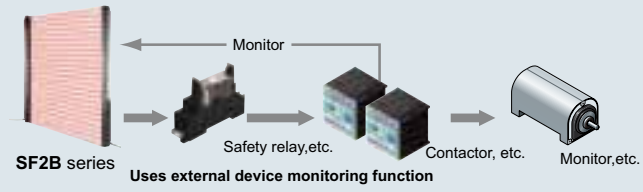
Selectable safety circuits

The light curtain unit has a built-in monitoring function for external devices (such as fused relay monitoring). This supports the construction of light curtain peripheral safety circuits which do not use a safety relay unit, and contributes to reduced costs and a more compact control panel. In addition, a connectable control unit is used, so that a safety circuit that is easy to construct and easy to install can be selected.

Utilizing light curtain functions

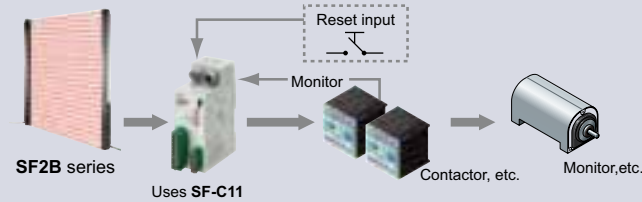
Reduced component costs



Note: Construct a separate reset input circuit.

Utilizing connectable control unit

Less processing



Guide to recommended safety relays and miniature contactors

- Safety relay
  Matsushita Electric Works Ltd.
  SF relay

- Miniature contactor
  Matsushita Electric Works Ltd.
  PC-5 series

Note: Contact the manufacturers for details on the recommended products.

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

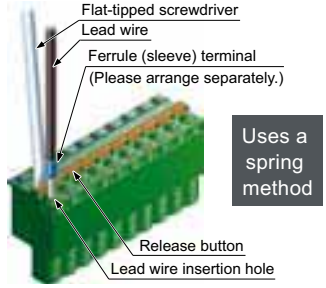
SF-C11

Light curtain peripheral safety circuits that are compatible with international safety standards are combined into a single unit.
This reduces the work involved in constructing the circuits.

● Quick-connection

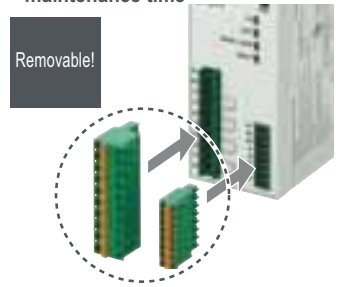
Connecting to the light curtain is done using plug-in connections, which shortens setup and replacement time.

● 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.

● Removable terminal blocks reduce maintenance time

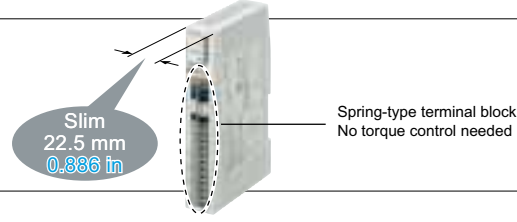


Removable terminal blocks are used. This reduces the work required for reconnecting wiring during maintenance.

Slim type control unit SF-C13

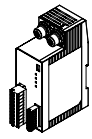
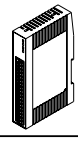
Slim design

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



OPTIONS

Exclusive control units

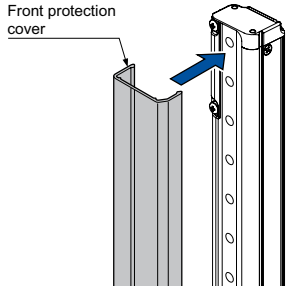
Designation	Appearance	Model No.	Applicable cable	Description
Connector connection type control unit		**SF-C11**	**SF2B-CB□** **SFB-CCJ10□**	Use 8-core cable with connector to connect to the light curtain. Compatible with up to control category 4 (control category 2 when used together with the **SF2B** series).
Slim type control unit		**SF-C13**	**SF2B-CCB□** **SFB-CC□**	Use a discrete wire cable to connect to the light curtain. Compatible with up to control category 4 (control category 2 when used together with the **SF2B** series).

Applicable beam channels / Designation		Front protection cover
Hand	Arm / Foot	Model No.
8	4	**FC-SF2BH-8**
12	6	**FC-SF2BH-12**
16	8	**FC-SF2BH-16**
20	10	**FC-SF2BH-20**
24	12	**FC-SF2BH-24**
28	14	**FC-SF2BH-28**
32	16	**FC-SF2BH-32**
36	18	**FC-SF2BH-36**
40	20	**FC-SF2BH-40**
48	24	**FC-SF2BH-48**
56	28	**FC-SF2BH-56**
64	32	**FC-SF2BH-64**
72	36	**FC-SF2BH-72**
80	40	**FC-SF2BH-80**
88	44	**FC-SF2BH-88**
96	48	**FC-SF2BH-96**

Note: 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.

Front protection cover

- **FC-SF2BH-□**
  This protects the sensing surfaces of the light curtain from flying objects such as welding spatter, oil and water.
  The operating range reduces when the front protection cover is used.



Sensing range

	Sensing range	
		When using the **SF2B-CB05-B**
Only emitter installed	0.2 to 11.5 m 0.656 to 37.730 ft	0.2 to 4.5 m 0.656 to 14.764 ft
Only receiver installed	0.2 to 11.5 m 0.656 to 37.730 ft	0.2 to 4.5 m 0.656 to 14.764 ft
Both emitter and receiver installed	0.2 to 10.0 m 0.656 to 32.808 ft	0.2 to 4.0 m 0.656 to 13.123 ft

Note: The 'operating range' is the possible setting distance between the emitter and the receiver. The sensor can detect less than 0.2 m 0.656 ft away.

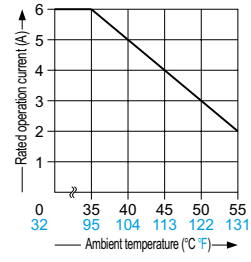
SPECIFICATIONS

Exclusive control unit

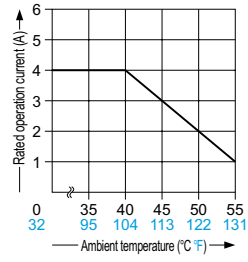
Item \ Model No.		SF-C11	SF-C13
Connectable light curtains		**SF4B** / **SF2B** series	Light curtain manufactured by SUNX
Applicable standard		IEC 61496-1, UL 61496-1, JIS B 9704-1	
Control category		ISO 13849-1 (EN 954-1, JIS B 9705-1) compliance up to Category 4 standards	
Supply voltage		24 V DC ±10 % 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 × 3 (13-14, 23-24, 33-34)
	Utillization 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 inductive load, during contact protection) Minute current: 10 mA or more (at 24 V DC)(Note 2)	30 V DC / 4 A, 230 V AC / 4 A, resistive load (For inductive load, during contact protection) Minute current: 10 mA or more (at 24 V DC)(Note 2)
	Contact material / contacts	AgSnO, self cleaning, positively driven	AgSnO, self cleaning, positively driven
	Contact resistance	100 mW or less (initial value)	
	Contact protection fuse rated	6 A (slow blow)	4 A (slow blow)
	Mechanical lifetime	10 million operations or more (switching frequency 180 operations/min.)(Note 3)	
	Electrical lifetime	100,000 operations or more (switching frequency 20 operations/min., 230 V AC / 3 A resistive load)(Note 3)	
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) × 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)	
	Contact protection fuse rated	2 A (slow blow)	
Semiconductor auxiliary output (AUX)		<Minus ground (Setting for PNP)> 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 <Plus ground (Setting for NPN)> NPN open-collector transistor • Max. sink current: 60 mA • Applied voltage: same as supply voltage (between the semiconductor auxiliary output and 0 V • Residual voltage: 1.5 V or less (at sink current 60 mA) • 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		3	
Indicators	Power supply (Ui)	Green LED (lights up when current flowing)	
	Enabling path (OUT)	Green LED (lights up when enabling contacts are closed)	
	Interlock (INTERLOCK)	Yellow LED (lights up when enabling contacts are opened)	
	Fault (FAULT)	Yellow LED (blinks when fault occurs)	
External relay monitor function		Incorporated	
Trailing edge function		Incorporated	
Polarity selection function		Incorporated (Sliding switch allows selection of plus / minus ground) Minus ground: Correspond to PNP output light curtain Plus ground: Correspond to NPN output light curtain	Incorporated (Cable connection allows selection of plus / minus ground) Minus ground: Correspond to PNP output light curtain Plus ground: Correspond to NPN output light curtain
Pollution degree		2	
Environmental resistance	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	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	Spring gauge terminal
Enclosure material		ABS	
Net weight		320 g approx.	200 g approx.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were ambient temperature + 20 °C + 68 °F.
2) 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.
3) Relay switching lifetime will vary depending on factors such as the type of load, the switching frequency, and ambient conditions.
4) The slide switch can be move to the PNP side for negative grounding and to the NPN side for positive grounding.

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



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



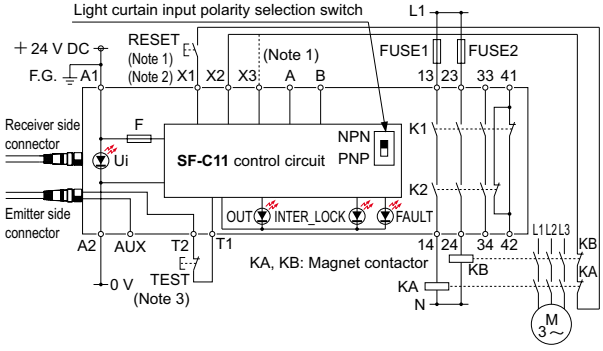
I/O CIRCUIT AND WIRING DIAGRAMS

SF-C11

SF2B series Wiring diagram (Control category 2)

NPN output type

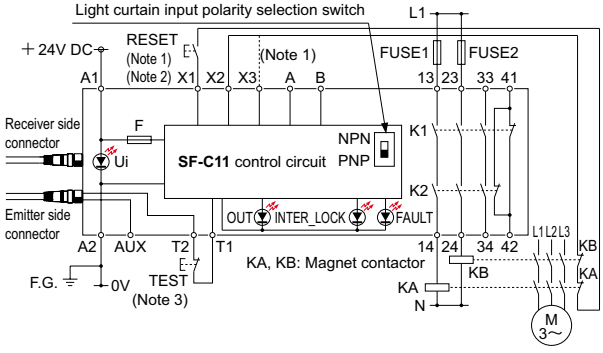
• Set the light curtain input polarity select switch to the NPN side and ground the ＋ side.



Notes: 1) The above diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a RESET switch is not needed.
2) Use a momentary-type switch as the reset button.
3) Emission halt occurs when the test button is open, and emission occurs when the test button is short-circuited. If not using the test button, short-circuit T1 and T2. However, use a test rod or similar to interrupt the light in order to carry out self-diagnosis separately.

NPN output type

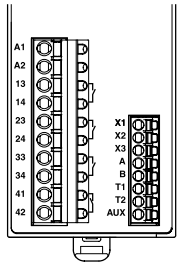
• Set the light curtain input polarity select switch to the PNP side and ground the 0 V line.



Notes: 1) The above diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a RESET switch is not needed.
2) Use a momentary-type switch as the reset button.
3) Emission halt occurs when the test button is open, and emission occurs when the test button is short-circuited. If not using the test button, short-circuit T1 and T2. However, use a test rod or similar to interrupt the light in order to carry out self-diagnosis separately.

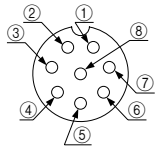
Be sure to use the following connection cables when connecting **SF-C11** to **SF2B** series.
SF2B-CB05 (cable length: 0.5 m 1.640 ft)
SF2B-CB5 (cable length: 5 m 16.404 ft)
SF2B-CB10 (cable length: 10 m 32.808 ft)
SFB-CCJ10E (for emitter • cable length: 10 m 32.808 ft)
SFB-CCJ10D (for receiver • cable length: 10 m 32.808 ft)

Terminal arrangement diagram



Terminal	Function
A1	＋24 V DC
A2	0 V
13-14, 23-24, 33-34	Enabling path (NO contact × 3)
41-42	Auxiliary output (NC contact × 1)
X1	Reset output terminal
X2	Reset input terminal (Manual)
X3	Reset input terminal (Automatic)
A	Not used
B	
T1	Test output terminal
T2	Test input terminal
AUX	Semiconductor auxiliary output

Pin layout for light curtain connectors

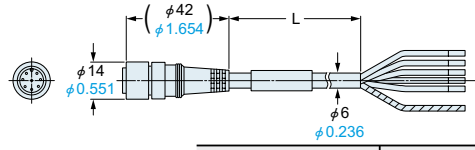


Connector pin No.	Emitter side connector	Receiver side connector
1	Not used	OSSD2
2	＋24 V DC	＋24V DC
3	Emission halt	OSSD1
4	Auxiliary output	EDM (External relay monitor)
5	Synchronization wire＋	Synchronization wire＋
6	Synchronization wire－	Synchronization wire－
7	0 V	0 V
8	Shielded wire	Shielded wire

DIMENSIONS (Unit: mm in)

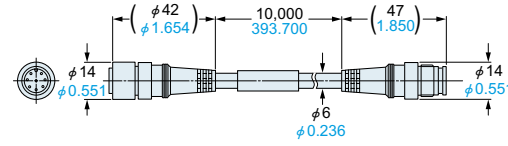
The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/
The CAD data is available in 2-D (dxf) and 3-D (IGES, STEP and Parasolid) formats.

SFB-CC3 SFB-CC10 Extension cable (Optional)

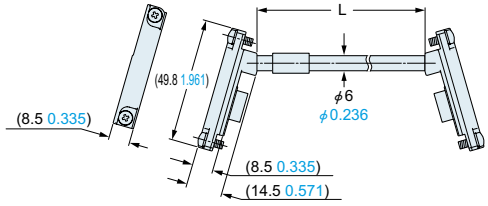


Model No.	L
SFB-CC3	3,000 118.110
SFB-CC10	10,000 393.700

SFB-CCJ10E SFB-CCJ10D Extension cable (Optional)

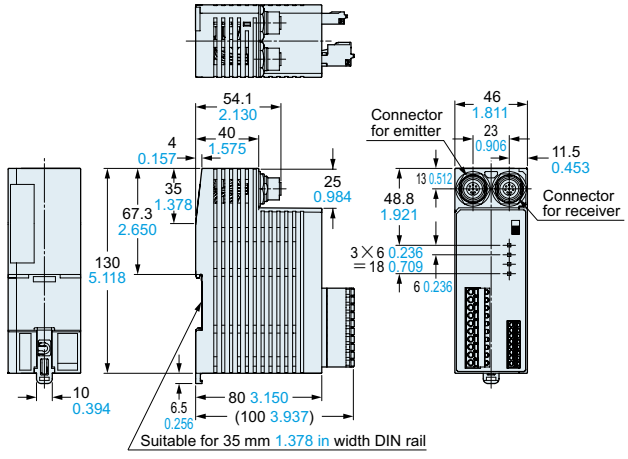


SF2B-CSL01 SF2B-CSL05 Cable for series connection (Optional)

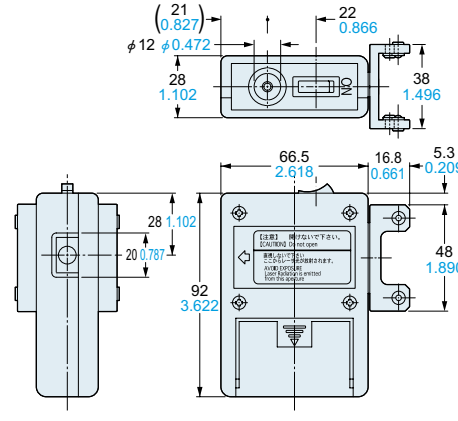


Model No.	L
SF2B-CSL01	100 3.937
SF2B-CSL05	500 19.685

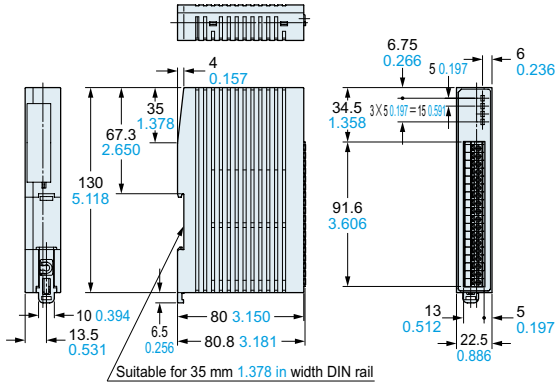
SF-C11 Control unit (Optional)



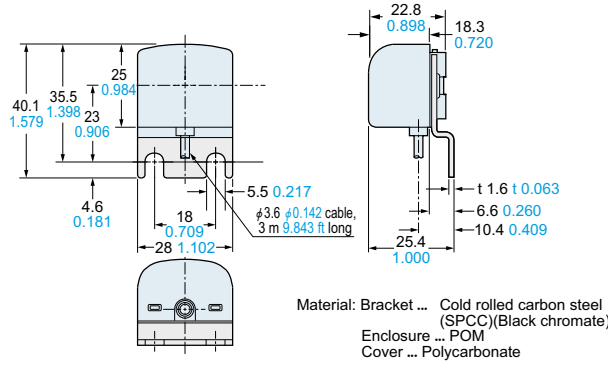
SF-LAT-2B Laser alignment tool (Optional)



SF-C13 Control unit (Optional)



SF-IND-2 Large display unit for light curtain (Optional)



Material: Bracket ... Cold rolled carbon steel (SPCC)(Black chromate)
Enclosure ... POM
Cover ... Polycarbonate