

FX-302

New

High-functional Digital Fiber Sensor



The evolution of fiber sensors has finally been realized broadening your possibilities

* Passed the UL 991 Environment Test

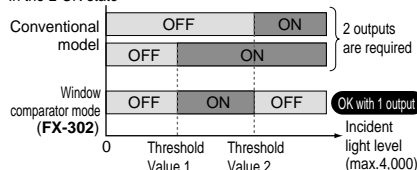


* UL 61010C-1 compatible, Passed the UL 991 Environment Test based on SEMI S2-0200.
[Category applicable for semiconductor manufacturing: TWW2, Process Equipment]
[Applicable standards: UL 61010C-1]
[Additional test / evaluation standards as per intended use: UL991, SEMI S2-0200]

Arithmetic processing is no longer required
Incorporates a convenient single-output window comparator mode

In addition to standard ON / OFF operation, **FX-302** comes fully equipped with a window comparator mode, which sets maximum and minimum threshold values and controls the incident light level through ON / OFF operation within this range. With its single output, only one wire is required, making PLC processing unnecessary.

In the L-ON state



Teaching Methods

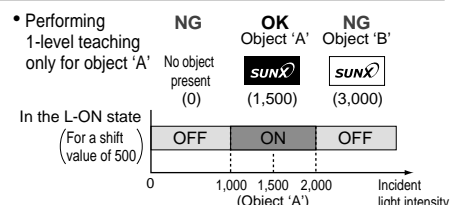
There are 3 types of teaching methods:
1-level teaching / 2-level teaching / 3-level teaching.

1-level Teaching

Identifying the orientation of the object
[When only object 'A' must be detected]



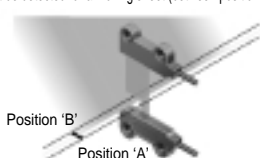
- Performing 1-level teaching only for object 'A'



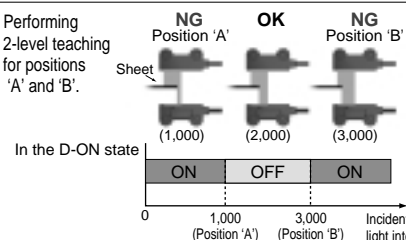
2-level Teaching

If teaching is performed for 2 positions (positions 'A' and 'B'), then the threshold values will be set for these 2 positions.

Sensing side-to-side fluctuations in sheet motion
[When side-to-side fluctuations, outside the permissible range of motion, must be detected for a moving sheet (between positions 'A' and 'B')]



- Performing 2-level teaching for positions 'A' and 'B'.



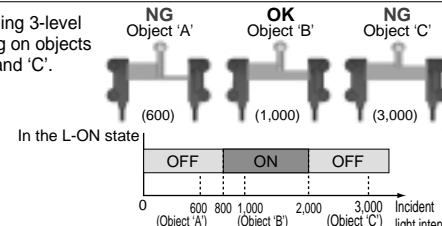
3-level Teaching

If 3-level teaching is performed for 3 positions (objects 'A', 'B' and 'C'), then the threshold values will be set in between objects 'A' & 'B', and objects 'B' & 'C'.

Identifying the length of a screw
[When only object 'B' must be detected]



- Performing 3-level teaching on objects 'A', 'B' and 'C'.



Lower total cost, as PLC and timer are not required. Equipped with variegated timer functions

In addition to the 3 timer modes incorporated in **FX-301** (ON-delay, OFF-delay and ONE SHOT), **FX-302** also adds an ON-delay / OFF-delay timer and an ON-delay / ONE SHOT timer. Timer operations that were previously controlled by the PLC and timer can now be controlled by the fiber sensor unit itself.

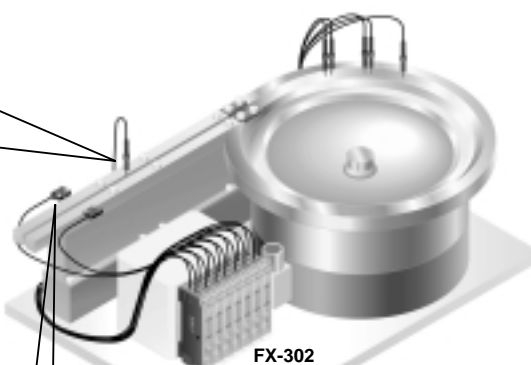
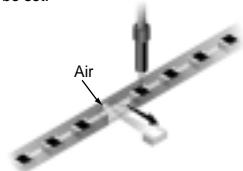
Application example for the ON-delay / OFF-delay timer and the ON-delay / ONE SHOT timer

Utilization of high pressure air for chip sorting after identification of top and bottom surfaces

Only chips with the bottom surface facing upward will be detected. These chips, once detected, will be blown to the side with a jet of air.

The ON-delay function cancels the detection signals of the electrodes.

By detecting the distance between the fiber head and the air outlet, and the rate of vibration, either the ON-delay / OFF-delay timer, or the ON-delay / ONE SHOT timer will be set.



FX-302

Application example for the ON-delay / OFF-delay timer

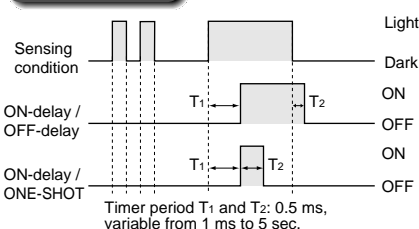
Detecting chip congestion status on a straight transport feeder

The ON-delay function is used to output a signal containing the chip congestion status, in order to determine whether the feeder is too crowded with chips. This signal controls the rate of vibration at the ball feeder area. The OFF-delay function keeps the vibration of the ball feeder area stopped, until chip congestion decreases and chips are again transported smoothly.



Time Chart

In the L-ON state

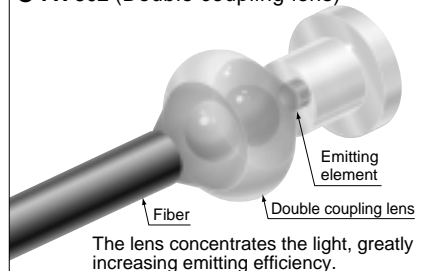


Timer period	Settings Changing Unit
0.5 ms, 1 ms to 30 ms	1 ms
30 ms to 100 ms	5 ms
100 ms to 500 ms	10 ms
500 ms to 1 sec.	50 ms
1 sec. to 5 sec.	0.5 sec.

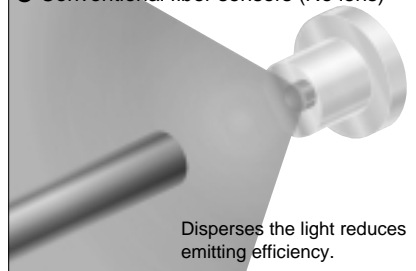
Long-range sensing made possible with built-in optical lens

For the first time in the industry, an optical 'double coupling lens' has been incorporated directly into the fiber sensor itself. This lens maximizes the light emission efficiency, resulting in a tremendous improvement in the sensing range. Sensing ranges with small diameter fibers and ultra-small diameter fibers, which have become very popular in recent years due to the miniaturization of chip components, have been increased by 50 % over previous values achieved with other amplifiers.

● FX-302 (Double coupling lens)



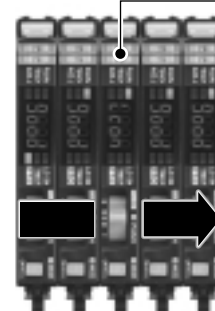
● Conventional fiber sensors (No lens)



Communications setting change function can be locked

Once optical communication has been used for the single-step copying of settings, or for the single-step read-out / saving of databank data, then new data cannot be overwritten into fiber sensors with locked settings.

This function is useful when all data must be read out in a single step, at the time that sensing objects are about to be rearranged, or when the existing settings of synchronized fiber sensors must be maintained.



Overwriting will be prevented when fiber sensor amplifier settings have been locked.

Up to 8 fiber heads can be installed closely together

The optical communications feature allows up to 8 fiber heads to be installed closely together, without causing mutual interference.

(However, when connecting **FX-301/311** units, a maximum of 4 units can be installed without mutual interference.)



Stable long-term sensing


The newly developed four-chemical emitting element that uses the **FX-302** suppresses changes over long periods of time as much as possible, so that a stable light emitting level is maintained. There is very little element deterioration so that stable and accurate sensing can be maintained over long periods.

FX-302

ORDER GUIDE

The sensing range is the same as the **FX-301** (red LED type). Refer to [p.67](#) for details.

Amplifiers **Quick-connection cable is not supplied with the amplifier. Please order it separately.**

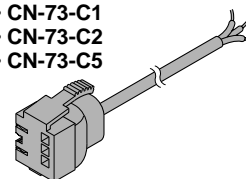
Type	Appearance	Model No.	Emitting element	Output
High-functional digital		FX-302	Red LED	NPN open-collector transistor
		FX-302P		PNP open-collector transistor

Quick-connection cable **Quick-connection cable is not supplied with the amplifier. Please order it separately.**

Type	Model No.	Description	
Main cable	CN-73-C1	Length: 1 m 3.281 ft	0.15 mm ² 3-core cabtyre cable, with connector on one end Cable outer diameter: ϕ 3 mm ϕ 0.118 in
	CN-73-C2	Length: 2 m 6.562 ft	
	CN-73-C5	Length: 5 m 16.404 ft	
Sub cable	CN-71-C1	Length: 1 m 3.281 ft	0.15 mm ² 1-core cabtyre cable, with connector on one end Cable outer diameter: ϕ 3 mm ϕ 0.118 in
	CN-71-C2	Length: 2 m 6.562 ft	
	CN-71-C5	Length: 5 m 16.404 ft	

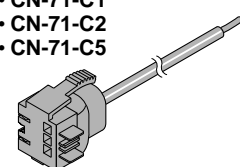
Main cable

- CN-73-C1
- CN-73-C2
- CN-73-C5

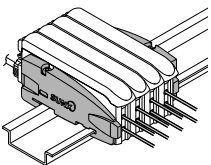


Sub cable

- CN-71-C1
- CN-71-C2
- CN-71-C5



End plates **End plates are not supplied with the amplifier. Please order separately when the amplifiers are mounted in cascade.**

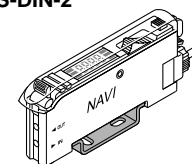
Appearance	Model No.	Description
	MS-DIN-E	When cascading multiple amplifiers, or when it moves depending on the way it is installed on a DIN rail, these end plates ensure that all amplifiers are mounted together in a secure and fully connected manner. Two pcs. per set

OPTIONS

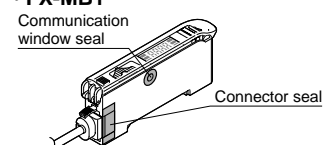
Designation	Model No.	Description	
Amplifier mounting bracket	MS-DIN-2	Mounting bracket for amplifier	
Fiber sensor amplifier protection seal	FX-MB1	10 sets of 2 communication window seals and 1 connector seal Communication window seal: It prevents malfunction due to transmission signal from another amplifier, as well as, prevents effect on another amplifier. Connector seal: It prevents contact of any metal, etc., with the pins of the quick-connection cable.	
Universal sensor mounting stand (Note)	MS-AJ1-F	Horizontal mounting type	Mounting stand assembly for fiber (For M3, M4 or M6 threaded head fiber)
	MS-AJ2-F	Vertical mounting type	

Note: Refer to [p.332](#) for the universal sensor mounting stand.

Amplifier mounting bracket • MS-DIN-2



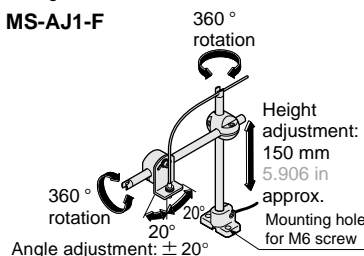
Fiber sensor amplifier protection seal • FX-MB1



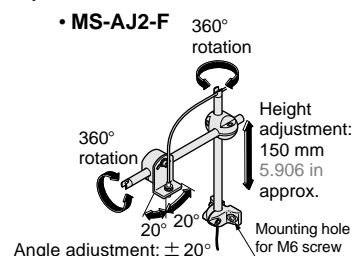
Universal sensor mounting stand

Using the arm which enables adjustment in the horizontal direction, sensing can also be done from above an assembly line.

• MS-AJ1-F



• MS-AJ2-F



SPECIFICATIONS

Item	Type	NPN output	PNP output
	Model No.	FX-302	FX-302P
Supply voltage		12 to 24 V DC \pm 10 % Ripple P-P 10 % or less	
Power consumption		Normal operation: 960 mW or less (Current consumption 40 mA or less at 24 V supply voltage) ECO mode: 600 mW or less (Current consumption 25 mA or less at 24 V supply voltage)	
Output		NPN open-collector transistor • Maximum sink current: 100 mA (50 mA, if five, or more, amplifiers are connected in cascade) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less at 100 mA sink current (50 mA, if five, or more, amplifiers are connected in cascade)	PNP open-collector transistor • Maximum source current: 100 mA (50 mA, if five, or more, amplifiers are connected in cascade) • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1.5 V or less at 100 mA source current (50 mA, if five, or more, amplifiers are connected in cascade)
Utilization category		DC-12 or DC-13	
Output operation		Selectable either Light-ON or Dark-ON, with jog switch	
Short-circuit protection		Incorporated	
Response time		300 μ s or less (FAST), 500 μ s or less (STD / S-D), 4 ms or less (LONG) selectable with jog switch	
Operation indicator		Orange LED (lights up when the output is ON)	
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition)	
MODE indicator		RUN: Green LED, TEACH • ADJ • L/D ON • TIMER • PRO: Yellow LED	
Digital display		4 digit red LED display	
Sensitivity setting		Normal mode: 2-level teaching / Limit teaching / Manual adjustment Window comparator mode: Teaching (1-level / 2-level / 3-level) / Manual adjustment	
Fine sensitivity adjustment function		Incorporated	
Timer function		Incorporated with variable ON-delay, OFF-delay, ONE SHOT, ON-delay / OFF-delay, ON-delay / ONE SHOT timer, switchable either effective or ineffective (timer period. 0.5 ms to 5 sec. approx.)	
Automatic interference prevention function		Incorporated (Up to 8 sets of fiber heads (Note 1) can be mounted close together) (Note 2)	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Ambient temperature	- 10 to + 55 °C + 14 to + 131 °F (If 4 to 7 units are connected in cascade: - 10 to + 50 °C + 14 to + 122 °F,) (If 8 to 16 units are connected in cascade: - 10 to + 45 °C + 14 to + 113 °F) (No dew condensation or icing allowed), Storage: - 20 to + 70 °C - 4 to + 158 °F	
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH	
	EMC	EN 50081-2, EN 50082-2, EN 60947-5-2	
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure (Note 3)	
	Insulation resistance	20 M Ω , or more, with 250 V DC megger between all supply terminals connected together and enclosure (Note 3)	
	Vibration resistance	10 to 150 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each	
Shock resistance		98 m/s ² acceleration (10 G approx.) in X, Y and Z directions for five times each	
Emitting element		Red LED (modulated)	
Material		Enclosure: Heat-resistant ABS, Case cover: Polycarbonate, Switch: Acrylic	
Connecting method		Connector connection (Note 4)	
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.	
Weight		20 g approx.	

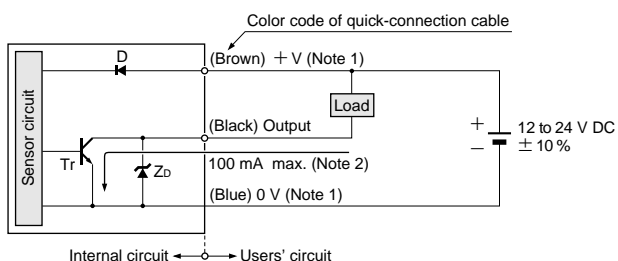
- Notes: 1) When connecting the **FX-301** series digital fiber sensors and the **FX-311** series manually set fiber sensors, a maximum of 4 units can be installed without mutual interference.
- 2) When the power supply is switched on, the emission timing are automatically set for interference prevention.
- 3) The voltage withstandability and the insulation resistance values given in the above table are for the amplifier only.
- 4) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cable given below.
Main cable (3-core): **CN-73-C1** (cable length 1 m 3.281 ft), **CN-73-C2** (cable length 2 m 6.562 ft), **CN-73-C5** (cable length 5 m 16.404 ft)
Sub cable (1-core): **CN-71-C1** (cable length 1 m 3.281 ft), **CN-71-C2** (cable length 2 m 6.562 ft), **CN-71-C5** (cable length 5 m 16.404 ft)
- 5) The sensing range is identical to the **FX-301(P)** and **FX-311(P)**. Refer to p.67 ~ or p.156 ~ for details.
- 6) Refer to the 'Fiber Sensor Guide Book' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

FX-302

I/O CIRCUIT AND WIRING DIAGRAMS

FX-302

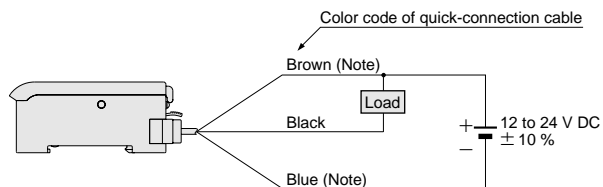
NPN output type



Notes: 1) The quick-connection sub cable does not have + V (brown) and 0 V (blue).
2) 50 mA max., if five, or more, amplifiers are connected in cascade.

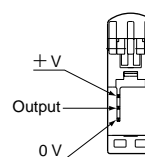
Symbols ... D : Reverse supply polarity protection diode
Zd: Surge absorption zener diode
Tr : NPN output transistor

Wiring diagram



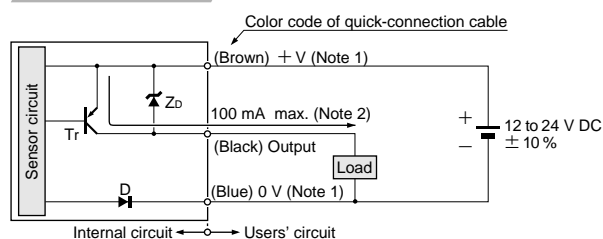
Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.

Terminal arrangement diagram



FX-302P

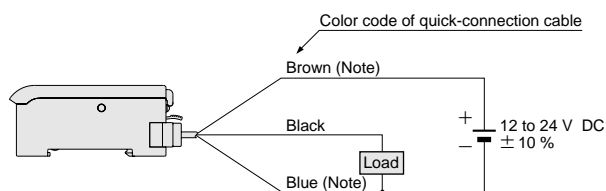
PNP output type



Notes: 1) The quick-connection sub cable does not have + V (brown) and 0 V (blue).
2) 50 mA max., if five, or more, amplifiers are connected in cascade.

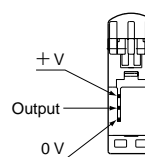
Symbols ... D : Reverse supply polarity protection diode
Zd: Surge absorption zener diode
Tr : PNP output transistor

Wiring diagram



Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.

Terminal arrangement diagram



PRECAUTIONS FOR PROPER USE

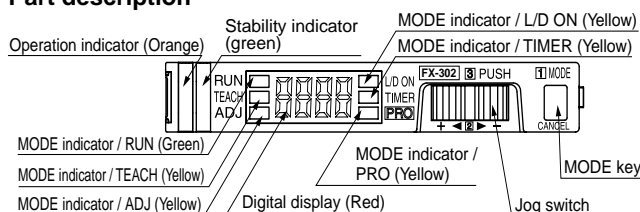
Refer to p.1135 ~ for general precautions, and to the 'PRO Mode Operation Guide' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

Amplifier



This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

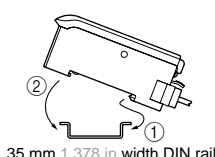
Part description



Mounting

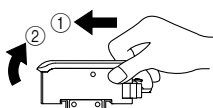
How to mount the amplifier

- ① Fit the rear part of the mounting section of the amplifier on a 35 mm 1.378 in width DIN rail.
- ② Press down the front part of the mounting section of the amplifier on the 35 mm 1.378 in width DIN rail.



How to remove the amplifier

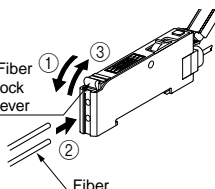
- ① Push the amplifier forward.
- ② Lift up the front part of the amplifier to remove it.



Note: Take care that if the front part is lifted up without pushing the amplifier forward, the hook on the rear portion of the mounting section is likely to break.

How to connect the fiber cables

- ① Snap the fiber lock lever down.
- ② Insert the fiber cables slowly into the inlets until they stop. (Note 1)
- ③ Return the fiber lock lever to the original position, till it stops.



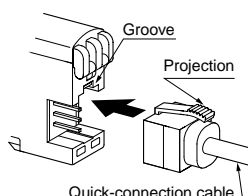
Notes: 1) In case the fiber cables are not inserted to a position where they stop, the sensing range reduces.
2) With the coaxial reflective type fiber, such as, **FD-G4** or **FD-FM2**, insert the single-core fiber cable into the beam-emitting inlet and the multi-core fiber cable into the beam-receiving inlet. If they are inserted in reverse, the sensing accuracy will deteriorate.

Connection

- Make sure that the power supply is off while connecting or disconnecting the quick-connection cable.

Connection method

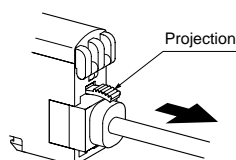
- ① Holding the connector of the quick-connection cable, align its projection with the groove at the top portion of the amplifier connector.
- ② Insert the connector till a click is felt.



Disconnection method

- ① Pressing the projection at the top of the quick-connection cable connector, pull out the connector.

Note: Take care that it the connector is pulled out without pressing the projection, the projection may break. Do not use a quick-connection cable whose projection has broken. Further, do not pull by holding the cable, as this can cause a cable-break.



Wiring

- Make sure that the power supply is off while wiring and cascading work.
- Verify that the supply voltage variation is within the rating.
- Take care that if a voltage exceeding the rated range is applied, or if an AC power supply is directly connected, the sensor may get burnt or damaged.
- 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 product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Take care that short-circuit or wrong wiring of the load may burn or damage the sensor.
- 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.
- Ensure that an isolation transformer is utilized for the DC power supply. If an autotransformer is utilized, the main amplifier or power supply may be damaged.
- Make sure to use the optional quick-connection cable for the connection of the amplifier. Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable. However, in order to reduce noise, make the wiring as short as possible.

Others

- Do not use during the initial transient time (0.5 sec. approx.) after the power supply is switched on.
- Take care that the sensor is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- This sensor is suitable for indoor use only.
- Avoid dust, dirt, and steam.
- Take care that the product does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- This sensor cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify the sensor.

PRECAUTIONS FOR PROPER USE

Refer to p.1135 ~ for general precautions, and to the 'PRO Mode Operation Guide' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

Amplifier

Teaching

- The output mode at the time of factory shipment is set to the normal mode.
In case the teaching is carried out in the window comparator mode, the teaching should be done after setting at PRO6 of PRO mode.
For details of the setting method, please refer to 'Setting method for detection mode' on p.122.

- When MODE indicator / TEACH (yellow) lights up, the threshold value can be set in either the normal mode (2-level teaching or the limit teaching) or in the window comparator mode (1-level teaching, 2-level teaching or 3-level teaching).

Normal mode

<In case of 2-level teaching>

- This is the method of setting the threshold value by teaching two levels, corresponding to the object present and the object absent conditions. Normally, setting is done by this method.

Step	Description	Display
①	Set the fiber within the sensing range. Press MODE key to light up MODE indicator / TEACH (yellow).	1234
②	Press jog switch in the object present condition. If the teaching is accepted, the read incident light intensity blinks in the digital display.	557
③	The MODE indicator / TEACH (yellow) blinks. Press jog switch in the object absent condition.	1234
④	When the teaching is accepted, the read incident light intensity blinks in the digital display and the threshold value is set at the mid-value between the incident light intensities in the object present and in the object absent conditions. After this, the judgment on stability of sensing is displayed. • In case stable sensing is possible: 'Good' is displayed. Stability indicator (green) blinks. • In case stable sensing is not possible: 'Err-d' blinks. Stable indicator (green) is off.	Good Err-d
⑤	The threshold value is displayed.	900
⑥	'....' is displayed in the digital display.
⑦	The incident light intensity appears in the display and the setting is complete.	1234

Note: Do not move or bend the fiber cable after the sensitivity setting.
Detection may become unstable.

<In case of limit teaching>

- This is the method of setting the threshold value by teaching only the object absent condition (stable incident light condition). This is used for detection in the presence of a background body or for detection of small objects.

Step	Description	Display
①	Set the fiber within the sensing range. Press MODE key to light up MODE indicator / TEACH (yellow).	1234
②	Press jog switch in the object absent condition. If the teaching is accepted, the read incident light intensity blinks in the display.	1234
③	The MODE indicator / TEACH (yellow) blinks. Turn jog switch to the '+' side or '-' side.	1234
④	If jog switch is turned to the '+' side, ' ' scrolls (twice) the display from right to left, and the threshold level is shifted to a value approx. 15 % higher (lower sensitivity) than that set at ②. (Note 1) This is used in case of reflective type fibers. If jog switch is turned to the '-' side, ' ' scrolls (twice) the display from left to right, and the threshold level is shifted to a value approx. 15 % lower (higher sensitivity) than that set at ②. (Note 1) This is used in case of thru-beam type fibers.	
⑤	After this, the judgment on whether the set shift amount is possible to change or not will be displayed. • When the shift is possible: 'Good' blinks. • When the shift is not possible: 'Err-d' blinks.	Good Err-d
⑥	The threshold value is displayed.	1420
⑦	'....' is displayed in the digital display.
⑧	The incident light intensity appears in the digital display and the setting is complete.	1234

- Notes: 1) The approx. 15 % amount of shift is the initial value. The amount of shift can be changed in the PRO mode from approx. 5 to 80 % (5 % step). Refer to the 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>).
2) Do not move or bend the fiber cable after the sensitivity setting. Detection may become unstable.

PRECAUTIONS FOR PROPER USE

Refer to p.1135 ~ for general precautions, and to the 'PRO Mode Operation Guide' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

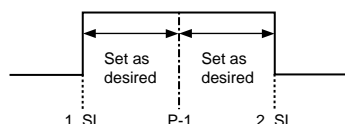
Amplifier

Window comparator mode

- This is used to detect specific objects from various objects in size or shape, etc.

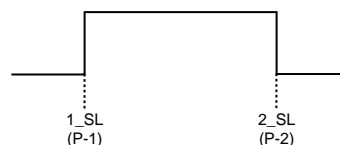
<In case of 1-level teaching>

- This is the method of setting the threshold range by 1-level teaching. The shift value can be set as desired.



<In case of 2-level teaching>

- This is a method of setting the threshold range by two levels (P-1, P-2) teaching.



Step	Description	Display
①	Set the fiber within the sensing range. Press MODE key to light up MODE indicator / TEACH (yellow).	1234
②	The current teaching method is displayed for 0.5 sec.	1Lch
③	'P-1' is displayed for 0.5 sec.	P-1
④	Press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	567
⑤	The judgment on stability of sensing is displayed. • In case stable sensing is possible: 'Good' blinks. • In case stable sensing is not possible: 'Err' blinks.	Good
		Err
⑥	A value deducted the shift value (100) from the incident light intensity becomes the threshold value (1_SL), which is displayed. (Note 1) (Note 2)	467
⑦	A value added the shift value (100) to the incident light intensity becomes the threshold value (2_SL), which is displayed. (Note 1) (Note 2)	667
⑧	'....' is shown on the display, and the sensor returns to step ②. The setting is complete.

Notes: 1) The shift value 100 is the initial value. The shift value can be changed in PRO mode. For details of the setting method, refer to 'Setting method for detection mode' on p.122.
2) In case the set value exceeds the max. (min.) sensitivity, the set value is fixed at max. (min.) sensitivity.
3) Do not move or bend the fiber cable after the sensitivity setting. Detection may become unstable.

Step	Description	Display
①	Set the fiber within the sensing range. Press MODE key to light up MODE indicator / TEACH (yellow).	1234
②	The current teaching method is displayed for 0.5 sec.	2Lch
③	'P-1' is displayed for 0.5 sec.	P-1
④	First, press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	567
⑤	'P-2' is displayed for 0.5 sec.	P-2
⑥	Second, press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	890
⑦	The judgment on stability of sensing is displayed. • In case stable sensing is possible: 'Good' blinks. • In case stable sensing is not possible: 'Err' blinks.	Good
		Err
⑧	The value of 'P-1' becomes the threshold value (1_SL), which is displayed. (Note 1)	567
⑨	The value of 'P-2' becomes the threshold value (2_SL), which is displayed. (Note 1)	890
⑩	'....' is displayed, and the sensor returns to step ②. The setting is complete.

Notes: 1) In case the set value exceeds the max. (min.) sensitivity, the set value is fixed at max. (min.) sensitivity.
2) Do not move or bend the fiber cable after the sensitivity setting. Detection may become unstable.

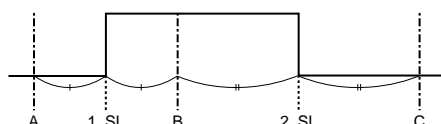
PRECAUTIONS FOR PROPER USE

Refer to p.1135 ~ for general precautions, and to the 'PRO Mode Operation Guide' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

Amplifier

<In case of 3-level teaching>

- This is a method of setting the threshold range by three levels (P-1, P-2, P-3) teaching and set the threshold values at the middle of 'A' and 'B' (1_SL) and 'B' and 'C' (2_SL) as per the diagram below.
- After teaching, P-1, P-2 and P-3 are automatically assigned in ascending order to 'A', 'B', and 'C'.



Step	Description	Display
①	Set the fiber within the sensing range. Press MODE key to light up MODE indicator / TEACH (yellow).	1234
②	The current teaching method is displayed for 0.5 sec.	Teach
③	'P-1' is displayed for 0.5 sec.	P-1
④	For the first level teaching, press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	123
⑤	'P-2' is displayed for 0.5 sec.	P-2
⑥	For the second level teaching, press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	345
⑦	'P-3' is displayed for 0.5 sec.	P-3
⑧	For the third level teaching, press jog switch in the object present condition. When the teaching is accepted, the read incident light intensity blinks on the display.	567
⑨	The judgment on stability of sensing is displayed. • In case stable sensing is possible: 'Good' blinks. • In case stable sensing is not possible: 'Err' blinks.	Good Err
⑩	The middle of 'A' and 'B' becomes the threshold (1_SL), as shown in the diagram above, which is displayed. (Note 1)	234
⑪	The middle of 'B' and 'C' becomes the threshold (2_SL), as shown in the diagram above, which is displayed. (Note 1)	456
⑫	'...' is displayed, and the sensor returns to step ②. The setting is complete.	...

Notes: 1) In case the set value exceeds the max. (min.) sensitivity, the set value is fixed at max. (min.) sensitivity.
2) Do not move or bend the fiber cable after the sensitivity setting. Detection may become unstable.

Threshold value fine adjustment

- Fine adjustment of the threshold value can be done when MODE indicator / ADJ (yellow) lights up.
- When the window comparator mode is set, select either '1_SL' or '2_SL' first, and then, carry out the setting as follows.
- When jog switch is turned to the '+' side, the threshold value increases. (sensitivity decreases)
When jog switch is pressed, the threshold value is confirmed.

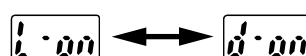


- When jog switch is turned to the '-' side, the threshold value decreases. (sensitivity increases)
When jog switch is pressed, the threshold value is confirmed.



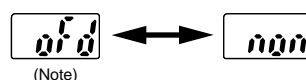
Output operation setting

- The output operation setting can be done when MODE indicator / L/D ON (yellow) lights up.
- The output operation is changed when jog switch is turned to the '+' side or the '-' side.
- When jog switch is pressed, the setting is confirmed.



Timer operation setting

- The setting for whether the timer is used or not can be done when MODE indicator / TIMER (yellow) lights up.
 - 10 ms OFF-delay (initial value) timer is automatically set when the timer is set to be used.
 - Further, an OFF-delay (off), which is useful when the response of the connected device is slow, etc., an ON-delay (on), which is useful to detect only objects taking a long time to travel, ONE SHOT ($shot$), which is useful when the input specifications of the connected device require a signal of a fixed width, an ON-delay / OFF-delay ($onoff$), which is useful when the conditions in use between ON-delay and OFF-delay overlaps, and an ON-delay / ONE SHOT ($onshot$), which is useful when the conditions in use between ON-delay and ONE SHOT overlaps, are possible with FX-302(P).
- Refer to the 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to each timer's setting method.



Note: The OFF-delay timer interval set in the PRO mode is displayed. Refer to the 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details.

PRECAUTIONS FOR PROPER USE

Refer to p.1135 ~ for general precautions, and to the 'PRO Mode Operation Guide' or 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to operating instructions for the amplifier.

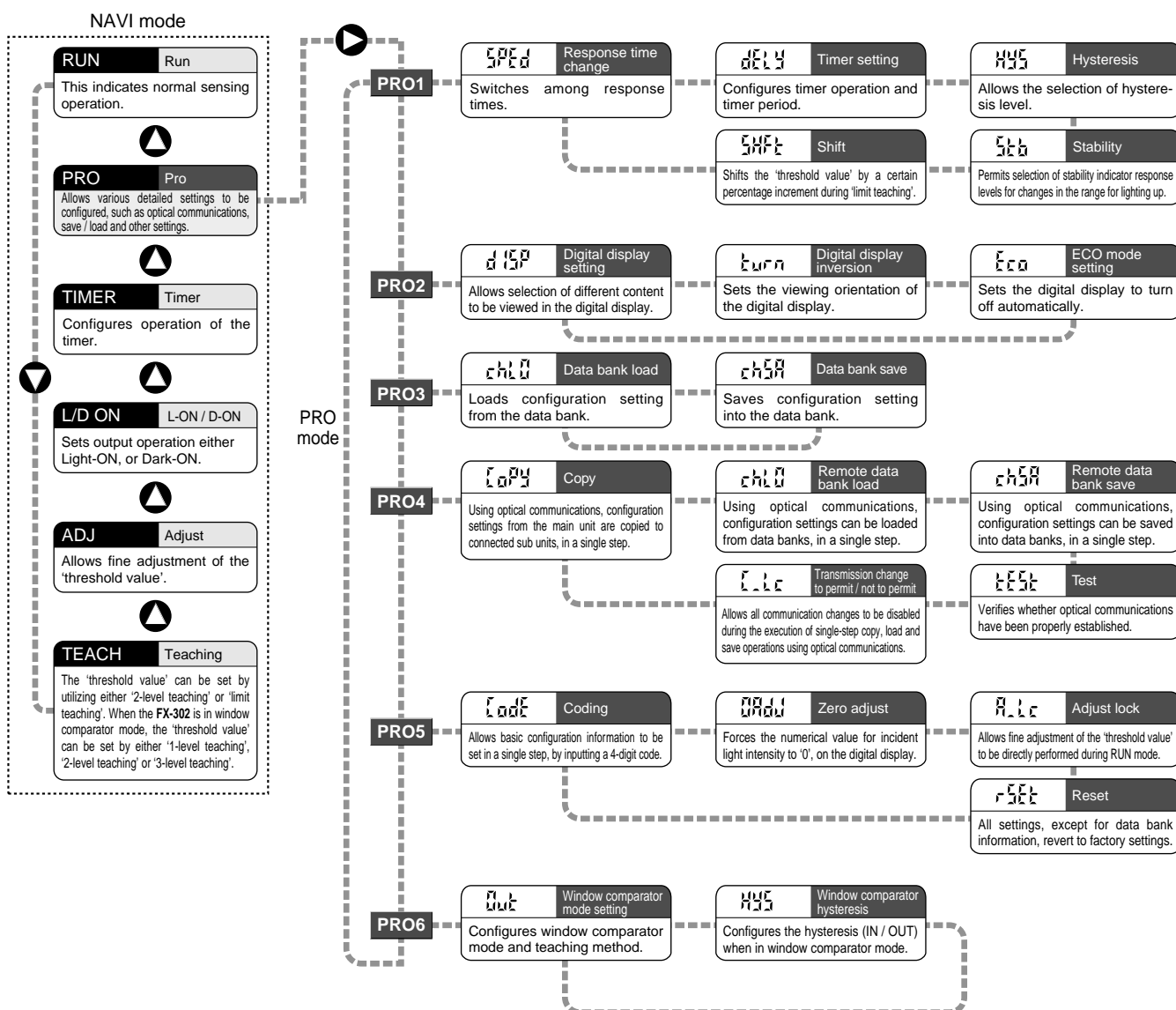
Amplifier

PRO mode

- Refer to the 'SUNX fiber sensor home page' (<http://www.fiber-sensor.com>) for details pertaining to the PRO mode's setting instructions and procedures.

- PRO settings can be done when MODE indicator / PRO (yellow) lights up.

Table for PRO mode settings

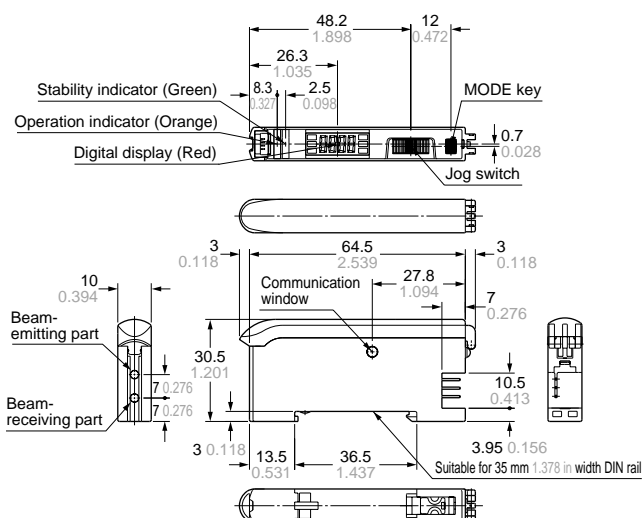


DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the 'SUNX fiber sensor home page': <http://www.fiber-sensor.com/>
Refer to p.103~ for fiber dimensions.

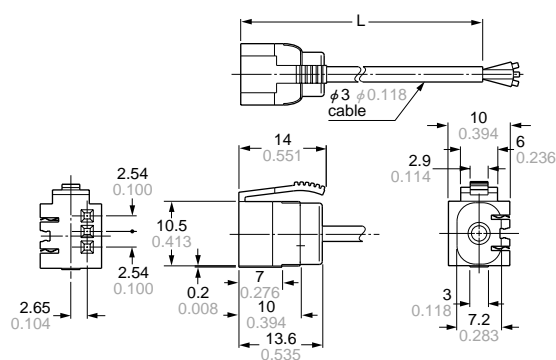
FX-302 FX-302P

Amplifier



CN-73-C1 CN-73-C2 CN-73-C5

Main cable (Optional)

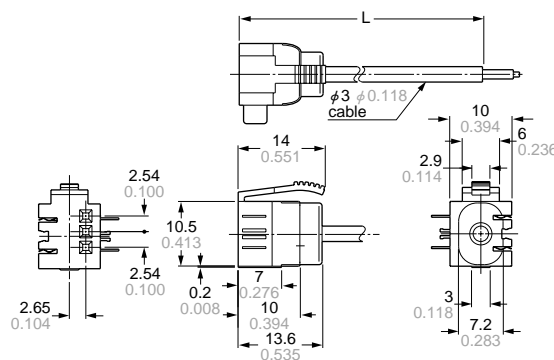


• Length (L)

Model No.	Length (mm in)
CN-73-C1	1,000 39.370
CN-73-C2	2,000 78.740
CN-73-C5	5,000 196.850

CN-71-C1 CN-71-C2 CN-71-C5

Sub cable (Optional)

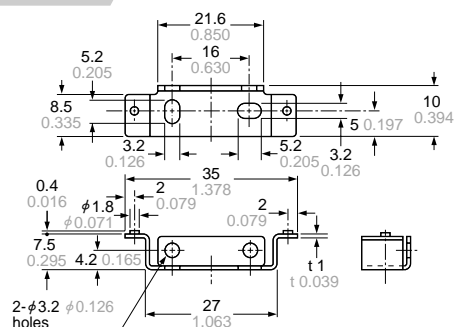


• Length (L)

Model No.	Length (mm in)
CN-71-C1	1,000 39.370
CN-71-C2	2,000 78.740
CN-71-C5	5,000 196.850

MS-DIN-2

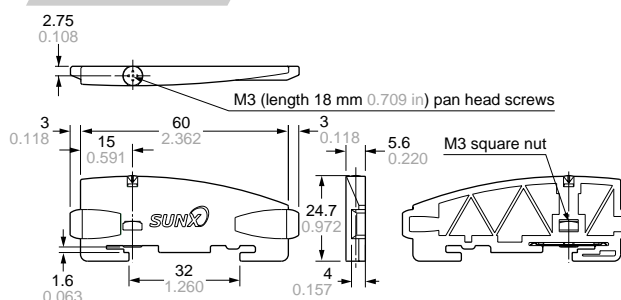
Amplifier mounting bracket (Optional)



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

MS-DIN-E

End plates (Optional)



Material: Polycarbonate