Panasonic **INSTRUCTION MANUAL**

Control Unit Exclusive for Light Curtain
SF-AC

ME-SFAC No.0063-81V

Thank you very much for purchasing Panasonic 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.
English and Japanese are original instructions.

1 OUTLINE

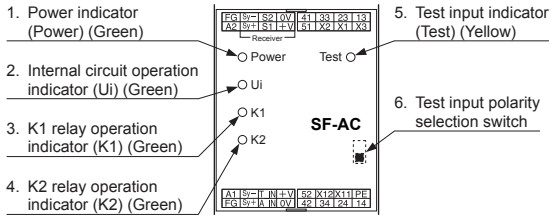
- This product is a control unit exclusive for the light curtain conforming to European / North American safety standards and Japanese safety standards for press machines.
- This device complies with the following standards / regulations.

<EU Directives>
EU Machinery Directive 2006/42/EC
EMC Directive 2014/30/EU
RoHS Directive 2011/65/EU
<European Standards>
EN 60947-5-1, EN ISO 13849-1 (Category 4, PLe)
EN ISO 13849-2
<International Standards>
IEC 60947-5-1, ISO 13849-1 (Category 4, PLe), ISO 13849-2
<Japanese Industrial Standards (JIS)>
JIS B 9705-1 (Category 4)
<Standards in US / Canada)>
ANSI/UL 508, CAN/CSA C22.2 No.14
<Regulations in US>
OSHA 1910.212, OSHA 1910.217(C), ANSI B11.1 to B11.19
ANSI/RIA 15.06

Regarding EU Machinery Directive, a Notified Body, BG, has certified with the type examination certificate.
With regard to the standards in US / Canada, a NRTL, UL (Underwriters Laboratories Inc.) has certified for C-UL US Listing Mark.

<Reference>
The conformity to JIS, OSHA and ANSI for this device has been evaluated by ourselves.

2 FUNCTIONAL DESCRIPTION

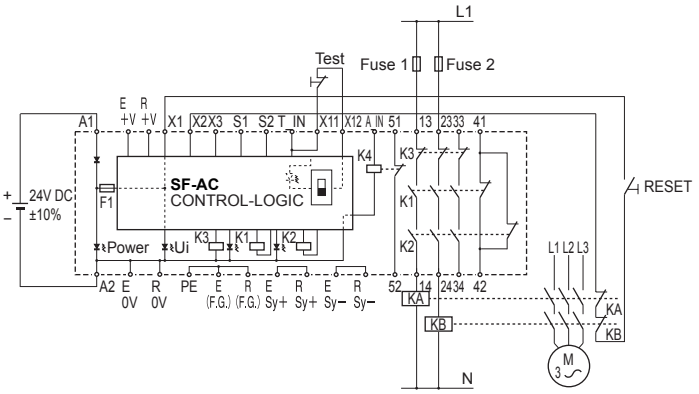


No.	Designation	Description
1	Power indicator (Power) (Green)	Lights up when power is supplied.
2	Internal circuit operation (Ui) (Green)	Lights up when both conditions are present: unit is powered up and electronic fuse is at normal state.
3	K1 relay operation (K1) (Green)	Lights up when enabling contacts are closed.
4	K2 relay operation (K2) (Green)	
5	Test input indicator (Test) (Yellow)	Lights up when X11-X12 is opened.
6	Test input polarity selection switch	Selectable PNP or NPN test input polarity.

3 INSTALLATION POSITION / DIRECTION / METHOD

- Use the 35mm width DIN rail to install the unit.
- The installation position/direction is not basically limited.
- Please fix this product with optional DIN rail stopper **MS-DIN-E** after it installs it in 35mm width DIN rail.
- Tighten the wiring to the wiring terminal block at tightening torque of 0.6N·m.
- Please install and connect ferrule (sleeve) terminal when the lead wire of the connected equipment is a twisted wire. Please do not connect the twisted wire directly with the terminal.
- Always install this product in a control panel having an IP54 or higher protective structure.

4 I/O CIRCUIT DIAGRAM



* E: Emitter, R: Receiver
T_IN: Used to connect the test input wire (or the emission halt input wire) of light curtain.
A_IN: Used to connect the auxiliary output wire (or the alarm output wire) of light curtain.

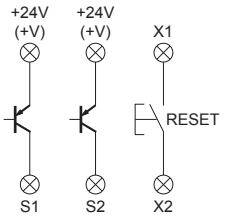
Note: Please wire between X1-X2 when using it by the manual reset as shown in the figure below or please wire between X1-X3 when using it by the auto reset.

⚠ WARNING

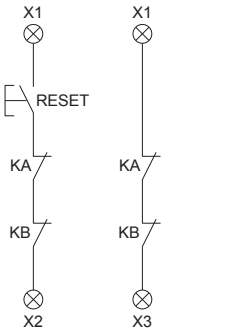
Install a RESET switch in palace where it is possible to see all over the dangerous zone and outside of the zone.

5 CIRCUIT EXAMPLE

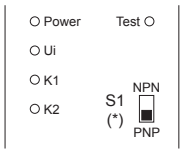
- **Wiring example of input part**
  2-channel input type
  Connection of PNP transistor output
  It is possible to detect the wire disconnection and short-circuit (against ground) by the built-in monitor circuit.
  When the external reset signal is connected.



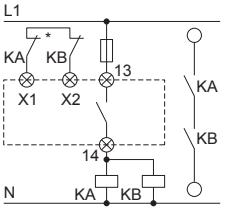
- For auto reset, the external conductor B contact is connected to between the X1-X3 to make up a back-check circuit.
  When the back-check function is not used, the jumper is connected to between the X1-X3.
  When the external reset button (it makes up a back-up check circuit between X1-X2.) is used, the relay unit is operated by the signal trailing operation. When the product is used for auto-start, use the other control circuit to prevent the system (after emergency shutdown) from being reset automatically. (Refer to the "IEC / EN 60204-1)



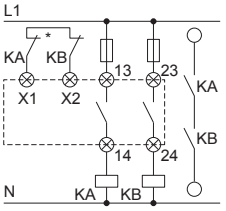
- The test input polarity selection switch S1 (arranged on rear side of upper cover) built in the relay unit is changed depending on the polarity of test input (emission halt input).
  * It has been set to 'PNP' side at time of shipment.
  For **SF2-EH** series, change the slide switch to "NPN" side prior to use.



- **Connection example of output part**
- 1-channel output
  The 1-channel output is suitable for the strengthened type to which a relay is used, or for the contactor to which chamber structure type contact or forced guide type contact is provided.
  * The external reset button is connected in series to the back-check circuit.



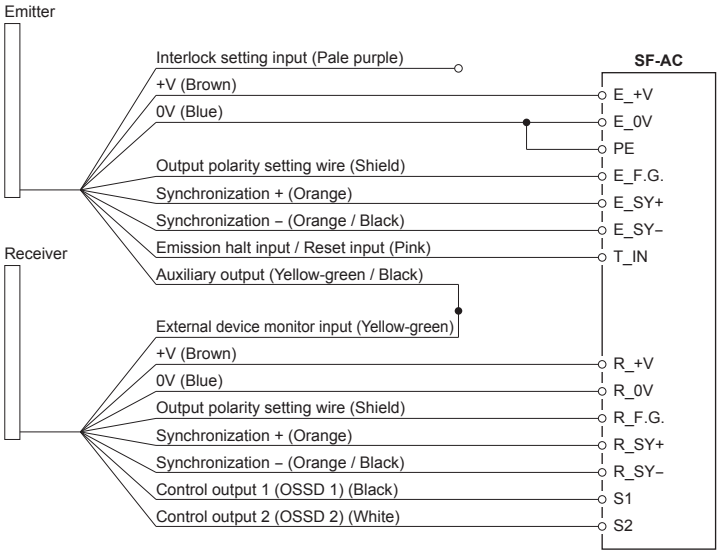
- 2-channel output
  The 2-channel output is suitable for the strengthened type to which a relay is used, or for the contactor to which chamber structure type contact or forced guide type contact is provided.
  * The external reset button is connected in series to the back-check circuit.



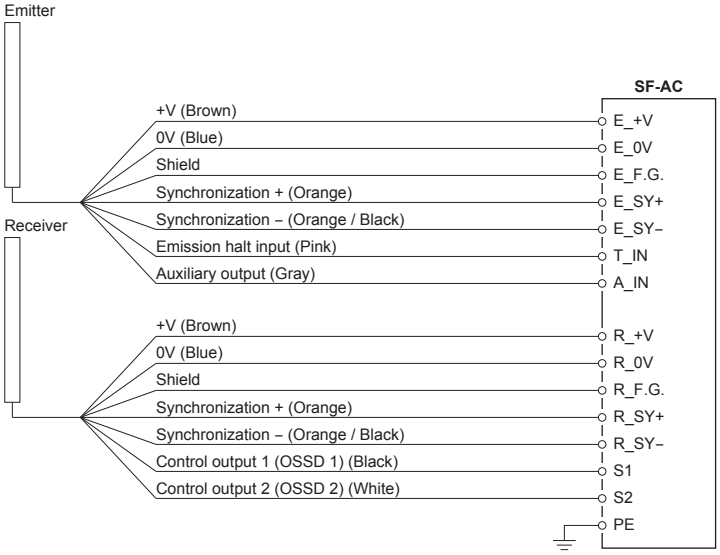
6 EXAMPLE OF CONNECTION CIRCUIT WITH LIGHT CURTAIN

Please wire between X1-X2 when using it by the manual reset as shown in the figure below or please wire between X1-X3 when using it by the auto reset.

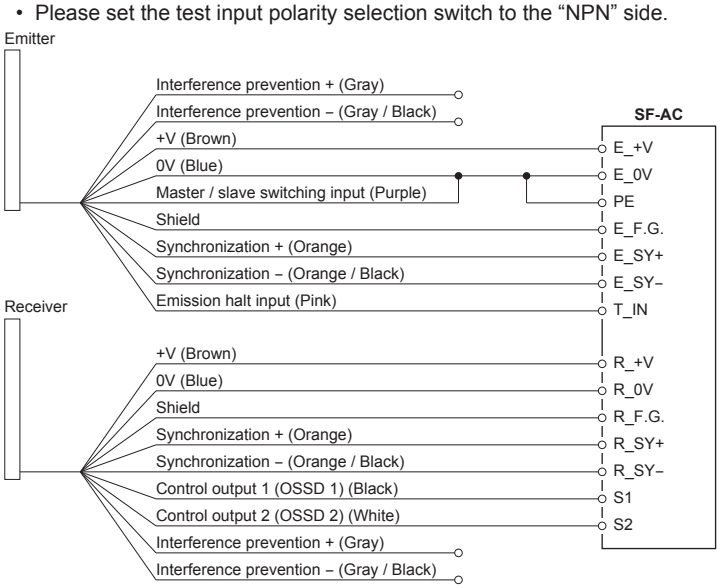
- **SF4B<V2> series**
- Please set the test input polarity selection switch to the “PNP” side.



- **SF4-AH series**
- Please set the test input polarity selection switch to the “PNP” side.



- **SF2-EH series**
- Please set the test input polarity selection switch to the “NPN” side.



7 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 be unable to satisfy the specifications.

8 FUNCTIONS

- **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.

- **Test input polarity selection function**
- The function is used to change the polarity of the test input to PNP or NPN with an internal switch.

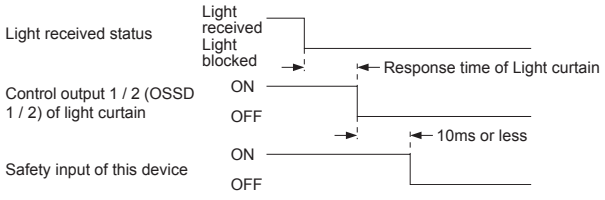
9 MAINTENANCE

- Be sure to do maintenance before use and 6 month periodic maintenance. Refer included instruction manual of light curtain for the inspection items.
- In case replacing this device to new this device, be sure special technician to exchange it. And do daily maintenance and periodic maintenance.

10 SPECIFICATIONS

Item \ Model No.	SF-AC
Connectable input device	Light curtains manufactured by Panasonic Industrial Devices SUNX (PNP output type)
Applicable standard	EN 60947-5-1, EN ISO 13849-1 (Category 4,PLe) EN ISO 13849-2, IEC 60947-5-1, ISO 13849-1 (Category 4, PLe) ISO 13849-2, JIS B 9705-1 (Category 4)
Control category	ISO 13849-1 compliance up to Category 4
Supply voltage	24V DC±10% Ripple P-P 10% or less
Fuse rating	Built-in electronic fuse, Breaking current: 1.1A or more reset by power supply stop
Power consumption	Approx. 1.7W (without light curtain)
Safety output (Note 1)	NO contact × 3
Switching capacity (13-14, 23-24, 33-34)	Max. 6A 30V DC / 6A 230V AC, resistive load
Fuse	6A (slow-blow)
Auxiliary output	NC contact × 1
Switching capacity (41-42)	Max. 1A 24V DC
Fuse	1A (slow-blow)
Alarm output	NC contact × 1 (Non-safety contact, related to input “Alarm in”)
Switching capacity (51-52)	Max. 1A 24V DC, Min. 5mA 24V DC
Fuse	1A (slow-blow)
Application category	AC-15, DC-13(IEC 60947-5-1)
Pick-up delay	40ms or less / 50ms or less (Auto reset / Manual reset)
Drop-out delay	10ms or less
Contact material / contacts	AgSnO, Self cleaning, positively driven
Contact resistance (Initial value)	100mΩ or less
Mechanical lifetime	10,000,000 times or more (switching frequency 180 times/min.) (Note 2)
Electrical lifetime	100,000 times or more (switching frequency 20 times/min. at 230V AC / 3A, resistive load) (Note 2)
Trailing edge function	Incorporated
Test input polarity selection function	Incorporated (Selectable PNP or NPN test input polarity by internal switch)
Overvoltage category	III
B_{10d} (Note 3)	20,000,000 (load: 20%)
Environmental resistance: Protection	Enclosure: IP40, Terminal: IP20 (This product must be installed into a control box having IP54 construction.)
Environmental resistance: Ambient temperature	-10 to +55°C (No dew condensation or icing allowed) Storage: -10 to +55°C
Environmental resistance: Ambient humidity	35 to 85% RH, Storage: 35 to 95% RH
Environmental resistance: Vibration resistance	No malfunction when tested with 10 to 55Hz frequency, 0.35mm amplitude in X, Y and Z directions for twenty times each
Environmental resistance: Pollution degree	2
Connection terminal	Removable European terminal
Material	Enclosure: Polycarbonate
Weight	Approx. 400g

Notes: 1) Timing chart of the safety output is diagram below.



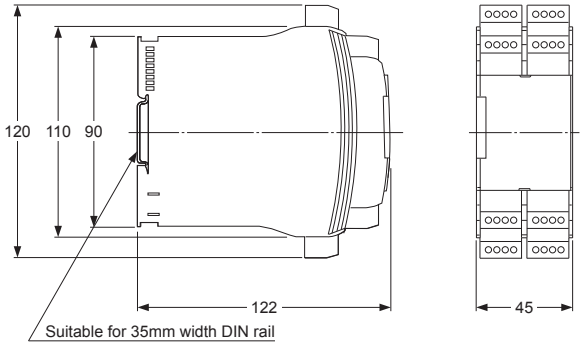
2) The lifetime of the switch of relay depends on type of the load, frequency of switching or environment etc.
3) Mean cycle time that 10% of parts reach dangerous failure.

11 CAUTIONS

- This product has been developed / produced for industrial use only.
- Make sure that the power is OFF while wiring.
- 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 product 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 SELV (safety extra low voltage) / PELV (protected extra low voltage) conforming to EMC Directive and Low-voltage Directive (In case CE Marking 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) In case a surge is generated, take countermeasures such as connecting a surge absorber to the origin of the surge.
  7) Power supply unit corresponding to CLASS 2 (In case UL Listing Mark / C-UL US Listing Mark conformity is required.)
- 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 contact with water, oil, grease, or organic solvents such as thinner, etc.
- The seal as shown in the drawing on the right is stuck to the engagement point of unit. When the seal is peeled off or broken, this equipment will not be certified as a " Safety equipment" and will not be covered by our guarantee.

- 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.
- The control category of this equipment follows the light curtain to be connected.
- This unit is suitable for indoor use only.
- This product is suitable for indoor use only.
- In case of disposal, dispose this product as an industrial waste.

12 DIMENSIONS (Unit: mm)



13 INTENDED PRODUCTS FOR CE MARKING

- The model listed under "10 **SPECIFICATIONS**" comes with CE Marking.
  As for all other models, please contact our office.

CE

14 CE MARKING DECLARATION OF CONFORMITY

EC Declaration of Conformity

Original

K.A. Schmersal GmbH & Co. KG
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42279 WuppertalGermany
Internet: www.schmersal.com

We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.

Name of the component:	Panasonic **SF-AC**	
Description of the component:	Safety-monitoring module	
Relevant Directives:	Machinery Directive EMC-Directive RoHS-Directive	2006/42/EG 2014/30/EU 2011/65/EU
Applied standards:	DIN EN 60947-5-1:2010, DIN EN ISO 13849-1:2016, DIN EN ISO 13849-2:2013	
Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:	TÜV Rheinland Industrie Service GmbHAlboinstr. 56, 12103 Berlin ID n°: 0035	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, April 5, 2018	

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Philip Schmersal
Managing Director

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