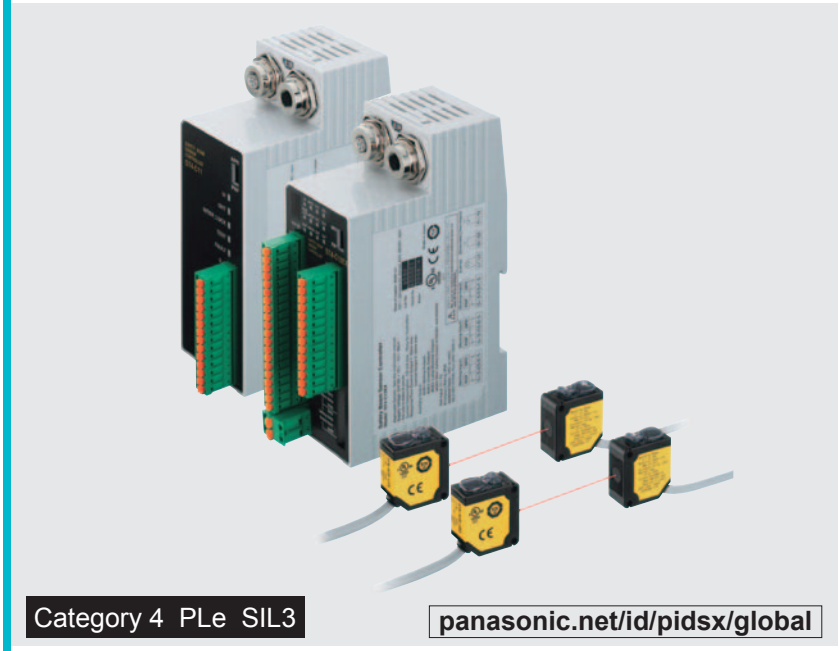
Compact Safety Beam Sensor Type 4

ST4 SERIES

Related Information ■ General terms and conditions..... F-13 ■ General precautions P.1501



Category 4 PLe SIL3

panasonic.net/id/pidsx/global

Conforming to Machine & EMC Directive

c UL us Listing

Certified

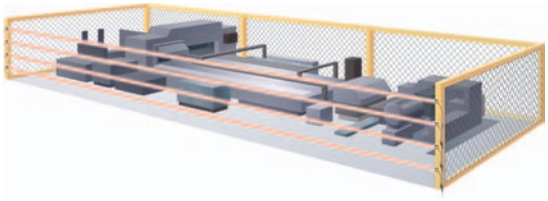
Conforming to OSHA / ANSI

PNP output type available

From wide areas to narrow spaces, full support for both safety and productivity

Long sensing range of up to 15 m 49.213 ft

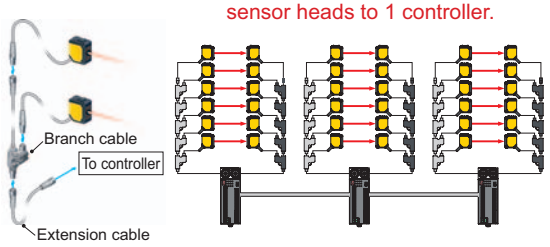
Secures safety of large facilities where installation of guardian fence is difficult.



Series connection of sensors and interference prevention

The numbers of sensor heads and controllers can be freely adjusted to meet the heights and the required numbers of the protection area.

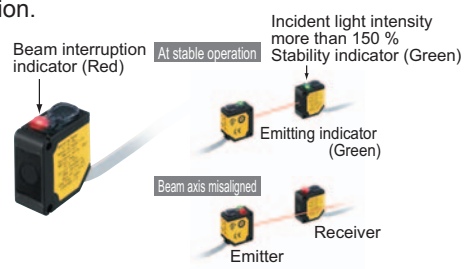
Series connection of 6 sets of sensor heads to 1 controller.



Interference prevention of 18 sets of sensor heads with a cascade connection of up to 3 controllers.

Beam axis alignment and operation confirmation

The beam interruption indicator is incorporated in both the emitter and receiver. This indicator can be used not only for operation confirmation but also for beam axis alignment. Moreover, the stability indicator indicates if the incident light intensity exceeds 150 % in stable operation.

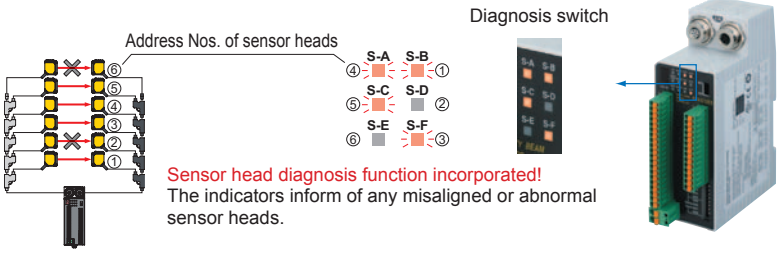


Supports beam axis alignment at startup and quick restoration in case of trouble

High-functional type **ST4-C12EX**

Light received condition of the sensor heads in series connection can be confirmed by the high-functional controller **ST4-C12EX**.
In addition, any abnormal sensors during lockout can be identified.

(Ex.) When address No.2 and 6 are misaligned in a series connection of 6 sets.

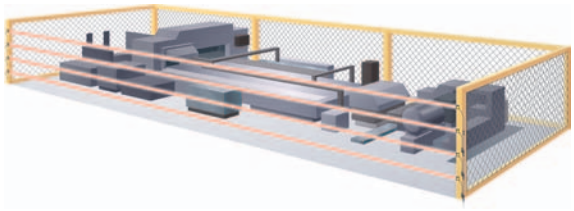


Sensor head diagnosis function incorporated!
The indicators inform of any misaligned or abnormal sensor heads.

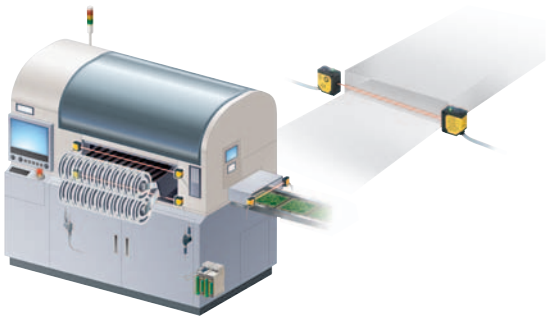
FIBER SENSORS
LASER SENSORS
PHOTOELECTRIC SENSORS
MICRO PHOTOELECTRIC SENSORS
AREA SENSORS
LIGHT CURTAINS / SAFETY COMPONENTS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC ELECTRICITY PREVENTION DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY CONSUMPTION VISUALIZATION COMPONENTS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
Light Curtains
Safety Components
Optical Touch Switch
Control Units
Definition of Sensing Heights
SG-B1/SG-A1
SG-B2
SG-C1
SG-D1
SG-E1
SD3-A1
ST4

APPLICATIONS

Long sensing range

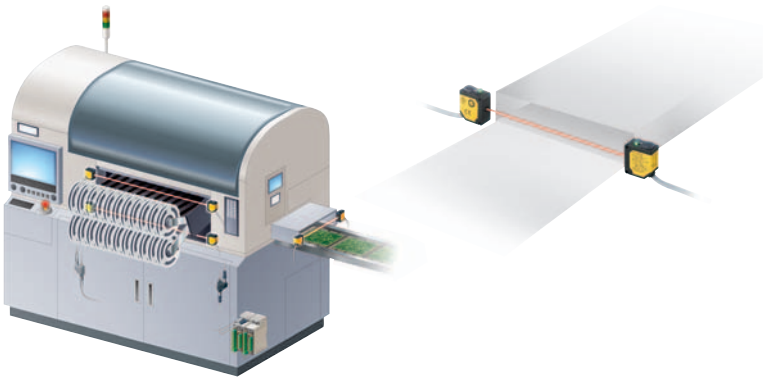


Small gap sensing



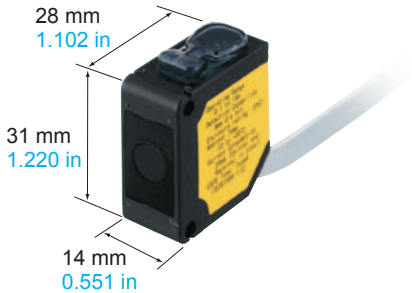
In small openings where light curtains cannot be installed

Ensures safety in small openings that are often missed.



Compact sensor head saves space

The Type 4 long sensing range type has a compact size that is equivalent to those of general-purpose photoelectric sensors.



Industry standard mounting pitch

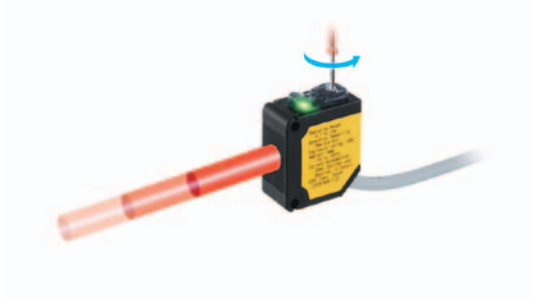
Having the same mounting pitch as those of general-purpose photoelectric sensors makes model switchovers easy.

Protection structure IP67

Conforming to protection structure IP67, the sensor heads can be used safely even at lines where water splashes.

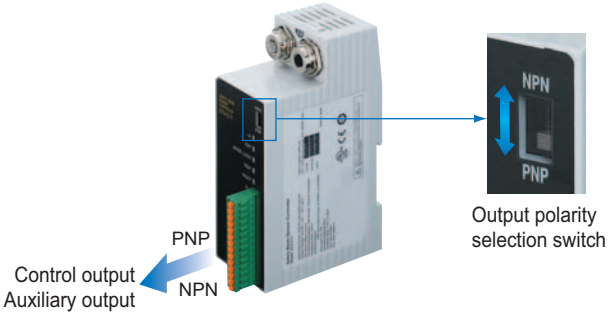
Control of interferences to surrounding sensors

The emission amount adjuster can be used to reduce the emission to control any interference to the surrounding sensors.



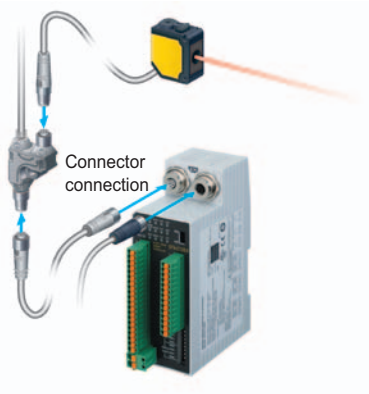
Supports both PNP and NPN polarities

A single unit can be used for PNP / NPN output switching, reducing the number of parts that need to be registered.



Easy connector connection

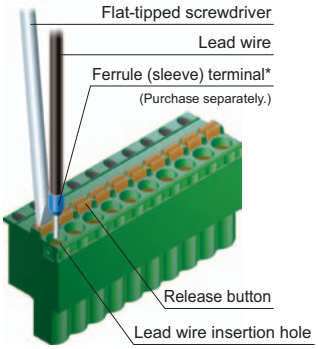
Connecting to the sensor head is done using connector connections, which shortens setup and replacement time.



Easy setup requiring no torque control

A spring method is used for the terminal blocks. There is no need to control tightening torques for these terminal blocks.

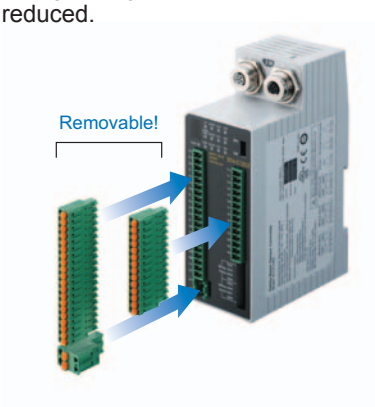
Uses a spring method!



* Connection is possible with a single wire or coil wires.

Removal terminal blocks reduce maintenance time

The work required for reconnecting wiring during maintenance is reduced.



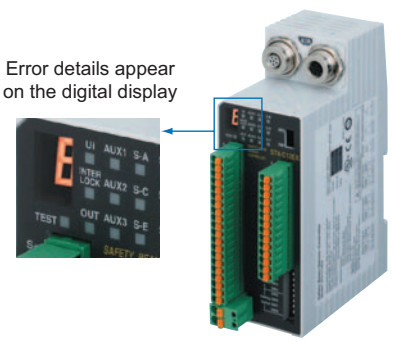
Semiconductor output reduces running costs!

Semiconductor output is used for control output. This means there is no need to periodically replace safety relays.

Error details can be understood at a glance!

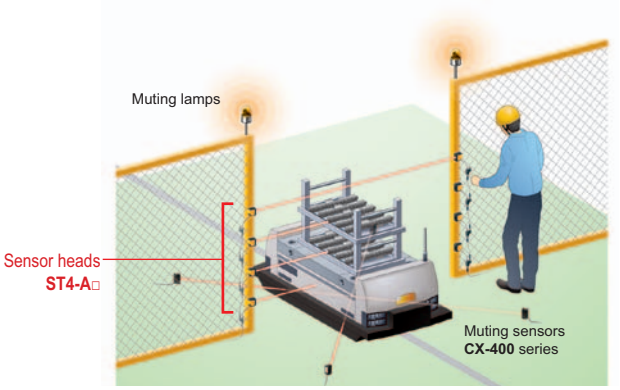
High-functional type
ST4-C12EX

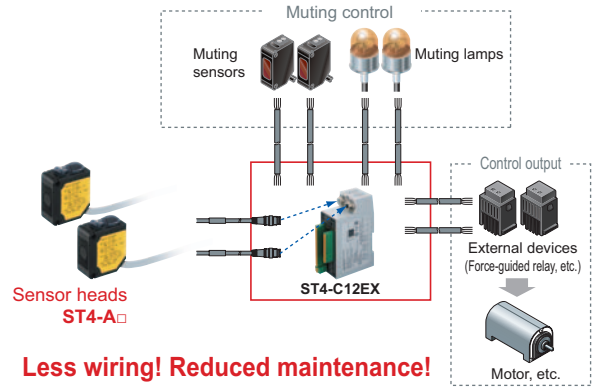
If a problem should occur, the control output is switched OFF, and the details of the error appear on the digital display.



Three patterns of muting control function for greater safety with no loss in productivity — High-functional type ST4-C12EX

Sensor heads, muting sensors, and muting lamps connect directly to the controller, so that muting control circuits can be built easilv.





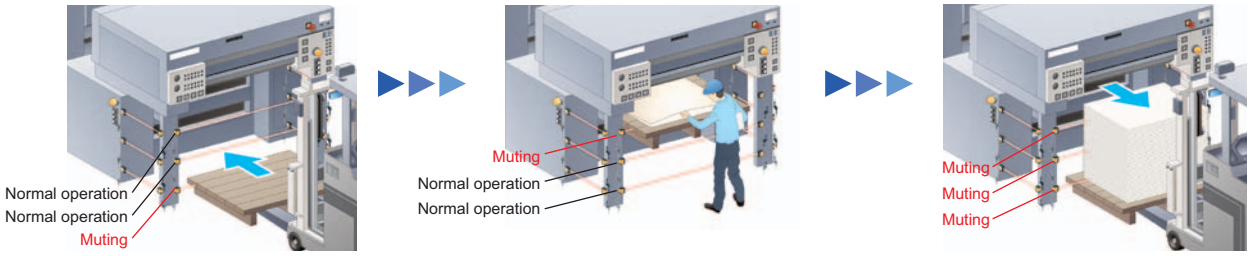
Less wiring! Reduced maintenance!

Muting pattern No.1

Compliant to international safety standard ISO 12643 for printing industry

Muting area can be changed to suit the printing process. This is the optimal muting control for printing machines.

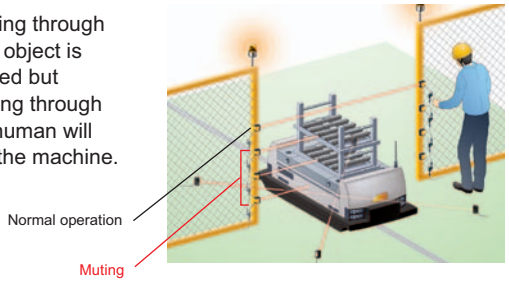
①Put in an unfilled palette (Bottom-most muting) ▶ ②Sample inspect the printing paper (Top-most muting) ▶ ③Take out the printed material (All muting)



Muting pattern No.2

Set apart only the top-most sensor heads and perform muting control.

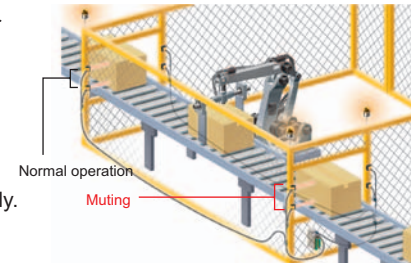
(Ex.) Passing through of an object is allowed but passing through of a human will stop the machine.



Muting pattern No.3

Divide the muting area into two.

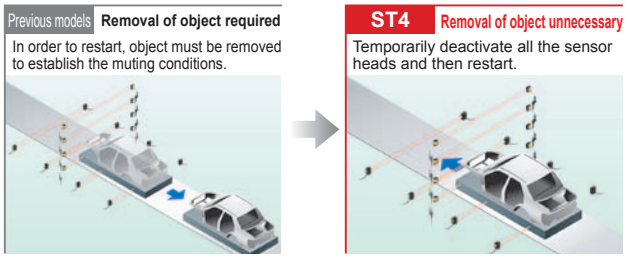
(Ex.) Allocate sensor heads at the entrance and exit of objects separately, so that muting is done individually.



Line restarts smoothly after being stopped while muting control was active <Override function> — High-functional type ST4-C12EX

In case the sensor head has been interrupted by an object or in case there is an emergency stop before the muting conditions have been established, all the sensor heads will be temporarily deactivated following by a smooth restart.

(Ex.) When the power turns off while the sensor head has been interrupted by an object.



Informs all kinds of operation conditions — High-functional type ST4-C12EX

In case the muting lamp that is connected to the controller breaks, an alarm will go off. Also, auxiliary outputs that link to the muting function, override function, and control outputs (OSSD) are incorporated.

Auxiliary outputs	Function	Operation
Auxiliary output 1	Muting output	ON when muting function is invalid
Auxiliary output 2	Override output	ON when override function is invalid
Auxiliary output 3	Blown lamp output	ON when muting lamp is in normal condition
Auxiliary output 4	Monitor output	ON when control output is OFF

ORDER GUIDE

Sensor heads

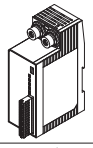
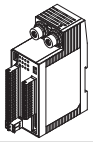
Always use the sensor head and the controller together as a set.

Type	Appearance	Operating range (Note 1)	Model No. (Note 2)
Cable length 0.2 m 0.656 ft		0.1 to 15 m 0.328 to 49.231 ft	ST4-A1-J02
With emission amount adjuster			ST4-A1-J02V
Cable length 1 m 3.281 ft			ST4-A1-J1
With emission amount adjuster			ST4-A1-J1V

Notes: 1) The "operating range" is the possible setting distance between the emitter and the receiver.
2) The model No. with suffix "**E**" shown on the label affixed to the product is the emitter, "**D**" shown on the label is the receiver.

Controllers

Always use the sensor head and the controller together as a set.

Type	Appearance	Model No.	Control output
Controller		ST4-C11	Dual PNP transistor open-collector output × 1 system or Dual NPN transistor open-collector output × 1 system (Set using output polarity selection switch)
High-functional type		ST4-C12EX	

OPTIONS

Designation	Model No.	Description		
Extension cable	ST4-CCJ1E	Cable length: 1 m 3.281 ft Net weight 55 g approx. (1 cable)	For emitter	Use as an extension for the **ST4-A**□. 5-wire shielded cable. One each for emitter and receiver Cable color: Gray (for emitter), Gray with black line (for receiver) Connector color: Gray (for emitter), Black (for receiver) Min. bending radius: R5 mm R0.197 in
	ST4-CCJ1D		For receiver	
	ST4-CCJ3E	Cable length: 3 m 9.843 ft Net weight 130 g approx. (1 cable)	For emitter	
	ST4-CCJ3D		For receiver	
	ST4-CCJ5E	Cable length: 5 m 16.404 ft Net weight 200 g approx. (1 cable)	For emitter	
	ST4-CCJ5D		For receiver	
	ST4-CCJ7E	Cable length: 7 m 22.966 ft Net weight 270 g approx. (1 cable)	For emitter	
	ST4-CCJ7D		For receiver	
	ST4-CCJ15E	Cable length: 15 m 49.213 ft Net weight 540 g approx. (1 cable)	For emitter	
	ST4-CCJ15D		For receiver	
Branch cable	ST4-CCJ05-WY	Cable length: 0.5 m 1.640 ft Net weight 80 g approx. (2 cables)	Use to connect **ST4-A**□ in series. 5-wire shielded cable. Two cables per set for emitter and receiver Cable color: Gray (for emitter), Gray with black line (for receiver) Connector color: Gray (for emitter), Black (for receiver) Min. bending radius: R5 mm R0.197 in	
Sensor head mounting bracket	MS-CX2-1	Foot angled mounting bracket. 2 different types for emitter and receiver required.		
	MS-ST4-3	Back angled mounting bracket. 2 different types for emitter and receiver required.		
	MS-ST4-6	Foot biangled mounting bracket. 2 different types for emitter and receiver required.		
Round slit mask (Note)	OS-ST4-2 (Slit size ø2 mm ø0.079 in)	Dampens the light to suppress interference with neighboring sensors.	Operating range • Slit on one side: 3 m 9.843 ft • Slit on both sides: 0.75 m 2.461 ft	
	OS-ST4-3 (Slit size ø3 mm ø0.118 in)		Operating range • Slit on one side: 4.5 m 14.764 ft • Slit on both sides: 1.5 m 4.921 ft	

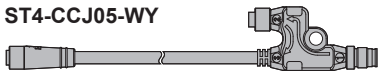
Note: When the slit mask is installed, applicable sensing objects are opaque objects with a diameter of ø9 mm ø0.354 in or more.

Extension cable

• **ST4-CCJ**□

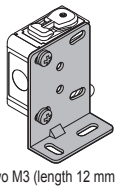
Branch cable

• **ST4-CCJ05-WY**



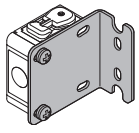
Sensor head mounting bracket

• **MS-CX2-1**



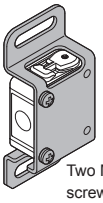
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

• **MS-ST4-3**



Two M3 (length 12 mm 0.472 in) screws with washers are attached.

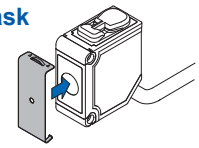
• **MS-ST4-6**



Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Round slit mask

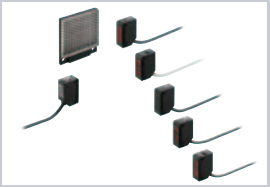
• **OS-ST4-2**
• **OS-ST4-3**



OPTIONS

Introduction to Panasonic Industrial Devices SUNX sensors that can be used as muting sensors

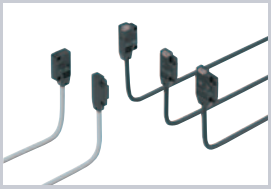
Compact Photoelectric Sensor
CX-400 SERIES Ver.2



- World standard size
- Wide variation

P.277~

Ultra-slim Photoelectric Sensor
EX-10 SERIES Ver.2

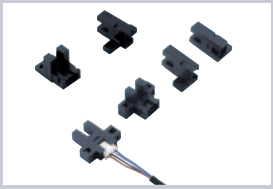


- 3.5 mm 0.138 in thickness
- Long sensing range: 1 m 3.281 ft (thru-beam type: **EX-19**)

* The **EX-20** series that is compatible with M3 mounting screws is also available.

P.313~

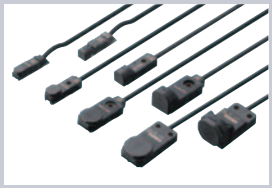
U-shaped Micro Photoelectric Sensor
PM-64 SERIES



- Extremely compact and space saving
- A lineup of quick fitting-up connector type

P.429~

Rectangular-shaped Inductive Proximity Sensor
GX-F/H SERIES



- Industry longest in stable sensing range
- 10 times the durability (Compared to previous models)
- IP68G protective construction

P.807~

Recommended muting lamps

Manufactured by Maruyasu Dengyo Co., Ltd.
Model No.: BLR-30O-C

Manufactured by IDEC Corporation
Model No.: HW1P-5Q7A

Note: Contact the manufacturers for details on the recommended products.

Recommended safety relays

Manufactured by Panasonic Corporation
Model No.: SF series (Safety Relay)
Note: Contact the manufacturers for details on the recommended products.

SPECIFICATIONS

Sensor heads

Item \ Type		Cable length 0.2 m 0.656 ft		Cable length 1 m 3.281 ft	
			With emission amount adjuster		With emission amount adjuster
Model No.		ST4-A1-J02	ST4-A1-J02V	ST4-A1-J1	ST4-A1-J1V
Applicable standard (Note 2)		IEC 61496-1/2 (JIS B 9704-1/2 / UL 61496-1/2) (Type 4), ISO 13849-1 (Category 4, PLe), JIS B 9705-1 (Category 4), IEC 61508-1 to 7 (SIL3), IEC 62061 (SIL3), JIS C 0508-1 to 7 (SIL3), UL 1998, OSHA 1910.212, OSHA 1910.217 (C), ANSI B11.1 to B11.19, ANSI/RIA R15.06, ANSI/ISA S84.01 (SIL3)			
Operating range		0.1 to 15 m 0.328 to 49.213 ft (Note 3)			
Sensing object		ø9 mm ø0.354 in or more opaque object			
Effective aperture angle (EAA)		±2.5° or less for operating range exceeding 3 m 9.843 ft (required by IEC 61496-2 / UL 61496-2)			
Supply voltage		Supplied from controller			
Current consumption		Emitter: 11 mA or less, Receiver: 9 mA or less			
Beam interruption indicator (Note 4)		Red LED (lights up when the beam is interrupted or lock out, lights off during reception)			
Beam emission indicator		Green LED (lights up during beam emission, lights off during emission halt)			
Stable incident beam indicator		Green LED (lights up under stable light received condition, lights off under unstable light received condition)			
Environmental resistance	Degree of protection	IP67 (IEC)			
	Ambient temperature	−10 to +55 °C +14 to +131 °F (No dew condensation or icing allowed), Storage: −25 to +70°C −13 to +158 °F			
	Ambient humidity	30 to 85 % RH, Storage: 30 to 95 % RH			
	Ambient illuminance	Incandescent lamp: 3,500 ℓx at the light-receiving face			
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	20 MΩ or more with 500V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 55 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each			
	Shock resistance	300 m/s^2 acceleration in X, Y and Z directions for three times each			
Emitting element		Infrared LED (Peak emission wavelength: 870 nm 0.034 mil)			
Material		Enclosure: PBT (Polybutylene terephthalate), Lens: Acrylic, Indicator cover: Acrylic			
Cable		Shielded cable with connector, 0.2 m 0.656 ft long		Shielded cable with connector, 1 m 3.281 ft long	
Cable extension		Extention up to total 50 m 164.042 ft is possible for both emitter and receiver with exclusive cable.			
Weight (Total of emitter and receiver)		Net weight: 45 g approx., Gross weight: 60 g approx.		Net weight: 100 g approx., Gross weight: 140 g approx.	

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.
2) Complies with those standards only when the sensor head is used in combination with the controller **ST4-C11 / ST4-C12EX**.
3) The operating range is the possible setting distance between the emitter and the receiver. It can detect sensing object of less than 0.1 m 0.328 ft away.
4) Shows light interruption information between the emitter and the receiver with the same address. It does not show OSSD output.

SPECIFICATIONS

Controllers

Item \ Model No.	Type	Controller	High-functional controller
		ST4-C11	**ST4-C12EX**
Applicable sensor head		**ST4-A□**	
	No. of series connections	Interference prevention possible when up to a maximum of 6 sets are connected (When the maximum of 3 controllers are connected together, interference prevention is possible for up to 18 sets)	
Applicable standards (Note 2)		IEC 61496-1/2 (JIS B 9704-1/2 / UL 61496-1/2) (Type 4), ISO 13849-1 (Category 4, PLe), JIS B 9705-1 (Category 4), IEC 61508-1 to 7 (SIL3), IEC 62061 (SIL3), JIS C 0508-1 to 7 (SIL3), UL 1998, OSHA 1910.212, OSHA 1910.217 (C), ANSI B11.1 to B11.19, ANSI/RIA R15.06, ANSI/ISA S84.01 (SIL3)	
Supply voltage		24 V DC $^{+10}_{-15}$ % Ripple P-P 10 % or less	
Current consumption		100 mA or less (excluding sensor head **ST4-A□**)	120 mA or less (excluding sensor head **ST4-A□**)
Control outputs (OSSD1, OSSD2) (Note 3)		PNP open-collector transistor / NPN open-collector transistor Dual output × 1 system (Set using output polarity selection switch) <PNP output> • Maximum source current: 200 mA • Applied voltage: same as the supply voltage (between control output and +V) • Residual voltage: 2.5 V or less (at 200 mA source current) • Leakage current: 200 µA or less (including power OFF condition) • Maximum load capacity: 1 µF (from no-load to max. source current) • Load wiring resistance: 3 Ω or less (between control output and load)	<NPN output> • Maximum sink current: 200 mA • Applied voltage: same as the supply voltage (between control output and 0 V) • Residual voltage: 2.0 V or less (at 200 mA sink current) • Leakage current: 200 µA or less (including power OFF condition) • Maximum load capacity: 1 µF (from no-load to max. sink current) • Load wiring resistance: 3 Ω or less (between control output and load)
	Operation mode	ON when all beams of the connected **ST4-A□**s are received OFF when one or more beams of the connected **ST4-A□**s are interrupted (except during muting / override when **ST4-C12EX** is used) OFF during lockout	
	Protection circuit	Incorporated	
Response time		OFF response: 25 ms or less, ON response: 90 ms or less (auto reset) / 140 ms or less (manual reset)	
Auxiliary outputs (Note 3)		PNP open-collector transistor / NPN open-collector transistor (Set using output polarity selection switch) **ST4-C11**: one output **ST4-C12EX**: four outputs <PNP output> • Maximum source current: 100 mA • Applied voltage: same as the supply voltage (between auxiliary output and +V) • Residual voltage: 2.5 V or less (at 100 mA source current)	<NPN output> • Maximum sink current: 100 mA • Applied voltage: same as the supply voltage (between auxiliary output and 0 V) • Residual voltage: 2.0 V or less (at 100 mA sink current)
	Operation mode	OFF when all beams of the connected **ST4-A□**s are received ON when one or more beams of the connected **ST4-A□**s are interrupted	<Auxiliary output 1> ON when muting function is invalid OFF when muting function is valid <Auxiliary output 2> ON when override function is invalid OFF when override function is valid <Auxiliary output 3> ON when muting lamp is in normal condition OFF when muting lamp is in abnormal condition <Auxiliary output 4> Negative logic of the control outputs (OSSD1, OSSD2)
	Protection circuit	Incorporated	
Muting lamp output (Note 3)		———	Available muting lamp: 24 V DC, 1 to 10 W
	Protection circuit	Incorporated	
Environmental resistance	Degree of protection	Enclosure: IP40 (IEC), Terminal: IP20 (IEC)	
	Ambient temperature	−10 to +55 °C +14 to +131 °F (No dew condensation or icing allowed), Storage: −25 to +70°C −13 to +158 °F	
	Ambient humidity	30 to 85 % RH, Storage: 30 to 95 % RH	
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure	
	Insulation resistance	20 MΩ or more with 500 V DC mega between all supply terminals connected together and enclosure	
	Vibration resistance	10 to 55 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each	
	Shock resistance	300 m/s^2 acceleration in X, Y and Z directions for three times each	
Connection terminal		Detachable spring-cage terminal	
Wiring cable		Terminal block connector: 0.2 to 1.5 mm^2 Power supply connector (A1, A2): 0.2 to 2.5 mm^2 (only for **ST4-C12EX**)	
Material		Enclosure: ABS	
Weight		Net weight: 180 g approx., Gross weight: 390 g approx.	Net weight: 240 g approx., Gross weight: 450 g approx.

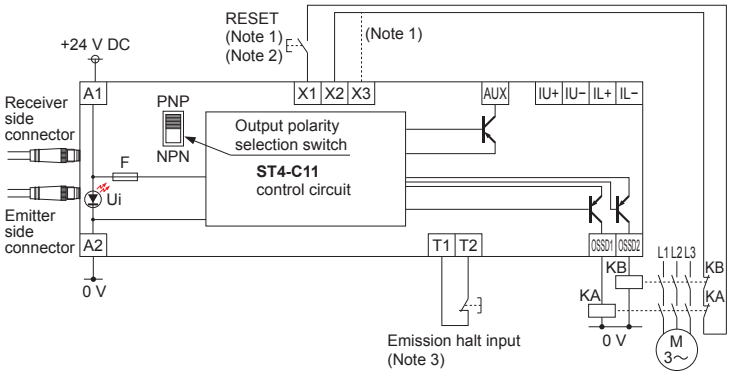
Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.
2) Complies with those standards only when the controller is used in combination with the sensor head **ST4-□**.
3) If the total current of the control outputs (OSSD1, OSSD2), auxiliary outputs, and muting lamp output exceeds 400 mA, the wiring resistance between the controller and the power supply should be 1 Ω or less. In addition, if the total current is 400 mA or less, the wiring resistance between the controller and the power supply should be 2 Ω or less.

I/O CIRCUIT AND WIRING DIAGRAMS

ST4-C11

In case of PNP output

• Set the output polarity selection switch to the PNP side.

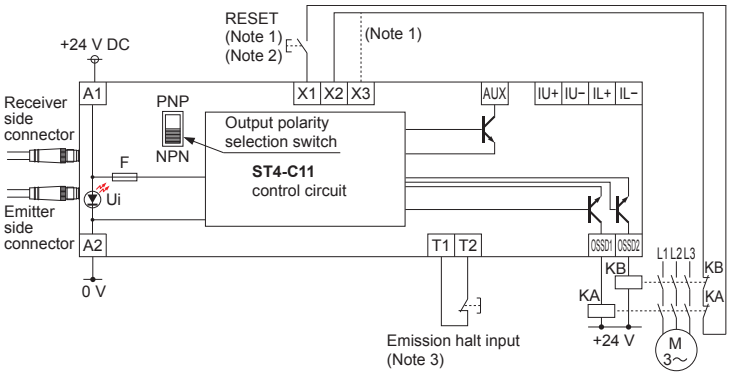


Notes: 1) The left diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a reset (RESET) button is not needed.
2) Use a momentary-type switch as the reset (RESET) button.
3) Emission halt input is for stopping emission when open, and emitting when short-circuited. If not using the test button, short-circuit T1 and T2.

KA, KB: Force-guided relay or magnetic contactor

In case of NPN output

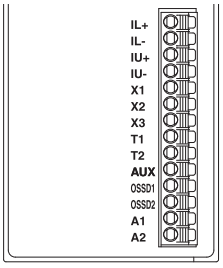
• Set the output polarity selection switch to the NPN side.



Notes: 1) The left diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a reset (RESET) button is not needed.
2) Use a momentary-type switch as the reset (RESET) button.
3) Emission halt input is for stopping emission when open, and emitting when short-circuited. If not using the test button, short-circuit T1 and T2.

KA, KB: Force-guided relay or magnetic contactor

Terminal arrangement diagram



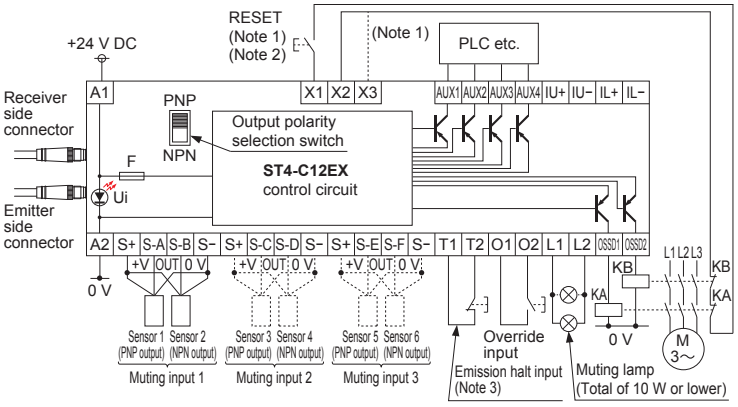
Terminal	Description
IL+	Interference prevention terminals
IL−	
IU+	Interference prevention terminals
IU−	
X1	Reset input terminals (When X1 and X2 are connected: manual reset, and when X1 and X3 are connected: auto reset)
X2	
X3	
T1	Emission halt input terminals (Open: emission halt, Short-circuit: emission)
T2	
AUX	Negative logic of the control outputs (OSSD1, OSSD2)
OSSD1	Control outputs (OSSD1, OSSD2)
OSSD2	
A1	24 V DC
A2	0 V

I/O CIRCUIT AND WIRING DIAGRAMS

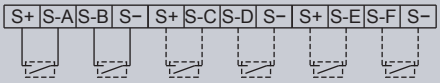
ST4-C12EX

In case of PNP output

• Set the output polarity selection switch to the PNP side.



When using the normally open (NO) contact switch as a muting sensor, wire as shown in the figure below.

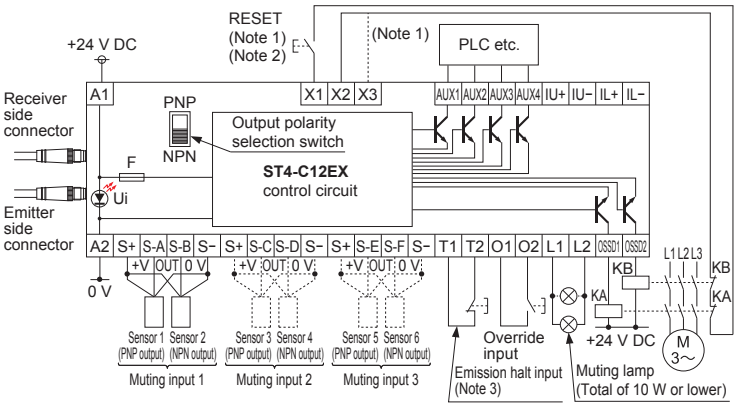


Notes: 1) The left diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a reset (RESET) button is not needed.
2) Use a momentary-type switch as the reset (RESET) button.
3) Emission halt input is for stopping emission when open, and emitting when short-circuited. If not using the test button, short-circuit T1 and T2.

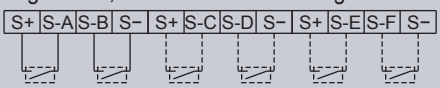
KA, KB: Force-guided relay or magnetic contactor

In case of NPN output

• Set the output polarity selection switch to the NPN side.



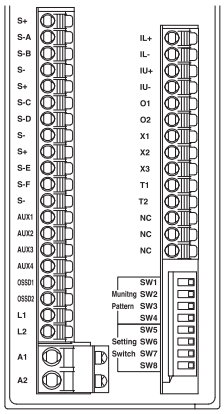
When using the normally open (NO) contact switch as a muting sensor, wire as shown in the figure below.



Notes: 1) The left diagram is when using manual reset. If automatic reset is used, disconnect the lead from X2 and connect it to X3. In this case, a reset (RESET) button is not needed.
2) Use a momentary-type switch as the reset (RESET) button.
3) Emission halt input is for stopping emission when open, and emitting when short-circuited. If not using the test button, short-circuit T1 and T2.

KA, KB: Force-guided relay or magnetic contactor

Terminal arrangement diagram



Terminal	Description
S+	Muting input power supply (24 V)
S-A	Muting input S-A [For NO (nomally open) contact or PNP output type sensor]
S-B	Muting input S-B [For NO (nomally open) contact or NPN output type sensor]
S−	Muting input power supply (0 V)
S+	Muting input power supply (24 V)
S-C	Muting input S-C [For NO (nomally open) contact or PNP output type sensor]
S-D	Muting input S-D [For NO (nomally open) contact or NPN output type sensor]
S−	Muting input power supply (0 V)
S+	Muting input power supply (24 V)
S-E	Muting input S-E [For NO (nomally open) contact or PNP output type sensor]
S-F	Muting input S-F [For NO (nomally open) contact or NPN output type sensor]
S−	Muting input power supply (0 V)
AUX1	Auxiliary output 1 (muting function)
AUX2	Auxiliary output 2 (override function)
AUX3	Auxiliary output 3 (muting lamp shutoff)
AUX4	Negative logic of the control outputs (OSSD1, OSSD2)
OSSD1	Control outputs (OSSD1, OSSD2)
OSSD2	
L1	Muting lamp connecting terminal
L2	
A1	24 V DC
A2	0 V

Terminal	Description
IL+	Interference prevention terminals
IL−	
IU+	Interference prevention terminals
IU−	
O1	Override input terminals
O2	
X1	Reset input terminals (When X1 and X2 are connected: manual reset, and when X1 and X3 are connected: auto reset)
X2	
X3	
T1	Emission halt input terminals (Open: emission halt, Short-circuit: emission)
T2	

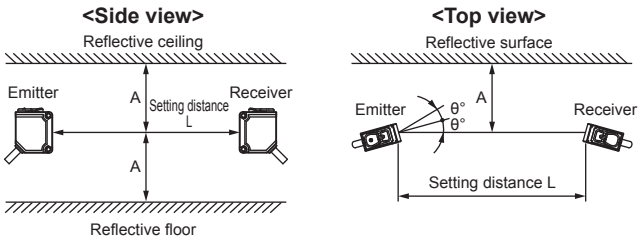
PRECAUTION FOR PROPER USE

Refer to p.1501 for general precautions.

Influence of reflective surfaces

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.

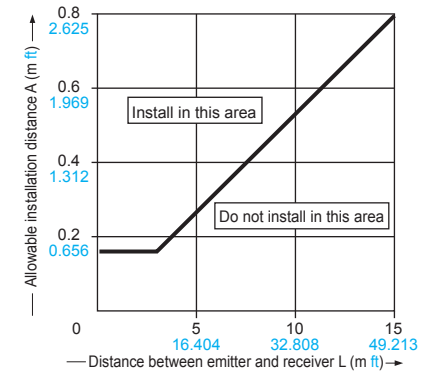
- Install this device at a distance of at least A (m) (given below) away from reflective surfaces such as metal walls, floors, ceilings, objects, covers, panels or glass surfaces.



Distance between emitter and receiver (Setting distance L)	Allowable installation distance A
0.1 to 3 m 0.328 to 9.843 ft	0.16 m 0.525 ft
3 to 15 m 9.843 to 49.213 ft	L / 2 × tan 2θ = L × 0.053 (m) 0.174 (ft) (θ = 3°)

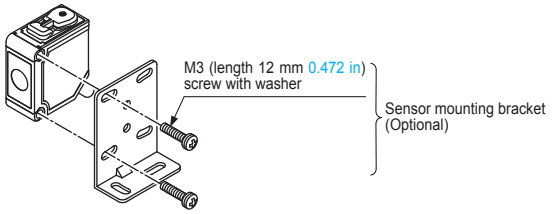
Note: The effective aperture angle for this device is ±2.5° (when L > 3 m 9.843 ft) as required by IEC 61496-2 / UL 61496-2. However, install this device away from reflective surfaces considering an effective aperture angle of ±3° to take care of beam misalignment, etc. during installation.

〈Allowable installation distance between reflective surfaces and beam axis of receiver〉

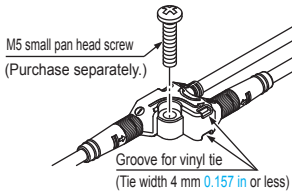


Mounting

- When mounting the sensor head, the tightening torque should be 0.5 N·m or less.



- When mounting **ST4-CCJ05-WY**, the tightening torque should be 0.7 N·m or less. Using a vinyl tie (width 4 mm 0.157 in or less) to fix the cable is also possible.



Wiring

Refer to the applicable regulations for the region where this device is to be used when setting up the device. In addition, make sure that all necessary measures are taken to prevent possible dangerous operating errors resulting from earth faults.

- Make sure to carry out the wiring in the power supply off condition.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this sensor and controller, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- 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.
- It is recommended that the following single wires or twisted wires (lead wires) be used to connect to the terminal block of the controller.
  - Terminal block connector: 0.2 to 1.5 mm^2 (AWG24 to AWG16)
  - Power supply connector (A1, A2) (**ST4-C12EX** only): 0.2 to 2.5 mm^2 (AWG24 to AWG12)

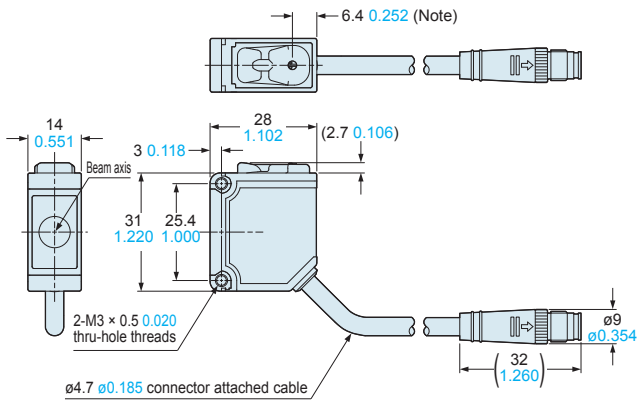
Others

- Do not use during the initial transient time (2 sec.) after the power supply is switched on.
- Avoid dust, dirt and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- Take care that the sensor is not directly exposed to fluorescent lamp from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- The DC power supply unit must satisfy the conditions given below.
  1) Power supply unit authorized in the region where this devices is to be used.
  2) Power supply unit conforming to EMC Directive and Low-voltage Directive (In case CE conformity is required).
  3) Power supply unit conforming to the Low-voltage Directive and with an output of 100 VA or less.
  4) The frame ground (F.G.) terminal must be connected to ground when using a commercially available switching regulator.
  5) Power supply unit with an output holding time of 20 ms or more.
  6) If surges are likely to occur, take countermeasures such as connecting a surge absorber to the origin of the surge.
  7) Power supply unit corresponding to Class 2 (In case UL / cUL conformity is required).

DIMENSIONS (Unit: mm in)

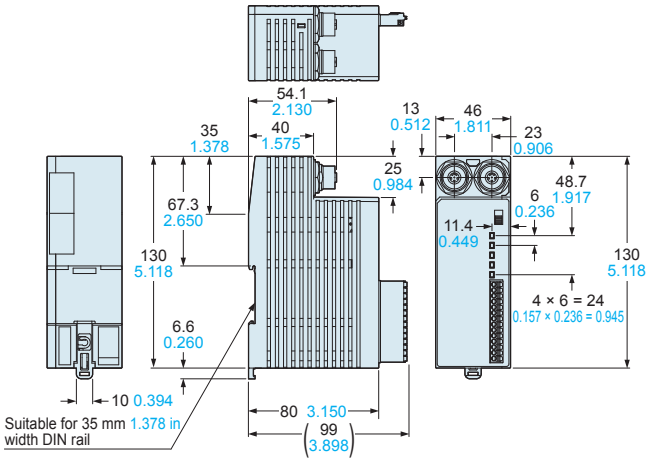
The CAD data in the dimensions can be downloaded from our website.

ST4-A□ Sensor head

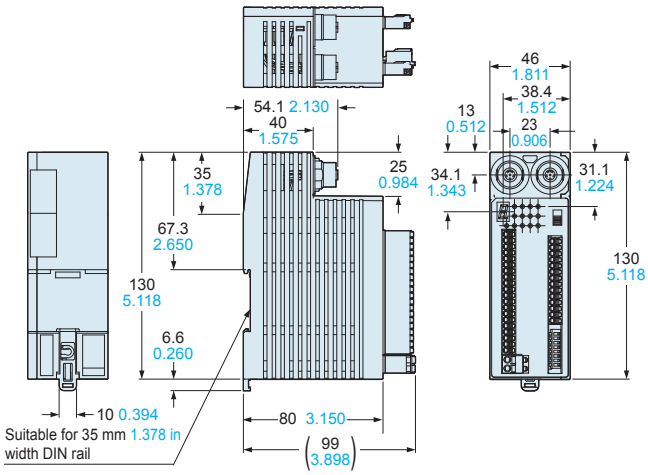


Note: It indicates the position of the emission amount adjuster on **ST4-A□V**.

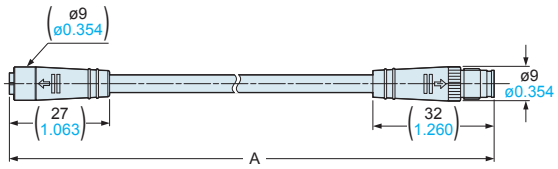
ST4-C11 Controller



ST4-C12EX Controller

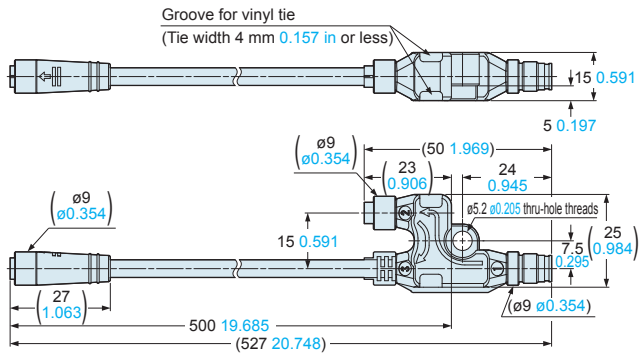


ST4-CCJ□ Extension cable (Optional)

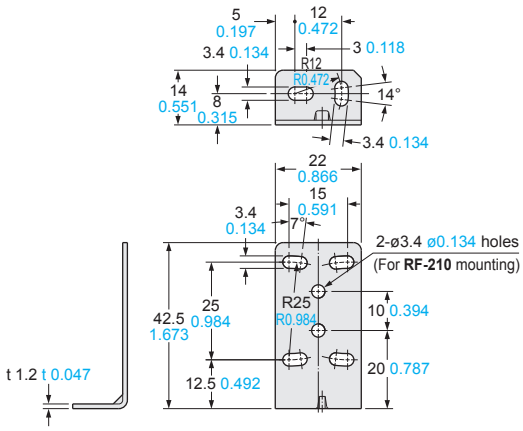


Model No.	A
ST4-CCJ1□	1,000 39.370
ST4-CCJ3□	3,000 118.110
ST4-CCJ5□	5,000 196.850
ST4-CCJ7□	7,000 275.590
ST4-CCJ15□	15,000 590.550

ST4-CCJ05-WY Branch cable (Optional)



MS-CX2-1 Sensor head mounting bracket (Optional)



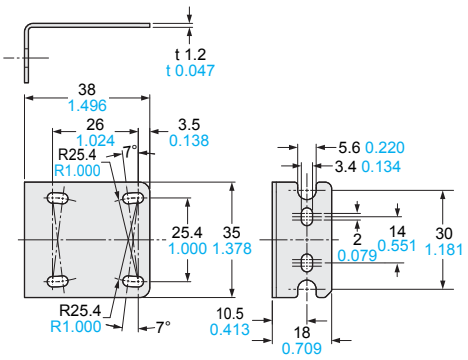
Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

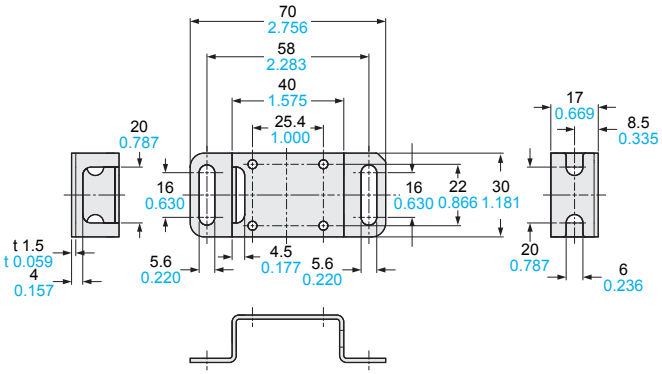
MS-ST4-3 Sensor head mounting bracket (Optional)



Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

MS-ST4-6 Sensor head mounting bracket (Optional)



Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.