Safety circuits can be installed and configured easily.

Exclusive control unit is available for easy design and construction of safety circuits
All models

Supports both PNP and NPN polarities
Industry first ※

A single unit can be used for PNP / NPN input switching, reducing the number of parts that need to be registered.

※ As of October 2004 and based on research conducted by SUNX.

NPN PNP

Polarity selection switch

PNP
NPN
FUNCTION
INTER LOCK

NPN
PNP

Ui

SF-C10 SERIES

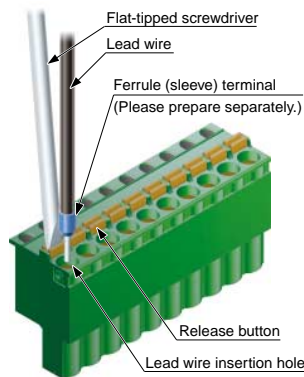## Plug-in type control unit SF-C11

Quick-connection

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

Easy setup requiring no torque control

A spring method is used for the terminal blocks for connections other than to the light curtain. There is no need to control tightening torques for these terminal blocks.

Flat-tipped screwdriver

Lead wire

Ferrule (sleeve) terminal
(Please prepare separately.)

Release button

Lead wire insertion hole

Removable terminal blocks reduce maintenance time

Removable terminal blocks are used. This reduces the work required for reconnecting wiring during maintenance.

Removable!
Uses a spring method
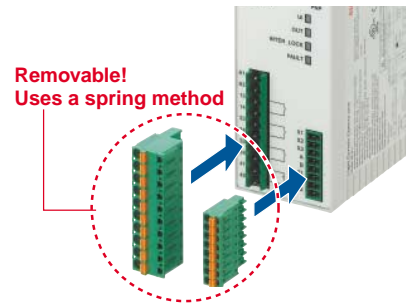
Robust type control unit SF-C12

Metal enclosure with a IP65 protective structure
Robust

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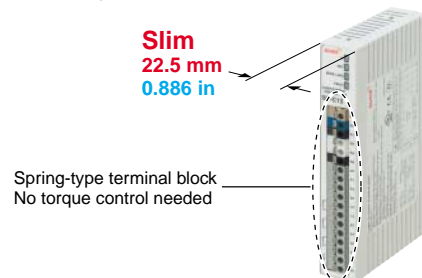
IP65 Metal enclosure

Connecting to the light curtain is done using plug-in connector connections
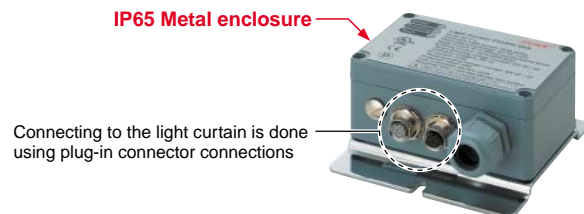
Slim type control unit SF-C13

Slim design
Slim

22.5 mm 0.886 in thickness, so can be inserted even into narrow spaces inside panels.

Slim
22.5 mm
0.886 in

Spring-type terminal block
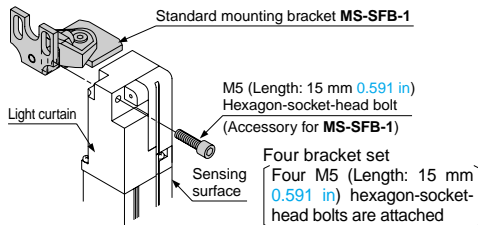No torque control needed

12

SF4B

ORDER GUIDE

5 Mounting brackets — Mounting bracket is not supplied with the light curtain. Please order it separately.

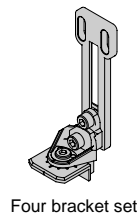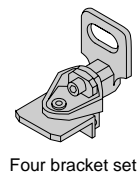| Designation	Model No.	Description
Standard mounting bracket	**MS-SFB-1**	Used to mount the light curtain on the rear surface and side surface (4 pcs. per set for emitter and receiver)
Pitch adapter bracket	**MS-SFB-4**	Used as the mounting bracket when changing over a previous light curtain with a protective height of 200 to 750 mm 7.874 to 29.528 in to the **SF4B** series. It is installed using two M5 hexagon-socket-head bolts. (4 pcs. per set for emitter and receiver)
M8 mounting bracket	**MS-SFB-1-T**	Allows the light curtain to be mounted at the rear and side with one M8 hexagon-socket-head bolt. (4 pcs. per set for emitter and receiver)
M8 pitch adapter bracket	**MS-SFB-4-T**	Used as the mounting bracket when changing over a previous light curtain with a protective height of 200 to 750 mm 7.874 to 29.528 in to the **SF4B** series. It is installed using two M8 hexagon-socket-head bolts. (4 pcs. per set for emitter and receiver)
Dead zoneless mounting bracket	**MS-SFB-3**	Mounting with no dead zone is possible so that the mounting bracket does not project past the sensing height. (4 pcs. per set for emitter and receiver)

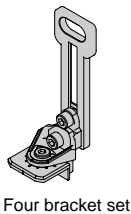### Standard mounting brackets
• **MS-SFB-1**

Standard mounting bracket **MS-SFB-1**

Light curtain

M5 (Length: 15 mm 0.591 in) Hexagon-socket-head bolt
(Accessory for **MS-SFB-1**)

Sensing surface

Four bracket set
Four M5 (Length: 15 mm 0.591 in) hexagon-socket-head bolts are attached

Pitch adapter bracket
• **MS-SFB-4**

Four bracket set

M8 mounting bracket
• **MS-SFB-1-T**

Four bracket set

M8 pitch adapter bracket
• **MS-SFB-4-T**

Four bracket set

Dead zoneless mounting bracket
• **MS-SFB-3**

Dead zoneless mounting bracket **MS-SFB-3**
Spacer (Accessory for **MS-SFB-3**)
M5 (Length: 25 mm 0.984 in) Hexagon-socket-head bolt
(Accessory for **MS-SFB-3**)
Four bracket set
Four M5 (Length: 25 mm 0.984 in) hexagon-socket-head bolts and four spacers are attached

Light curtain
Sensing surface

Exclusive control units

Designation	Appearance	Model No.	Description
Connector connection type control unit		**SF-C11**	Applicable to 8-core cable with connector. Up to control category 4
Solid type control unit		**SF-C12**	Applicable to 12-core cable with connector. Up to control category 4
Thin type control unit		**SF-C13**	Applicable to discrete wire connector. Up to control category 4

SF-C12 spare relay set

A set of spare relays (2 safety relays and 1 removal tool) is available for the safety relay that is built into the **SF-C12**. Model No.: **SF-C12-RY**
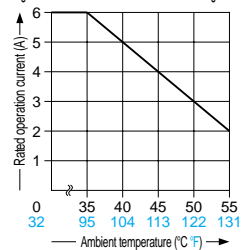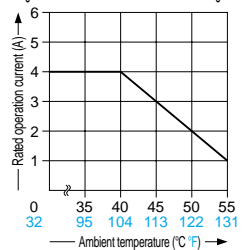
SF4B

SPECIFICATIONS

Exclusive control unit

Model No. / Item	SF-C11	SF-C12	SF-C13
Connectable light curtains	**SF4B** series		Light curtain manufactured by SUNX
Applicable standard	IEC 61496-1, UL 61496-1, JIS B 9704-1		
Control category	ISO 13849-1 (EN 954-1, JIS B 9705-1) compliance up to Category 4 standards		
Supply voltage	24 V DC ± 10 % Ripple P-P 10 % or less		
Current consumption	100 mA or less (without light curtain)		
Fuse (power supply)	Built-in electronic fuse, Triggering current: 0.5 A or more, Reset after power down		
Enabling path	NO contact × 3 (13-14, 23-24, 33-34)	NO contact × 2 (13-14, 23-24)	NO contact × 3 (13-14, 23-24, 33-34)
Application category	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 (For induced load, during contact protection) Minute current: 10 mA or more (at 24 V DC)(Note 1)	24 V DC / 1 A, resistive load (For induced load, during contact protection) Minimum applicable load: 15 mA or less (at 24 V DC)	30 V DC / 4 A, 230 V AC / 4 A, resistive load (For induced load, during contact protection) Minute current: 10 mA or more (at 24 V DC)(Note 1)
Contact material / contacts	AgSnO, self cleaning, positively driven	AgNiO + 0.2 μmAu, self cleaning, positively driven	AgSnO, self cleaning, positively driven
Contact resistance	100 mΩ or less (initial value)	50 mΩ or less (initial value)	100 mΩ or less (initial value)
Contact protection fuse rated	6 A (slow blow)	3 A (slow blow)	4 A (slow blow)
Mechanical lifetime	10 million times or more (switching frequency 180 times/min.) (Note 2)		
Electrical lifetime	100,000 times or more (switching frequency 20 times/min, 230 V AC / 3 A resistive load)		
Pick-up delay (Auto reset / Manual reset)	80 ms or less / 90 ms or less	30 ms or less / 30 ms or less	80 ms or less / 90 ms or less
Response time	10 ms or less	14 ms or less	10 ms or less
Auxiliary output	Safety relay contact (NC contact) × 1 (41-42) (Related to enabling path)	Safety relay contact (NC contact) × 1 (31-32) (Related to enabling path)	Safety relay contact (NC contact) × 1 (41-42) (Related to enabling path)
Rated operation voltage / current	24 V DC / 2 A, Minute current: 10 mA or more (at 24 V DC)	30 V DC / 3 A, Minute current: 15 mA or less (at 24 V DC)	24 V DC / 2 A, Minute current: 10 mA or more (at 24 V DC)
Contact protection fuse rated	2 A (slow blow)	3 A (slow blow)	2 A (slow blow)
Semiconductor auxiliary output (AUX)	<Minus ground (Setting for PNP)> <Plus ground (Setting for NPN)> • Max. source current: 60 mA • Max. sink current: 60 mA • Applied voltage: same as supply voltage • Applied voltage: same as supply voltage (between the semiconductor (between the semiconductor auxiliary output and + V) auxiliary output and 0 V) • Residual voltage: 2.3 V or less • Residual voltage: 1.5 V or less (at source current 60 mA) (at sink current 60 mA) • Leakage current: 2 mA or less • Leakage current: 2 mA or less	—	PNP open collector transistor • Max. source current: 60 mA • Applied voltage: same as supply voltage (between the semiconductor auxiliary output and + V) • Residual voltage: 2.3 V or less (at source current 60 mA) • Leakage current: 2 mA or less
Output operation	Related to auxiliary output of light curtain	—	On when the light curtain is interrupted
Excess voltage category	Ⅲ		
Indicators — Power supply (Ui)	Green LED (lights up when current flowing)		
Indicators — Enabling path [OUT (Note 3)]	Green LED (lights up when enabling contacts are closed)		
Indicators — Interlock (INTERLOCK)	Yellow LED (lights up when enabling contacts are opened)	—	Yellow LED (lights up when enabling contacts are opened)
Indicators — Fault (FAULT)	Yellow LED (blinks when fault occurs)	Orange LED (lights up when two light curtain input polarity select switch settings are different)	Yellow LED (blinks when fault occurs)
External relay monitor function	Incorporated	Incorporated (Note 4)	Incorporated
Trailing edge function	Incorporated		
Polarity selection function	Incorporated (Sliding switch allows selection of plus / minus ground) Plus ground: Correspond to NPN output light curtain Minus ground: Correspond to PNP output light curtain		Incorporated (Cable connection allows selection of plus / minus ground) Plus ground: Correspond to NPN output light curtain Minus ground: Correspond to PNP output light curtain
Pollution level	2		
Environmental resistance — Protection	Enclosure: IP40, Terminal: IP20	IP65	Enclosure: IP40, Terminal: IP20
Environmental resistance — 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		
Environmental resistance — Ambient humidity	30 to 85 %RH, Storage: 30 to 95 %RH	35 to 85 %RH, Storage: 35 to 85 %RH	30 to 85 %RH, Storage: 30 to 95 %RH
Environmental resistance — Vibration resistance	10 to 55 Hz frequency, 0.35 mm 0.014 in amplitude in X, Y, and Z directions for twenty times each	10 to 55 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y, and Z directions for two hours each	10 to 55 Hz frequency, 0.35 mm 0.014 in amplitude in X, Y, and Z directions for twenty times each
Connection terminal	Detachable-type spring gauge terminal	European terminal	Spring gauge terminal
Enclosure material	ABS	Die-cast aluminium	ABS
Net weight	320 g approx.	1 kg approx.	200 g approx.

Notes: 1) If several **SF-C11** or **SF-C13** units are being used in 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.
2) Relay switching lifetime will vary depending on factors such as the type of load, the switching frequency, and ambient conditions.
3) The operation indicator is marked as 'Enabling' on the unit for **SF-C12**.
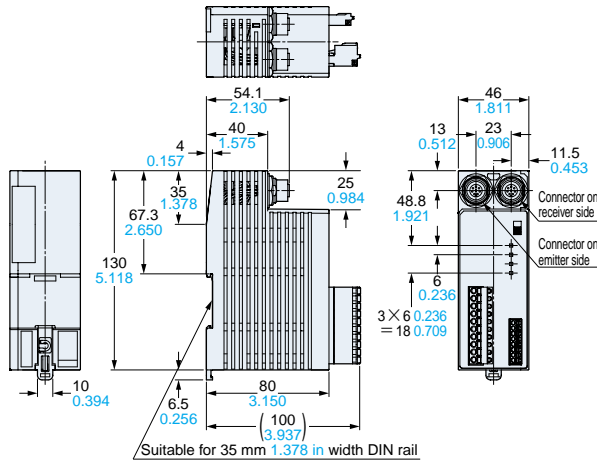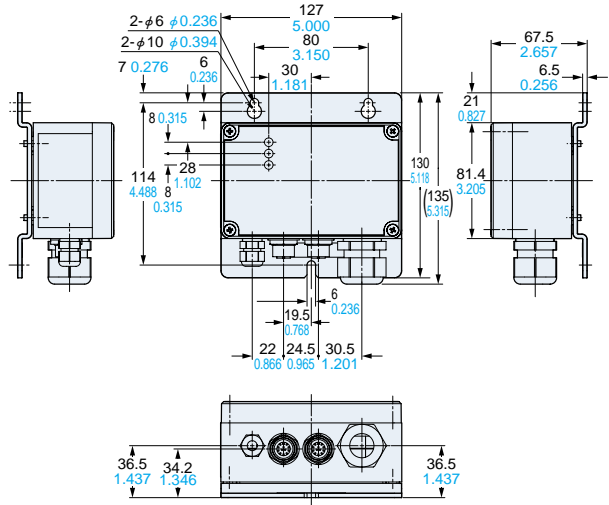4) Terminals for utilizing the functions of the **SF4B** series are available.

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

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

SF-C11   Control unit (Optional)

Suitable for 35 mm 1.378 in width DIN rail

Connector on receiver side
Connector on emitter side

SF-C12   Control unit (Optional)

SF-C13   Control unit (Optional)

Suitable for 35 mm 1.378 in width DIN rail
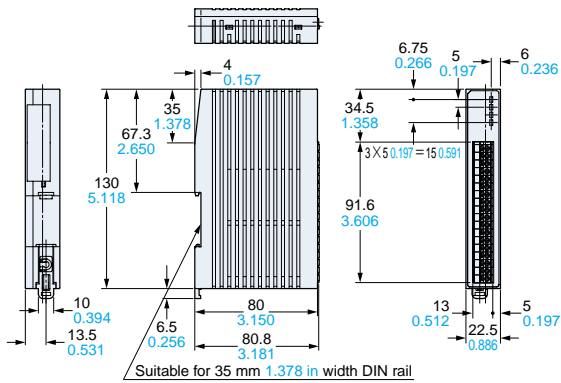
SFB-HC   Handy-controller (Optional)

φ6 φ0.236 cables, 0.5 m 1.640 ft long