

Thank you very much for purchasing Panasonic products. 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.

- This is an abridged instruction manual simply explains mounting, wiring and etc. Kindly refer "our web site (<http://panasonic.net/id/pidsx/global>)" when you need more detail of contents.
- Instruction Manuals in the following languages are published on our Web site. Japanese, English, Chinese, Korean, French, Brazilian Portuguese
- Le manuel d'instructions français est publié sur notre site web.
- O Manual de Instruções em Português Brasileiro está publicado em nosso Web site.

1 SAFETY PRECAUTIONS

- Use this device as per its specifications. Do not modify this device since its functions and capabilities may not be maintained and it may malfunction.
- This device has been developed / produced for industrial use only.
- This device is suitable for indoor use only.
- Use of this device under the following conditions or environments is not presupposed. Please consult us if there is no other choice but to use this device in such an environment.
 - Operating this device under conditions or environments not described in this manual.
 - Using this device in the following fields: nuclear power control, railroad, aircraft, auto mobiles, combustion facilities, medical systems, aerospace development, etc.
- When this device is to be used for enforcing protection of a person from any danger occurring around an operating machine, the user should satisfy the regulations established by national or regional security committees (Occupational Safety and Health Administration: OSHA, the European Standardization Committee, etc.). Contact the relative organization(s) for details.
- In case of installing this device to a particular machine, follow the safety regulations in regard to appropriate usage, mounting (installation), operation and maintenance. The users including the installation operator are responsible for the introduction of this device.
- Note that this device may be damaged if it is subject to a strong shock (if it is dropped onto the floor, for example).
- Use this device by installing suitable protection equipment as a countermeasure for failure, damage, or malfunction of this device.
- Before using this device, check whether the device performs properly with the functions and capabilities as per the design specifications.
- In case of disposal, dispose this device as an industrial waste.

⚠ WARNING

- Machine designer, installer, employer and operator**
 - The machine designer, installer, employer and operator are solely responsible to ensure that all applicable legal requirements relating to the installation and the use in any application are satisfied and all instructions for installation and maintenance contained in the instruction manual are followed.
 - Whether this device functions as intended to and systems including this device comply with safety regulations depends on the appropriateness of the application, installation, maintenance and operation. The machine designer, installer, employer and operator are solely responsible for these items.
- Engineer**
 - The engineer would be a person who is appropriately educated, has widespread knowledge and experience, and can solve various problems which may arise during work, such as a machine designer, or a person in charge of installation or operation etc.
- Operator**
 - The operator should read this instruction manual thoroughly, understand its contents, and perform operations following the procedures described in this manual for the correct operation of this device.
 - In case this device does not perform properly, the operator should report this to the person in charge and stop the machine operation immediately. The machine must not be operated until correct performance of this device has been confirmed.
- Environment**
 - Do not use a mobile phone or a radio phone near this device.
 - If there exists a reflective surface in the place where this device is to be installed, make sure to install this device so that reflected light from the reflective surface does not enter into the receiver, or take countermeasures such as painting, masking, roughening, or changing the material of the reflective surface, etc. Failure to do so may cause the device not to detect, resulting in death or serious injury.
 - Do not install this device in the following environments.
 - Areas exposed to intense interference (extraneous) light such as high-frequency fluorescent lamp (inverter type), rapid starter fluorescent lamp, stroboscopic lights or direct sunlight.
 - Areas with high humidity where condensation is likely to occur
 - Areas exposed to corrosive or explosive gases
 - Areas exposed to vibration or shock of levels higher than that specified
 - Areas exposed to contact with water
 - Areas exposed to too much steam or dust

- Installation**
 - Always keep the correctly calculated safety distance between this device and the dangerous parts of the machine.
 - Install extra protection structure around the machine so that the operator must pass through the sensing area of this device to reach the dangerous parts of the machine.
 - Install this device such that some part of the operator's body always remains in the sensing area when operator is done with the dangerous parts of the machine.
 - Do not install this device at a location where it can be affected by wall reflection.
 - When installing multiple sets of this device, connect the sets and, if necessary, install some barriers such that mutual interference does not occur. For details, refer to "4 DEVICE PLACEMENT."
 - Do not use this device in a reflective configuration.
 - The corresponding emitter and receiver must have the same serial No. and be correctly oriented.

- Machine in which this device is installed**
 - 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.
 - In Japan and China, Korea, do not use this device as safety equipment for a press machine.
 - Do not install this device with a machine whose operation cannot be stopped immediately in the middle of an operation cycle by an emergency stop equipment.
 - This device starts the performance after 2 seconds from the power ON. Have the control system started to function with this timing.

- Wiring**
 - Be sure to carry out the wiring in the power supply OFF condition.
 - All electrical wiring should conform to the regional electrical regulations and laws. The wiring should be done by engineer(s) having the special electrical knowledge.
 - 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.
 - In case of extending the cable of the emitter or the receiver, each can be extended up to 50m by using the exclusive cable. Extending the cable longer than 50m may cause malfunction, which can result in death or serious injury.
 - Do not control the device only at one control output (OSSD 1 / 2).
 - In order that the output is not turned to ON due to earth fault of the control output (OSSD 1 / 2) wires, be sure to ground to 0V side (PNP output) / +V side (NPN output).
 - When using this device in Korea with S-mark, be sure to ground to 0V side (PNP output).

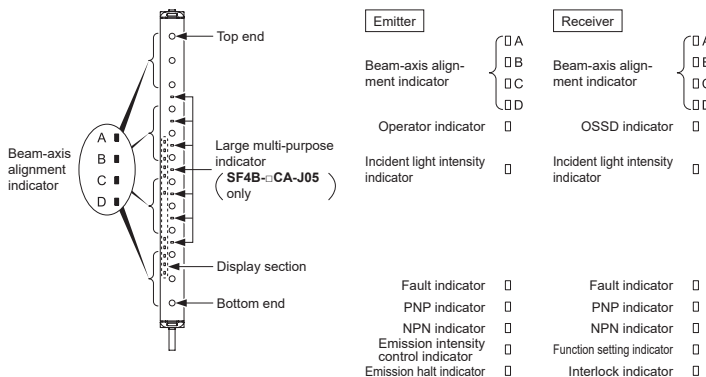
- Maintenance**
 - When replacement parts are required, always use only genuine supplied replacement parts. If substitute parts from another manufacturer are used, the device may not come to detect, result in death or serious injury.
 - The periodical inspection of this device must be performed by an engineer having the special knowledge.
 - After maintenance or adjustment, and before starting operation, test this device following the procedure specified in "5 MAINTENANCE."
 - Clean this device with a clean cloth. Do not use any volatile chemicals.

- Others**
 - Never modify this device. Modification may cause the device not to detect, resulting in death or serious injury.
 - Do not use this device to detect objects flying over the sensing area.
 - Do not use this device to detect transparent objects, translucent objects or objects smaller than the specified minimum sensing objects.

2 CONFIRMATION OF PACKED CONTENTS

- Sensor: Emitter, Receiver 1 pc. each
- Test Rod 1 pc.
- SF4B-H-C, SF4B-H-CA-J05: SF4B-TR25 (ø25 × 220mm)
- Quick Instruction Manual (Japanese, English, Chinese, Korean) 1 pc. each language

3 PART DESCRIPTION OF INDICATORS



Description	Function
Large multi-purpose indicator (Orange) (SF4B-CA-J05 only)	When input for the large multi-purpose indicator is validated: lights up When input for the large multi-purpose indicator is invalidated: OFF
Beam-axis alignment indicator (Red / Green)	A When device top receives light: lights up in red When device top end receives light: blinks in red When control output (OSSD 1 / 2) is ON: lights up in green
	B When device upper middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green
	C When device lower middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green
	D When device bottom receives light: lights up in red When device bottom end receives light: blinks in red When control output (OSSD 1 / 2) is ON: lights up in green
Incident light intensity indicator (Orange / Green)	When stable light is received: lights up in green When unstable light is received: lights up in orange When light is blocked: OFF
Fault indicator (Yellow)	When fault occurs in the device: lights up or blinks
PNP indicator (Orange)	When PNP output is set: lights up
NPN indicator (Orange)	When NPN output is set: lights up

Description	Function
Operator indicator (Red / Green)	Both end beam channels are received: blinks in red All beam channels are received: lights up in green When control output (OSSD 1 / 2) is OFF: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green
Emission intensity control indicator (Orange)	When emission intensity is controlled: lights up
Emission halt indicator (Orange)	When light emission is halt: lights up, When light is emitted: OFF

Description	Function
OSSD indicator (Red / Green)	Both end beam channels are received: blinks in red All beam channels are received: lights up in green When control output (OSSD 1 / 2) is OFF: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green
Function setting indicator (Orange)	When connecting the handy controller: blinks When blanking function is used: lights up
Interlock indicator (Yellow)	When device is interlocked: lights up, Other cases: OFF

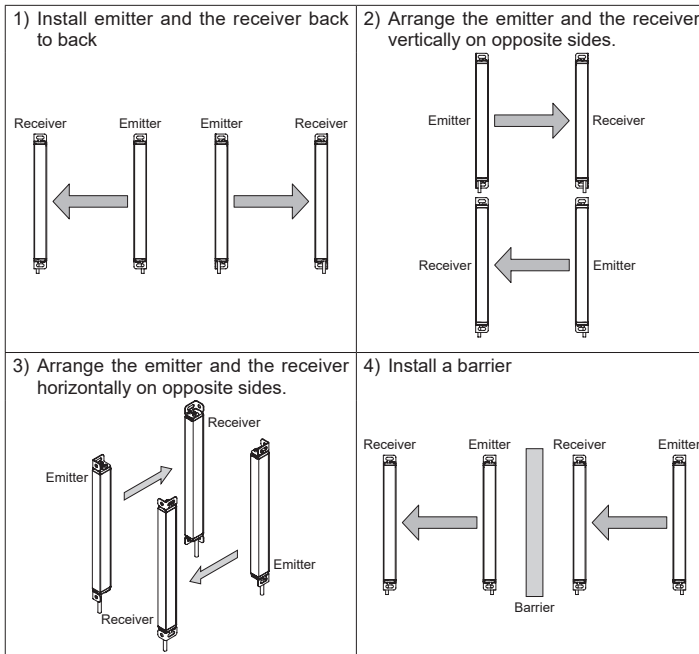
4 DEVICE PLACEMENT

- This is the configuration when two or more sets of emitter and receiver facing each other are placed. It is used for the case that there is a problem in wiring or for system evaluation in case of addition of equipment. It is used for system evaluation in case of addition of equipment.

⚠ WARNING

- Refer to the examples of device placement given below and understand them thoroughly before installing the devices. Improper sensor placement could cause device malfunction, which can result in death or serious injury.
- If this device is used in multiple sets, arrange them to avoid mutual interference. If mutual interference occurs, it can result in death or serious injury.

<Example of device placement>

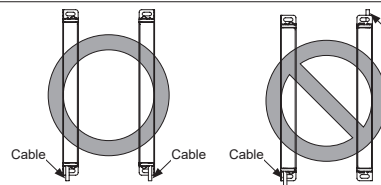


<Reference>

The above figures are just examples of device placement. If there are any questions or problems, please contact our office.

⚠ WARNING

Position the emitter and receiver so that their cables are aligned. Failure to do so will cause the system to malfunction.



5 MOUNTING

⚠ CAUTION

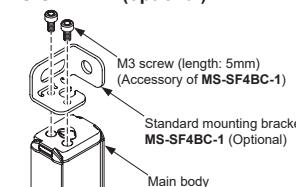
The minimum bending radius of the cable is R5mm. Mount the device considering the cable bending radius.

<Reference>

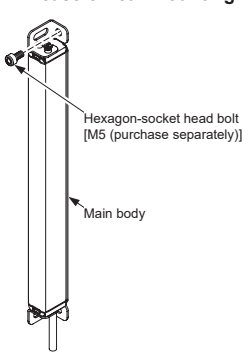
Mount the emitter and the receiver at the same level and parallel to each other. The effective aperture angle of this device is ±2.5° or less for a sensing distance of 3m or more.

<In case of using standard mounting bracket MS-SF4BC-1 (optional)>

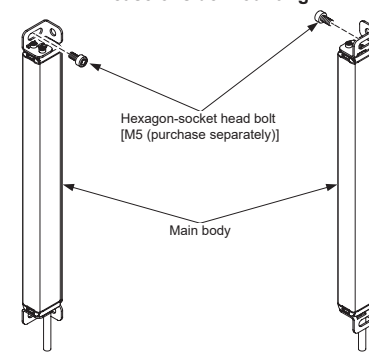
- Secure the bracket with two M3 screws (length: 5mm). The tightening torque should be 0.5N·m.
- Mount the standard mounting bracket on the mounting surface using hexagon-socket head bolts [M5 (purchase separately)].



<In case of rear mounting>



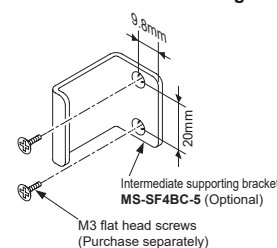
<In case of side mounting>



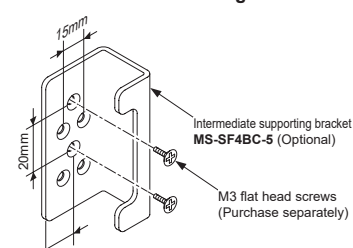
<In case of using intermediate supporting bracket MS-SF4BC-5 (optional)>

- Secure the bracket with two M3 flat head screws (purchase separately). The tightening torque should be 0.5N·m.

<In case of rear mounting>

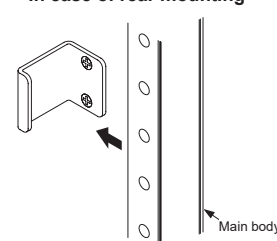


<In case of side mounting>

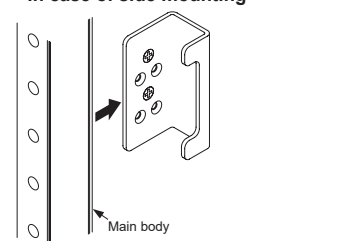


- Insert this device into the intermediate supporting bracket.

<In case of rear mounting>



<In case of side mounting>



Note: SF4B-H-C: 48 beam channels or more, SF4B-A-C: 24 beam channels or more require intermediate supporting bracket MS-SF4BC-5 (optional). Refer "our web site (<http://panasonic.net/id/pidsx/global>)" for mounting position. 40 to 56 beam channels for SF4B-H-C, 20 to 28 beam channels for SF4B-A-C: 1 set 64 to 96 beam channels for SF4B-H-C, 32 to 48 beam channels for SF4B-A-C: 2 sets

6 WIRING

⚠ WARNING

- Earth the machine or the support where the device is mounted on to frame ground (F.G.). Failure to do so could cause the malfunction of the device by noise, resulting in death or serious injury. Furthermore, the wiring should be done in a metal box connected to the frame ground (F.G.).
- Take countermeasure against the system to be applied for this device so as not to carry out the dangerous performance caused by the earth failure. Failure to do so could cause invalid for the system stop, resulting in death or serious injury.
- When the synchronization + wire (orange) and synchronization - wire (orange / black) is extended with a cable other than exclusive cable, use a 0.2mm² or more shielded twisted pair cable.
- In case of using the interlock function, be sure there exists no operator inside of the dangerous area. It causes death or serious injury without the confirmation.
- The reset switch shall be placed in area where all over the dangerous zone shall be comprehend and out side of the dangerous zone.
- Do not use the emission halt function and auxiliary output for the purpose of stopping the machine in which this device is installed. Failure to do so could result in death or serious injury.
- Make sure manually to operate system for starting override function. Furthermore, the system shall be placed in area where all over the dangerous zone shall be comprehend and outside of the dangerous zone.
- Using override function, make sure that there exist no operator in the dangerous zone, which may result in death or serious injury.

⚠ CAUTION

Make sure to insulate the ends of the unused lead wires.

<Reference>

Use a safety relay unit or an equivalent control circuit in safety for FSD.

• Power Supply Unit

⚠ CAUTION

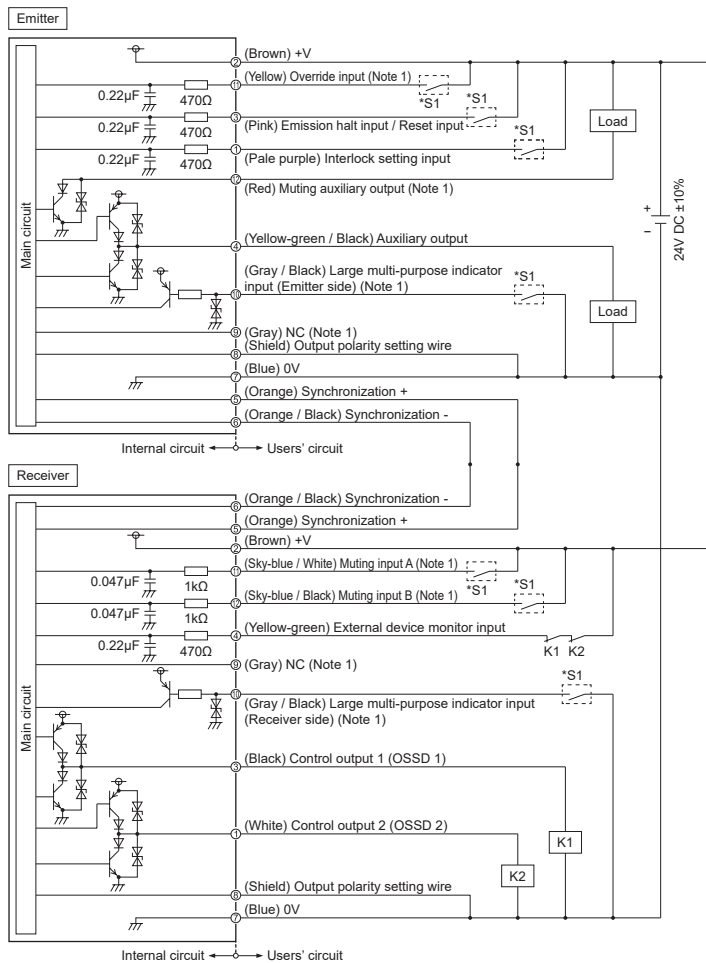
Wire correctly using a power supply unit which conforms to the laws and standards of the region where this device is to be used. If the power supply unit is non-conforming or the wiring is improper, it can cause damage or malfunction of this device.

<Reference>

- A specialist who has the required electrical knowledge should perform the wiring. The power supply unit must satisfy the conditions given below.
- Power supply unit authorized in the region where this device is to be used.
 - Power supply unit SELV (safety extra low voltage) / PELV (protected extra low voltage) conforming to EMC Directive and Low-voltage Directive. (only for requiring CE marking conformation)
 - Power supply unit conforming to the Low-voltage Directive and with an output of 100VA or less.
 - The frame ground (F.G.) terminal must be connected to ground when using a commercially available switching regulator.
 - Power supply unit with an output holding time of 20ms or more.
 - In case a surge is generated, take countermeasures such as connecting a surge absorber to the origin of the surge.
 - Power supply unit corresponding to CLASS 2 (only for requiring cTUVus Mark conformation).

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

• I/O Circuit Diagrams



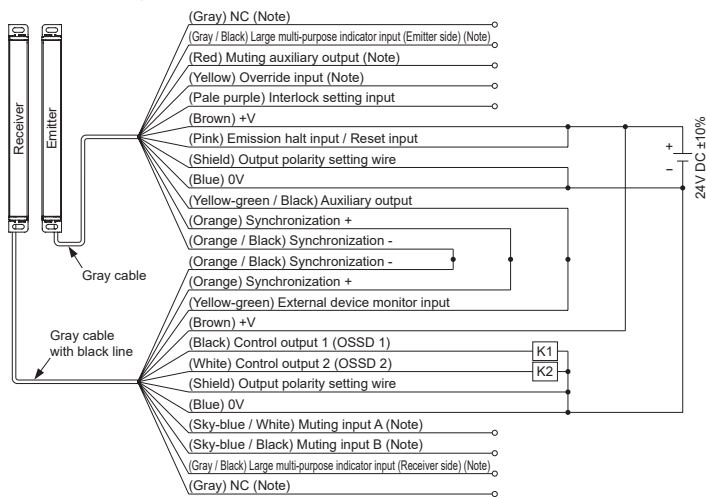
*S1
Switch S1
• Emission halt input / Reset input
For manual reset ... Vs to Vs - 2.5V (sink current 5mA or less) : Emission halt (Note 2), Open: Emission
For auto-reset ... Vs to Vs - 2.5V (sink current 5mA or less) : Emission (Note 2), Open: Emission halt
• Interlock setting input, Override input, Muting input A / B, External device monitor input
Vs to Vs - 2.5V (sink current 5mA or less): Valid (Note 2), Open: Invalid
• Large multi-purpose indicator input
0 to + 1.5V (source current: 5mA or less): Lights up, Open: Turn OFF

Notes: 1) The circuit diagram shown above is for SF4B-C-CA-J05. For SF4B-C, yellow, red, gray, gray / black, sky-blue / white, sky-blue / black, there is no lead wire.
2) Vs is the applying supply voltage.

<Reference>

K1, K2: External device (Forced guided relay or magnetic contactor)

• Basic Wiring

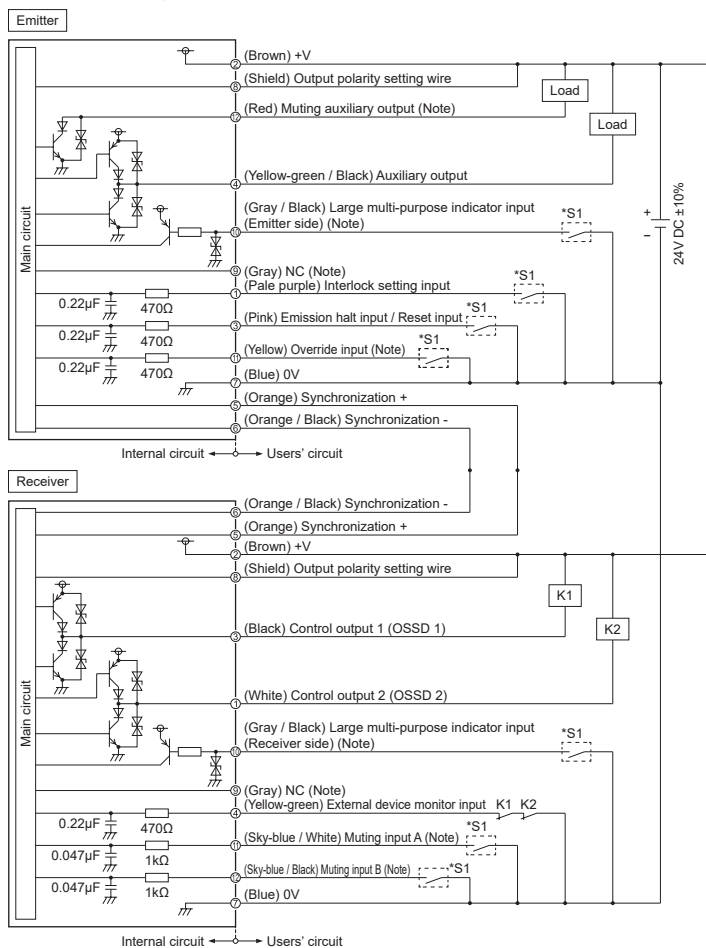


Interlock function	Invalid (Auto-reset)
External device monitor function	Invalid
Auxiliary output	Cannot be used

Note: The circuit diagram shown above is for SF4B-C-CA-J05. For SF4B-C, yellow, red, gray, gray / black, sky-blue / white, sky-blue / black, there is no lead wire.

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

• I/O Circuit Diagrams



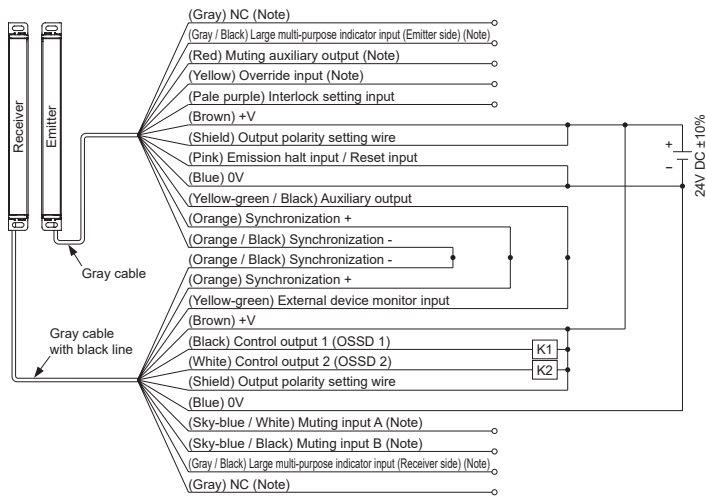
*S1
Switch S1
• Emission halt input / Reset input
For manual reset ... 0 to +1.5V (source current 5mA or less): Emission halt, Open: Emission
For auto-reset ... 0 to +1.5V (source current 5mA or less): Emission, Open: Emission halt
• Interlock setting input, Override input, Muting input A / B, External device monitor input
0 to + 1.5V (source current: 5mA or less): Valid, Open: Invalid
• Large multi-purpose indicator input
0 to + 1.5V (source current: 5mA or less): Lights up, Open: Turn OFF

Note: The circuit diagram shown above is for SF4B-C-CA-J05. For SF4B-C, yellow, red, gray, gray / black, sky-blue / white, sky-blue / black, there is no lead wire.

<Reference>

K1, K2: External device (Forced guided relay or magnetic contactor)

• Basic Wiring



Interlock function	Invalid (Auto-reset)
External device monitor function	Invalid
Auxiliary output	Cannot be used

Note: The circuit diagram shown above is for SF4B-C-CA-J05. For SF4B-C, yellow, red, gray, gray / black, sky-blue / white, sky-blue / black, there is no lead wire.

7 OPERATION OF INDICATORS

• Normal Operation

: Blinks in red, : Lights up in red, : Lights up in orange, : Lights up in green, : Turns OFF

Device status	Indicators (Note)		Control output	
	Emitter	Receiver	OSSD 1	OSSD 2
Light received status (all beams received)	RECEPTION	RECEPTION		ON
	OSSD	OSSD		
	STB	STB		
	FAULT	FAULT		
One or more lights blocked	OSSD	OSSD		OFF
	STB	STB		
	FAULT	FAULT		
	PNP	PNP		
Light blocked status	RECEPTION	RECEPTION		
	OSSD	OSSD		
	STB	STB		
	FAULT	FAULT		
Lights other than the top end blocked	RECEPTION	RECEPTION		
	OSSD	OSSD		
	STB	STB		
	FAULT	FAULT		
Lights other than the bottom end blocked	RECEPTION	RECEPTION		
	OSSD	OSSD		
	STB	STB		
	FAULT	FAULT		

Note: The status of the emitter / receiver indicators during operation above shows the case in PNP output setting mode. In case of NPN output setting mode, the NPN indicator (orange) lights up.

• When an error occurs

: Blinks in yellow, : Lights up in red, : Lights up in orange, : Turns OFF

Device status	Indicators (Note)		Control output	
	Emitter	Receiver	OSSD 1	OSSD 2
Error state	RECEPTION	RECEPTION		OFF
	OSSD	OSSD		
	STB	STB		
	FAULT	FAULT		

Note: The status of the emitter / receiver indicators during operation above shows the case in PNP output setting mode. In case of NPN output setting mode, the NPN indicator (orange) lights up.

8 FUNCTION

• Refer "our web site (<http://panasonic.net/id/pidsx/global>)" for details of functions of this product.

9 MAINTENANCE

<Reference>

When any errors are found, refer to "our web site (<http://panasonic.net/id/pidsx/global>)" and report the symptoms to the maintenance in charge. If the rectification method is not clear, please contact our office. Please make a copy of this checklist, check each inspection item in the respective square, and file the list for record.

• Daily Inspection

WARNING

Be sure to inspect the following items prior to operation and confirm that there is no error. Operating this device without inspection or in an error condition can result in death or serious injury.

Check column	Inspection item
<input type="checkbox"/>	Dangerous parts of the machine cannot be reached without passing through the sensing area of this device.
<input type="checkbox"/>	Some part of operator's body remains in the sensing area when operation is done with dangerous parts of the machine.
<input type="checkbox"/>	The calculated safety distance has been maintained or exceeded during installation.
<input type="checkbox"/>	There is no damage to the safety guard or protective structure.
<input type="checkbox"/>	There is no defect, fold, or damage in the wiring.
<input type="checkbox"/>	The corresponding connectors have been connected securely.
<input type="checkbox"/>	No dirt or scratches exist on the light emitting surface.
<input type="checkbox"/>	The test rod is not deformed or defective.
<input type="checkbox"/>	The operation indicator (green) of the emitter and the OSSD indicator (green) of the receiver light up when no object is present in the sensing area. The control output (OSSD 1 / 2) is in ON status. At this time, the effect of external noise can be inspected. In case external noise affects the operation, remove its cause and reinspect.
<input type="checkbox"/>	It should be possible to detect the test rod (ø25mm for SF4B-H-C or ø45mm for SF4B-A-C) at three positions, directly in front of the emitter, midway between the emitter and the receiver, and directly in front of the receiver when the test rod is moved at a speed of 1,600mm/sec. The OSSD indicator (red) of the receiver and the operation indicator (red) of the emitter continue to light up as long as the test rod is present in the sensing area.
<input type="checkbox"/>	With the machine in the operating condition, the dangerous parts operate normally when no object is present in the sensing area.
<input type="checkbox"/>	With the machine in the operating condition, the dangerous parts stop immediately when the testrod is inserted into the sensing area at any of the three positions, directly in front of the emitter, midway between the emitter and the receiver, and directly in front of the receiver.
<input type="checkbox"/>	The dangerous parts remain stopped as long as the test rod is present in the sensing area.
<input type="checkbox"/>	The dangerous parts stop immediately when the power supply of this device is turned OFF.
<input type="checkbox"/>	The control output (OSSD 1 / 2) must turn OFF when the emission halt input wire (pink) is open (for manual reset: connected to 0V, +V). At this time, the effect of external noise can be inspected. In case external noise affects the operation, remove its cause and reinspect.
<input type="checkbox"/>	Be sure to check the operation of the muting function before its use. Furthermore, check the state of the muting indicator (cleanliness or brightness, etc.)

• Periodic Inspection (Every Six Months)

WARNING

Be sure to inspect the following items every six months and confirm that there is no error. Operating this device without inspection or in an error condition can result in death or serious injury.

Check column	Inspection item
<input type="checkbox"/>	The structure of the machine does not obstruct any safety mechanism for stopping operation.
<input type="checkbox"/>	No modification has been made in the machine controls which obstructs the safety mechanisms.
<input type="checkbox"/>	The output of this device is correctly detected.
<input type="checkbox"/>	The wiring from this device is correct.
<input type="checkbox"/>	The overall response time of the complete machine is equal or less than the calculated value.
<input type="checkbox"/>	The actual number of operation cycle (time) of the limited lifetime parts (relay, etc.) is less than their rated operation cycles (time).
<input type="checkbox"/>	No screws or connectors of this device are loose.
<input type="checkbox"/>	No extraneous light source or reflective object has been added near this device.

• Inspection after Maintenance

1. When any parts of this device are replaced.
2. When some abnormality is felt during operation.
3. When beam-axis alignment of the emitter and receiver is done.
4. When the device installation place or environment is changed.
5. When the wiring method or wiring layout is changed.
6. When FSD (Final Switching Device) parts are replaced.
7. When FSD (Final Switching Device) setting is changed.

10 SPECIFICATIONS

Type	20mm pitch type	40mm pitch type
Model No.	SF4B-H-C	SF4B-A-C
Number of beam channels	12 / 16 / 20 / 24 / 28 / 32 / 36 / 40 / 48 / 56 / 64 / 72 / 80 / 88 / 96	8 / 12 / 16 / 20 / 24 / 28 / 32 / 36 / 40 / 44 / 48
Protective height	263.4 (12 channels) to 1,943.4 (96 channels) mm	343.4 (8 channels) to 1,943.4 (48 channels) mm
Sensing range	0.3 to 7m	
Minimum sensing object	ø25mm opaque object	ø45mm opaque object
Supply voltage	24V DC ±10%	
Control output (OSSD 1 / 2)	Maximum source (PNP) / sink (NPN) current: 200mA, Residual voltage: 2.5V or less Leakage current: 0.1mA or less, Maximum load capacity: 0.22µF, Load wiring resistance: 30 or less	
Response time	When OFF: 14ms or less, When ON: 80 to 90ms	
Auxiliary output setting (AUX)	Maximum source (PNP) / sink (NPN) current: 60mA, Residual voltage: 2.5V or less	
Muting auxiliary output	Maximum sink current: 100mA, Residual voltage: 2.5V or less	
Ambient temperature	-10 to +55°C, Storage: -25 to +60°C	
Ambient humidity	30 to 85%RH, Storage: 30 to 85%RH	

<Reference>

The enclosure of the SF4B-C is made of a clear resin (polycarbonate). Therefore, machining marks or electrolytic corrosion may be found on the internal shield frame. However, they do not affect the performance of the device.

11 CE MARKING DECLARATION OF CONFORMITY

Itemized Essentials of EU Declaration of Conformity

Manufacturer's Name: Panasonic Industrial Devices SUNX Co., Ltd.
Manufacturer's Address: 2431-1, Ushiyama-cho, Kasugai, Aichi 486-0901, Japan
EU Representative's Name: Panasonic Marketing Europe GmbH Panasonic Testing Center
EU Representative's Address: Winsbergring 15, 22525 Hamburg, Germany
Product: Active Opto-electronic Protective Device (Light Curtain)
Model Name: SF4B Series
Trade Name: Panasonic
Application of Council Directive:
 - 2006/42/EC Machinery Directive
 - 2014/30/EU EMC Directive
 - 2011/65/EU RoHS Directive
Harmonized standards:
 - EN 61496-1
 - EN ISO 13849-1
 - EN 55011
 - EN 61000-6-2
 - EN 50581
Type Examination: Certified by TÜV SÜD Product Service GmbH Ridlerstrasse 65 80339 München Germany

Panasonic Corporation

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<https://panasonic.net/id/pidsx/global>
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