

Light Curtain **SF2B** Series
Sub Sensor Exclusive for Series Connection

SF2B-□SL

Instruction Manual



(MEMO)

Thank you for purchasing Panasonic Industrial Devices SUNX's sub sensor exclusive for series connection, **SF2B-□SL**.

Please read this instruction manual carefully and thoroughly for the correct and optimum use of this device.

Kindly keep this manual in a convenient place for quick reference.

Do not use this device independently. Be sure to use it in combination with Light Curtain **SF2B** series.

When using this device, please also confirm the contents of '**Instruction Manual for SF2B Series**'.

This device is a light curtain for protecting a person from dangerous parts of a machine which can cause injury or accident.

This manual has been written for the following personnel who have undergone suitable training and have knowledge of light curtains, as well as, safety systems and standards.

- who are responsible for the introduction of this device
- who design the system using this device
- who install and connect this device
- who manage and operate a plant using this device

Notes



- 1) All the contents of this instruction manual are the copyright of the publishers, and may not be reproduced (even extracts) in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.
- 2) The contents of this instruction manual may be changed without prior notice for further improvement of the device.
- 3) Though we have carefully drawn up the contents of this instruction manual, if there are any aspects that are not clear, or any error that you may notice, please contact our local Panasonic Industrial Devices SUNX office of the nearest distributor.
- 4) English and Japanese versions of this instruction manual are original.

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Chapter 1 Introduction

1-1 Attention Marks

This instruction manual employs the following attention marks  **WARNING**,  **CAUTION** depending on the degree of the danger to call operator's attention to each particular action. Read the following explanation of these marks thoroughly and observe these notices without fail.



If you ignore the advice with this mark, death or serious injury could result.



If you ignore the advice with this mark, injury or material damage could result.

<Reference>

It gives useful information for better use of this device.

1-2 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 environment is not presupposed. Please consult us if there is no other choice but to use this device in such an environment.
 - 1) Operating this device under conditions or environments not described in this manual.
 - 2) Using this device in the following fields: nuclear power control, railroad, aircraft, automobiles, 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.
- 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.



◆ 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.

WARNING

◆ **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.
 - 1) Areas exposed to intense interference (extraneous) light such as direct sunlight
 - 2) Areas with high humidity where condensation is likely to occur
 - 3) Areas exposed to corrosive or explosive gases
 - 4) Areas exposed to vibration or shock of levels higher than that specified
 - 5) Areas exposed to contact with water
 - 6) Areas exposed to too much steam or dust
 - 7) Areas where the light-receiving part of this device is directly exposed to light from high-frequency fluorescent lamp (inverter type) or rapid starter fluorescent lamp.

◆ **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.
- Do not use this device in a reflective configuration.

◆ **Machine in which this device is installed**

- Do not use this device as a 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.
- Do not use this device during the initial transient time (approx. 2 sec.) after the power supply is switched ON.
- 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.

 **WARNING**

◆ **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 set procedure. For details, refer to '**Instruction Manual for SF2B Series**'.
- 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.

1-3 Applicable Standards / Regulations

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 61496-1 (Type 2), EN 55011, EN IEC 63000, EN ISO 13849-1: 2015 (Category 2, PLc)

<International Standards>

IEC 61496-1/2 (Type 2), ISO 13849-1: 2015 (Category 2, PLc), IEC 61508-1 to 7 (SIL1)

<Japanese Industrial Standards (JIS)>

JIS B 9704-1/2 (Type 2), JIS B 9705-1 (Category 2), JIS C 0508 (SIL1)

<Standards in US / Canada>

ANSI/UL 61496-1/2 (Type 2), ANSI/UL 508, UL 1998 (Class 1)

CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8

<Regulations in US>

OSHA 1910.212 (Note), OSHA 1910.217(C) (Note), ANSI B11.1 to B11.19, ANSI/RIA 15.06

Regarding EU Machinery Directive, a Notified Body, TÜV SÜD, has certified with the type examination certificate.


With regard to the standards in US / Canada, a NRTL, UL (Underwriters Laboratories Inc.) has certified for cULus Listing Mark.

Note: In case of using the bottom cap cable (**SF2B-CB05-A**) (optional), this device does not conform to OSHA.

<Reference>

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

The cULus Listing Mark  indicates compliance with both Canadian and US requirements.

This device conforms to the EMC Directive and the Machinery Directive. The  mark on the main body indicates that this device conforms to the EMC Directive.



WARNING

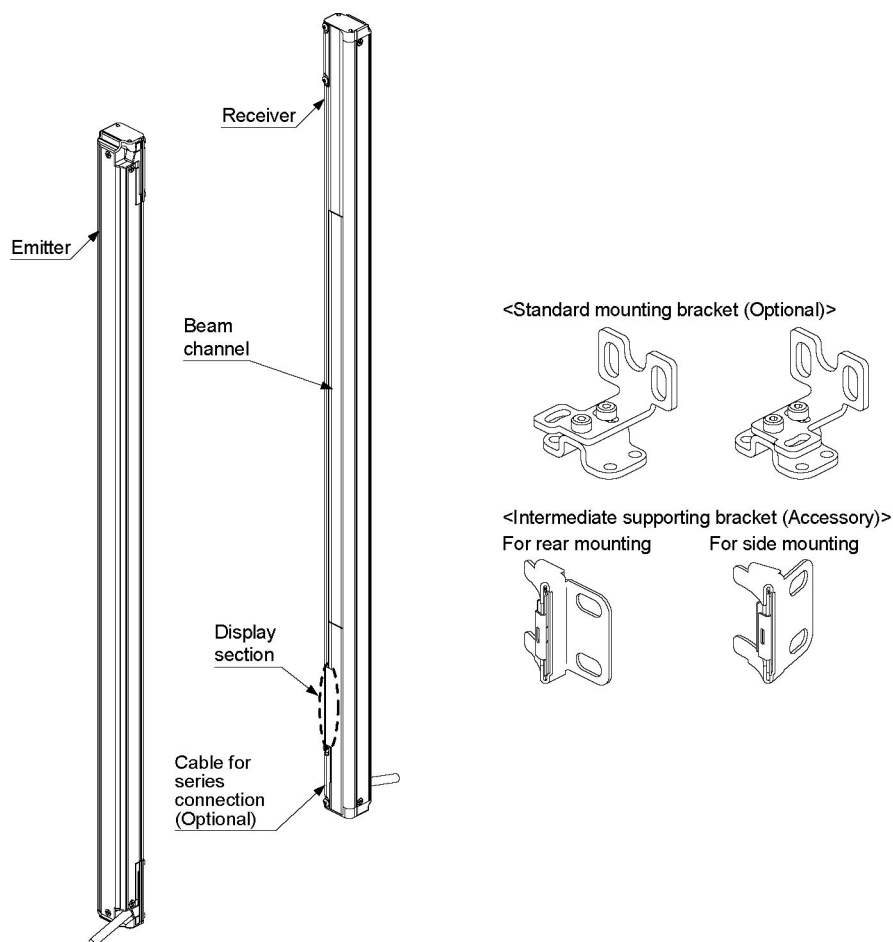
- In Japan, never use this device as a safety equipment for any press machine or shearing machine.
- When this device is used in a place other than the places shown in the table above, be sure to confirm the standards or regulations applicable in each region or country before use.

1-4 Confirmation of Packed Contents

- | | |
|--|-------------|
| <input type="checkbox"/> Sensor: EMITTER, RECEIVER | each 1pc. |
| <input type="checkbox"/> Test Rod | 1 pc. |
| For SF2B-H <input type="checkbox"/> SL : SF2B-TR27 (ø 27 x 220mm) | |
| <input type="checkbox"/> Intermediate Supporting Bracket (MS-SF2B-2) | 0 to 3 sets |
| Note: The intermediate support bracket (MS-SF2B-2) is enclosed with the following devices. The quantity differs depending on the device as shown below: | |
| 1 set : SF2B-H <input type="checkbox"/> SL ...40 to 56 beam channels, SF2B-A <input type="checkbox"/> SL ...20 to 28 beam channels | |
| 2 sets: SF2B-H <input type="checkbox"/> SL ...64 to 80 beam channels, SF2B-A <input type="checkbox"/> SL ...32 to 40 beam channels | |
| 3 sets: SF2B-H <input type="checkbox"/> SL ...88 to 96 beam channels, SF2B-A <input type="checkbox"/> SL ...44 to 48 beam channels | |
| <input type="checkbox"/> Instruction Manual (this manual) | 1 pc. |

Chapter 2 Before Using This Device

2-1 Part Description



<Emitter>

It emits light to the receiver facing it. Furthermore, the status of the emitter and the receiver is indicated on its display section.

<Receiver>

It receives light from the emitter facing it. Simultaneously, it turns ON the control output (OSSD 1 / 2) when the all beam channels receive light from emitter, and it turns OFF the control output (OSSD 1 / 2) when one or more beam channels are blocked light. Besides, the receiver displays its status on the display section.

<Beam channel>

The light emitting elements of the emitter and the light receiving elements of the receiver are placed at the following intervals, 20mm (**SF2B-H□SL**) and 40mm (**SF2B-A□SL**).

<Standard mounting bracket (optional)>

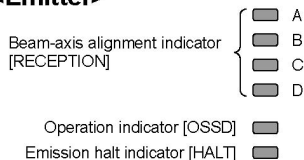
This bracket is to be used for mounting the emitter / receiver. It enables to adjust the horizontal mounting angle using the standard mounting bracket.

<Intermediate supporting bracket (For rear mounting and side mounting)>

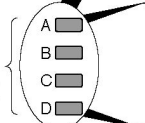
This bracket is to be used for mounting the device. **SF2B-H□SL** is for the device having 40 beam channels or more, **SF2B-A□SL** is for 20 beam channels or more.

<Display section>

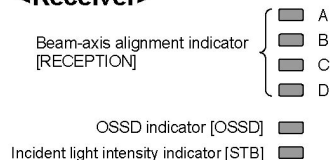
<Emitter>



Beam-axis alignment indicator [RECEPTION]



<Receiver>



Description	Function
Beam-axis alignment indicator (Red / Green) [RECEPTION]	<p>A</p> <p><Wiring synchronization using 8-core cable> 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 <Beam synchronization using 4-core cable> Always OFF</p>
	<p>B</p> <p><Wiring synchronization using 8-core cable> When device upper middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green <Beam synchronization using 4-core cable> Always OFF</p>
	<p>C</p> <p><Wiring synchronization using 8-core cable> When device lower middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green <Beam synchronization using 4-core cable> Always OFF</p>
	<p>D</p> <p><Wiring synchronization using 8-core cable> 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 <Beam synchronization using 4-core cable> Always OFF</p>
Operation indicator (Red / Green) [OSSD] (Note 1)	<p><Wiring synchronization using 8-core cable> When control output (OSSD 1 / 2) is OFF: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green <Beam synchronization using 4-core cable> When an error occurs in emitter: lights up in red When emitter operates normally: lights up in green</p>
Emission halt indicator (Orange) [HALT]	<p>When light emission is halt: lights up When light is emitted: turns OFF</p>

Description	Function
Beam-axis alignment indicator (Red / Green) [RECEPTION]	<p>A</p> <p><Common for 8-core cable and 4-core cable> 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</p>
	<p>B</p> <p><Common for 8-core cable and 4-core cable> When device upper middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green</p>
	<p>C</p> <p><Common for 8-core cable and 4-core cable> When device lower middle receives light: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green</p>
	<p>D</p> <p><Common for 8-core cable and 4-core cable> 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</p>
OSSD indicator (Red / Green) [OSSD]	<p>When control output (OSSD 1 / 2) is OFF: lights up in red When control output (OSSD 1 / 2) is ON: lights up in green</p>
Incident light intensity indicator (Orange / Green) [STB]	<p>When sufficient light is received (incident light: 130% or more) (Note 2): lights up in green When light is stably received (incident light: 115 to 130%) (Note 2): OFF When light is unstably received (incident light: 100 to 115%) (Note 2): lights up in orange When light is blocked: OFF (Note 3)</p>

- Notes: 1) Since the color of the operation indicator changes according to ON / OFF status of the control output (OSSD 1 / 2), the operation indicator is marked as 'OSSD' on the device.
- 2) The threshold where the control output (OSSD 1 / 2) changes from OFF to ON is applied as '100% incident beam intensity'.
- 3) The status 'when light is blocked' refers to the status that the some obstacle is existed in the sensing area.
- 4) The description given in [] is marked on the device.

2-2 Mounting

2-2-1 Mounting of the Mounting Bracket



CAUTION

- For selecting the appropriate mounting bracket matched to the installation environment, the mounting bracket is not incorporated in this device. Please purchase the optional mounting bracket to fit on the mounting environment.
- Do not apply the load such as forced bending to the cable of this device. Applying improper load could cause the wire breakage.
- The minimum bending radius of the cable is R6mm. Mount the device considering the cable bending radius.

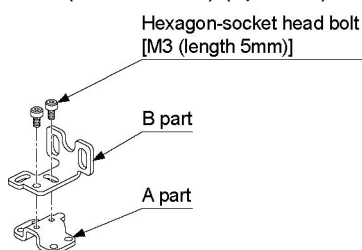
<Reference>

- Mount the emitter and the receiver at the same level and parallel to each other. The effective aperture angle of this device is $\pm 5^\circ$ or less for a sensing distance of 3m or more.
- Unless otherwise specified, the following mounting procedure is common for both emitter and receiver. For the mounting, prepare the mounting holes on the mounting surface by referring to '3-2 Dimensions'.

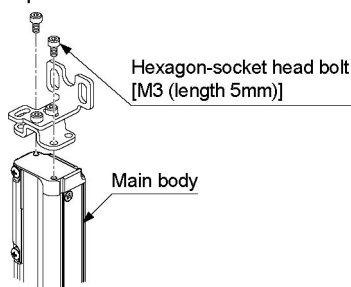
<When the standard mounting bracket (MS-SF2B-1) (optional) is used>

Configuration

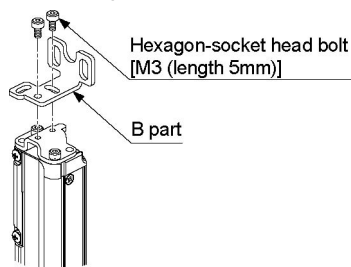
The standard mounting bracket (**MS-SF2B-1**) (optional) configures as follows.



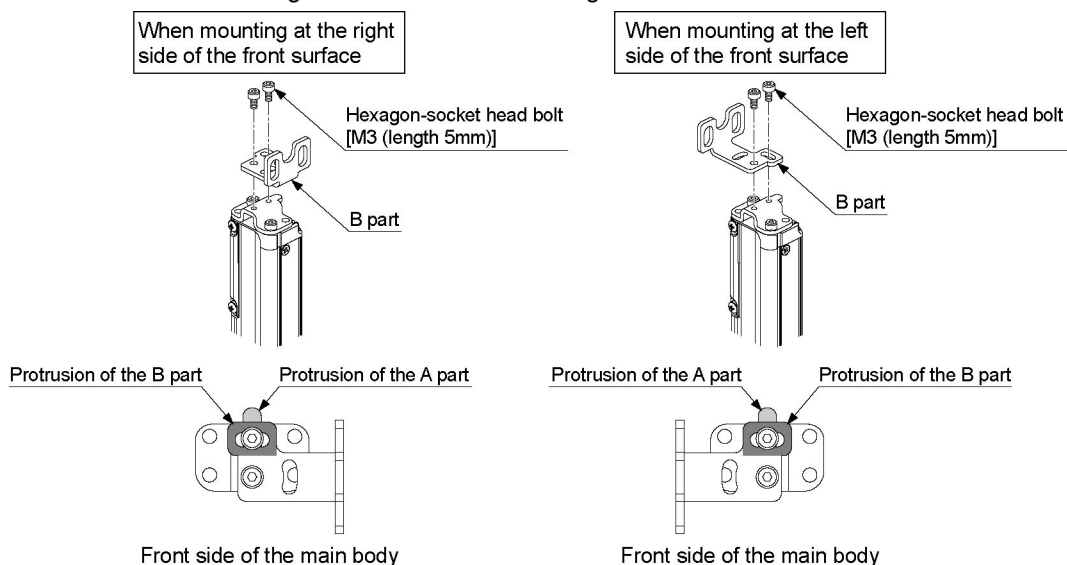
1. Fix the standard mounting bracket with two hexagon-socket head bolts [M3 (length: 5mm)]. The tightening torque should be 0.6N·m or less.



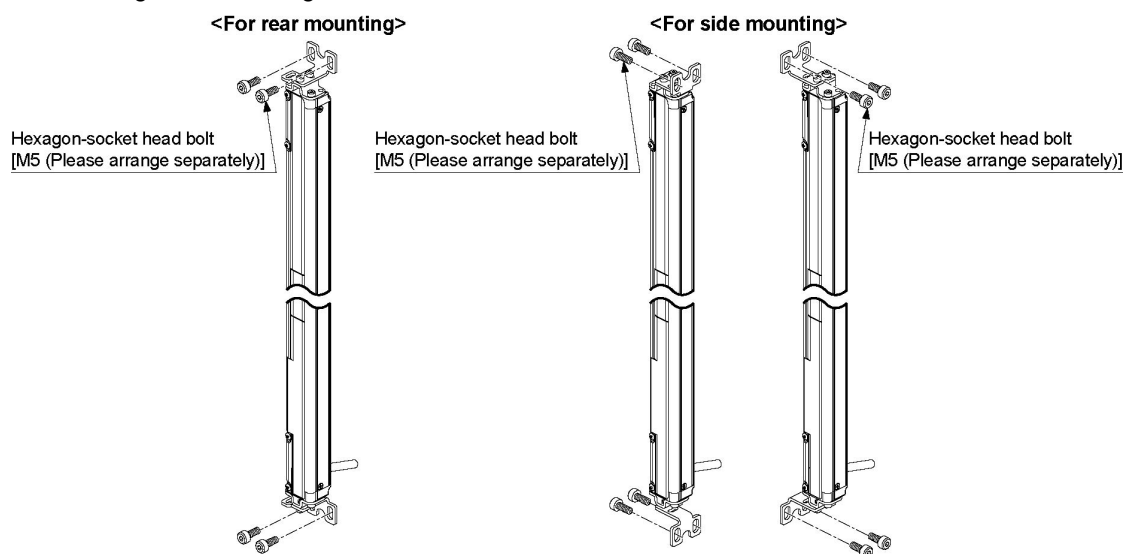
2. For side mounting, remove the B part.



3. Mount the brackets so that the protrusion of the A part and the B part are overlapped.
B part to be attached to the top or bottom side of this device differs depending on the direction of mounting described as the following chart.



4. Mount the mounting bracket on to the mounting surface with two hexagon-socket head bolts [M5 (please arrange separately)] temporarily.
5. Adjust the height of the emitter and the receiver to level with the elongate holes and then tighten the hexagon-socket head bolts.

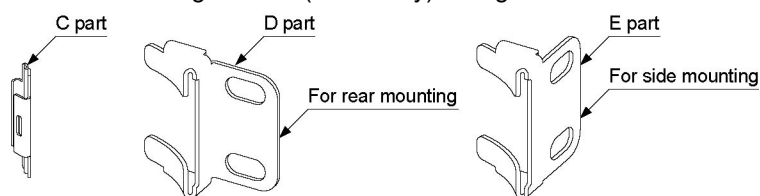


Note: For the models that the intermediate supporting bracket (**MS-SF2B-2**) is enclosed with, be sure to use the intermediate supporting bracket (**MS-SF2B-2**). For details, refer to **<When the intermediate mounting bracket (MS-SF2B-2) (accessory) is used>**.

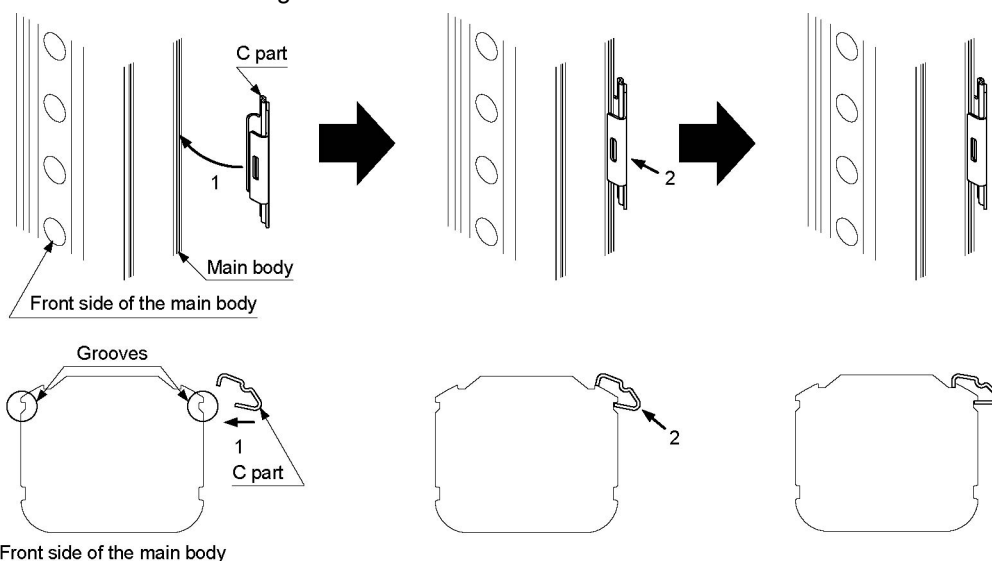
<When the intermediate mounting bracket (MS-SF2B-2) (accessory) is used>

Configuration

The intermediate mounting bracket (accessory) configures as follows.

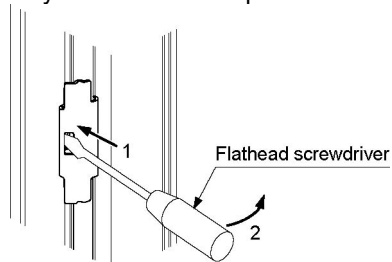


1. Hook the C part into the groove on the side of the body and press it.
Note that the position to fit the C part onto the main body differs from the surface where the intermediate mounting bracket is fit.



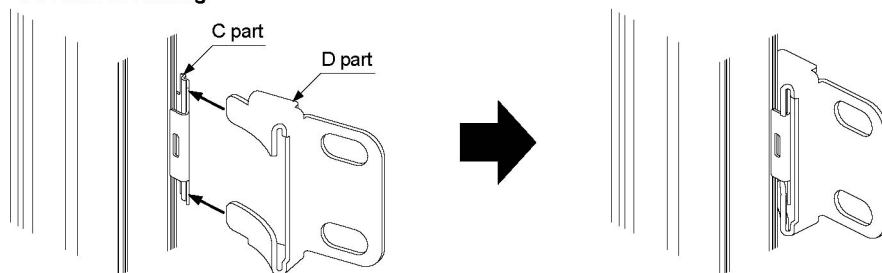
<How to remove the bracket>

Insert a flathead screwdriver into the hole located on the rear side of the C part and tilt it to the rear side of the main body to remove the C part.

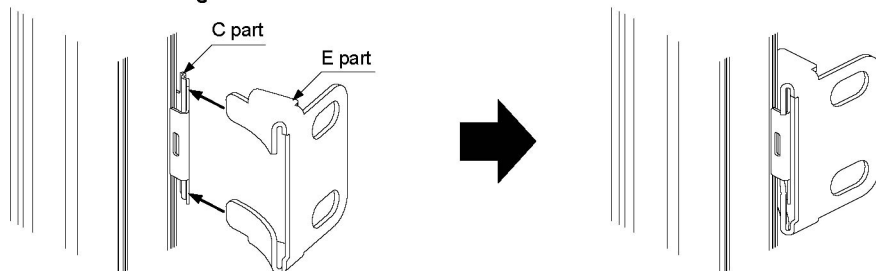


2. Insert the D part or E part into the C part in the step 1 condition.

<For rear mounting>

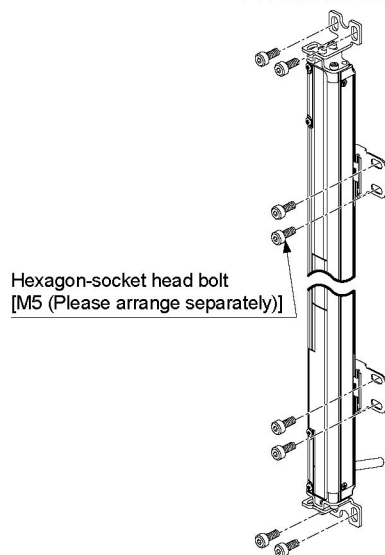


<For side mounting>



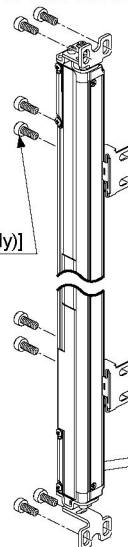
3. Mount the D part or E part on to the mounting surface with the two hexagon-socket head bolts [M5 (please arrange separately)].

<For rear mounting>



Hexagon-socket head bolt
[M5 (Please arrange separately)]

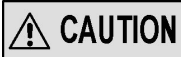
<For side mounting>



Hexagon-socket head bolt
[M5 (Please arrange separately)]

2-2-2 Mounting of the Connector for Series Connection (Optional)

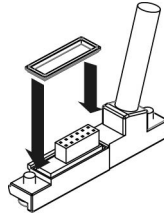
For constructing the series connection, the following procedure is required.



Do not lose any screws during extension / dismantling work.

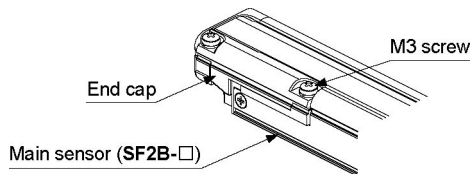
Furthermore, do not mix emitters and receivers to mount in series connection

The packing is attached to the connector of the bottom cap cable. If the packing is not attached correctly, reattach the packing as shown in the figure below, and mount to this device.

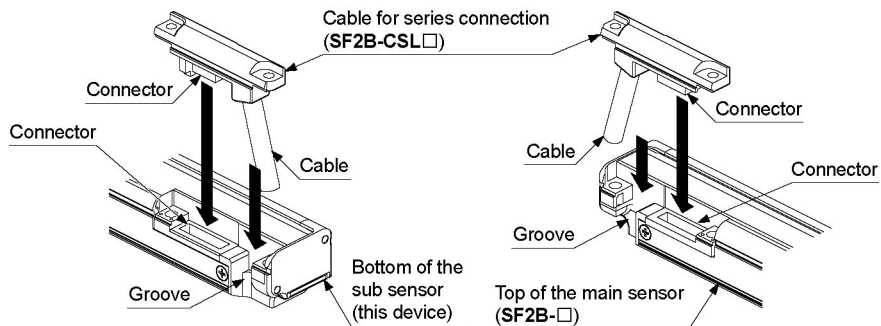


<Constructing method for the series connection>

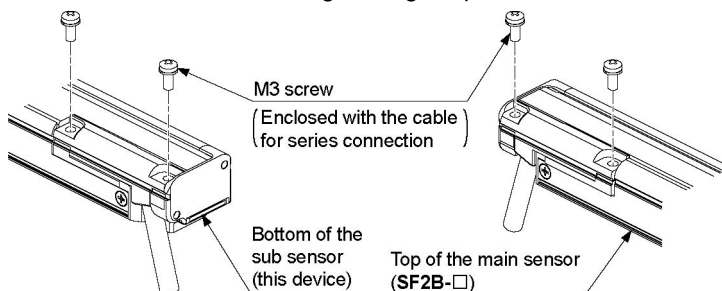
1. Loosen the two M3 screws of the end cap on the main sensor (SF2B-□), and then remove the end cap from the device.



2. Insert the cable for the series connection (SF2B-CSL□) into the connector of the main sensor (SF2B-□) and the sub sensor (this device). When inserting the connector, fit the cable into the groove of the main sensor (SF2B-□) and the sub sensor (this device).



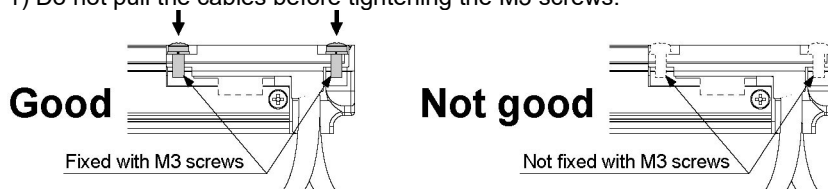
3. Tighten each two M3 screws. The tightening torque should be 0.3N·m or less.



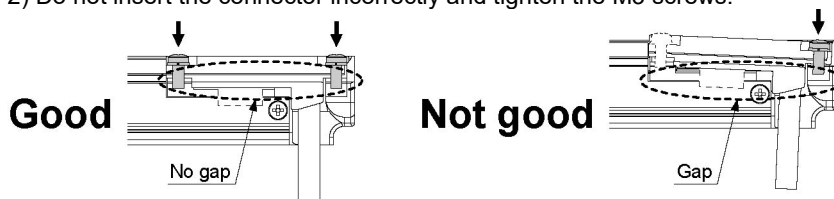
CAUTION

- The cable for series connection (**SF2B-CSL□**) cannot be extended.
- When the cable for series connection (**SF2B-CSL□**) is inserted to the main sensor (**SF2B-□**) and the sub sensor (this device), take care of the following. If inserted without care, the connector pins may bend.

1) Do not pull the cables before tightening the M3 screws.



2) Do not insert the connector incorrectly and tighten the M3 screws.



<Reference>

There is no difference in the cable for series connection for the emitter and the receiver.
The length of the cable for series connection differs depending on the model No.

Model No.	Cable Length (m)
SF2B-CSL01	0.1
SF2B-CSL05	0.5

<Dismantling the cable for series connection>

1. For dismantling the cable for series connection, follow the above procedure of **<Constructing method for the series connection>** in reverse.

2-3 Wiring

<Series connection>

SF2B-H□: Connectable up to 3 sets of the devices (128 beam channels max.).
SF2B-A□: Connectable up to 3 sets of the devices (64 beam channels max., however, when 2 sets are connected, 96 beam channels max.).

This is the configuration for connecting multiple sets of emitters and receivers facing each other in series. It is used when the dangerous part can be entered from two or more directions. If any of the sets is in light blocked status, the control output (OSSD 1 / 2) turns OFF.



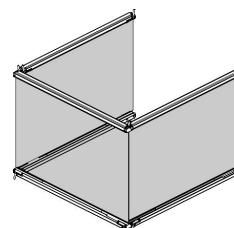
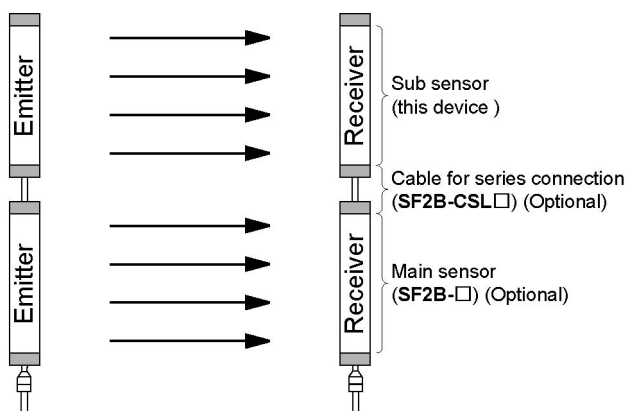
When **SF2B-H□** and **SF2B-A□** are combined in series connection, double the number of the beam channels of **SF2B-A□** to calculate the total number of beam channels, which should be 128 or less.

<e.g.> The total number of beam channels for **SF2B-H36** and **SF2B-A44SL** is 124.
 The number of beam channels of **SF2B-H36** + (the number of beam channels of **SF2B-A44SL** x 2) = Total number of beam channels
 36 beam channels + (44 beam channels x 2) = 124 beam channels

For series connection, the cable for series connection (**SF2B-CSL□**) is required separately.



Connect the emitter of this main sensor (**SF2B-□**) and the emitter of the sub sensor (this device), the receiver of this main sensor (**SF2B-□**) and the receiver of the sub sensor (this device) respectively using the exclusive cable (**SF2B-CSL□**). Wrong connection could generate the non-sensing area, resulting in death or serious injury.

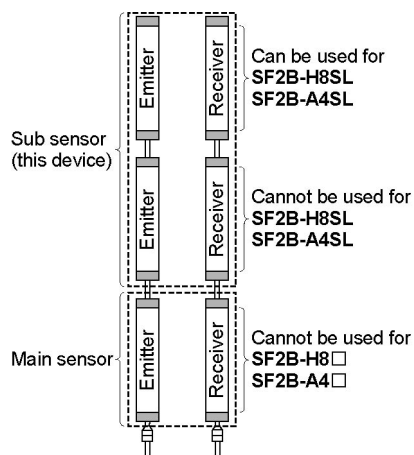


<Reference>

The wiring method depends on the type of bottom cap cable. Refer to 'Instruction Manual for **SF2B Series**' for the details of wiring.

CAUTION

- As the connector for series connection is not incorporated in the main sensor such as **SF2B-H8□** or **SF2B-A4□**, it cannot be connected in series.
- The connector for series connection is not incorporated in the sub sensors such as **SF2B-H8SL** or **SF2B-A4SL**. In case of connecting three sets of the devices in series, it cannot be used in the middle position.



2-4 Adjustment

In case of series connection, if any of the sets is in light blocked status, the control output (OSSD 1 / 2) turns OFF.

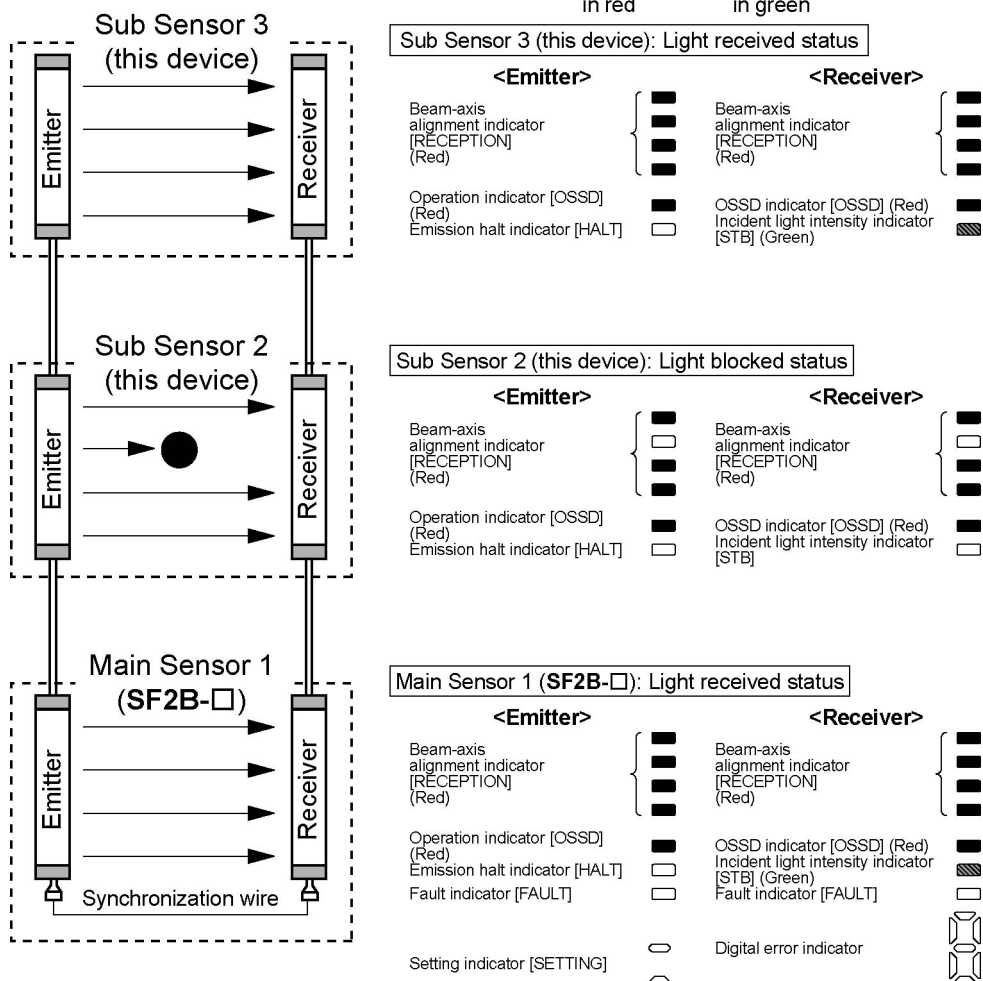
<Reference>

The emitter / receiver indicators indicate the output status.

The following figure shows the status of the indicators with Sub Sensor 2 (this device) in light blocked status.

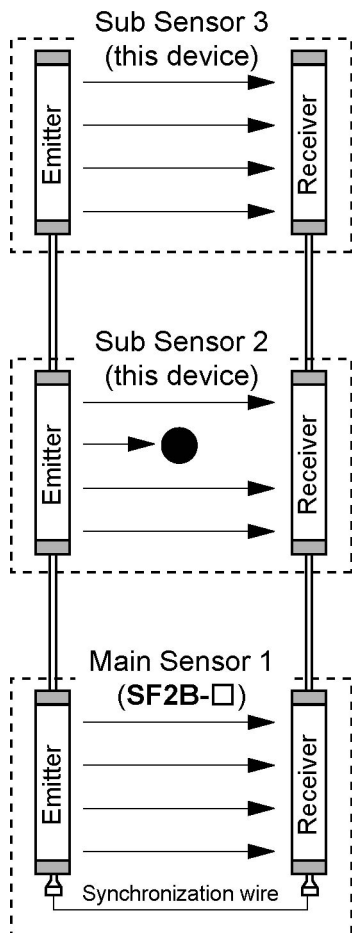
Wiring synchronization using 8-core cable / When sufficient light is received

■ : Lights up in red ■ : Lights up in green □ : Turns OFF



Beam synchronization using 4-core cable / When sufficient light is received

: Lights up in red
 : Lights up in green
 : Turns OFF



Sub Sensor 3 (this device): Light received status

<Emitter>		<Receiver>	
Beam-axis alignment indicator [RECEPTION]	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black;"></div> </div>	Beam-axis alignment indicator [RECEPTION] (Red)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div> </div>
Operation indicator [OSSD] (Green)	<div style="width: 10px; height: 10px; background-color: gray; border: 1px solid black;"></div>	OSSD indicator [OSSD] (Red)	<div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div>
Emission halt indicator [HALT]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>	Incident light intensity indicator [STB] (Green)	<div style="width: 10px; height: 10px; background-color: gray; border: 1px solid black;"></div>

Sub Sensor 2 (this device): Light blocked status

<Emitter>		<Receiver>	
Beam-axis alignment indicator [RECEPTION]	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black;"></div> </div>	Beam-axis alignment indicator [RECEPTION] (Red)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: white; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div> </div>
Operation indicator [OSSD] (Green)	<div style="width: 10px; height: 10px; background-color: gray; border: 1px solid black;"></div>	OSSD indicator [OSSD] (Red)	<div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div>
Emission halt indicator [HALT]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>	Incident light intensity indicator [STB]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>

Main Sensor 1 (SF2B-□): Light received status

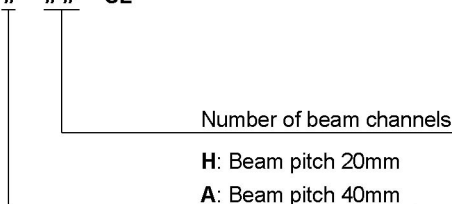
<Emitter>		<Receiver>	
Beam-axis alignment indicator [RECEPTION]	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black;"></div> </div>	Beam-axis alignment indicator [RECEPTION] (Red)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div> </div>
Operation indicator [OSSD] (Green)	<div style="width: 10px; height: 10px; background-color: gray; border: 1px solid black;"></div>	OSSD indicator [OSSD] (Red)	<div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div>
Emission halt indicator [HALT]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>	Incident light intensity indicator [STB] (Green)	<div style="width: 10px; height: 10px; background-color: gray; border: 1px solid black;"></div>
Fault indicator [FAULT]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>	Fault indicator [FAULT]	<div style="width: 10px; height: 10px; border: 1px solid black;"></div>
Setting indicator [SETTING] (Red)	<div style="width: 10px; height: 10px; background-color: black; border: 1px solid black;"></div>	Digital error indicator (Red)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; border: 1px solid black; margin-bottom: 2px;"></div> <div style="width: 10px; height: 10px; border: 1px solid black;"></div> </div>

Chapter 3 Specifications / Dimensions

3-1 Specifications

Model

SF2B- # ## SL



Example: **SF2B-H56SL**

Beam pitch: 20mm

Number of beam channels: 56 channels

Model-wise specifications

<Min. sensing object ϕ 27mm (20mm pitch) type>

Type	Min. sensing object ϕ 27mm (20mm pitch) type					
Item \ Model No.	SF2B-H8SL	SF2B-H12SL	SF2B-H16SL	SF2B-H20SL	SF2B-H24SL	SF2B-H28SL
No. of beam channels	8	12	16	20	24	28
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m, Beam synchronization using 4-core cable: 0.2 to 5m					
Beam pitch	20mm					
Protective height	168mm	232mm	312mm	392mm	472mm	552mm
Current consumption	Emitter: 20mA or less Receiver: 25mA or less		Emitter: 20mA or less Receiver: 35mA or less		Emitter: 30mA or less Receiver: 45mA or less	
PFHd	3.36×10^{-10}	5.30×10^{-10}	6.69×10^{-10}	8.63×10^{-10}	1.00×10^{-9}	1.20×10^{-9}
MTTFd	More than 100 years					
Weight (total of emitter and receiver)	170g approx.	280g approx.	400g approx.	510g approx.	610g approx.	720g approx.

Type	Min. sensing object ϕ 27mm (20mm pitch) type					
Item \ Model No.	SF2B-H32SL	SF2B-H36SL	SF2B-H40SL	SF2B-H48SL	SF2B-H56SL	SF2B-H64SL
No. of beam channels	32	36	40	48	56	64
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m, Beam synchronization using 4-core cable: 0.2 to 5m					
Beam pitch	20mm					
Protective height	632mm	712mm	792mm	952mm	1,112mm	1,272mm
Current consumption	Emitter: 30mA or less Receiver: 55mA or less		Emitter: 40mA or less Receiver: 65mA or less		Emitter: 45mA or less Receiver: 85mA or less	
PFHd	1.34×10^{-9}	1.53×10^{-9}	1.67×10^{-9}	2.00×10^{-9}	2.33×10^{-9}	2.67×10^{-9}
MTTFd	More than 100 years					
Weight (total of emitter and receiver)	830g approx.	930g approx.	1,000g approx.	1,300g approx.	1,500g approx.	1,700g approx.

Type	Min. sensing object ϕ 27mm (20mm pitch) type			
Item \ Model No.	SF2B-H72SL	SF2B-H80SL	SF2B-H88SL	SF2B-H96SL
No. of beam channels	72	80	88	96
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m Beam synchronization using 4-core cable: 0.2 to 5m			
Beam pitch	20mm			
Protective height	1,432mm	1,592mm	1,752mm	1,912mm
Current consumption	Emitter: 50mA or less Receiver: 105mA or less		Emitter: 60mA or less Receiver: 125mA or less	
PFHd	3.00×10^{-9}	3.33×10^{-9}	3.67×10^{-9}	4.00×10^{-9}
MTTFd	More than 100 years			
Weight (total of emitter and receiver)	1,900g approx.	2,100g approx.	2,300g approx.	2,500g approx.

<Min. sensing object ϕ 47mm (40mm pitch) type>

Type	Min. sensing object ϕ 47mm (40mm pitch) type					
Item \ Model No.	SF2B-A4SL	SF2B-A6SL	SF2B-A8SL	SF2B-A10SL	SF2B-A12SL	SF2B-A14SL
No. of beam channels	4	6	8	10	12	14
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m, Beam synchronization using 4-core cable: 0.2 to 5m					
Beam pitch	40mm					
Protective height	168mm	232mm	312mm	392mm	472mm	552mm
PFHd	1.88×10^{-10}	3.13×10^{-10}	3.82×10^{-10}	5.07×10^{-10}	5.76×10^{-10}	7.01×10^{-10}
MTTFd	More than 100 years					
Current consumption	Emitter: 15mA or less Receiver: 20mA or less		Emitter: 15mA or less Receiver: 25mA or less		Emitter: 20mA or less Receiver: 30mA or less	
Weight (total of emitter and receiver)	170g approx.	280g approx.	400g approx.	510g approx.	610g approx.	720g approx.

Type	Min. sensing object ϕ 47mm (40mm pitch) type					
Item \ Model No.	SF2B-A16SL	SF2B-A18SL	SF2B-A20SL	SF2B-A24SL	SF2B-A28SL	SF2B-A32SL
No. of beam channels	16	18	20	24	28	32
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m, Beam synchronization using 4-core cable: 0.2 to 5m					
Beam pitch	40mm					
Protective height	632mm	712mm	792mm	952mm	1,112mm	1,272mm
PFHd	7.71×10^{-10}	8.95×10^{-10}	9.65×10^{-10}	1.16×10^{-9}	1.35×10^{-9}	1.55×10^{-9}
MTTFd	More than 100 years					
Current consumption	Emitter: 20mA or less Receiver: 35mA or less		Emitter: 25mA or less Receiver: 40mA or less		Emitter: 25mA or less Receiver: 50mA or less	
Weight (total of emitter and receiver)	830g approx.	930g approx.	1,000g approx.	1,300g approx.	1,500g approx.	1,700g approx.

Type	Min. sensing object ϕ 47mm (40mm pitch) type			
Item \ Model No.	SF2B-A36SL	SF2B-A40SL	SF2B-A44SL	SF2B-A48SL
No. of beam channels	36	40	44	48
Sensing range	Wiring synchronization using 8-core cable: 0.2 to 13m Beam synchronization using 4-core cable: 0.2 to 5m			
Beam pitch	40mm			
Protective height	1,432mm	1,592mm	1,752mm	1,912mm
PFHd	1.74×10^{-9}	1.94×10^{-9}	2.13×10^{-9}	2.32×10^{-9}
MTTFd	More than 100 years			
Current consumption	Emitter: 30mA or less Receiver: 60mA or less		Emitter: 35mA or less Receiver: 70mA or less	
Weight (total of emitter and receiver)	1,900g approx.	2,100g approx.	2,300g approx.	2,500g approx.

Common specifications

Type	Min. sensing object ϕ 27mm (20mm pitch) type	Min. sensing object ϕ 47mm (40mm pitch) type
Item \ Model No.	SF2B-H□SL	SF2B-A□SL
Detecting capability	ϕ 27mm opaque object	ϕ 47mm opaque object
Effective aperture angle (EAA)	± 5 degree or less [for sensing range exceeding 3m (Required by IEC 61496-2 / UL 61496-2)]	
Interference prevention function	Series connection: SF2B-H type... Connectable up to 3 sets of the devices (128 beam channels max.) SF2B-A type... Connectable up to 3 sets of the devices (64 beam channels max., however, when 2 sets are connected, 96 beam channels max.) SF2B-H type and SF2B-A type can be combined (Note 2)	
Emission halt function	Incorporated	
Protection	IP65 and IP67 (IEC)	
Ambient temperature	-10 to +55°C (No condensation or icing allowed), Storage: -25 to +70°C	
Ambient humidity	30 to 85%RH, Storage: 30 to 95%RH	
Ambient illuminance	Incandescent lamp: 3,500 lx or less at the light-receiving surface	
Voltage withstandability	1,000V AC for one min. (between all supply terminals connected together and enclosure)	
Insulation resistance	20M Ω or more with 500V DC mega (between all supply terminals connected together and enclosure)	
Vibration resistance	10 to 55Hz frequency, 0.75mm amplitude in X, Y and Z directions for two hours each	
Shock resistance	300m/s ² acceleration (approx. 30G) in X, Y and Z directions for three times each	
SFF (Safe failure fraction)	99%	
HFT (Hardware failure tolerance)	0	
Sub system type	Type B (IEC 61508-2)	
Mission time	20 years	
Emitting element	Infrared LED (Peak emission wavelength: 870nm)	
Connection method	Connection with connectors	
Material	Enclosure: Aluminum, Top / bottom end: Zinc diecasting, Inner case: PC / Polyester resin, Cap: PBT	
Accessory	MS-SF2B-2 (Intermediate supporting bracket): (Note 3) SF2B-TR27 (Test rod): 1 pc.	MS-SF2B-2 (Intermediate supporting bracket): (Note 3)
Applicable standard	EN 61496-1 (Type 2), EN 55011, EN IEC 63000, EN ISO 13849-1: 2015 (Category 2, PLc), IEC 61496-1/2 (Type 2), ISO 13849-1: 2015 (Category 2, PLc), IEC 61508-1 to 7 (SIL1), JIS B 9704-1/2 (Type 2), JIS B 9705-1 (Category 2), JIS C 0508 (SIL1), ANSI/UL 61496-1/2 (Type 2), UL 1998(Class 1)	

Notes: 1) The operating ambient temperature is +20°C unless otherwise specified.

- 2) When **SF2B-H□** and **SF2B-A□** are combined in series connection, double the number of the beam channels of **SF2B-A□** to calculate the total number of beam channels, which should be 128 or less.

<e.g.>: The total number of beam channels for **SF2B-H36** and **SF2B-A44SL** is 124.

The number of beam channels of **SF2B-H36** + (the number of beam channels of **SF2B-A44SL** x 2)

= Total number of beam channels

36 beam channels + (44 beam channels x 2) = 124 beam channels

- 3) The intermediate supporting bracket (**MS-SF2B-2**) is enclosed with the following devices. The quantity of the enclosed bracket differs depending on the device as follows:

1 set : **SF2B-H□SL** ...40 to 56 beam channels, **SF2B-A□SL** ...20 to 28 beam channels

2 sets: **SF2B-H□SL** ...64 to 80 beam channels, **SF2B-A□SL** ...32 to 40 beam channels

3 sets: **SF2B-H□SL** ...88 to 96 beam channels, **SF2B-A□SL** ...44 to 48 beam channels

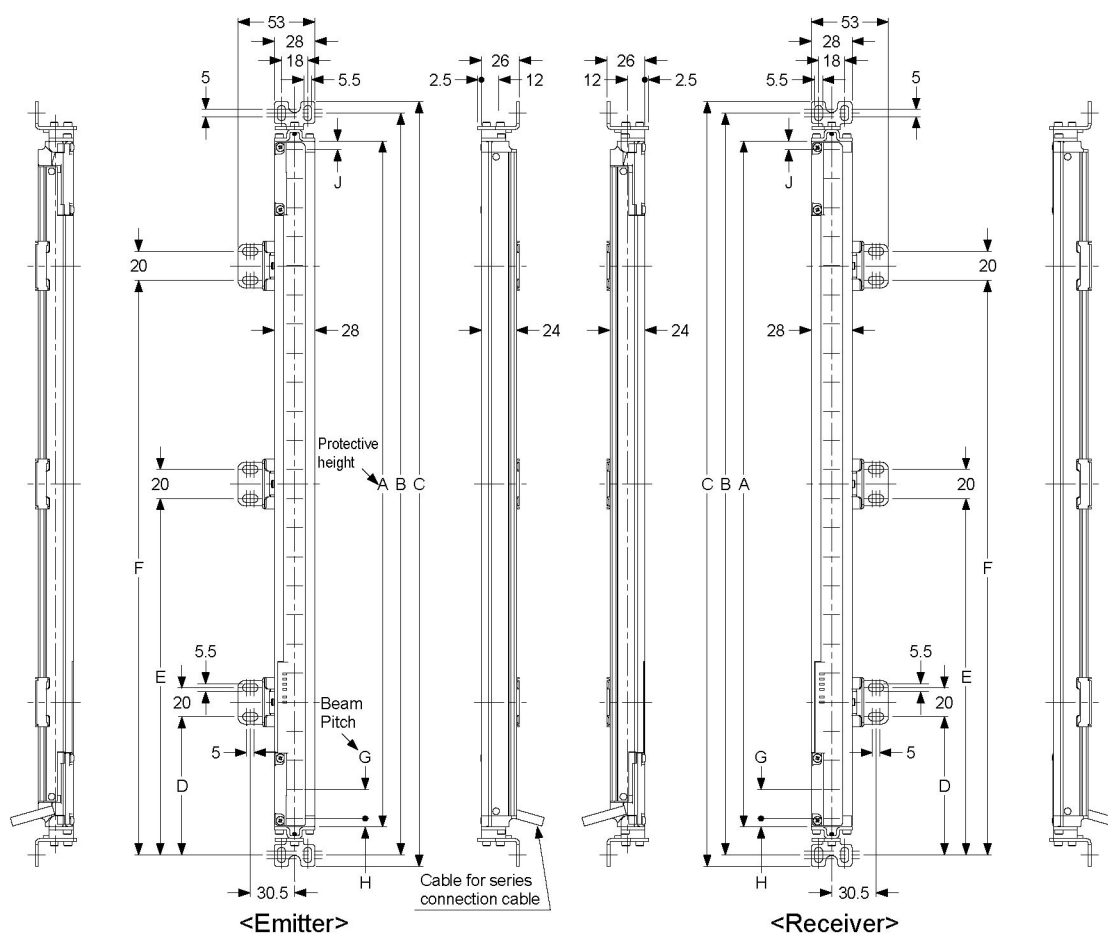
<Reference>

Both emitter and receiver are adjusted before shipment, please apply both emitter and receiver with the same serial No. The serial No. is indicated on the plates of both emitter and receiver. (Indicated on the lower level of the model No.)

3-2 Dimensions

3-2-1 Rear Mounting with Standard Mounting Bracket (MS-SF2B-1)

(Unit: mm)



Model No.	A	B	C	D	E	F
SF2B-H8SL, SF2B-A4SL	168	207	223	—	—	—
SF2B-H12SL, SF2B-A6SL	232	270	286	—	—	—
SF2B-H16SL, SF2B-A8SL	312	350	366	—	—	—
SF2B-H20SL, SF2B-A10SL	392	430	446	—	—	—
SF2B-H24SL, SF2B-A12SL	472	510	526	—	—	—
SF2B-H28SL, SF2B-A14SL	552	590	606	—	—	—
SF2B-H32SL, SF2B-A16SL	632	670	686	—	—	—
SF2B-H36SL, SF2B-A18SL	712	750	766	—	—	—
SF2B-H40SL, SF2B-A20SL	792	830	846	390	—	—
SF2B-H48SL, SF2B-A24SL	952	990	1,006	470	—	—
SF2B-H56SL, SF2B-A28SL	1,112	1,150	1,166	550	—	—
SF2B-H64SL, SF2B-A32SL	1,272	1,310	1,326	418	842	—
SF2B-H72SL, SF2B-A36SL	1,432	1,470	1,486	472	948	—
SF2B-H80SL, SF2B-A40SL	1,592	1,630	1,646	525	1,055	—
SF2B-H88SL, SF2B-A44SL	1,752	1,790	1,806	433	870	1,308
SF2B-H96SL, SF2B-A48SL	1,912	1,950	1,966	473	950	1,428

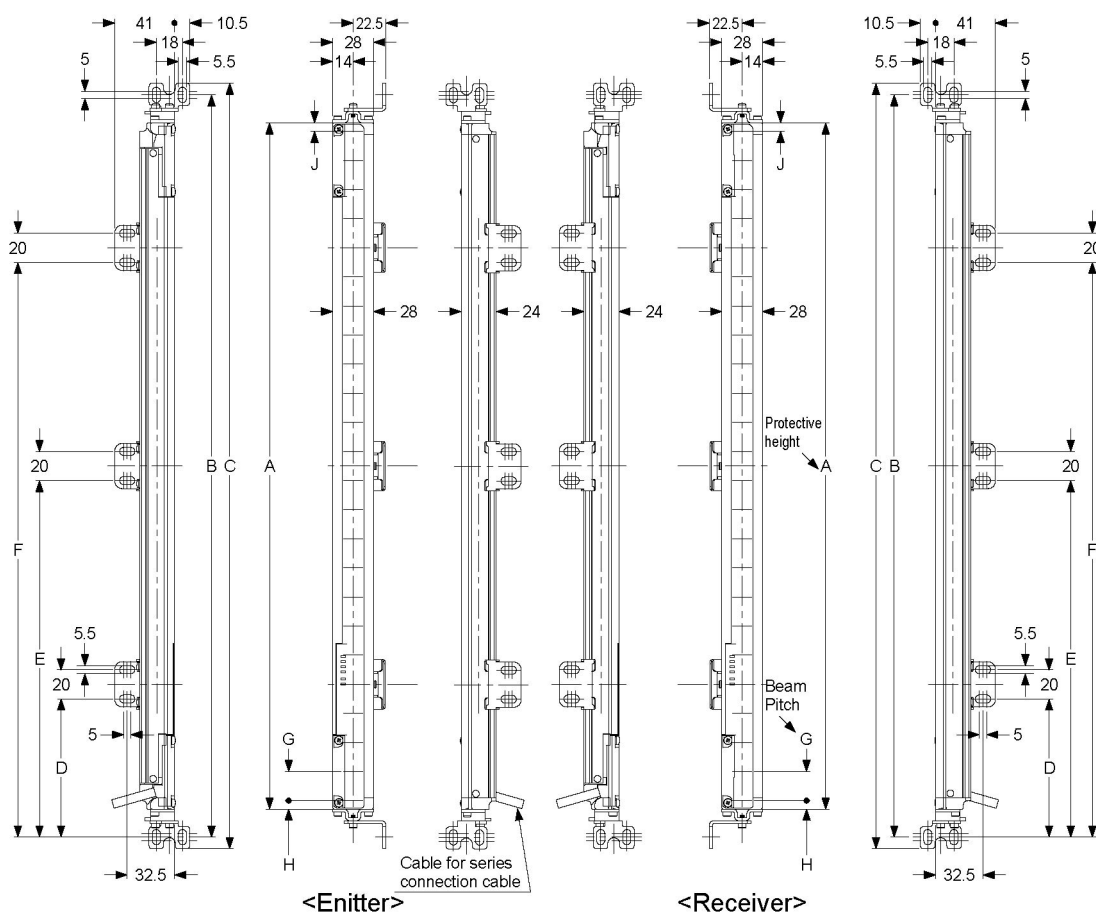
Type	G	H	J
SF2B-H□SL	20	6	6 (Note)
SF2B-A□SL	40	26	6 (Note)

Note: The distance between the tip of the light curtain and the last beam-axis of the **SF2B-H8SL** and **SF2B-A4SL** is 22mm.

Note: The intermediate supporting bracket (**MS-SF2B-2**) is enclosed with the devices. The number of the brackets varies depending on the device.

3-2-2 Side Mounting with Standard Mounting Bracket (MS-SF2B-1)

(Unit: mm)



Model No.	A	B	C	D	E	F
SF2B-H8SL, SF2B-A4SL	168	207	223	—	—	—
SF2B-H12SL, SF2B-A6SL	232	270	286	—	—	—
SF2B-H16SL, SF2B-A8SL	312	350	366	—	—	—
SF2B-H20SL, SF2B-A10SL	392	430	446	—	—	—
SF2B-H24SL, SF2B-A12SL	472	510	526	—	—	—
SF2B-H28SL, SF2B-A14SL	552	590	606	—	—	—
SF2B-H32SL, SF2B-A16SL	632	670	686	—	—	—
SF2B-H36SL, SF2B-A18SL	712	750	766	—	—	—
SF2B-H40SL, SF2B-A20SL	792	830	846	390	—	—
SF2B-H48SL, SF2B-A24SL	952	990	1,006	470	—	—
SF2B-H56SL, SF2B-A28SL	1,112	1,150	1,166	550	—	—
SF2B-H64SL, SF2B-A32SL	1,272	1,310	1,326	418	842	—
SF2B-H72SL, SF2B-A36SL	1,432	1,470	1,486	472	948	—
SF2B-H80SL, SF2B-A40SL	1,592	1,630	1,646	525	1,055	—
SF2B-H88SL, SF2B-A44SL	1,752	1,790	1,806	433	870	1,308
SF2B-H96SL, SF2B-A48SL	1,912	1,950	1,966	473	950	1,428

Type	G	H	J
SF2B-H□SL	20	6	6 (Note)
SF2B-A□SL	40	26	6 (Note)

Note: The distance between the tip of the light curtain and the last beam-axis of the **SF2B-H8SL** and **SF2B-A4SL** is 22mm.

Note: The intermediate supporting bracket (**MS-SF2B-2**) is enclosed with the devices. The number of the brackets varies depending on the device.

Chapter 4 Others

4-1 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: SF2B Series

Trade Name: Panasonic

Application of Council Directive:

- 2006/42/EC Machinery Directive
- 2014/30/EU EMC Directive
- 2011/65/EU RoHS Directive

Applicable Standard(s):

- | | |
|------------------------|---------------|
| - EN 61496-1 | - IEC 61496-1 |
| - EN ISO 13849-1: 2015 | - IEC 61496-2 |
| - EN 55011 | - IEC 61508-1 |
| - EN IEC 63000 | - IEC 61508-2 |
| | - IEC 61508-3 |
| | - IEC 61508-4 |

Type Examination: Certified by TÜV SÜD Product Service GmbH
Ridlerstrasse 65 80339 München Germany

Revision History

First edition: June 30, 2006

Second edition: August 31, 2007

Third edition: October 20, 2008

Forth edition: October 1, 2009

Fifth edition: December 20, 2010

Sixth edition: January 30, 2012

Seventh edition: January 30, 2013

Eighth edition: October 20, 2015

Ninth edition: January 15, 2016

Tenth edition: September 3, 2021

(MEMO)

1. WARRANTIES:

- (1) Subject to the exclusions stated in 2 (EXCLUSIONS) herein below, Panasonic Industrial Devices SUNX warrants the Products to be free of defects in material and workmanship for a period of one (1) year from the date of shipment under normal usage in environments commonly found in manufacturing industry.
- (2) Any Products found to be defective must be shipped to Panasonic Industrial Devices SUNX with all shipping costs paid by Purchaser or offered to Panasonic Industrial Devices SUNX for inspection and examination. Upon examination by Panasonic Industrial Devices SUNX, Panasonic Industrial Devices SUNX will, at its sole discretion, repair or replace at no charge, or refund the purchase price of, any Products found to be defective.

2. EXCLUSIONS:

- (1) This warranty does not apply to defects resulting from any cause:
 - (i) which was due to abuse, misuse, mishandling, improper installation, improper interfacing, or improper repair by Purchaser;
 - (ii) which was due to unauthorized modification by Purchaser, in part or in whole, whether in structure, performance or specification;
 - (iii) which was not discoverable by a person with the state-of-the-art scientific and technical knowledge at the time of manufacture;
 - (iv) which was due to an operation or use by Purchaser outside of the limits of operation or environment specified by Panasonic Industrial Devices SUNX;
 - (v) which was due to normal wear and tear;
 - (vi) which was due to Force Majeure; and
 - (vii) which was due to any use or application expressly discouraged by Panasonic Industrial Devices SUNX in 4 (CAUTIONS FOR SAFE USE) hereunder.
- (2) This warranty extends only to the first purchaser for application, and is not transferable to any person or entity which purchased from such purchaser for application.

3. DISCLAIMERS

- (1) Panasonic Industrial Devices SUNX's sole obligation and liability under this warranty is limited to the repair or replacement, or refund of the purchase price, of a defective Product, at Panasonic Industrial Devices SUNX's option.
- (2) THE REPAIR, REPLACEMENT, OR REFUND IS THE EXCLUSIVE REMEDY OF THE PURCHASER, AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF PROPRIETARY RIGHTS, ARE HEREBY EXPRESSLY DISCLAIMED. IN NO EVENT SHALL PANASONIC INDUSTRIAL DEVICES SUNX AND ITS AFFILIATED ENTITIES BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCTS, OR FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, GENERAL TERMS AND CONDITIONS 4 OR ANY DAMAGES RESULTING FROM LOSS OF USE, BUSINESS INTERRUPTION, LOSS OF INFORMATION, LOSS OR INACCURACY OF DATA, LOSS OF PROFITS, LOSS OF SAVINGS, THE COST OF PROCUREMENT OF SUBSTITUTED GOODS, SERVICES OR TECHNOLOGIES, OR FOR ANY MATTER ARISING OUT OF OR IN CONNECTION WITH THE USE OR INABILITY TO USE THE PRODUCTS.

4. CAUTIONS FOR SAFE USE

- (1) The applications shown in the catalogue are only suggestions, and it is Purchaser's sole responsibility to ascertain the fitness and suitability of the Products for any particular application, as well as to abide by Purchaser's applicable local laws and regulations, if any.
- (2) Never use the Products NOT rated or designated as "SAFETY SENSOR" in any application involving risk to life or property. When such a use is made by Purchaser, such Purchaser shall indemnify and hold harmless Panasonic Industrial Devices SUNX from any liability or damage whatsoever arising out of or in relation to such use.
- (3) In incorporating the Products to any equipment, facilities or systems, it is highly recommended to employ fail-safe designs, including but not limited to a redundant +++design, flame propagation prevention design, and malfunction prevention design so as not to cause any risk of bodily injury, fire accident, or social damage due to any failure of such equipment, facilities or systems.
- (4) The Products are each intended for use only in environments commonly found in manufacturing industry, and, unless expressly allowed in the catalogue, specification or otherwise, shall not be used in, or incorporated into, any equipment, facilities or systems, such as those:
 - (a) which are used for the protection of human life or body parts;
 - (b) which are used outdoors or in environments subject to any likelihood of chemical contamination or electromagnetic influence;
 - (c) which are likely to be used beyond the limits of operations or environments specified by Panasonic Industrial Devices SUNX in the catalogue or otherwise;
 - (d) which may cause risk to life or property, such as nuclear energy control equipment, transportation equipment (whether on rail or land, or in air or at sea), and medical equipment;
 - (e) which are operated continuously each day for 24 hours; and
 - (f) which otherwise require a high level of safety performance similar to that required in those equipment, facilities or systems as listed in (a) through (e) above.

5. EXPORT CONTROL LAWS

In some jurisdictions, the Products may be subject to local export laws and regulations. If any diversion or re-export is to be made, Purchaser is advised to abide by such local export laws and regulations, if any, at its own responsibility.

Please contact

Panasonic Corporation

Panasonic Industrial Devices SUNX Co., Ltd.
<https://panasonic.net/id/pidsx/global/>

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September, 2021

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MJE-SF2BSL No.0077-52V