, use a 0.2mm <sup>2</sup> or more twisted pair cable.<br>• If the problem persists, check the number that is blinking in the digital indicator (yellow) and the number of times it blinks, and contact our office. |   |
|  blinks.<br>Synchronization error  | Receiver is in lockout state.  | Check an digital indicator (yellow) of receiver.  |   |

## PRECAUTIONS FOR PROPER USE

### Receiver

| Error display / Cause  |  | Remedy  |  |
|--|--|---|--|
|  blinks.<br>Error in device settings.   | Line synchronization   | The device is affected by noise or the power supply. An internal circuit has failed. <ul style="list-style-type: none"> <li>• Check the noise environment of the device.</li> <li>• Check the connections, supply voltage, and power supply capacity.</li> <li>• Replace the device.</li> </ul>   |  |
|  | Optical synchronization  | Scattered light is received, or light emitted from a different model is received. <ul style="list-style-type: none"> <li>• Make sure that the receiver will not receive scattered light at the time of power ON.</li> <li>• Light from a different model set to the same frequency may be received. Change the setting of the DIP switches 1/2 to a different frequency.</li> </ul>   |  |
|  blinks.<br>Emitter and receiver system mismatch.   | The emitter system and receiver system do not match.   | <ul style="list-style-type: none"> <li>• Make sure the beam pitch, number of sensors and number of beam channels of the emitter and receiver match.</li> <li>• Wire the output polarity setting / lockout release input wire (pale blue) of the emitter and the receiver in the same way.                             <ul style="list-style-type: none"> <li>• Using PNP output: Connect to 0V (blue)</li> <li>• Using NPN output: Connect to + V (brown)</li> </ul> </li> </ul>  |  |
|  blinks.<br>Scattered light error.  | Scattered light is received, or light emitted from a different model No. is received.  | After turning on the power, make sure that the receiver does not receive scattered light.   |  |
|  or  blinks.<br>Control output (OSSD 1 / 2) error. | The control output 1 (OSSD 1) wire (black) or the control output 2 (OSSD 2) wire (white) is shorted to 0V or +V.   | Connect the control output 1 (OSSD 1) wire (black) and the control output 2 (OSSD 2) wire (white) to the safety relay unit, external device (forcible guide relay or magnetic contactor), safety controller, or safety PLC. The current values of the control output 1 (OSSD 1) wire (black) and the control output 2 (OSSD 2) wire (white) must be within the specified range.   |  |
|  | The control output 1 (OSSD 1) wire (black) and control output 2 (OSSD 2) wire (white) are shorted to each other, or to another input / output wire.  |   |  |
|  | Excessive current is flowing in the control output 1 (OSSD 1) wire (black) or control output 2 (OSSD 2) wire (white).  | <b>&lt;Using PNP output&gt;</b> <ul style="list-style-type: none"> <li>• Connect the output polarity setting / lockout release input wire (pale blue) to 0V (blue).</li> <li>• Connect the control output 1 (OSSD 1) wire (black) and the control output 2 (OSSD 2) wire (white) to the safety relay unit, external device (forcible guide relay or magnetic contactor), safety controller, or safety PLC.</li> </ul> <b>&lt;Using NPN output&gt;</b> <ul style="list-style-type: none"> <li>• Connect the output polarity setting / lockout release input wire (pale blue) to + V (brown).</li> <li>• Connect the control output 1 (OSSD 1) wire (black) and the control output 2 (OSSD 2) wire (white) to the safety relay unit, external device (forcible guide relay or magnetic contactor), safety controller, or safety PLC.</li> </ul> |  |
|  | The output polarity setting / lockout release input wire (pale blue), and the control output 1 (OSSD 1) wire (black) and control output 2 (OSSD 2) wire (white) are not connected correctly. |   |  |
|  | Output circuit error.  | Output circuit damage. Replace the device.  |  |
|  blinks.<br>External device error.  | When a safety relay is used  | The safety relay contact has welded.  | Replace the safety relay.  |
|  |  | The response time of the relay is slow.   | Replace with a safety relay with a suitable response time.<br><b>&lt;Using SF4D-F□/H□/A□&gt;</b> <ul style="list-style-type: none"> <li>• This can also be set using the communication module <b>SF4D-TM1</b> (optional) and <b>Configurator Light Curtain</b> software.</li> </ul>  |
|  |  | Safety relay contact "b" is not connected.  | Correctly connect the safety relay.  |
|  | When the external device monitor function is invalid.  | The auxiliary output wire (red) and external device monitor input wire (pale purple) are not connected.   | <ul style="list-style-type: none"> <li>• Connect the auxiliary output wire (red) and external device monitor input wire (pale purple).</li> </ul> <b>&lt;Using SF4D-F□/H□/A□&gt;</b> <ul style="list-style-type: none"> <li>• Using the communication module <b>SF4D-TM1</b> (optional) and <b>Configurator Light Curtain</b> software, set the external device monitor function to "Not used".</li> </ul> |
| Auxiliary output does not operate correctly.   |  | <ul style="list-style-type: none"> <li>• Check if the auxiliary output wire (red) is broken or has shorted.</li> </ul> <b>&lt;Using SF4D-F□/H□/A□&gt;</b> <ul style="list-style-type: none"> <li>• Using the communication module <b>SF4D-TM1</b> (optional) and <b>Configurator Light Curtain</b> software, return the auxiliary output setting to the factory default setting (mode 0).</li> </ul>  |  |
|  lights.<br>Synchronization error   | Mismatch between synchronization method and wiring.  |   | The wiring and synchronization method (line synchronization, optical synchronization) must be made to match.   |
|  | Line synchronization   | Synchronization + wire (orange) or synchronization - wire (orange / black) is shorted or broken.  | Make sure that the synchronization + wire (orange) and synchronization - wire (orange / black) are connected correctly.  |
|  |  | The emitter has generated an error.   | Check the operation of the emitter.  |
|  | Optical synchronization  | Significant noise outside the specified range is being received.  | Check the noise environment of the device.   |
| Cable for series connection has failed.  |  | Replace the cable for series connection.  |  |
|  blinks.<br>Emitter error   | Emitter is in lockout state.   | Check a digital indicator (yellow) of emitter.  |  |
|  blinks.<br>Effects of noise or power supply, or internal circuit failure.  | The device is affected by noise or the power supply. An internal circuit has failed.   | <ul style="list-style-type: none"> <li>• Check the noise environment of the device.</li> <li>• Check the connections, supply voltage, and power supply capacity, and check for scattered light.</li> <li>• If you are extending the synchronization + wire (orange) and synchronization - wire (orange / black) using a cable other than the special-use cable, use a 0.2mm<sup>2</sup> or more twisted pair cable.</li> <li>• If the problem persists, check the number that is blinking in the digital indicator (yellow) and the number of times it blinks, and contact our office.</li> </ul>   |  |
|  blinks.<br>Synchronization error   | The other receiver connected in series is locked out.  | Check the digital indicator (yellow) of the other receiver connected in series.   |  |

**DIMENSIONS (Unit: mm in)**

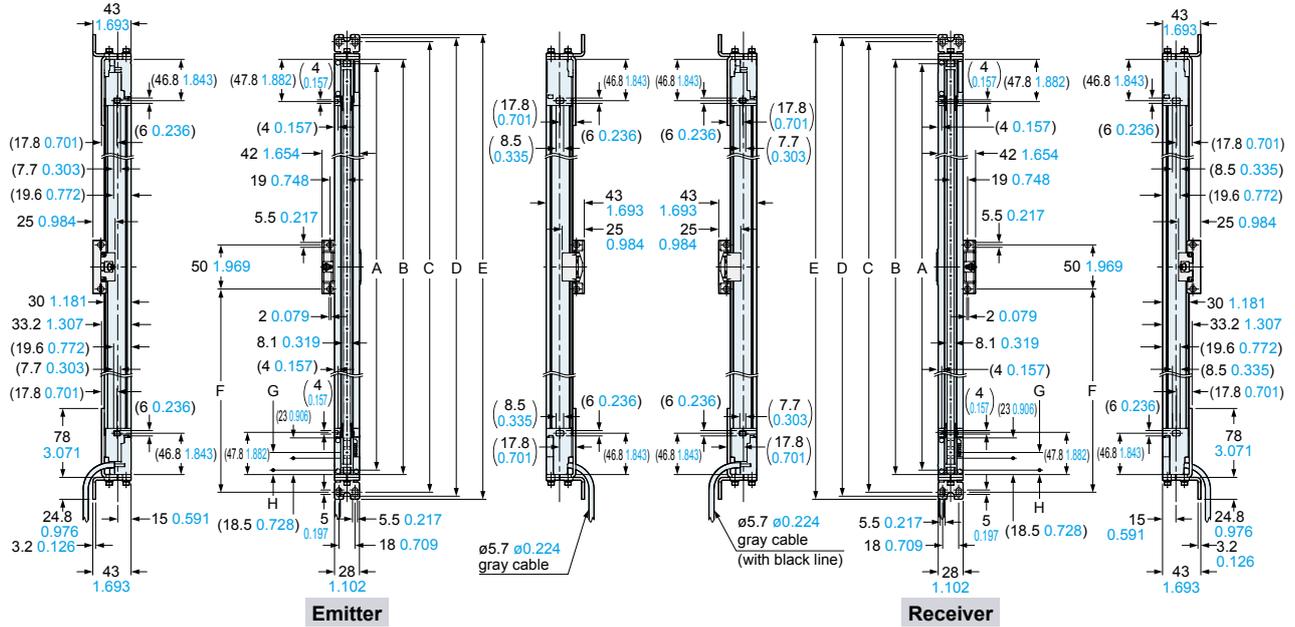
**SF4D-□(-01)**

Safety light curtain

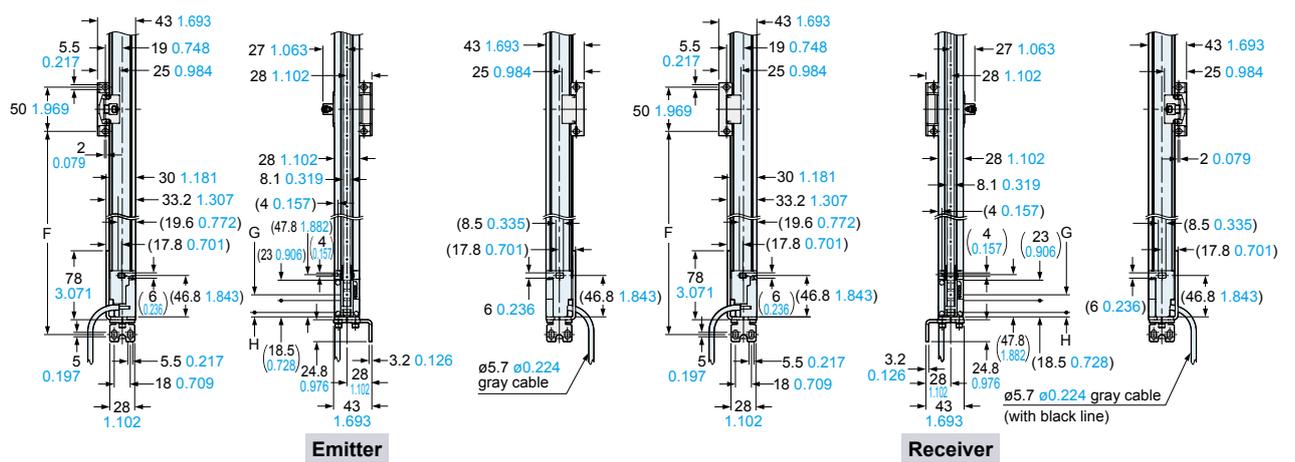
**Assembly dimensions**

Mounting drawing for the safety light curtains using the beam adjustment mounting bracket **MS-SFD-1-5** (optional) and the intermediate support brackets **MS-SFB-2** (optional).

**<Rear mounting>**



**<Side mounting>**



| Model No.      | Protective height |               | Mounting pitch |              | Total length | Intermediate support bracket mounting pitch (Note 4) |              |              |            |
|----------------|-------------------|---------------|----------------|--------------|--------------|--|--------------|--------------|------------|
|                | A (Note 1)        |               | B              | C (Note 2)   |              |  | D (Note 3)   |              |            |
|                | SF4D-F□(-01)      | SF4D-A□(-01)  |                |              |              |  |              |              |            |
| SF4D-F15(-01)  | SF4D-H8(-01)      | SF4D-A4(-01)  | 140 5.512      | 120 4.724    | 150 5.906    | 190 7.480  | 199 7.835    | 206 8.110    | —          |
| SF4D-F23(-01)  | SF4D-H12(-01)     | SF4D-A6(-01)  | 220 8.661      | 200 7.874    | 230 9.055    | 270 10.630   | 279 10.984   | 286 11.260   | —          |
| SF4D-F31(-01)  | SF4D-H16(-01)     | SF4D-A8(-01)  | 300 11.811     | 280 11.024   | 310 12.205   | 350 13.780   | 359 14.134   | 366 14.409   | —          |
| SF4D-F39(-01)  | SF4D-H20(-01)     | SF4D-A10(-01) | 380 14.961     | 360 14.173   | 390 15.354   | 430 16.929   | 439 17.283   | 446 17.559   | —          |
| SF4D-F47(-01)  | SF4D-H24(-01)     | SF4D-A12(-01) | 460 18.110     | 440 17.323   | 470 18.504   | 510 20.079   | 519 20.433   | 526 20.709   | —          |
| SF4D-F55(-01)  | SF4D-H28(-01)     | SF4D-A14(-01) | 540 21.260     | 520 20.472   | 550 21.654   | 590 23.228   | 599 23.583   | 606 23.858   | —          |
| SF4D-F63(-01)  | SF4D-H32(-01)     | SF4D-A16(-01) | 620 24.409     | 600 23.622   | 630 24.803   | 670 26.378   | 679 26.732   | 686 27.008   | —          |
| SF4D-F71(-01)  | SF4D-H36(-01)     | SF4D-A18(-01) | 700 27.559     | 680 26.772   | 710 27.953   | 750 29.528   | 759 29.882   | 766 30.157   | —          |
| SF4D-F79(-01)  | SF4D-H40(-01)     | SF4D-A20(-01) | 780 30.709     | 760 29.921   | 790 31.102   | 830 32.677   | 839 33.031   | 846 33.307   | —          |
| SF4D-F95(-01)  | SF4D-H48(-01)     | SF4D-A24(-01) | 940 37.008     | 920 36.220   | 950 37.402   | 990 39.976   | 999 39.331   | 1,006 39.606 | —          |
| SF4D-F111(-01) | SF4D-H56(-01)     | SF4D-A28(-01) | 1,100 43.307   | 1,080 42.520 | 1,110 43.701 | 1,150 45.276   | 1,159 45.630 | 1,166 45.906 | 550 21.654 |
| SF4D-F127(-01) | SF4D-H64(-01)     | SF4D-A32(-01) | 1,260 49.606   | 1,240 48.819 | 1,270 50.000 | 1,310 51.575   | 1,319 51.929 | 1,326 52.205 | 630 24.803 |
| —              | SF4D-H72(-01)     | SF4D-A36(-01) | 1,420 55.906   | 1,400 55.118 | 1,430 56.299 | 1,470 57.874   | 1,479 58.228 | 1,486 58.504 | 710 27.953 |
| —              | SF4D-H80(-01)     | SF4D-A40(-01) | 1,580 62.205   | 1,560 61.417 | 1,590 62.598 | 1,630 64.173   | 1,639 64.528 | 1,646 64.803 | 790 31.102 |
| —              | SF4D-H88(-01)     | SF4D-A44(-01) | 1,740 68.504   | 1,720 67.717 | 1,750 68.898 | 1,790 70.472   | 1,799 70.827 | 1,806 71.102 | 870 34.252 |
| —              | SF4D-H96(-01)     | SF4D-A48(-01) | 1,900 74.803   | 1,880 74.016 | 1,910 75.197 | 1,950 76.772   | 1,959 77.126 | 1,966 77.402 | 950 37.402 |

Notes: 1) In the case of "When used as safety device for presses in China" or "When SF4D-□(-01) is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height (A).  
 2) Mounting pitch when beam adjustment mounting bracket **MS-SFD-1-5** (optional) is mounted with two M5 hexagon-socket head bolts.  
 3) Mounting pitch when beam adjustment mounting bracket **MS-SFD-1-5** (optional) is mounted with one M8 hexagon-socket head bolt.  
 4) When the number of beam channels is SF4D-F□(-01): 111 or more beam channels, SF4D-H□(-01): 56 or more beam channels, SF4D-A□(-01): 28 or more beam channels, one set is required.



**DIMENSIONS (Unit: mm in)**

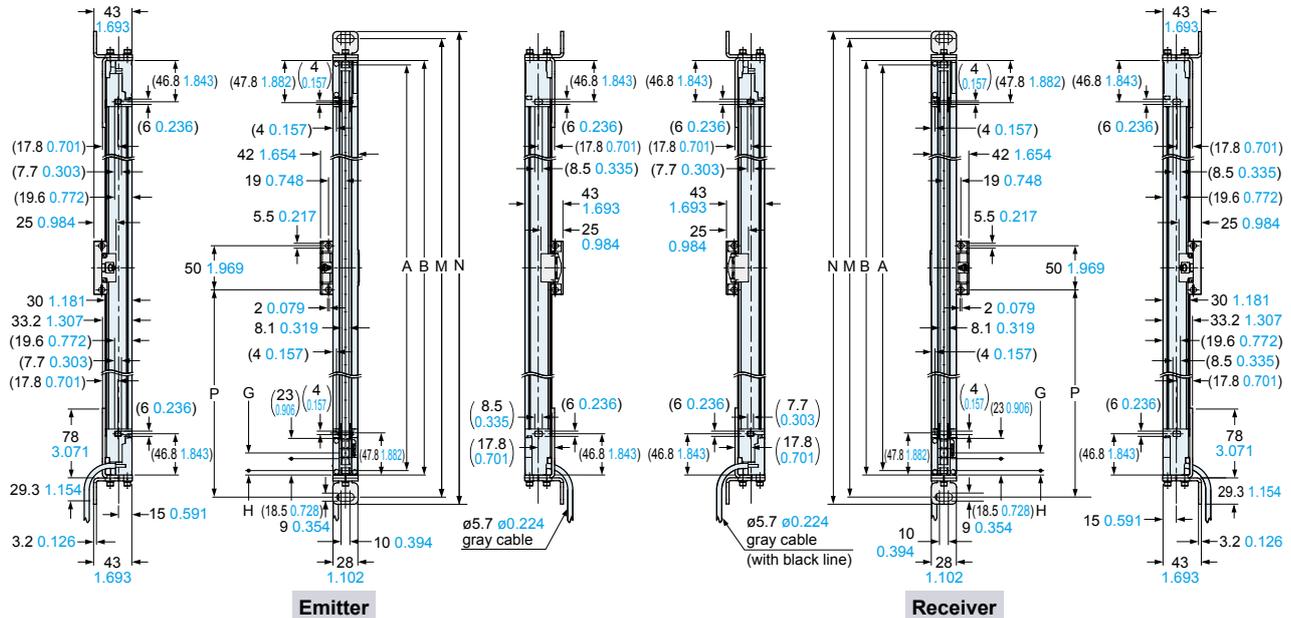
**SF4D-□(-01)**

Safety light curtain

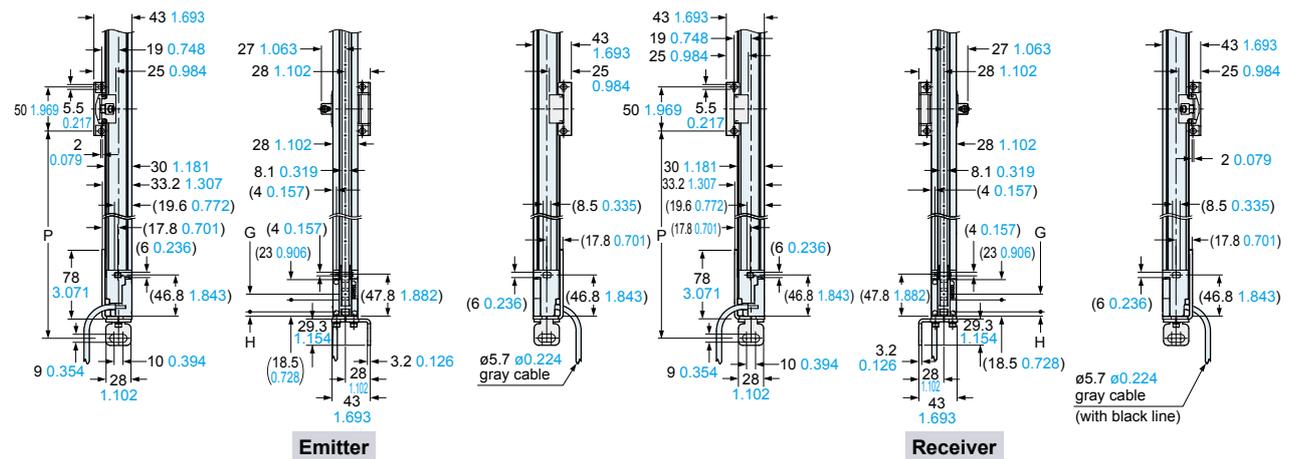
**Assembly dimensions**

Mounting drawing for the safety light curtains using the beam adjustment mounting bracket **MS-SFD-1-8** (optional) and the intermediate support brackets **MS-SFB-2** (optional).

**<Rear mounting>**



**<Side mounting>**



| Model No.      | Protective height |               | Mounting pitch | Total length | Intermediate support bracket mounting pitch (Note 2) |              |              |            |
|----------------|-------------------|---------------|----------------|--------------|--|--------------|--------------|------------|
|                | A (Note 1)        |               |                |              |  |              |              |            |
|                | SF4D-F□(-01)      | SF4D-H□(-01)  | B              | M            | N  | P            |              |            |
| SF4D-F15(-01)  | SF4D-H8(-01)      | SF4D-A4(-01)  | 140 5.512      | 120 4.724    | 150 5.906  | 199 7.835    | 215 8.465    | —          |
| SF4D-F23(-01)  | SF4D-H12(-01)     | SF4D-A6(-01)  | 220 8.661      | 200 7.874    | 230 9.055  | 279 10.984   | 295 11.614   | —          |
| SF4D-F31(-01)  | SF4D-H16(-01)     | SF4D-A8(-01)  | 300 11.811     | 280 11.024   | 310 12.205   | 359 14.134   | 375 14.764   | —          |
| SF4D-F39(-01)  | SF4D-H20(-01)     | SF4D-A10(-01) | 380 14.961     | 360 14.173   | 390 15.354   | 439 17.283   | 455 17.913   | —          |
| SF4D-F47(-01)  | SF4D-H24(-01)     | SF4D-A12(-01) | 460 18.110     | 440 17.323   | 470 18.504   | 519 20.433   | 535 21.063   | —          |
| SF4D-F55(-01)  | SF4D-H28(-01)     | SF4D-A14(-01) | 540 21.260     | 520 20.472   | 550 21.654   | 599 23.583   | 615 24.213   | —          |
| SF4D-F63(-01)  | SF4D-H32(-01)     | SF4D-A16(-01) | 620 24.409     | 600 23.622   | 630 24.803   | 679 26.732   | 695 27.362   | —          |
| SF4D-F71(-01)  | SF4D-H36(-01)     | SF4D-A18(-01) | 700 27.559     | 680 26.772   | 710 27.953   | 759 29.882   | 775 30.512   | —          |
| SF4D-F79(-01)  | SF4D-H40(-01)     | SF4D-A20(-01) | 780 30.709     | 760 29.921   | 790 31.102   | 839 33.031   | 855 33.661   | —          |
| SF4D-F95(-01)  | SF4D-H48(-01)     | SF4D-A24(-01) | 940 37.008     | 920 36.220   | 950 37.402   | 999 39.331   | 1,015 39.961 | —          |
| SF4D-F111(-01) | SF4D-H56(-01)     | SF4D-A28(-01) | 1,100 43.307   | 1,080 42.520 | 1,110 43.701   | 1,159 45.630 | 1,175 46.260 | 555 21.850 |
| SF4D-F127(-01) | SF4D-H64(-01)     | SF4D-A32(-01) | 1,260 49.606   | 1,240 48.819 | 1,270 50.000   | 1,319 51.929 | 1,335 52.559 | 635 25.000 |
| —              | SF4D-H72(-01)     | SF4D-A36(-01) | 1,420 55.906   | 1,400 55.118 | 1,430 56.299   | 1,479 58.228 | 1,495 58.858 | 715 28.150 |
| —              | SF4D-H80(-01)     | SF4D-A40(-01) | 1,580 62.205   | 1,560 61.417 | 1,590 62.598   | 1,639 64.528 | 1,655 65.157 | 795 31.299 |
| —              | SF4D-H88(-01)     | SF4D-A44(-01) | 1,740 68.504   | 1,720 67.717 | 1,750 68.898   | 1,799 70.827 | 1,815 71.457 | 875 34.449 |
| —              | SF4D-H96(-01)     | SF4D-A48(-01) | 1,900 74.803   | 1,880 74.016 | 1,910 75.197   | 1,959 77.126 | 1,975 77.756 | 955 37.598 |

Notes: 1) In the case of "When used as safety device for presses in China" or "When SF4D-□(-01) is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height (A).  
 2) When the number of beam channels is SF4D-F□(-01): 111 or more beam channels, SF4D-H□(-01): 56 or more beam channels, SF4D-A□(-01): 28 or more beam channels, one set is required.

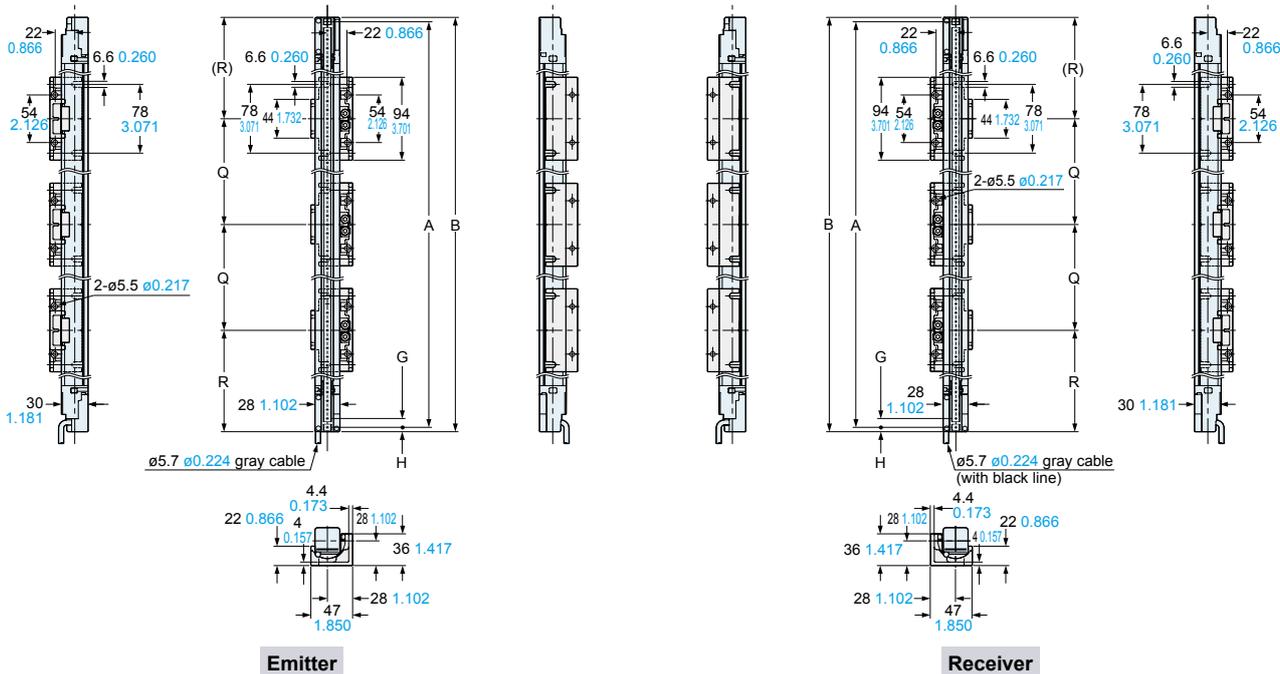
**DIMENSIONS (Unit: mm in)**

SF4D-□(-01)

Safety light curtain

**Assembly dimensions**

Mounting drawing for the safety light curtains using the dead zoneless beam adjustment mounting bracket **MS-SFD-3-6** (optional)



| Model No.      | Protective height |               |              | Dead zoneless mounting bracket |              |            | Required number of brackets for emitters / receivers |   |
|----------------|-------------------|---------------|--------------|--------------------------------|--------------|------------|--|---|
|                | A (Note)          |               | B            | Mounting position              |              |            |  |   |
|                | SF4D-F□(-01)      | SF4D-H□(-01)  |              | Q                              | R            |            |  |   |
| SF4D-F15(-01)  | SF4D-H8(-01)      | SF4D-A4(-01)  | 140 5.512    | 120 4.724                      | 150 5.906    | 0 0        | 75 2.953   | 2 |
| SF4D-F23(-01)  | SF4D-H12(-01)     | SF4D-A6(-01)  | 220 8.661    | 200 7.874                      | 230 9.055    | 94 3.701   | 68 2.677   |   |
| SF4D-F31(-01)  | SF4D-H16(-01)     | SF4D-A8(-01)  | 300 11.811   | 280 11.024                     | 310 12.205   | 110 4.331  | 100 3.937  | 4 |
| SF4D-F39(-01)  | SF4D-H20(-01)     | SF4D-A10(-01) | 380 14.961   | 360 14.173                     | 390 15.354   | 160 6.299  | 115 4.528  |   |
| SF4D-F47(-01)  | SF4D-H24(-01)     | SF4D-A12(-01) | 460 18.110   | 440 17.323                     | 470 18.504   | 200 7.874  | 135 5.315  |   |
| SF4D-F55(-01)  | SF4D-H28(-01)     | SF4D-A14(-01) | 540 21.260   | 520 20.472                     | 550 21.654   | 250 9.843  | 150 5.906  |   |
| SF4D-F63(-01)  | SF4D-H32(-01)     | SF4D-A16(-01) | 620 24.409   | 600 23.622                     | 630 24.803   | 290 11.417 | 170 6.693  |   |
| SF4D-F71(-01)  | SF4D-H36(-01)     | SF4D-A18(-01) | 700 27.559   | 680 26.772                     | 710 27.953   | 340 13.386 | 185 7.283  |   |
| SF4D-F79(-01)  | SF4D-H40(-01)     | SF4D-A20(-01) | 780 30.709   | 760 29.921                     | 790 31.102   | 380 14.961 | 205 8.071  |   |
| SF4D-F95(-01)  | SF4D-H48(-01)     | SF4D-A24(-01) | 940 37.008   | 920 36.220                     | 950 37.402   | 470 18.504 | 240 9.449  |   |
| SF4D-F111(-01) | SF4D-H56(-01)     | SF4D-A28(-01) | 1,100 43.307 | 1,080 42.520                   | 1,110 43.701 | 560 22.047 | 275 10.827   |   |
| SF4D-F127(-01) | SF4D-H64(-01)     | SF4D-A32(-01) | 1,260 49.606 | 1,240 48.819                   | 1,270 50.000 | 650 25.591 | 310 12.205   |   |
|                | SF4D-H72(-01)     | SF4D-A36(-01) | 1,420 55.906 | 1,400 55.118                   | 1,430 56.299 | 730 28.740 | 350 13.780   | 6 |
|                | SF4D-H80(-01)     | SF4D-A40(-01) | 1,580 62.205 | 1,560 61.417                   | 1,590 62.598 | 530 20.866 | 265 10.433   |   |
|                | SF4D-H88(-01)     | SF4D-A44(-01) | 1,740 68.504 | 1,720 67.717                   | 1,750 68.898 | 590 23.228 | 285 11.220   |   |
|                | SF4D-H96(-01)     | SF4D-A48(-01) | 1,900 74.803 | 1,880 74.016                   | 1,910 75.197 | 650 25.591 | 305 12.008   |   |

| Model No.    | Beam pitch | First beam channel position |
|--------------|------------|-----------------------------|
|              | G          | H                           |
| SF4D-F□(-01) | 10 0.394   | 5 0.197                     |
| SF4D-H□(-01) | 20 0.787   | 5 0.197                     |
| SF4D-A□(-01) | 40 1.575   | 15 0.591                    |

Note: In the case of "When used as safety device for presses in China" or "When SF4D-□01 is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height (A).

**DIMENSIONS (Unit: mm in)**

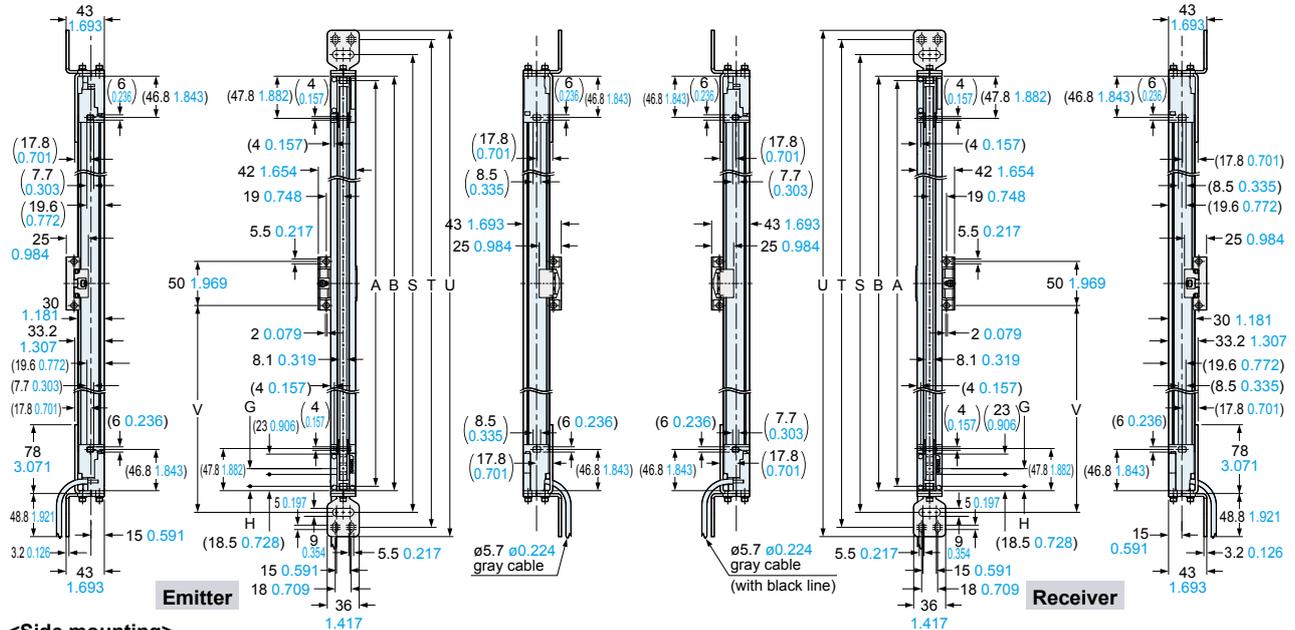
**SF4D-□(-01)**

Safety light curtain

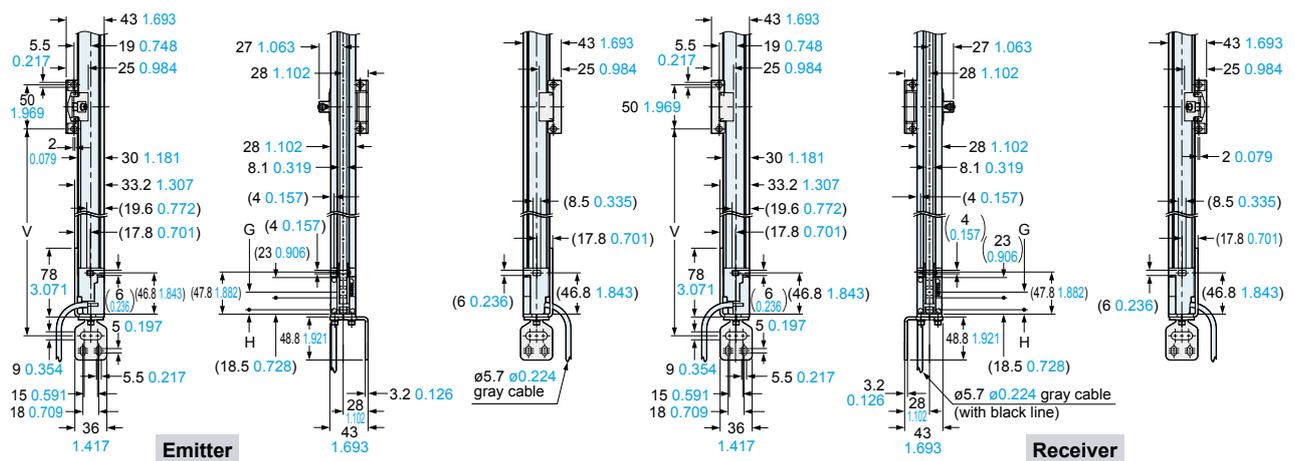
**Assembly dimensions**

Mounting drawing for safety light curtains using the **SF4B-G** compatible mounting bracket **MS-SFD-4BG** (optional) and the intermediate support bracket **MS-SFB-2**.

**<Rear mounting>**



**<Side mounting>**

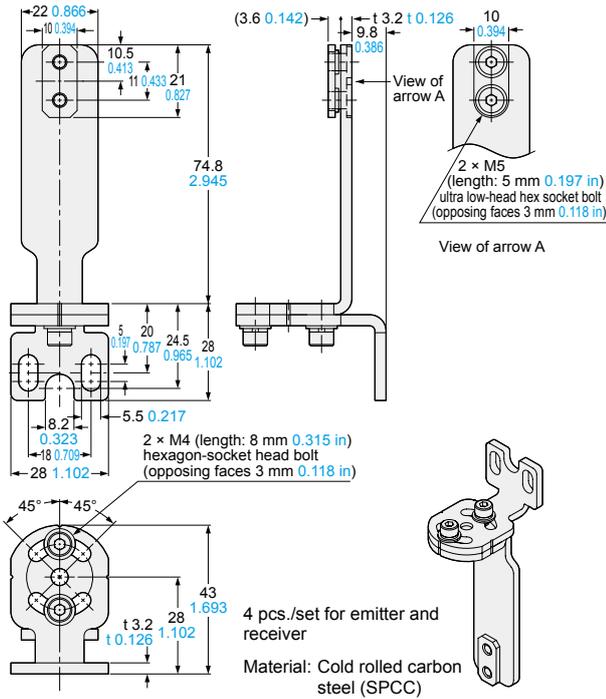


| Model No.      | Protective height            |               | Mounting pitch |              | Total length | Intermediate support bracket mounting pitch (Note 4) |              |              |            |
|----------------|------------------------------|---------------|----------------|--------------|--------------|--|--------------|--------------|------------|
|                | A (Note 1)                   | B             | S (Note 2)     | T (Note 3)   |              |  |              |              |            |
|                | SF4D-F□(-01)<br>SF4D-H□(-01) | SF4D-A□(-01)  |                | U            | V            |  |              |              |            |
| SF4D-F15(-01)  | SF4D-H8(-01)                 | SF4D-A4(-01)  | 140 5.512      | 120 4.724    | 150 5.906    | 199 7.835  | 233 9.173    | 254 10.000   | —          |
| SF4D-F23(-01)  | SF4D-H12(-01)                | SF4D-A6(-01)  | 220 8.661      | 200 7.874    | 230 9.055    | 279 10.984   | 313 12.323   | 334 13.150   | —          |
| SF4D-F31(-01)  | SF4D-H16(-01)                | SF4D-A8(-01)  | 300 11.811     | 280 11.024   | 310 12.205   | 359 14.134   | 393 15.472   | 414 16.299   | —          |
| SF4D-F39(-01)  | SF4D-H20(-01)                | SF4D-A10(-01) | 380 14.961     | 360 14.173   | 390 15.354   | 439 17.283   | 473 18.622   | 494 19.449   | —          |
| SF4D-F47(-01)  | SF4D-H24(-01)                | SF4D-A12(-01) | 460 18.110     | 440 17.323   | 470 18.504   | 519 20.433   | 553 21.772   | 574 22.598   | —          |
| SF4D-F55(-01)  | SF4D-H28(-01)                | SF4D-A14(-01) | 540 21.260     | 520 20.472   | 550 21.654   | 599 23.583   | 633 24.921   | 654 25.748   | —          |
| SF4D-F63(-01)  | SF4D-H32(-01)                | SF4D-A16(-01) | 620 24.409     | 600 23.622   | 630 24.803   | 679 26.732   | 713 28.071   | 734 28.898   | —          |
| SF4D-F71(-01)  | SF4D-H36(-01)                | SF4D-A18(-01) | 700 27.559     | 680 26.772   | 710 27.953   | 759 29.882   | 793 31.220   | 814 32.047   | —          |
| SF4D-F79(-01)  | SF4D-H40(-01)                | SF4D-A20(-01) | 780 30.709     | 760 29.921   | 790 31.102   | 839 33.031   | 873 34.370   | 894 35.197   | —          |
| SF4D-F95(-01)  | SF4D-H48(-01)                | SF4D-A24(-01) | 940 37.008     | 920 36.220   | 950 37.402   | 999 39.331   | 1,033 40.669 | 1,054 41.496 | —          |
| SF4D-F111(-01) | SF4D-H56(-01)                | SF4D-A28(-01) | 1,100 43.307   | 1,080 42.520 | 1,110 43.701 | 1,159 45.630   | 1,193 46.969 | 1,214 47.795 | 555 21.850 |
| SF4D-F127(-01) | SF4D-H64(-01)                | SF4D-A32(-01) | 1,260 49.606   | 1,240 48.819 | 1,270 50.000 | 1,319 51.929   | 1,353 53.268 | 1,374 54.094 | 635 25.000 |
| —              | SF4D-H72(-01)                | SF4D-A36(-01) | 1,420 55.906   | 1,400 55.118 | 1,430 56.299 | 1,479 58.228   | 1,513 59.567 | 1,534 60.394 | 715 28.150 |
| —              | SF4D-H80(-01)                | SF4D-A40(-01) | 1,580 62.205   | 1,560 61.417 | 1,590 62.598 | 1,639 64.528   | 1,673 65.866 | 1,694 66.693 | 795 31.299 |
| —              | SF4D-H88(-01)                | SF4D-A44(-01) | 1,740 68.504   | 1,720 67.717 | 1,750 68.898 | 1,799 70.827   | 1,833 72.165 | 1,854 72.992 | 875 34.449 |
| —              | SF4D-H96(-01)                | SF4D-A48(-01) | 1,900 74.803   | 1,880 74.016 | 1,910 75.197 | 1,959 77.126   | 1,993 78.465 | 2,014 79.291 | 955 37.598 |

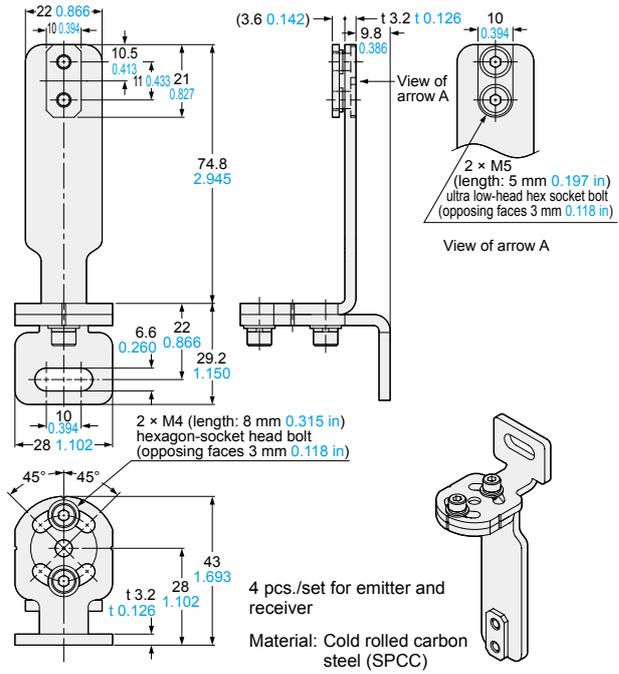
Notes: 1) In the case of "When used as safety device for presses in China" or "When SF4D-□(-01) is used for presses or shearing machines (paper cutting machines) in Japan," the distance between the center of the first beam axis and the center of the last beam axis of the device becomes the protective height (A).  
 2) Mounting pitch when the SF4B-G compatible mounting bracket MS-SFD-4BG (optional) is installed using one M8 hexagon socket head bolt.  
 3) Mounting pitch when the SF4B-G compatible mounting bracket MS-SFD-4BG (optional) is installed using two M5 hexagon socket head bolts.  
 4) When the number of beam channels is SF4D-F□(-01): 111 or more beam channels, SF4D-H□(-01): 56 or more beam channels, SF4D-A□(-01): 28 or more beam channels, one set is required.

**DIMENSIONS (Unit: mm in)**

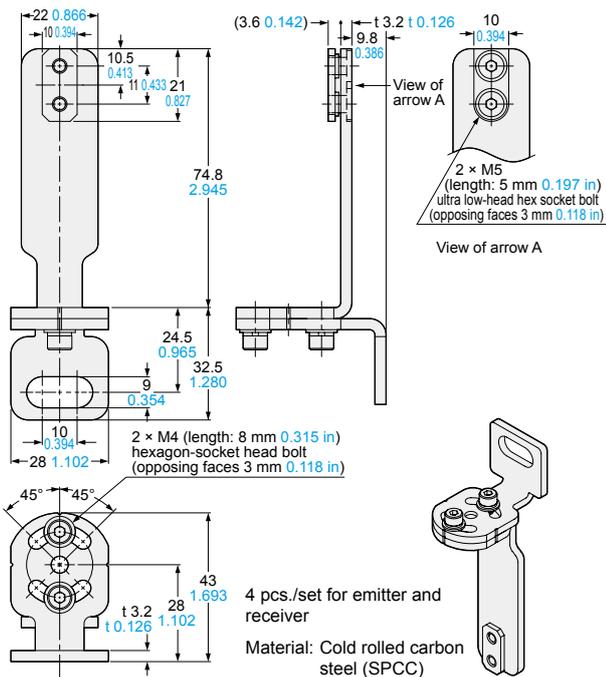
**MS-SFD-1-5** Beam adjustment mounting bracket (Optional)



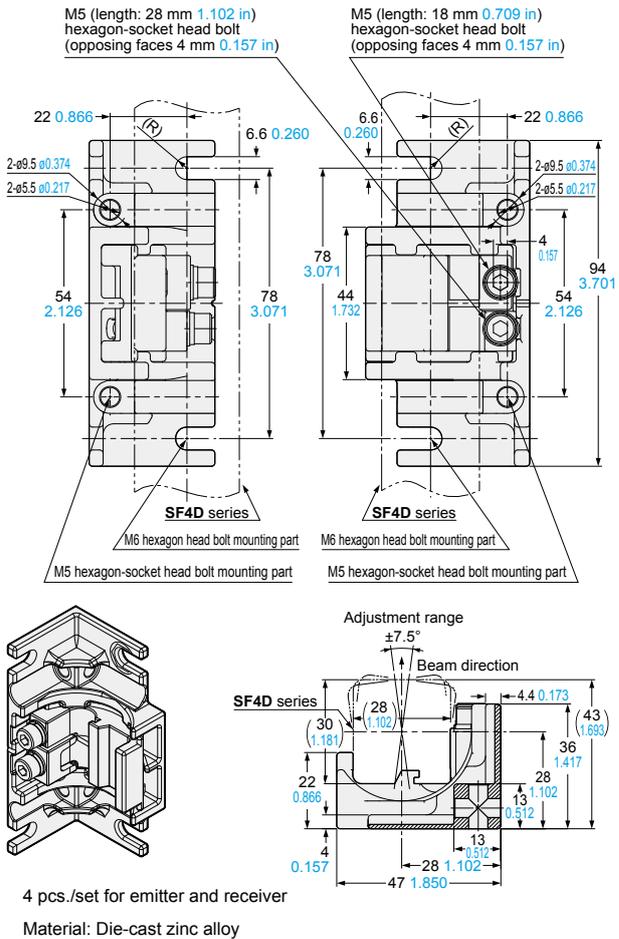
**MS-SFD-1-6** Beam adjustment mounting bracket (Optional)



**MS-SFD-1-8** Beam adjustment mounting bracket (Optional)



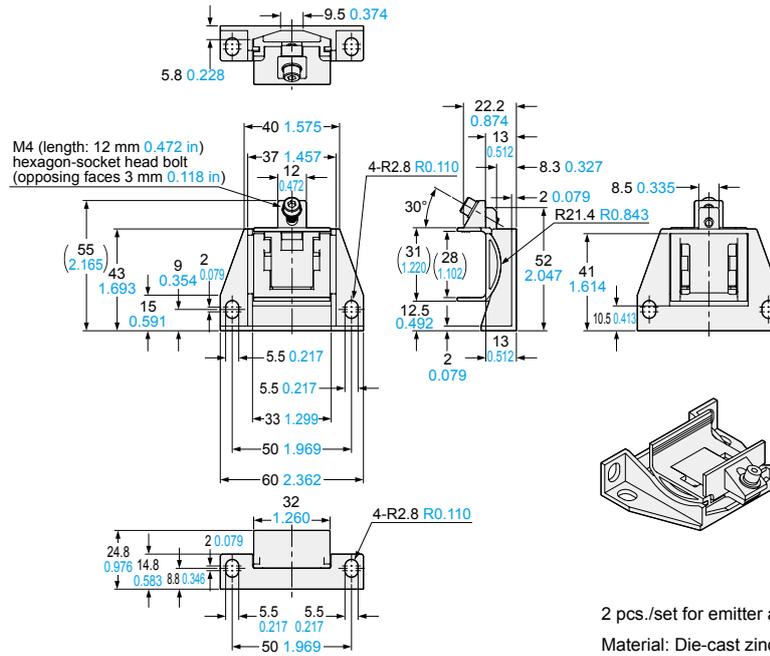
**MS-SFD-3-6** Dead zoneless beam adjustment mounting bracket (Optional)



**DIMENSIONS (Unit: mm in)**

**MS-SFB-2**

Intermediate support bracket (Optional)

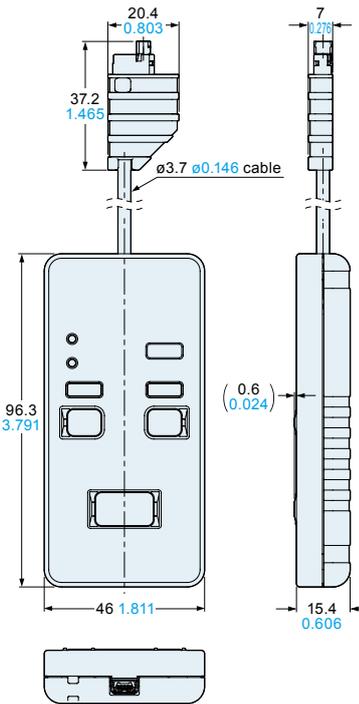
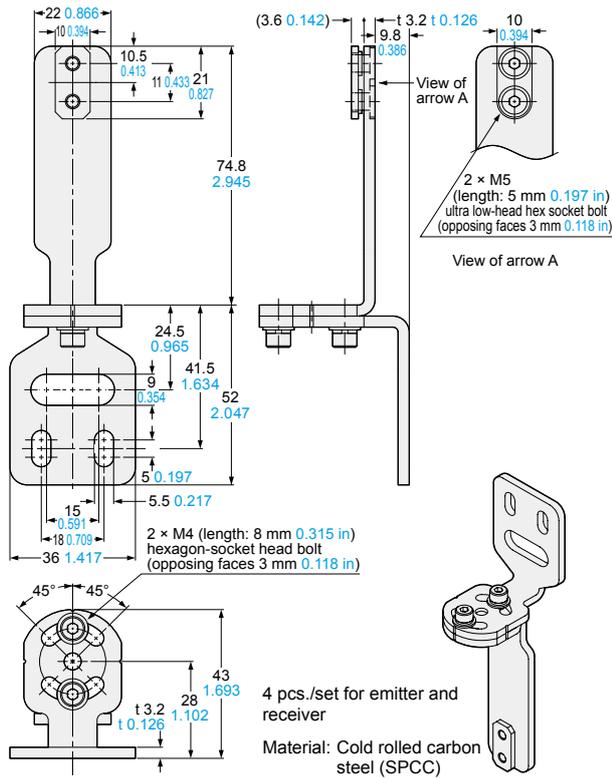


**MS-SFD-4BG**

SF4B-G compatible mounting bracket (Optional)

**SF4D-TM1**

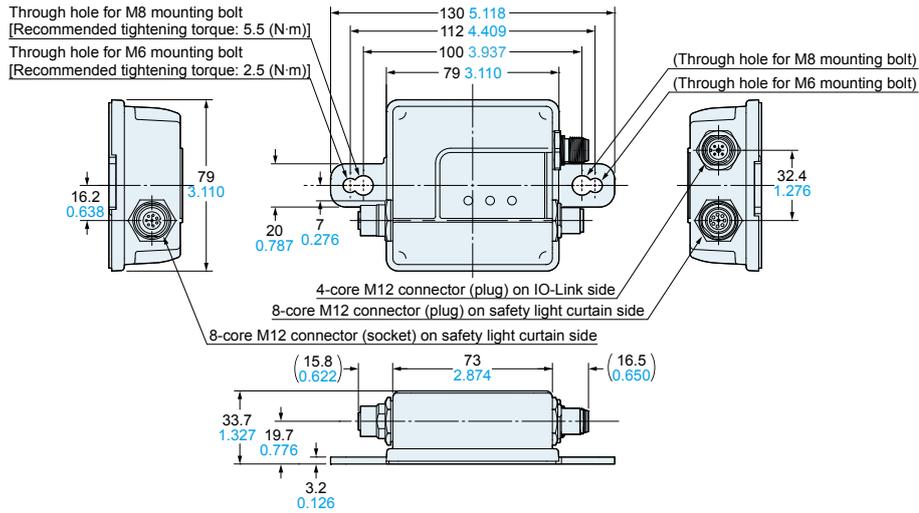
Communication module (Optional)



**DIMENSIONS (Unit: mm in)**

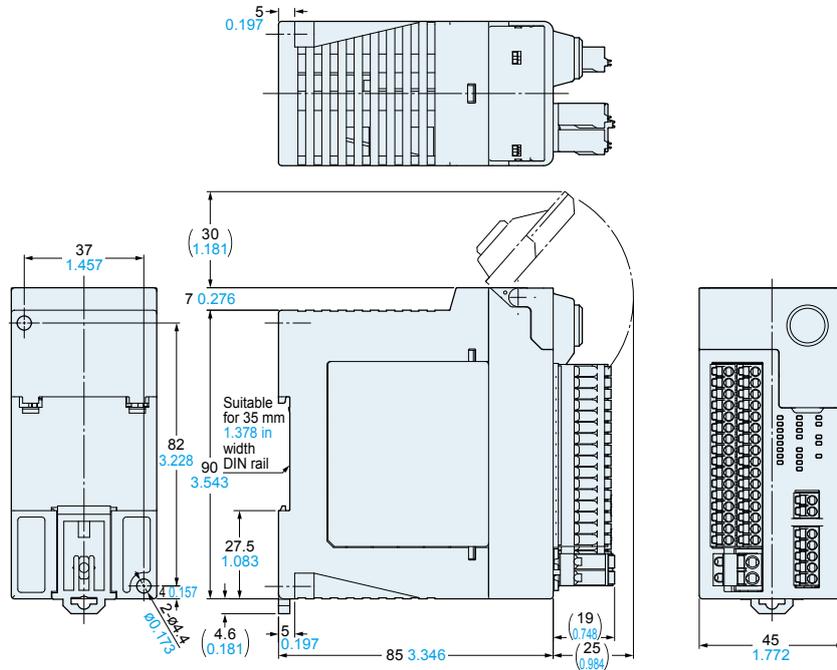
**SFD-WL3**

IO-Link communication unit (Optional)



**SF-C21**

Control units (Optional)

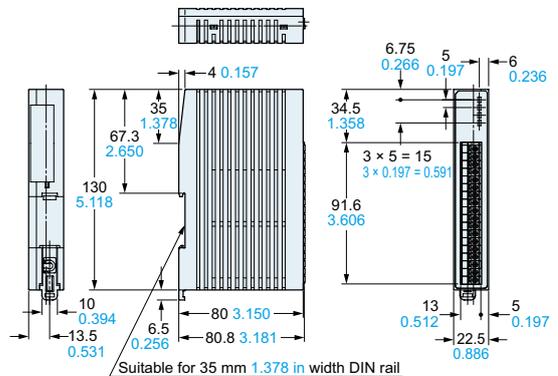
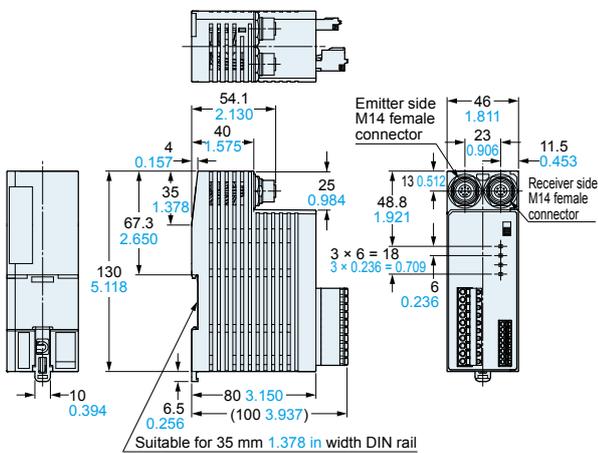


**SF-C11**

Control units (Optional)

**SF-C13**

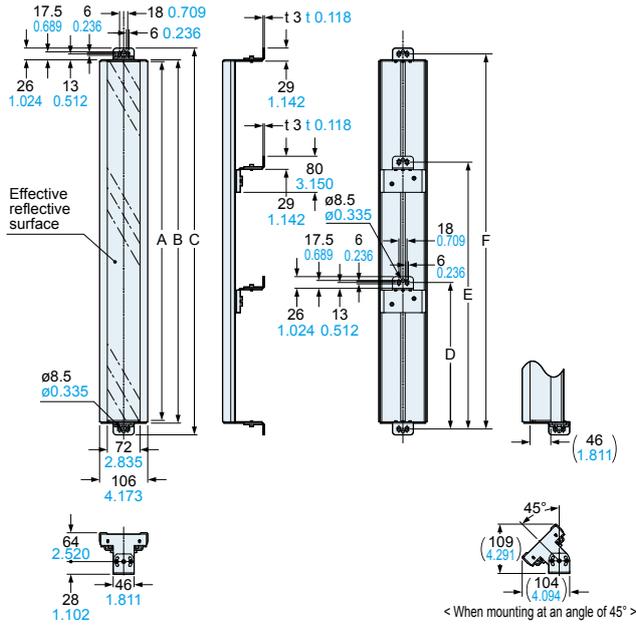
Control units (Optional)



**DIMENSIONS (Unit: mm in)**

**RF-SFBH-□**

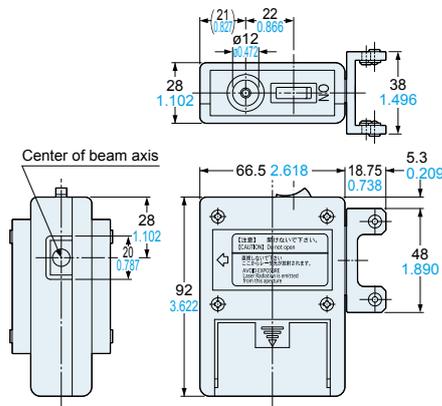
Corner mirror (Optional)



| Model No.         | A               | B               | C               | D                        | E                          | F               | Net weight      |
|-------------------|-----------------|-----------------|-----------------|--------------------------|----------------------------|-----------------|-----------------|
| <b>RF-SFBH-8</b>  | 173<br>6.811    | 183<br>7.205    | 235<br>9.252    | —                        | —                          | 209<br>8.228    | 810 g approx.   |
| <b>RF-SFBH-12</b> | 236<br>9.291    | 246<br>9.685    | 298<br>11.732   | —                        | —                          | 272<br>10.709   | 970 g approx.   |
| <b>RF-SFBH-16</b> | 316<br>12.441   | 326<br>12.835   | 378<br>14.882   | —                        | —                          | 352<br>13.858   | 1,170 g approx. |
| <b>RF-SFBH-20</b> | 396<br>15.591   | 406<br>15.984   | 458<br>18.031   | —                        | —                          | 432<br>17.008   | 1,370 g approx. |
| <b>RF-SFBH-24</b> | 476<br>18.740   | 486<br>19.134   | 538<br>21.181   | —                        | —                          | 512<br>20.157   | 1,570 g approx. |
| <b>RF-SFBH-28</b> | 556<br>21.890   | 566<br>22.283   | 618<br>24.331   | —                        | —                          | 592<br>23.307   | 1,770 g approx. |
| <b>RF-SFBH-32</b> | 636<br>25.039   | 646<br>25.433   | 698<br>27.480   | —                        | —                          | 672<br>26.457   | 1,970 g approx. |
| <b>RF-SFBH-36</b> | 716<br>28.189   | 726<br>28.583   | 778<br>30.630   | —                        | —                          | 752<br>29.606   | 2,170 g approx. |
| <b>RF-SFBH-40</b> | 796<br>31.339   | 806<br>31.732   | 858<br>33.780   | 458 ±50<br>18.031 ±1.969 | —                          | 832<br>32.756   | 2,660 g approx. |
| <b>RF-SFBH-48</b> | 956<br>37.638   | 966<br>38.031   | 1,018<br>40.079 | 538 ±50<br>21.181 ±1.969 | —                          | 992<br>39.055   | 3,060 g approx. |
| <b>RF-SFBH-56</b> | 1,116<br>43.937 | 1,126<br>44.331 | 1,178<br>46.378 | 618 ±50<br>24.331 ±1.969 | —                          | 1,152<br>45.354 | 3,460 g approx. |
| <b>RF-SFBH-64</b> | 1,276<br>50.236 | 1,286<br>50.630 | 1,338<br>52.677 | 698 ±50<br>27.480 ±1.969 | —                          | 1,312<br>51.654 | 3,890 g approx. |
| <b>RF-SFBH-72</b> | 1,436<br>56.535 | 1,446<br>56.929 | 1,498<br>58.976 | 538 ±50<br>21.181 ±1.969 | 1,018 ±50<br>40.079 ±1.969 | 1,472<br>57.953 | 4,550 g approx. |
| <b>RF-SFBH-80</b> | 1,596<br>62.835 | 1,606<br>63.228 | 1,658<br>65.276 | 591 ±50<br>23.268 ±1.969 | 1,125 ±50<br>44.291 ±1.969 | 1,632<br>64.252 | 4,950 g approx. |
| <b>RF-SFBH-88</b> | 1,756<br>69.134 | 1,766<br>69.528 | 1,818<br>71.575 | 645 ±50<br>25.394 ±1.969 | 1,231 ±50<br>48.464 ±1.969 | 1,792<br>70.551 | 5,350 g approx. |
| <b>RF-SFBH-96</b> | 1,916<br>75.433 | 1,926<br>75.827 | 1,978<br>77.874 | 698 ±50<br>27.480 ±1.969 | 1,338 ±50<br>52.677 ±1.969 | 1,952<br>76.850 | 5,750 g approx. |

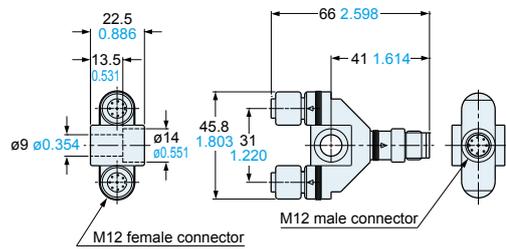
**SF-LAT-2N**

Laser alignment tool (Optional)



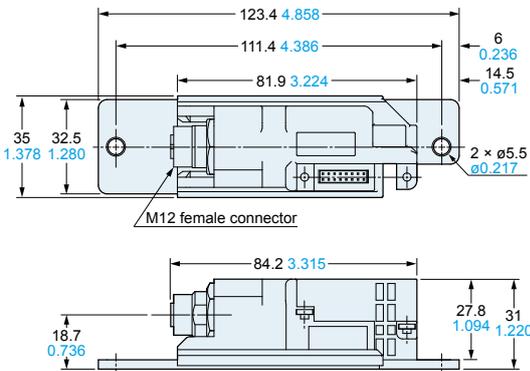
**SFB-WY1**

Y-shaped connector (Optional)



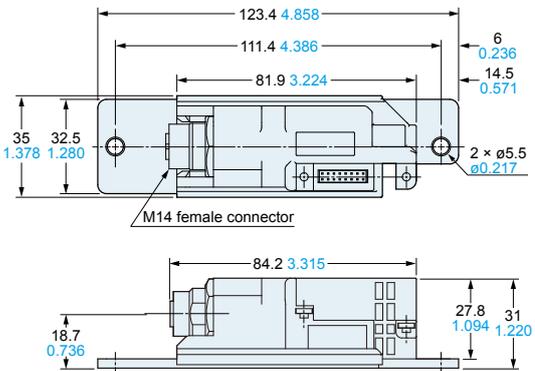
**SFD-J4B**

SF4D conversion adapter for 8-core cable (Optional)



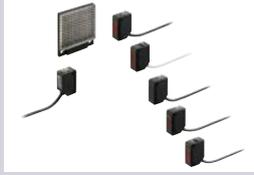
**SFD-J4B-MU**

SF4D conversion adapter for 12-core cable (Optional)



## Introduction to Panasonic sensors that can be used as muting sensors

### Compact Photoelectric Sensor CX-400 SERIES Ver.2



- World standard size
- Wide variation

### Ultra-slim Photoelectric Sensor EX-10 SERIES Ver.2



- 3.5 mm 0.138 in thickness
- Long sensing range: 1 m 3.281 ft (thru-beam type: EX-19)
- \* The EX-20 series that is compatible with M3 mounting screws is also available.

### U-shaped Micro Photoelectric Sensor PM-25/45/65 SERIES



- Three protection circuits standard on all models
- Ample beam emitting / receiving distance of 6 mm 0.236 in
- Easy to mount with M3 screws

### Rectangular-shaped Inductive Proximity Sensor GX-F/H SERIES



- Industry longest in stable sensing range
- 10 times the durability (Compared to previous models)
- IP68G rating

## NEW Non-Contact Safety Door Switch

Large and Bright Indicators Show the **Open/Close** Conditions of All Equipment Doors.

Non-Contact Safety Door Switch

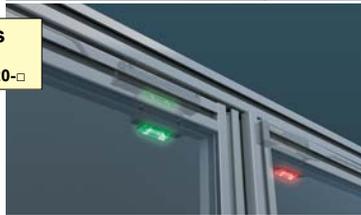
### SG-P SERIES

Compatible with Up to Control Category 4, PL<sub>e</sub> and SIL3  
\* Control category varies depending on external circuit configurations and wirings.

**For frame-less doors**  
Compact type  
SG-P1010-□ / SG-P2010-□

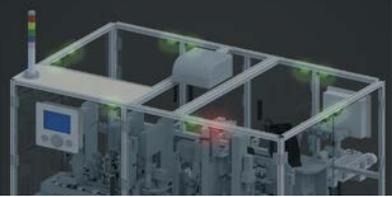


**For framed doors**  
Visible type  
SG-P1020-□ / SG-P2020-□



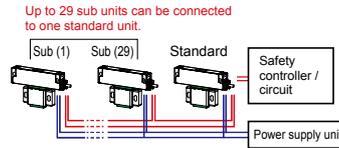
#### Flashing Function

If any one of the safety switches connected in series is not detected, the indicator lights of the other safety switches will blink green to notify the operator.



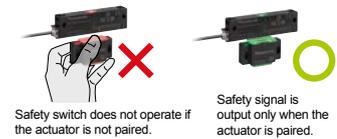
#### Serial Connection of Up to 30 Units

There is no need to purchase a dedicated controller. The presently used safety controller / circuit can be connected directly. Up to 30 units can be connected, thus contributing to wire-saving.



#### Helps Prevent Intentional Deactivation of Safety Function

The SG-P series products are available with two different coding levels: High-code models and Low-code models. The High-code models are compatible with ISO 14119 coding level (high level coded actuators) and prevent intentional deactivation of their safety function.



## Disclaimer

The applications described in the catalog are all intended for examples only. The purchase of our products described in the catalog shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described applications may not infringe any intellectual property rights, such as patent rights, of a third party.

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Industrial Device Business Division  
7-1-1, Morofuku, Daito-shi, Osaka 574-0044, Japan  
industrial.panasonic.com/ac/e/