SF2-EH SERIES

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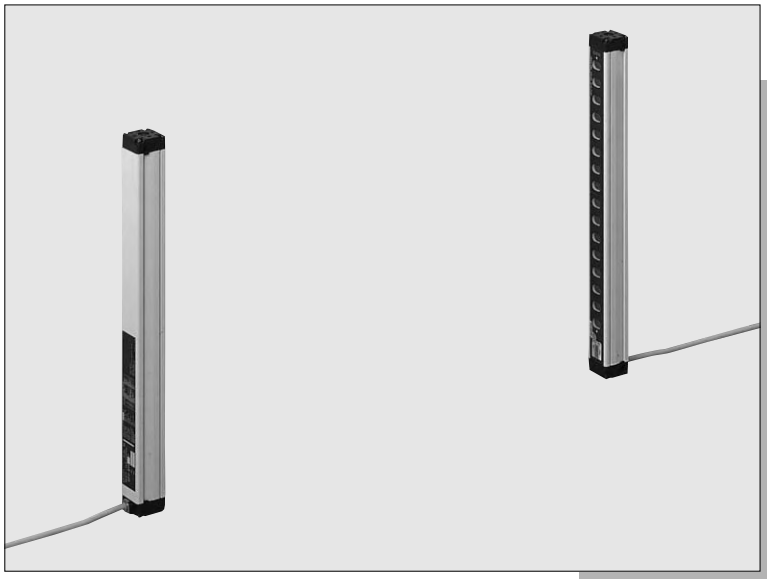
20mm Beam Pitch Global Safety Standard Conforming Area Sensor



Conforming to Latest International Safety Standards

Please contact us regarding CE marking.

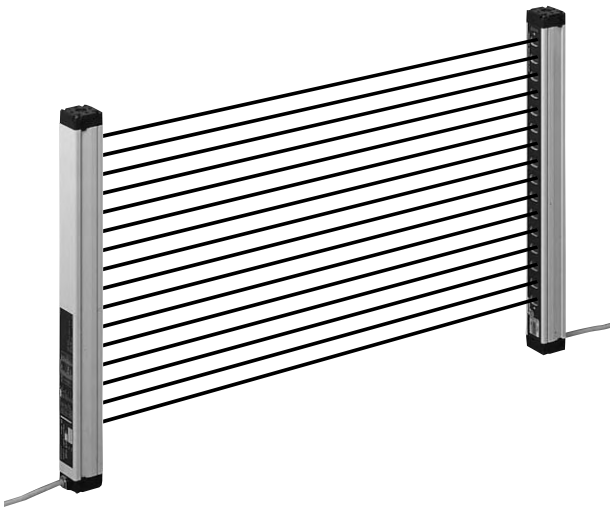
Global Safety

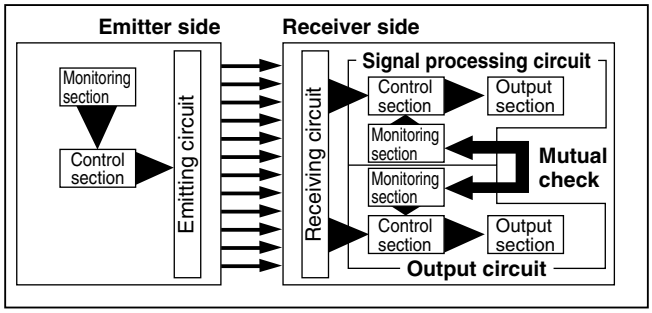
The **SF2-EH** series is UL listed (IEC 61496-1/2 Type 4), which is required for use in U.S.A.
Further, it is also compatible with equipment conforming to OSHA 1910.212/217, ANSI B11.1～B11.19 and ANSI/RIA 15.06.

UL® LISTED

Pursuit of Safety

It uses two independent CPUs, which mutually check the safety conditions. High reliability fail-safe design is realized by incorporating dual circuits for signal processing and output.
Further, in order to ensure safety, FMEA (Failure Mode & Effect Analysis) has been used to prove safe operation.





Safety Design of SF2-EH

SF2-EH checks by itself for any internal circuit failure, cable breakage/short-circuit, or even abnormal incident ambient light. If any error occurs, **SF2-EH** outputs the same signal as when a beam is interrupted (OFF signal), so that the machine is stopped and cannot restart.

Emitter

- Emitting element failure
- Emitting circuit failure
- Cable breakage/ short-circuit

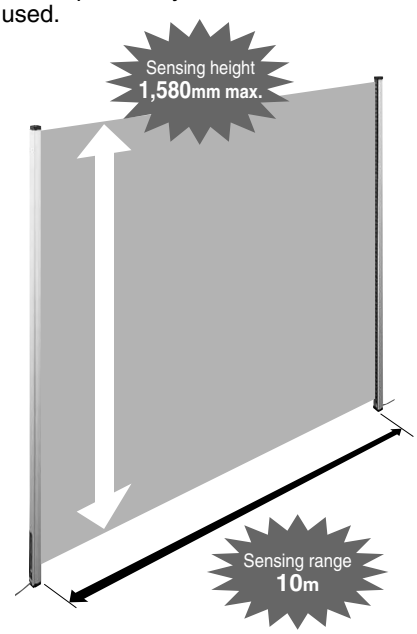
Receiver

- Receiving element failure
- Receiving circuit failure
- Strong extraneous light
- Output drive circuit failure
- Abnormal condition of CPU
- Cable breakage/ short-circuit

SF2-EH

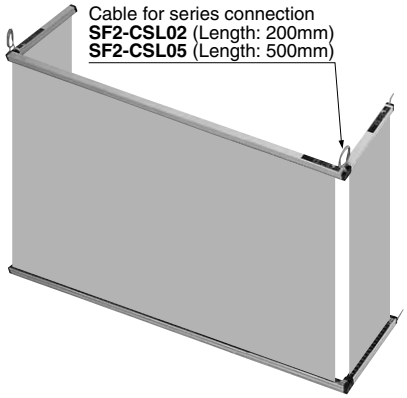
Wide Area: 1,580mm × 10m

It realizes a wide sensing area with a sensing height of 1,580mm max. (80 beam channels) and a long sensing range of 10m.
Just one sensor can cover an area where previously 2 sensors had to be used.



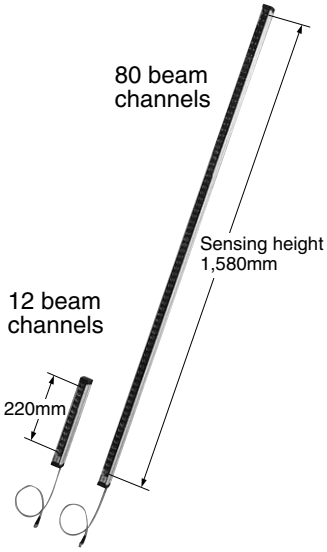
Sensors Connectable in Series

Using the optional cable (**SF2-CSL□**) for series connection, maximum 4 sets of sensors with a total of 192 beam channels can be connected in series.
For example, in case of mounting the sensors on the front, as well as, both the sides of a danger region, previously separate wiring was required for 3 sets of sensors. But now, wiring equivalent to that for only 1 set is required, thus saving troublesome wiring and cost.



Wide Variety

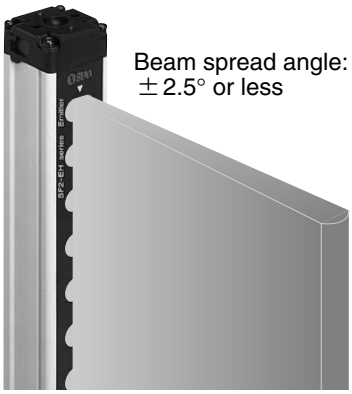
There are 13 types of sensor units having a sensing height ranging from 220mm (12 beam channels) to 1,580mm (80 beam channels). The sensors can be selected to suit the monitoring area of the used equipment.
Further, PNP output equivalent type, as well as, NPN output equivalent type are available.



No Interference

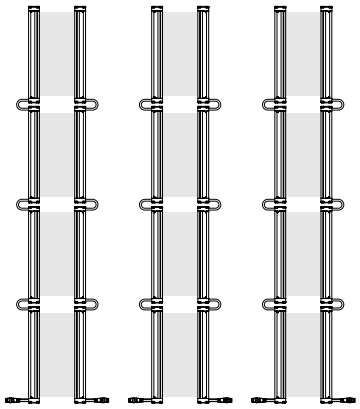
- **Beam spread angle ±2.5° or less**

  Since the beam spread angle is narrow (±2.5° or less), it reduces the effect of reflection from walls, etc., and interference from extraneous light.



- **Up to 12 sets mountable**

  In case of series connection or parallel connection, interference can be prevented for up to 4 sets, respectively.
  Further, in case of series and parallel mixed connection, up to 12 sets (total 192 beam channels) can be mounted.



- **Convenient slit mask available**

  By using the optional slit mask (**OS-SF2-H□**), the amount of beam emitted or received can be restrained to reduce the effect of extraneous light from other sensors, etc.

Exclusive Controller Not Required

Since an exclusive controller is not required, there is no need to provide space for it.

Easy Maintenance

An optional front protection cover (**FC-SF2-H□**) is available, so that the sensing face of the sensor can be protected in an adverse environment. Further, if the front protection cover becomes dirty or scratched, you can just change the cover. The sensor, itself, need not be changed.

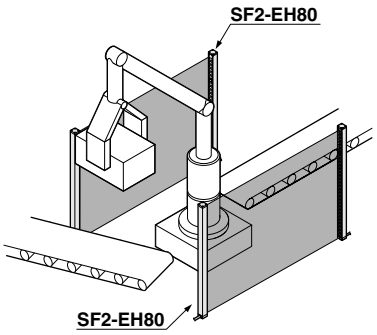
Mounting Bracket Enables Easy Beam Alignment

The beam alignment is easy since angle adjustment is possible with the sensor mounting bracket (**MS-SF2-1**).

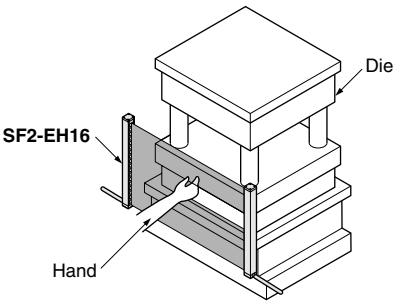
SF2-EH

APPLICATIONS

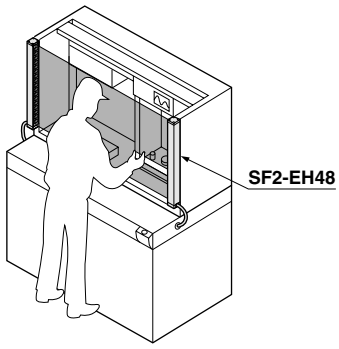
Guarding space around working robot



Safeguard for press machine

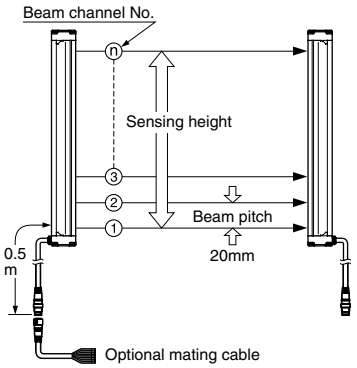


Safeguard for special purpose machine



ORDER GUIDE

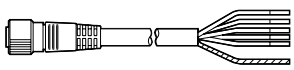
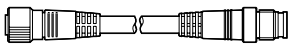
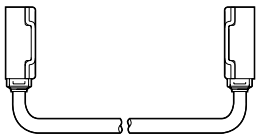
Sensors

Appearance	Sensing range	Model No.		Number of beam channels	Sensing height (mm)
		PNP output equivalent type	NPN output equivalent type		
	0.3 to 10m (Note)	**SF2-EH12**	**SF2-EH12-N**	12	220
		SF2-EH16	**SF2-EH16-N**	16	300
		SF2-EH20	**SF2-EH20-N**	20	380
		SF2-EH24	**SF2-EH24-N**	24	460
		SF2-EH28	**SF2-EH28-N**	28	540
		SF2-EH32	**SF2-EH32-N**	32	620
		SF2-EH36	**SF2-EH36-N**	36	700
		SF2-EH40	**SF2-EH40-N**	40	780
		SF2-EH48	**SF2-EH48-N**	48	940
		SF2-EH56	**SF2-EH56-N**	56	1,100
		SF2-EH64	**SF2-EH64-N**	64	1,260
		SF2-EH72	**SF2-EH72-N**	72	1,420
		SF2-EH80	**SF2-EH80-N**	80	1,580

Note: The sensing range is the possible setting distance between the emitter and the receiver. The sensor can detect an object less than 0.3m away.

Mating cable is not supplied with the sensor. Please order it separately.

Mating cables

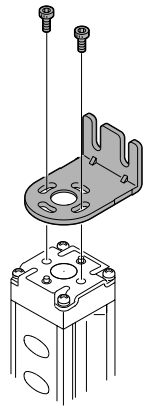
Type	Appearance	Model No.	Description	
Cable with connector on one end		**SF2-CC3**	Length: 3m Weight: 410g approx.	8-core shielded cable, with connector on one end, two cables per set • Cable outer diameter: ϕ6mm • Connector outer diameter: ϕ14mm max.
		SF2-CC7	Length: 7m Weight: 890g approx.	
		SF2-CC10	Length: 10m Weight: 1.2kg approx.	
Cable with connector on both ends		**SF2-CCJ10**	Length: 10m Weight: 1.2kg approx.	8-core shielded cable, with connector on both ends, two cables per set • Cable outer diameter: ϕ6mm • Connector outer diameter: ϕ14mm max.
Cable for series connection		**SF2-CSL02**	Length: 200mm Weight: 150g approx.	It can connect two sensors in series. 8-core shielded cable, two cables per set • Cable outer diameter: ϕ6mm • Connector outer dimensions: □35mm max.
		SF2-CSL05	Length: 500mm Weight: 170g approx.	

ORDER GUIDE

Spare parts

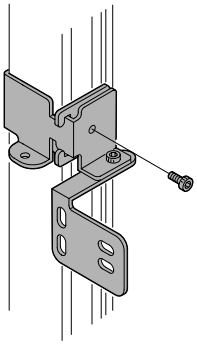
Designation	Model No.	Description
Sensor mounting bracket	**MS-SF2-1**	A set of brackets for both the emitter and the receiver
Intermediate supporting bracket	**MS-SF2-2**	A set of brackets for both the emitter and the receiver
Test rod	**SF2-EH-TR**	Sensing object (ϕ30mm) for daily check

Sensor mounting bracket



Four bracket set
Eight M4 (length 8mm) hexagon-socket-head bolts and eight spring washers are attached.

Intermediate supporting bracket



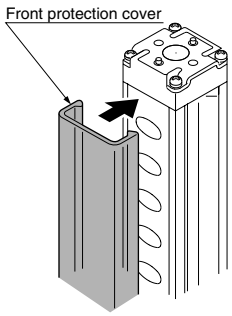
Set of 2 Nos. each of U-shaped intermediate supporting bracket and L-shaped intermediate supporting bracket
Two M4 (length 6mm), two M4 (length 8mm) hexagon-socket-head bolts, two nuts and two spring washers are attached.

OPTIONS

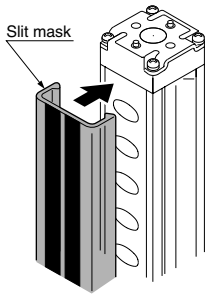
Designation	Model No.	Description	
Front protection cover	**FC-SF2-H12**	For 12 beam channels	Protects front lens
	FC-SF2-H16	For 16 beam channels	
	FC-SF2-H20	For 20 beam channels	
	FC-SF2-H24	For 24 beam channels	
	FC-SF2-H28	For 28 beam channels	
	FC-SF2-H32	For 32 beam channels	
	FC-SF2-H36	For 36 beam channels	
	FC-SF2-H40	For 40 beam channels	
	FC-SF2-H48	For 48 beam channels	
	FC-SF2-H56	For 56 beam channels	
	FC-SF2-H64	For 64 beam channels	
	FC-SF2-H72	For 72 beam channels	
	FC-SF2-H80	For 80 beam channels	
Slit mask	**OS-SF2-H12**	For 12 beam channels	The slit mask restrains the amount of beam emitted or received and hence reduces the interference between neighbouring sensors. However, the sensing range reduces when the slit mask is used. Contact our office for details.
	OS-SF2-H16	For 16 beam channels	
	OS-SF2-H20	For 20 beam channels	
	OS-SF2-H24	For 24 beam channels	
	OS-SF2-H28	For 28 beam channels	
	OS-SF2-H32	For 32 beam channels	
	OS-SF2-H36	For 36 beam channels	
	OS-SF2-H40	For 40 beam channels	
	OS-SF2-H48	For 48 beam channels	
	OS-SF2-H56	For 56 beam channels	
	OS-SF2-H64	For 64 beam channels	
	OS-SF2-H72	For 72 beam channels	
	OS-SF2-H80	For 80 beam channels	

Note: The model Nos. given above denote a single unit, not a pair of units.

Front protection cover



Slit mask



SF2-EH

SPECIFICATIONS

Item	Number of beam channels	12	16	20	24	28	32	36	40	48	56	64	72	80
	Model No. PNP output equivalent type	**SF2-EH12**	**SF2-EH16**	**SF2-EH20**	**SF2-EH24**	**SF2-EH28**	**SF2-EH32**	**SF2-EH36**	**SF2-EH40**	**SF2-EH48**	**SF2-EH56**	**SF2-EH64**	**SF2-EH72**	**SF2-EH80**
	NPN output equivalent type	**SF2-EH12-N**	**SF2-EH16-N**	**SF2-EH20-N**	**SF2-EH24-N**	**SF2-EH28-N**	**SF2-EH32-N**	**SF2-EH36-N**	**SF2-EH40-N**	**SF2-EH48-N**	**SF2-EH56-N**	**SF2-EH64-N**	**SF2-EH72-N**	**SF2-EH80-N**
Sensing height		220mm	300mm	380mm	460mm	540mm	620mm	700mm	780mm	940mm	1,100mm	1,260mm	1,420mm	1,580mm
Sensing range		0.3 to 10m												
Beam pitch		20mm												
Beam spread angle		± 2.5° or less [for sensing range exceeding 3m (conforming to IEC 61496-2)]												
Sensing object		ϕ30mm or more opaque object												
Supply voltage		24V DC ± 15%												
Current consumption		200mA or less												
Outputs (OSSD 1, OSSD 2) (Note 1)		<PNP output equivalent type> Semiconductor output (PNP output equivalent) 2 outputs • Maximum source current: 300mA • Applied voltage: same as supply voltage • Residual voltage: 2.5V or less (at 300mA source current)						<NPN output equivalent type> Semiconductor output (NPN output equivalent) 2 outputs • Maximum sink current: 300mA • Applied voltage: same as supply voltage • Residual voltage: 2V or less (at 300mA sink current)						
	Output operation	ON when all beams are received/OFF when one or more beams are interrupted (It also turns OFF in case of any abnormality in the sensor or the synchronization signal.)												
	Short-circuit protection	Incorporated												
Response time		ON→OFF: 15ms or less, OFF→ON: 20ms or less												
Indicators	Emitter	Emitting indicator: Green LED (lights up under normal emission) Emission stop indicator: Orange LED (lights up when emission stops) Fault indicator: Yellow LED (lights up or blinks if the sensor fails)												
	Receiver	OSSD ON indicator: Green LED (lights up when OSSDs are ON) OSSD OFF indicator: Red LED (lights up when OSSDs are OFF) Incident beam indicator: Green/Red LED [lights up in red with intensity proportional to the incident light intensity for reference channel (second channel from cable side), lights up in green when all beams are received] Fault indicator: Yellow LED (lights up or blinks if the sensor fails)												
Test input function		Incorporated												
Interference prevention function		Incorporated (Series connection: 4 sets max., however total 192 beam channels max. Parallel connection: 4 sets max., however total 192 beam channels max. Series and parallel mixed connection: 12 sets max., however total 192 beam channels max.)												
Environmental resistance	Protection	IP65 (IEC)												
	Ambient temperature	− 10 to + 55°C (No dew condensation or icing allowed), Storage: − 25 to + 70°C												
	Ambient humidity	30 to 85% RH, Storage: 30 to 95% RH												
	Ambient illuminance	Sunlight: 20,000ℓx at the light-receiving face, Incandescent light: 3,500ℓx at the light-receiving face												
	EMC	Emission: EN50081-2, Immunity: EN50082-2 and IEC 61496-1												
	Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure												
	Insulation resistance	20MΩ, or more, with 500V DC megger 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/s² acceleration (30G approx.) in X, Y and Z directions for three times each												
Emitting element		Infrared LED (Emission wavelength: 870nm)												
Material		Enclosure: Aluminum, Cap: ABS												
Cable		8-core (0.3mm² × 4-core, 0.2mm² × 4-core) shielded cable, 0.5m long, with a connector at the end ※ Use together with the optional mating cable												
Cable extension		Extension up to total 27m is possible, for both emitter and receiver, with optional mating cables.												
Weight		1.1kg approx.	1.3kg approx.	1.5kg approx.	1.7klg approx.	1.9kg approx.	2.2kg approx.	2.4kg approx.	2.6kg approx.	3.1kg approx.	3.5kg approx.	4.0kg approx.	4.4kg approx.	4.9kg approx.
Accessories		**MS-SF2-1** (Sensor mounting bracket): 1 set, **MS-SF2-2** (Intermediate supporting bracket): (Note 2), **SF2-EH-TR** (Test rod): 1 No.												

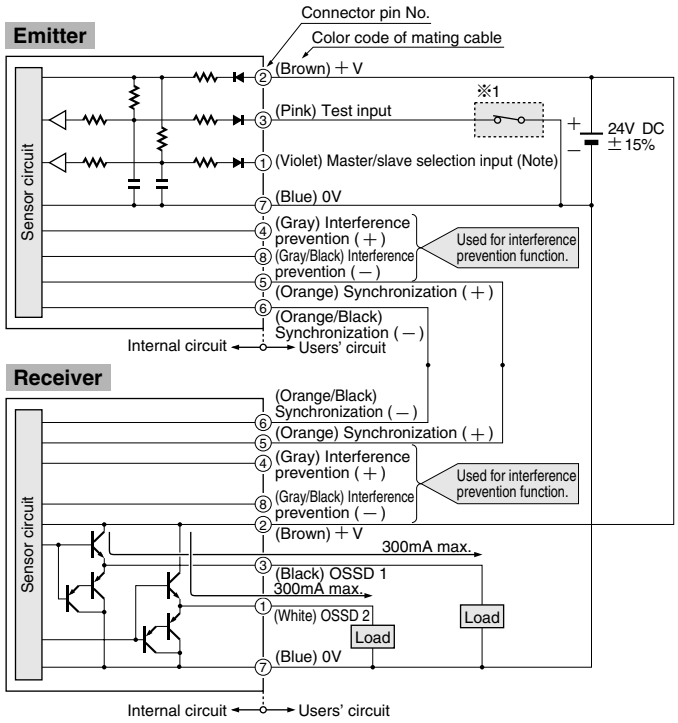
Notes: 1) OSSD stands for 'Output Signal Switching Device'.

2) **MS-SF2-2** (intermediate supporting bracket) is attached with sensors having 24, or more, beam channels.
The number of attached intermediate supporting brackets is different depending on the sensor as follows.
SF2-EH24(**-N**), **SF2-EH28**(**-N**), **SF2-EH32**(**-N**), **SF2-EH36**(**-N**), **SF2-EH40**(**-N**), **SF2-EH48**(**-N**), **SF2-EH56**(**-N**): 1 set
SF2-EH64(**-N**), **SF2-EH72**(**-N**), **SF2-EH80**(**-N**): 2 sets

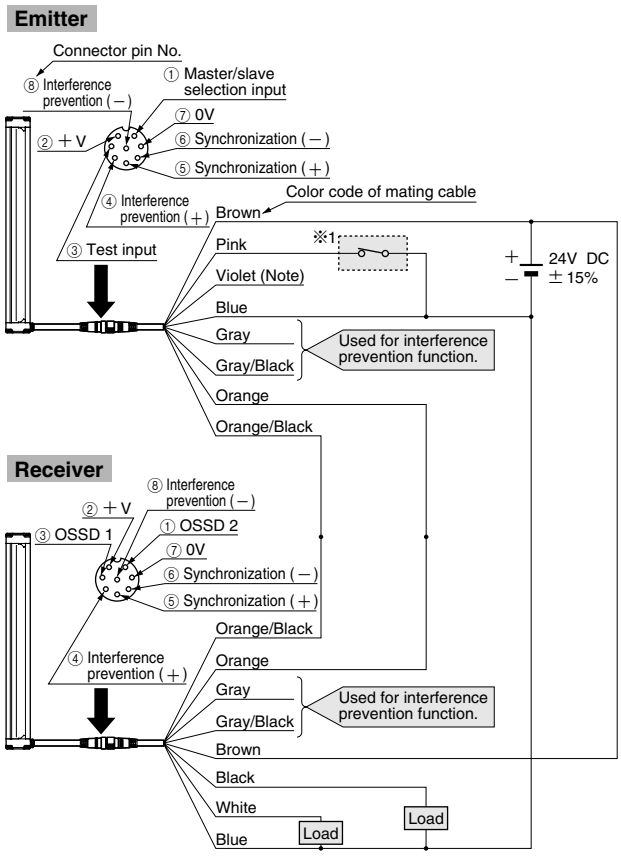
I/O CIRCUIT AND WIRING DIAGRAMS

PNP output equivalent type

I/O circuit diagram



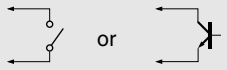
Wiring diagram



CAUTION
In order to maintain safety, use a safety relay or a safety relay unit for the load.

※1

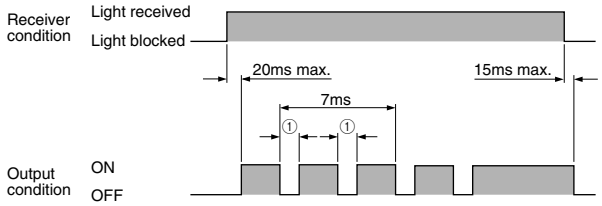
Non-voltage contact or
NPN open-collector transistor



Low (0V): emission
High (+ V or open): emission stopped

Output waveform (when output is ON)

- When the sensor is in the light received condition (ON state), the receiver self-diagnoses the output circuit. For this purpose, the output transistor goes to the OFF state periodically. (Refer to the figure given at the right.)
  If the OFF signal is fed back, the receiver judges the output circuit as normal. If the OFF signal is not fed back, the receiver judges that the output circuit or the wiring is abnormal, and the output is maintained in the OFF state.
  The frequency or the period for which the output transistor turns OFF does not change even for the maximum connected set No. of 4 sets connected in series.



No. of pulses (No. of ①'s in the figure) in 7ms... ②	1 to 2
Pulse width (width of ① in the figure) [μs]... ③	200
Sum of the pulse widths in 7ms (product of ② and ③)	400 max.

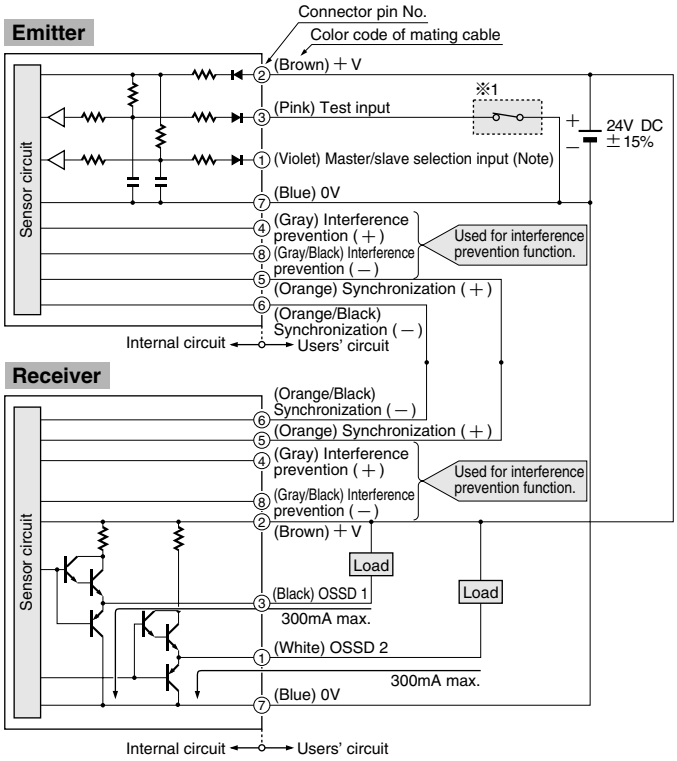
Take care of the input response time of the equipment connected to the sensor, since there is a possibility of the equipment malfunctioning due to the sensor OFF signal.

SF2-EH

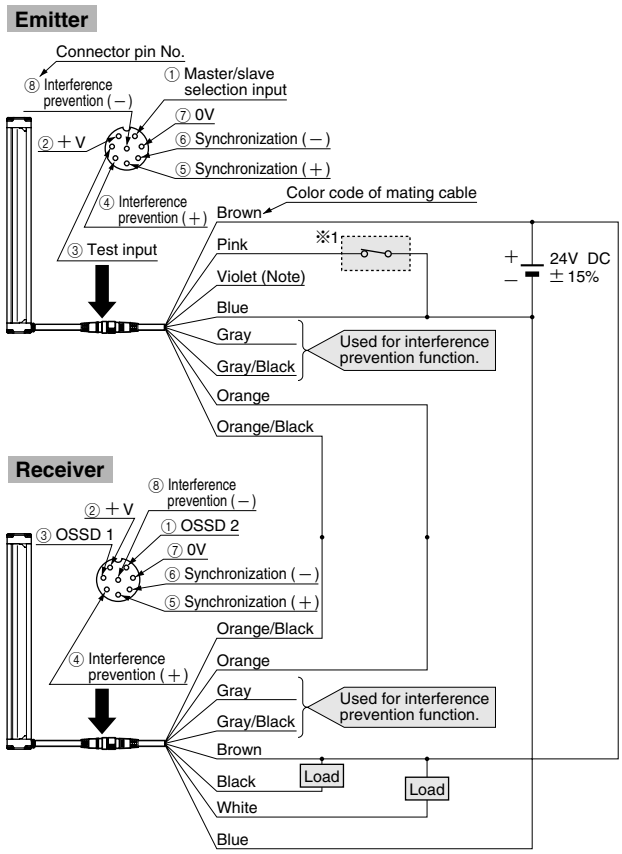
I/O CIRCUIT AND WIRING DIAGRAMS

NPN output equivalent type

I/O circuit diagram



Wiring diagram



CAUTION
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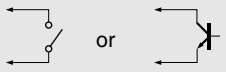
Non-voltage contact or
NPN open-collector transistor



Low (0V): emission
High (+ V or open): emission stopped

Output waveform (when output is ON)

- When the sensor is in the light received condition (ON state), the receiver self-diagnoses the output circuit. For this purpose, the output transistor goes to the OFF state periodically. (Refer to the figure given at the right.)
  If the OFF signal is fed back, the receiver judges the output circuit as normal. If the OFF signal is not fed back, the receiver judges that the output circuit or the wiring is abnormal, and the output is maintained in the OFF state.
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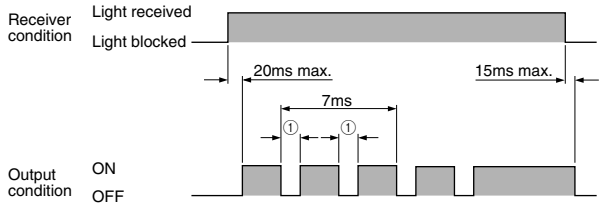


No. of pulses (No. of ①'s in the figure) in 7ms... ②	1 to 2
Pulse width (width of ① in the figure) [μs]... ③	200
Sum of the pulse widths in 7ms (product of ② and ③)	400 max.

Take care of the input response time of the equipment connected to the sensor, since there is a possibility of the equipment malfunctioning due to the sensor OFF signal.

PRECAUTIONS FOR PROPER USE

To use this product in the U.S.A., refer to OSHA 1910. 212 and OSHA 1910. 217 for installation, and in Europe, refer to prEN 999 as well.
Observe your national and local requirements before installing this product.

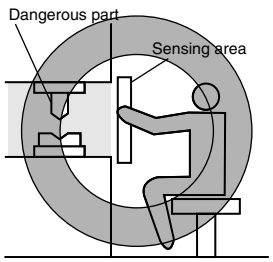
Refer to the instruction manual enclosed with this product for detailed instructions.

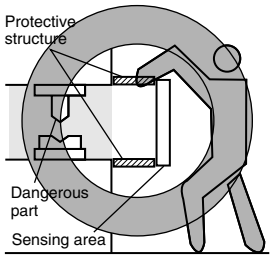
- Make sure to carry out the test run before regular operation.
- This safety system is for use only on machinery in which the dangerous parts can be stopped immediately, either by an emergency stop unit or by disconnecting the power supply. Do not use this system with machinery which cannot be stopped at any point in its operation cycle.

Sensing area

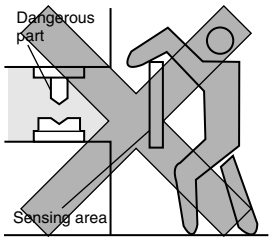
Make sure to install this product such that any part of the human body must pass through its sensing area in order to reach the dangerous parts of the machinery. If the human body is not detected, there is a danger of serious injury or death.

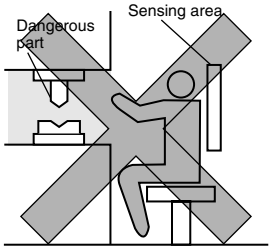
Correct mounting method





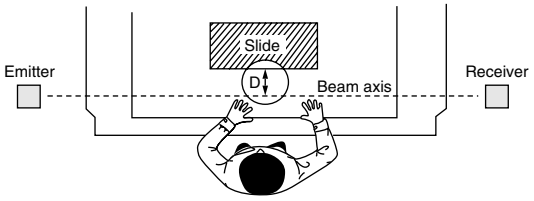
Wrong mounting method





Safety distance

Calculate the safety distance correctly, and always maintain a distance which is equal to or greater than the safety distance, between the sensing area of this sensor and the dangerous parts of the machinery.
If the safety distance is miscalculated or if sufficient distance is not maintained, there is a danger of serious injury or death.



- Safety distance is calculated based on the following equation when a person moves perpendicular (normal intrusion) to the sensing area of the sensor.

For use in Europe (as per prEN 999)

- Equation ① $D = K \times T + C$

D: Safety distance (mm)
Minimum required distance between the surface of the sensing area and dangerous part of machine.

K: Intrusion velocity of operator's body (hand, finger, etc.) (mm/sec.)
Normally taken as 2,000 (mm/sec.) for calculation.

T: Response time of total equipment (sec.)
$T = T_m + T_{SF2}$
T_m: Maximum halt time of device (sec.)
T_{SF2}: Response time of the **SF2-EH** series 0.015 (sec.)

C: Additional distance calculated from the size of the minimum sensing object of the area sensor (mm)
Note that the value of C is not 0 or less.
$C = 8 \times (d - 14)$
d: Minimum sensing object diameter 30 (mm)

For use in U.S.A. (as per ANSI B11.19)

- Equation ② $D = K \times (T_s + T_c + T_{SF2} + T_{bm}) + D_{pf}$

D: Safety distance (mm)
Minimum required distance between the surface of the sensing area and dangerous part of machine.

K: Intrusion velocity of operator's body (hand, finger, etc.) (mm/sec.)
Normally taken as 63 (inch/sec.)≒1,600 (mm/sec.) for calculation.

T_s: Halt time calculated from the operation time of the control element (air valve, etc.) (sec.)

T_c: Maximum response time of the control circuit required for functioning the brake. (sec.)

T_{SF2}: Response time of **SF2-EH** series 0.015 (sec.)

T_{bm}: Additional halt time tolerance for the brake monitor (sec.)
$T_{bm} = T_a - (T_s + T_c)$
T_a: Setting time of brake monitor (sec.)

D_{pf}: Additional distance calculated from the size of the minimum sensing object of the area sensor (mm)
Note that the value of D_{pf} is not 0 or less.
$D_{pf} = 3.4 \times (d - 0.726)$ (inch)
$= 3.4 \times (d - 7)$ (mm)
d: Minimum sensing object diameter 1.2 (inch)≒30 (mm)

SF2-EH

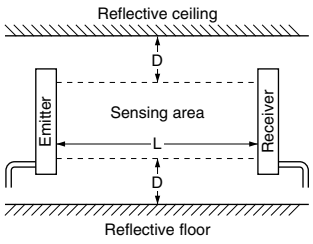
PRECAUTIONS FOR PROPER USE

Influence of reflective surface

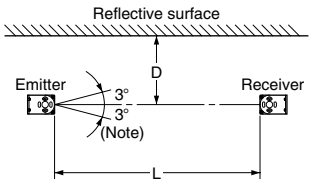
Install the sensor by considering the effect of nearby reflective surfaces and taking suitable countermeasures. Failure to do so may cause the sensor not to detect, resulting in serious injury or death.

- Keep the minimum distance given below, between the sensor and a reflective surface.

Side view



Top view



Distance between emitter and receiver, L	Allowable setting distance, D
0.3 to 3m	0.16m
3 to 10m	L × tan θ° = L × 0.052 (m)

Note: The beam spread angle for this sensor is ±2.5° (with L> 3m) as required by IEC 61496-2. However, install this sensor away from the reflective surfaces, assuming a beam spread angle of ±3° to provide for misalignment, etc., during installation.

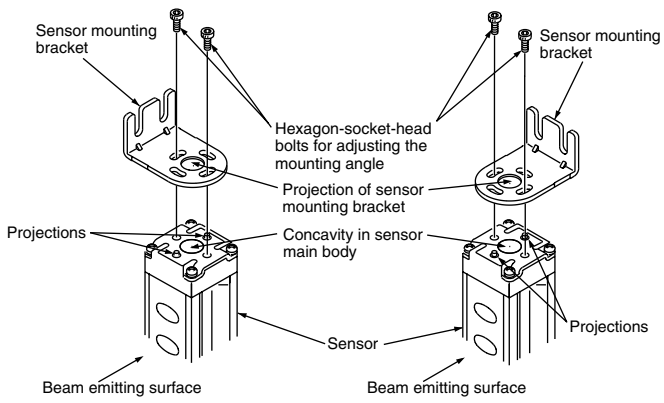
Mounting

- When mounting the sensor, the tightening torque should be 2N·m or less.

Mounting of sensor mounting bracket (MS-SF2-1)

- Choose the mounting direction for the sensor mounting bracket based on the mounting direction (side or back), and temporarily tighten the brackets with the two hexagon-socket-head bolts for adjusting the mounting angle (M4, length 8mm). Tighten the two hexagon-socket-head bolts securely, after beam alignment.

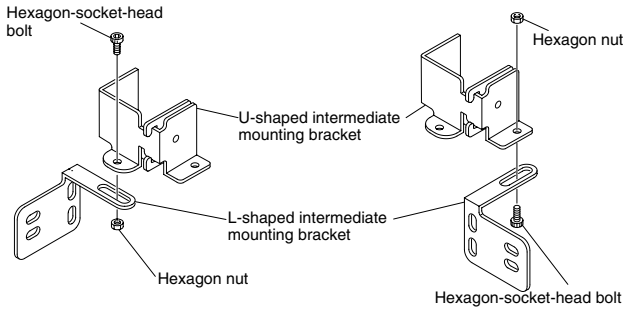
<Side mounting> **<Back mounting>**



Mounting of intermediate supporting bracket (MS-SF2-2)

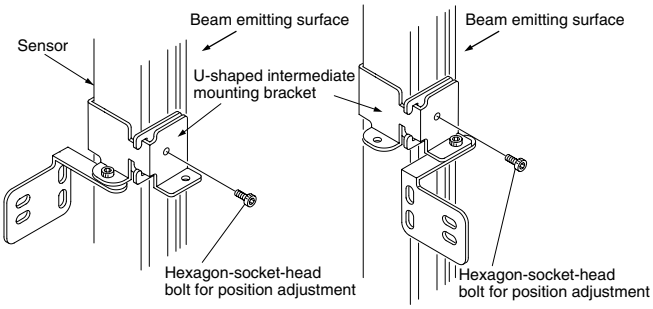
① Choose the mounting direction for the L- and U-shaped intermediate supporting brackets based on the mounting direction (side or back), and temporarily tighten the mounting brackets with the hexagon-socket-head bolt (M4, length 8mm). Tighten it securely, after beam alignment.

<Side mounting> **<Back mounting>**



② Clasp the body of the sensor with the U-shaped intermediate supporting bracket, and temporarily tighten with the hexagon-socket-head bolt (M4, length 6mm) for position adjustment. Tighten it securely, after beam alignment.

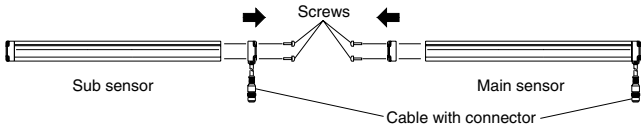
<Side mounting> **<Back mounting>**



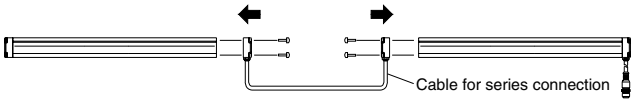
Note: The above drawing shows the intermediate supporting bracket mounted on the emitter. In case of mounting on the receiver, note that the intermediate supporting bracket is upside down.

Mounting of cable for series connection (SF2-CSL□)

① Remove four M4 screws (length 10mm) on the main sensor and the sub sensor as given below.



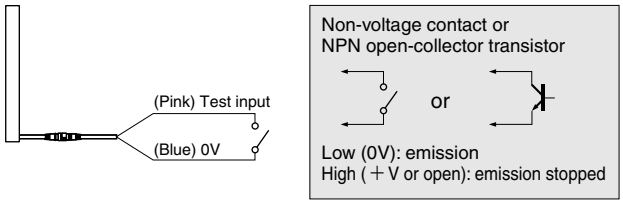
② As shown below, mount the cable for series connection at the place on the main sensor and the sub sensor from where the screws have been removed.



PRECAUTIONS FOR PROPER USE

Test input function

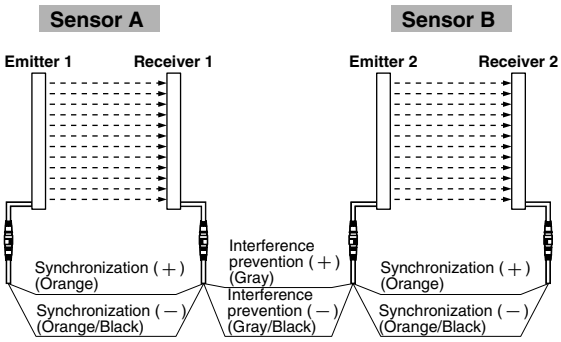
• The emission is halted when the test input wire (pink) is connected to + V or kept open. The test input is useful for a start-up check since the sensing output can be switched ON/OFF without the sensing object.



Note: When test input function is not used, make sure to connect the test input wire (pink) to 0V.

Interference prevention function

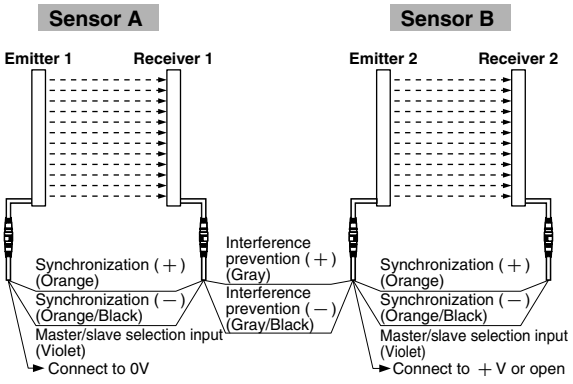
• Interference can be prevented between 4 sets max. (192 beam channels max.) for series connection, 4 sets max. (192 beam channels max.) for parallel connection, and 12 sets max. (192 beam channels max.) for series and parallel mixed connection. In this case, connect the respective interference (+) (gray) and interference (−) (gray/black) of the adjacent sensors.



Master/slave selection input

• In case of parallel connection, or series and parallel mixed connection, before switching on the power supply, connect the master/slave selection input (violet) of Sensor A, as master, to 0V and connect the master/slave selection input (violet) of Sensor B, as slave, to + V or open.
The master/slave selection is done only once at the time of switching on of the power supply. If selection is done after switching on of the power supply, it does not change.
Further, if the master/slave selection input is kept open when the sensor is set as slave, ensure to insulate it.

• In case of series connection or when using 1 set, connect the master/slave selection input (violet), as master, to 0V.



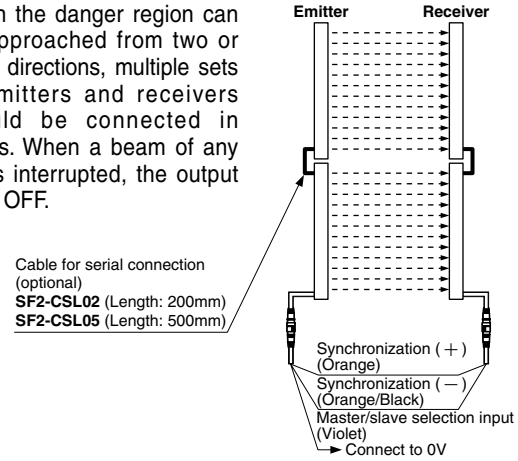
Others

• Do not use during the initial transient time (5 sec.) after the power supply is switched on.

Connection

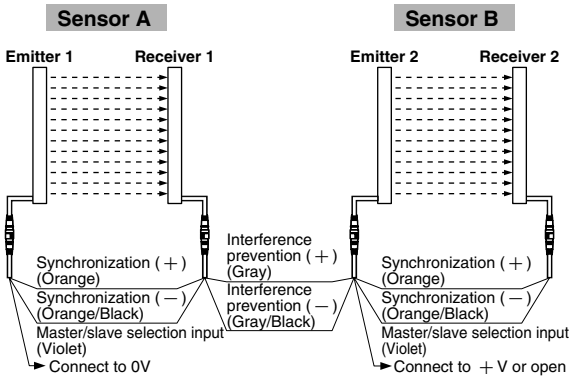
Series connection **[4 sets max. (192 beam channels max.) connectable]**

• When the danger region can be approached from two or more directions, multiple sets of emitters and receivers should be connected in series. When a beam of any set is interrupted, the output turns OFF.



Parallel connection **[4 sets max. (192 beam channels max.) connectable]**

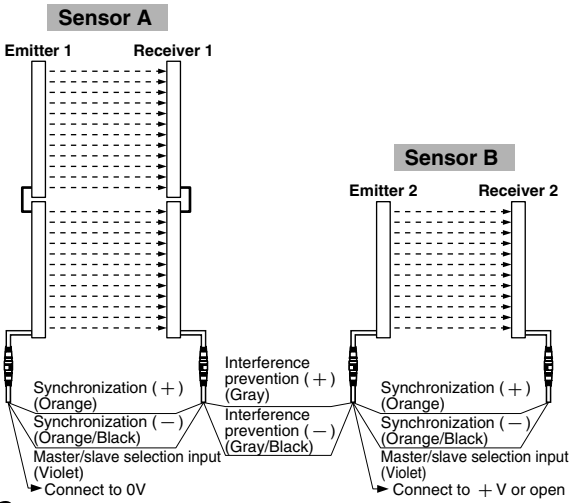
• In case there are two, or more, danger regions which can be approached from a single direction only, multiple sets of emitters and receivers can be connected in parallel by connecting their interference prevention wires to individually monitor the danger regions. Since the outputs are separate, only the output of the sensor whose beams are interrupted is turned OFF.



Serial/parallel mixed connection

[12 set max. (192 beam channel max.) connectable]

• In case there are two, or more, danger regions which can be approached from two or more directions, multiple sets of emitters and receivers can be connected in series and parallel mixed combination. For the sensors connected in series, the output turns OFF if the beams of any of these sensors are interrupted. For the sensors connected in parallel, the output of only the sensor whose beams are interrupted turns OFF.



SF2-EH

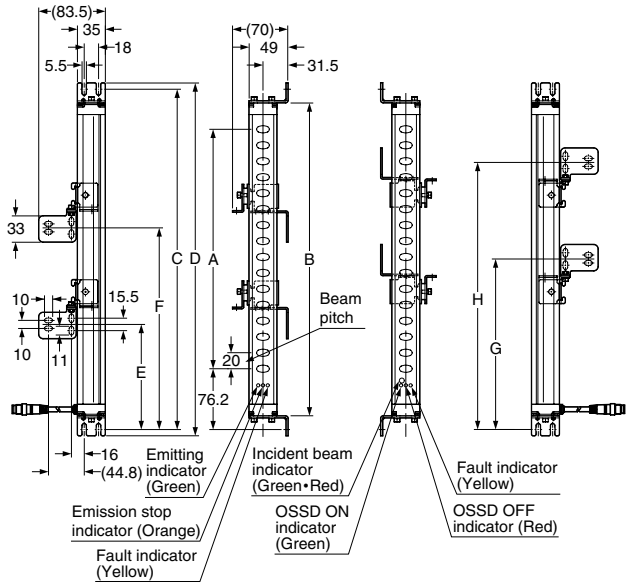
DIMENSIONS (Unit: mm)

SF2-EH□(-N) Sensor

Assembly dimensions

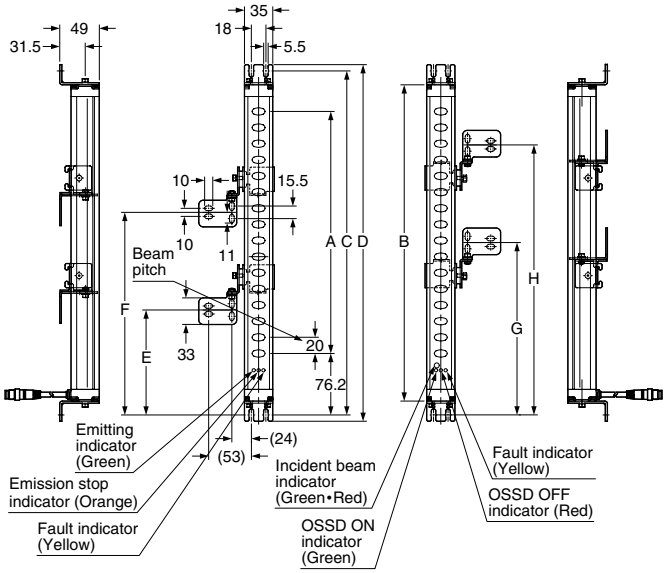
Mounting drawing for the sensor on which the sensor mounting brackets and the intermediate supporting brackets are mounted

<Side mounting>



Emitter **Receiver**

<Back mounting>



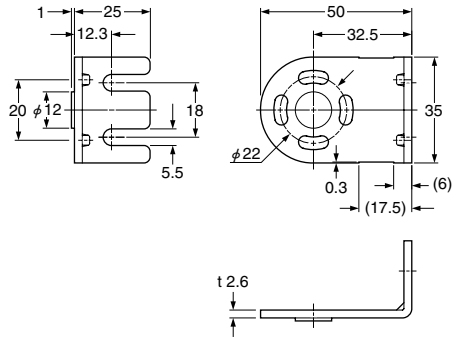
Emitter **Receiver**

Model No.	A	B	C	D	E	F	G	H
SF2-EH12(-N)	220	312	346	362	—	—	—	—
SF2-EH16(-N)	300	392	426	442	—	—	—	—
SF2-EH20(-N)	380	472	506	522	—	—	—	—
SF2-EH24(-N)	460	552	586	602	332	—	280	—
SF2-EH28(-N)	540	632	666	682	362	—	320	—
SF2-EH32(-N)	620	712	746	762	402	—	360	—
SF2-EH36(-N)	700	792	826	842	442	—	400	—
SF2-EH40(-N)	780	872	906	922	482	—	440	—
SF2-EH48(-N)	940	1,032	1,066	1,082	562	—	520	—
SF2-EH56(-N)	1,100	1,192	1,226	1,242	642	—	600	—
SF2-EH64(-N)	1,260	1,352	1,386	1,402	488	976	446	892
SF2-EH72(-N)	1,420	1,512	1,546	1,562	542	1,084	500	1,000
SF2-EH80(-N)	1,580	1,672	1,706	1,722	595	1,190	574	1,148

Note: **MS-SF2-2** (intermediate supporting bracket) is attached with sensors having 24, or more, beam channels.
The number of attached intermediate supporting brackets is different depending on the sensor as follows.
SF2-EH24(-N), **SF2-EH28(-N)**, **SF2-EH32(-N)**, **SF2-EH36(-N)**, **SF2-EH40(-N)**, **SF2-EH48(-N)**, **SF2-EH56(-N)**: 1 set
SF2-EH64(-N), **SF2-EH72(-N)**, **SF2-EH80(-N)**: 2 sets

DIMENSIONS (Unit: mm)

MS-SF2-1 Sensor mounting bracket (Accessory)

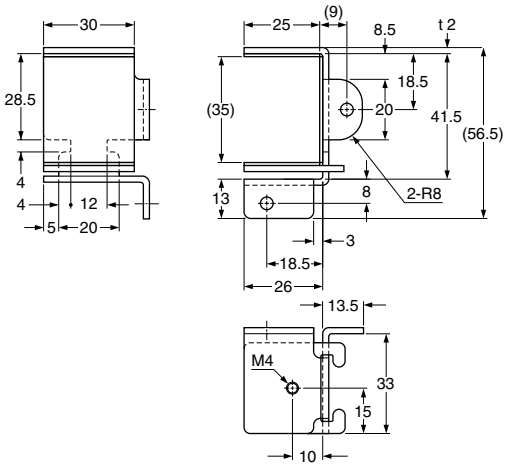


Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

Four bracket set
Eight M4 (length 8mm) hexagon-socket-head bolts and eight spring washers are attached.

MS-SF2-2 Intermediate supporting bracket (Accessory)

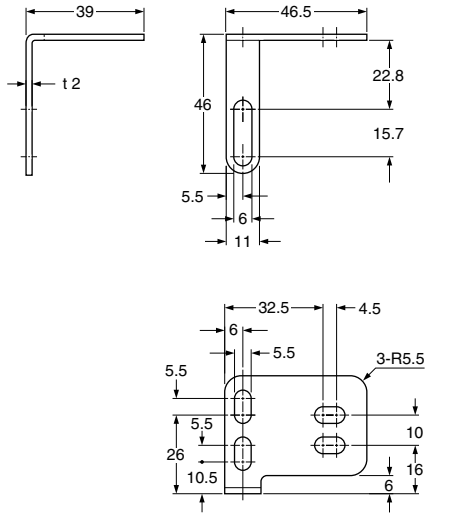
U-shaped intermediate supporting bracket



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

Set of 2 Nos. each of U-shaped intermediate supporting bracket and L-shaped intermediate supporting bracket
Two M4 (length 6mm), two M4 (length 8mm) hexagon-socket-head bolts, two nuts and two spring washers are attached.

L-shaped intermediate supporting bracket



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

MEMO