SUNX

INSTRUCTION MANUAL

Sensor Option

Control Unit for **SF4B** Series

SF-C12

Thank you very much for using SUNX products. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

1 OUTLINE

● The **SF-C12** is a control unit for the light curtain **SF4B** series conforming to European / North American safety standards.
This product in combination with the light curtain **SF4B** is conforming to up to the control category 4 specified in EN 954-1 (ISO 13849-1/JIS B 9705).

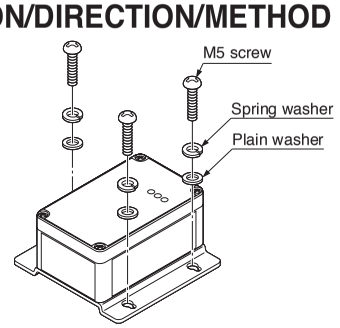
2 SPECIFICATIONS

Item \ Model No.		SF-C12
Connectable input device		**SF4B** series
Applicable standard		IEC 61496-1, UL 61496-1, JIS B 9704-1
Supply voltage		24V DC±10% Ripple P-P 10% or less
Safety output		NO contact×2
	Rated operation voltage / current	30V DC / 3A, Resistance load (the contact protection for inductive load), Min. applied load: 15mA or less (at 24V DC)
	Fuse	3A (slow-blow)
Contact material / contacts		AgNiO+0.2μm Au, Self cleaning, positively driven
Contact resistance (Initial value)		50mΩ or less
Mechanical lifetime		10,000,000 times or more (switching frequency 180 times/min.) (Note)
Electrical lifetime		100,000 times or more (switching frequency 20 times/min. at rated resistive load) (Note)
Auxiliary output		Safety relay contact (NC contact)×1 (interlocked to safety output)
	Rated operation voltage / current	30V DC / 3A, Min. applied load: 15mA or less (at 24V DC)
	Fuse	3A (slow-blow)
Fuse (power supply)		Built-in electronic fuse, Breaking current: 0.5A or more, reset by power supply stop
Current consumption		100mA or less (without light curtain)
Application category		AC-15, DC-13 (IEC 60947-5-1)
Pick-up delay		30ms or less / 30ms or less (Auto reset / Manual reset)
Response time (Drop-out delay)		14ms or less
Excess voltage category		Ⅲ
Indicators	Power	Green LED (Lights up when power is supplied)
	Safety output	Green LED (lights up when the safety output is 'close')
	Operation error	Orange LED (lights up when the setting of the two light curtain input polarity selection switches is different)
Trailing edge switching function		Incorporated
Polarity selection function		Incorporated (selectable either plus or minus grounding, selectable with slide switch) Plus grounding: For NPN input type light curtain Minus grounding: For PNP input type light curtain
Environmental resistance	Protection	IP65
	Ambient temperature	-10 to +55℃ (No dew condensation or icing allowed), Storage: -25 to +70℃
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH
	Vibration resistance	10 to 55Hz frequency, 0.75mm amplitude in X, Y and Z directions for two hours each (in power OFF state)
	Pollution degree	2
Connection terminal		European style terminal
Material		Enclosure: Die-cast aluminum
Weight		2kg approx.

Note: The lifetime of the switch of relay depends on type of the load, frequency of switching or environment etc.

3 INSTALLATION POSITION/DIRECTION/METHOD

● Do not use this product in the state where the protection enclosure is not fitted. Water-proof capability can not be maintained.
● Tighten connectors securely. Otherwise, water-proofness can not be maintained.
● The installation position/direction is not basically limited.
● The tightening torque for mounting the main body should be 2N·m or less. Furthermore, the control unit should be fixed at 3 points, as shown in the right figure.



4 SHORT-CIRCUIT PROTECTION

● The power supply unit of this equipment adopts the electronic fuse which do not require any replacement.
● When the electronic fuse is operated, turn off the power supply, and remove the cause of overcurrent before restarting the power supply for resetting.
● The electronic fuse is not suitable to use in which the equipment is operated continuously or daily. Note that operating the equipment continuously may not be unable to satisfy the specifications.

5 FUNCTIONS

● **Polarity selection function**
・ This is the function to switch either plus grounding or minus grounding with the polarity selection switch. When the polarity selection switch is set to 'PNP' side, minus grounding is selected and the connected light curtain **SF4B** series is set as PNP output type. When the polarity selection switch is set to 'NPN' side, plus grounding is selected and the connected light curtain **SF4B** series is set as NPN output type.
・ Since two light curtain input polarity selection switches are equipped, be sure to set them to the same side.

● **Trailing edge switching function**
・ This function is to accept the input when the reset switch is pressed (contact 'close') and then released (contact 'open') at the manual start setting.
An unexpected start-up due to the welded reset switch can be avoided.

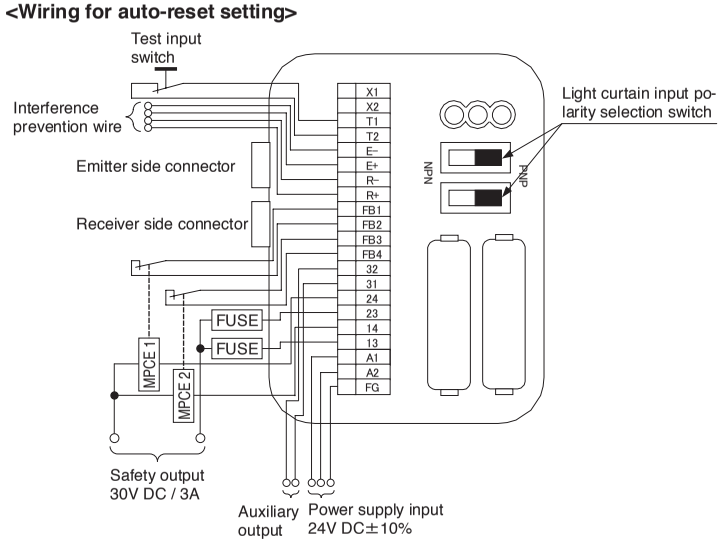
6 CAUTIONS

● Make sure to carry out the wiring in the power supply off condition.
● Take care that wrong wiring will damage the product.
● Verify that the supply voltage variation is within the rating. Take care that if a voltage exceeding the rated range is applied, or if an AC power supply is directly connected, the unit may get burnt or damaged.
● The DC power supply unit must satisfy the conditions given below:
1) Power supply unit authorized in the region where this device is to be used.
2) Power supply unit conforming to EMC Directive and Low-voltage Directive (In case CE conformity is required.)
3) Power supply unit conforming to the Low-voltage Directive and with an output of 100VA or less.
4) The frame ground (F.G.) terminal must be connected to ground when using a commercially available switching regulator.
5) Power supply unit with an output holding time of 20ms or more.
6) Use an isolation transformer for the DC power supply unit.
7) In case a surge is generated, take countermeasures such as connecting a surge absorber to the origin of the surge.
8) Power supply unit corresponding to CLASS 2 (In case C-UL conformity is required.)
<Additional information>
As proved in IEC 60536 (CLASS: Protection against Electric Shook), this power supply should require no ground earth and satisfy the insulation distance called double insulation or reinforced insulation.
(In case the power supply conforms to Low-voltage Directive and has an output of 100VA or less, it can be used as a suitable product.)
● Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
● Avoid dust, dirt, and steam.
● Take care that the product does not come in direct contact with oil, grease, or organic solvents, such as, thinner, etc.
● Note that this equipment is applicable only in the control circuit grounded in accordance with IEC 60204-1 and JIS B 9960-1, or in the control circuit in which the insulation monitor unit (ground fault detection unit) is arranged.
● This unit is suitable for indoor use only.

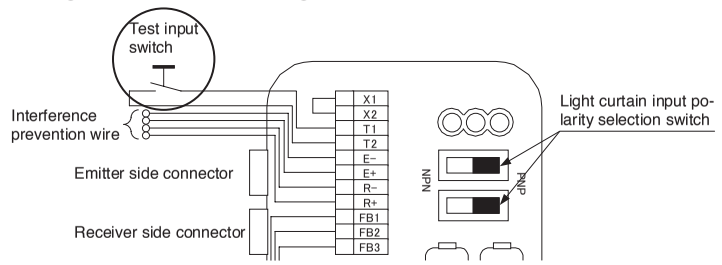
7 I/O CIRCUIT DIAGRAM

When this product is connected to the light curtain, be sure to use the following connection cable.
SFB-CB05-MU (cable length 0.5m)
SFB-CCJ10E-MU (Extension cable for emitter, cable length 10m)
SFB-CCJ10D-MU (Extension cable for receiver, cable length 10m)

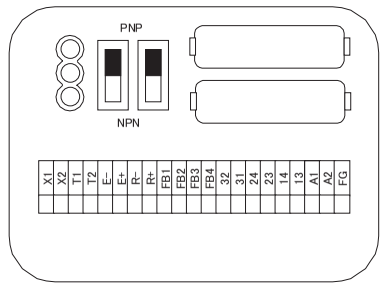
<Wiring for auto-reset setting>



<Wiring for manual reset setting>



● **Terminal arrangement diagram**



Terminal No.	Description
FG	Frame ground terminal
A2	0V
A1	24V DC
13-14, 23-24	Safety output (NO contact × 2)
31-32	Auxiliary output (NC contact × 1)
FB4	External relay monitor terminal 2
FB3	
FB2	External relay monitor terminal 1
FB1	

Terminal No.	Description
R+	Interference prevention wire - (receiver side)
R-	Interference prevention wire + (receiver side)
E+	Interference prevention wire - (emitter side)
E-	Interference prevention wire + (emitter side)
T2	Test input terminal
T1	
X2	Auto reset / Manual reset selection terminal
X1	Manual reset: short-circuit between X1 and X2

● **Connector pin position**

Connector pin No.	Emitter side connector	Receiver side connector
①	Interlock	OSSD 2
②	24V DC	24V DC
③	Emission halt	OSSD 1
④	Auxiliary output	EDM (External relay monitor)
⑤	Synchronization +	Synchronization +
⑥	Synchronization -	Synchronization -
⑦	0V	0V
⑧	Shield	Shield
⑨	Interference prevention wire +	Interference prevention wire +
⑩	Interference prevention wire -	Interference prevention wire -
⑪	Muting lamp output	Muting lamp input 1
⑫	Override input	Muting lamp input 2

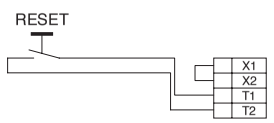
Note: I/O of the terminal No. ⑪ and ⑫ are not used.

<Auto reset>

・ Connect a press button switch (NC type) between T1 and T2. The button switch is used for emitting halt.
・ Do not connect anything between X1 and X2.
・ Avoid auto-reset of the system after emergency stop by using the other control circuit. (IEC/EN 60204-1 part 9.2.5.4.2 and 10.8.3)

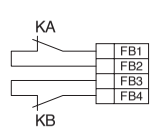
<Manual reset>

・ Connect between X1 to X2. Furthermore, connect a press button switch (NO type) between T1 and T2. The product operates by trailing operation of the reset button.

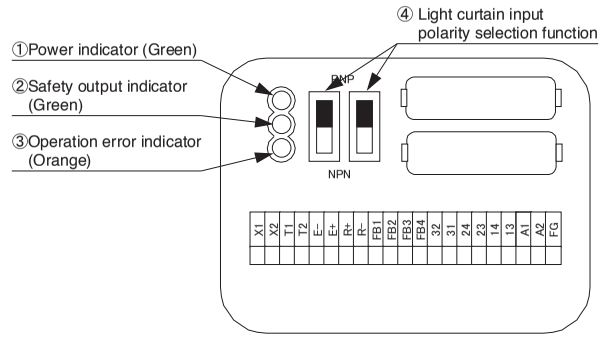


<External device monitor>

・ When connecting the external contactor KA and KB, configure the back-check circuit to monitor welding of the external contactor as shown in the figure below.
If it is not necessary to check the external contactor KA and KB, short-circuit the contactor KA and KB.



8 FUNCTIONAL DESCRIPTION



No.	Description	Function
①	Power indicator (Green)	Lights up when the power is supplied.
②	Safety output indicator (Green)	Lights up when the safety output is 'close'.
③	Operation error indicator (Orange)	Lights up when the setting of the two light curtain input polarity selection switches is different.
④	Light curtain input polarity selection switch	To select either PNP or NPN output of light curtain **SF4B** series and plus or minus grounding .

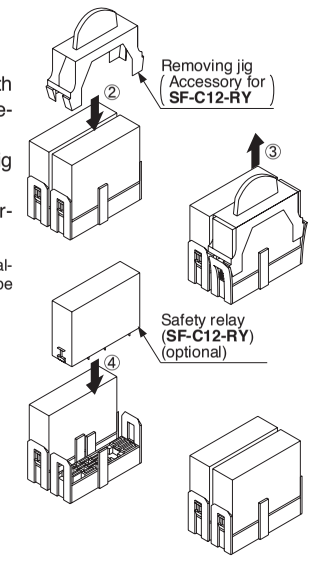
9 MAINTENANCE

● In case the relay in this product is broken, the safety relay for replacement (**SF-C12-RY**) is available.
● Be sure to replace the two relays at the same time.
● For replacing the safety relays, follow the procedure described below.

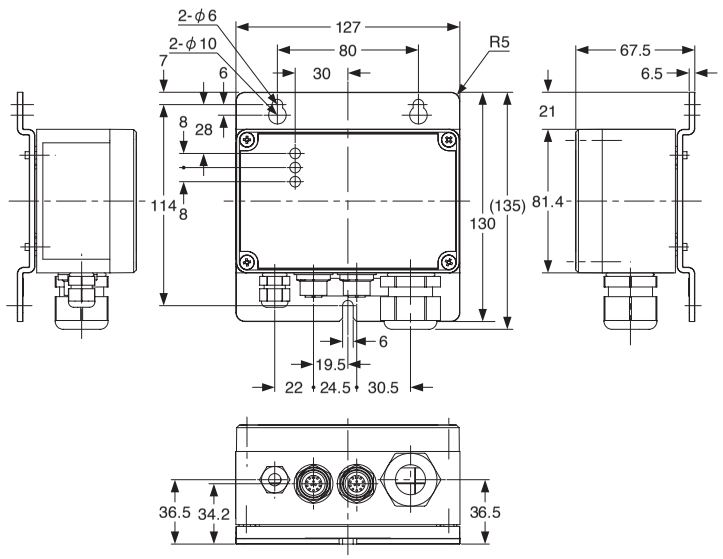
Procedure

① Remove the cover of the main body.
② Fit the removing jig, which is enclosed with the safety relay (**SF-C12-RY**), into the safety relay connected to the main body.
③ Holding the safety relay in the state the jig has been fit, pull out it upwards.
④ Insert the safety relay for replacement perpendicularly. (Note)

Note: Inserting the safety relay slantwise may cause malfunction so that the pins of the relay bend. Thus, be sure to fit the safety relay perpendicularly.



10 DIMENSIONS (Unit: mm)



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PRINTED IN JAPAN