

FD-F8Y

Contact Type Liquid Level Detection Fiber



Liquid adherence-free fiber tip

Avoids liquid drop adherence

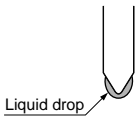
Reduces malfunction due to adhering of a liquid drop.

FD-F8Y

Conventional model



The multistep pointed end makes adhering of liquid drop.



Malfunction due to liquid drop adherence

Immune against chemical agents

The fiber is totally covered with fluorine resin. It can be immersed in chemicals.

No metal ionization

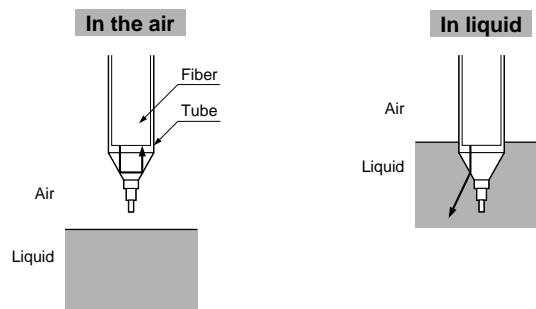
The fiber is made of 100 % resin. Hence, it does not release metal ions. It can also be safely used in semiconductor manufacturing cleaning equipment.

Heat-resistant up to 125 °C 257 °F and free-cut

It can be used in hot liquids since it is heat resistant. Moreover, it can be cut to any desired length.

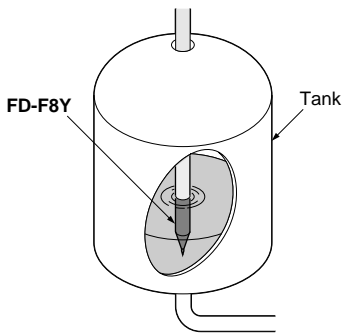
Principle of detection

When the fiber tip is in the air, as there is a large difference between the air and the tube refractive indexes, the tube boundary reflects the emitted beam back to the receiver. On the other hand, when the fiber tip is immersed in a liquid, the emitted beam scatters from the fiber into the liquid because of the small difference in the liquid and the tube refractive indexes.



APPLICATIONS

Detecting liquid level in a tank



ORDER GUIDE

Fiber

Appearance (mm in)	Fiber cable length ✂ : Free-cut	Allowable bending radius (mm in)	Model No.
	 2 m 6.562 ft (Note)	Protective tube: R40 R1.575 Fiber: R15 R0.591	FD-F8Y

Note: 1,000 mm 39.370 in from the amplifier insertion end is the cutting range.

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

Type	Appearance	Model No.	Emitting element	Output
Digital		FX-301	Red LED	NPN open-collector transistor
		FX-301P		PNP open-collector transistor
FX-302		NPN open-collector transistor		
FX-302P		PNP open-collector transistor		
FX-303		NPN open-collector transistor		
FX-303P		PNP open-collector transistor		
High-speed digital		FX-311		NPN open-collector transistor
		FX-311P		PNP open-collector transistor

FD-F8Y

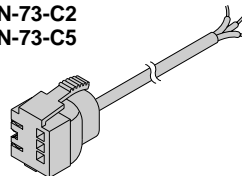
ORDER GUIDE

Quick-connection cables 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 3.0 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 3.0 mm ϕ 0.118 in.
	CN-71-C2	Length: 2 m 6.562 ft	
	CN-71-C5	Length: 5 m 16.404 ft	

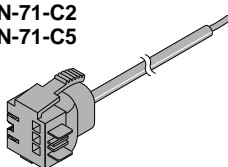
Main cable

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

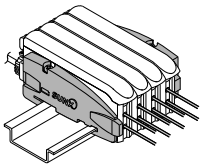


Sub cable

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



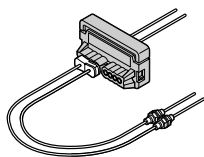
End plates End plates are not supplied with the amplifier. Please order it separately when the amplifiers are mounted in cascade.

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

Accessories

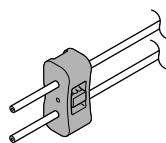
• **FX-CT2**

(Fiber cutter)



• **FX-AT3**

(ϕ 2.2 mm ϕ 0.087 in fiber attachment)
for **FX-301/302/303/311** series



SPECIFICATIONS

Refer to [p.77/p.119/p.138/p.166](#) for amplifier specifications.

Fiber

Type	Reflective
Item	Model No.
	FD-F8Y
Applicable amplifiers	FX-301(P), FX-302(P), FX-303(P), FX-311(P)
Sensing object	Liquid (Note 1)
Repeatability	0.5 mm 0.020 in or less (with water)
Allowable bending radius	Tube: R40 mm R1.575 in or more (Do not bend 32 mm 1.260 in length from the tip), Fiber cable: R15 mm R0.591 in or more
Fiber cable length	2 m 6.562 ft free-cut (Do not cut the tube (Note 2))
Ambient temperature (Note 3, 4)	- 40 to + 125 °C - 40 to + 257 °F (No dew condensation or icing allowed), Storage: - 40 to + 125 °C - 40 to + 257 °F
Ambient humidity	35 to 85% RH, Storage: 35 to 85 % RH
Ambient pressure (Note 3)	- 49 to + 490 kPa
Material	Tube: Fluorine resin, Fiber sheath: Polypropylene
Accessory	FX-CT2 (Fiber cutter): 1 pc. FX-AT3 ($\phi 2.2$ mm $\phi 0.087$ in fiber attachment for FX-301/302/303/311 series): 1 pc.

Notes: 1) Unclear liquid may not be sensed stably.

2) 1,000 mm 39.370 in from the amplifier insertion end is the cutting range.

3) Liquid being detected should also be kept within the rated ambient temperature range.

4) The ambient temperature and pressure under which these devices are used are set separately.

For usage with both of these at or near the maximum permissible value, please contact our office.

PRECAUTIONS FOR PROPER USE

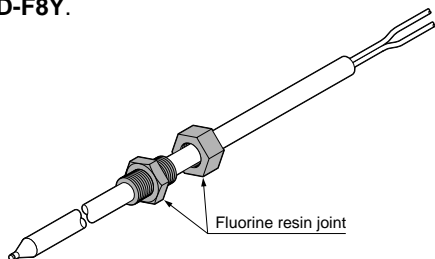
Refer to [p.1135~](#) for general precautions and [p.90/p.121/p.141/p.168~](#) for amplifier precautions.



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.

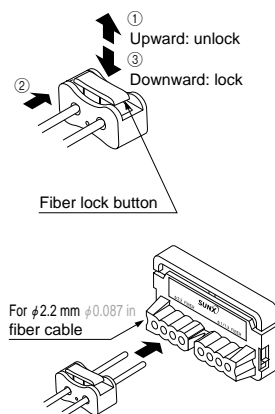
Mounting

- Use a commercially available fluorine resin joint, etc., to install **FD-F8Y**.



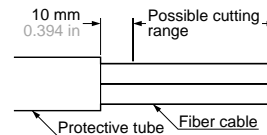
Method of mounting (FX-AT3)

- Confirm that the fiber lock button of **FX-AT3** is in unlock side.
- Insert the fiber cables one by one, in condition ①.
- After inserting, press down the fiber lock button. The fiber cables are fixed at the desired position. (In order to unlock the fiber cables, press the fiber lock button towards unlock direction from the opposite side.)
- Insert the fiber cables into the holes for $\phi 2.2$ mm $\phi 0.087$ in fiber cable of the fiber cutter (**FX-CT2**) from the direction shown in the figure above.
- Cut both fiber cables simultaneously. (At this time, place the attachment without any gap against the fiber cutter. The fiber cables will be cut at a position approx. 10.5 mm 0.413 in from the tip of the fiber.)
- After cutting, connect the fiber cables to the fiber sensor amplifier immediately.



Cutting fiber cable

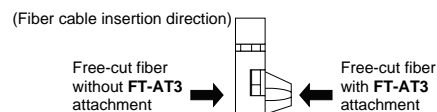
- The fiber cables should be cut off at the ends with the fiber cutter **FX-CT2** (accessory) before insertion into the amplifier.



- Do not scratch the fiber sheath while cutting the fluorine resin tube.

Cutting procedure

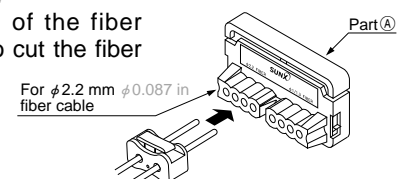
- To cut the fiber cables, insert them from the direction shown below.



How to use fiber cutter (FX-CT2)

- Slide part ① of the fiber cutter fully upward till it stops.
- Insert the fiber cables, mounted in the attachment, till they stop.

Take care that there are separate fiber cable insertion holes for $\phi 2.2$ mm $\phi 0.087$ in and $\phi 1.0$ mm $\phi 0.039$ in or $\phi 1.3$ mm $\phi 0.051$ in fiber cables.
- Slide part ① of the fiber cutter down to cut the fiber cable.



Notes: 1) The fiber cables should be cut in one stroke.

2) Once a fiber cable is cut off at a hole, do not use the hole again. If used, it degrades the cut surface quality and the detectability may deteriorate.

3) The blade cannot be replaced. Please purchase an additional fiber cutter, if required.

4) Note that the sensing range may be reduced by up to 20 % depending on the cut condition. Hence, decide the setting distance by taking sufficient margin.

FD-F8Y

PRECAUTIONS FOR PROPER USE

Refer to p.1135~ for general precautions and p.90/p.121/p.141/p.168~ for amplifier precautions.

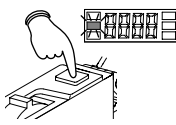



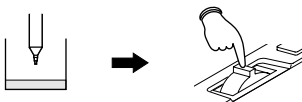






Teaching

When using the FX-301(P) or the FX-302(P), FX-303(P)

- The threshold values can be set by either 2-level teaching or limit teaching, when the MODE indicator / TEACH (yellow) lights up.

<In case of 2-level teaching>

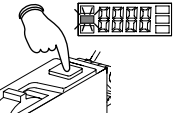




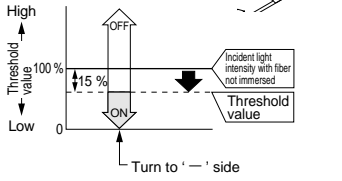






- This is the method of setting the threshold value by teaching two levels, corresponding to the immersed and not immersed conditions. Normally, setting is done by this method.

Step	Function	Display
①	The fibers are mounted in the tank. Press MODE key to light up MODE indicator / TEACH (yellow). 	
②	Press jog switch in the fiber immersed condition. If the teaching is accepted, the read incident light intensity blinks in the digital display. Fiber immersed 	
③	MODE indicator / TEACH (yellow) blinks. Press jog switch in the fiber not immersed condition. Fiber not immersed 	
④	If 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 immersed and the not immersed conditions. After this, the judgment on the 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' is displayed. Stability indicator (green) is off.	 
⑤	The threshold value is displayed.	
⑥	'....' blinks in the digital display.	
⑦	The incident light intensity appears in the digital display and the setting is complete.	

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 water absent condition (not immersed condition).

Step	Function	Display
①	The fibers are mounted in the tank. Press MODE key to light up MODE indicator / TEACH (yellow). 	
②	Press jog switch in the not immersed condition. If the teaching is accepted, the read incident light intensity blinks in the display. Fiber not immersed 	
③	MODE indicator / TEACH (yellow) blinks. Turn jog switch to the '-' side.	
④	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) 	
⑤	After this, the judgment on whether the setting shift amount can be shifted or not is displayed. • In case shifting is possible: 'Good' is displayed. • In case shifting is not possible: 'Err-d' is displayed.	 
⑥	The threshold value is displayed.	
⑦	'....' blinks in the digital display.	
⑧	The incident light intensity appears in the digital display and the setting is complete.	

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 'Fiber Sensor Guide Book' or 'SUNX fiber sensor homepage' (<http://www.fiber-sensor.com>) for details of the setting method.
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 p.90/p.121/p.141/p.168~ for amplifier precautions.

Others

- Take care that unclear liquid may not be sensed stably.
- Take care that the tube may stretch by maximum 2 % of the total length if it is used at a high temperature.
- Bending radius of the fiber cable must be R15 mm R0.591 in or more (tube: R40 mm R1.575 in or more). However, do not bend 32 mm 1.260 in length from the tip.
- If the bending radius is smaller than the specified value, the sensing performance may deteriorate.
- Do not use the fiber at places having intense vibrations, as this can cause malfunction.
- Keep the fiber head surface intact. If it is scratched or spoiled, the detectability will deteriorate.
- Ensure that any strong extraneous light is not incident on the receiving face of the fiber head.
- Do not apply excessive tensile force to the fiber cable.
- 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.

Sensitivity adjustment

FX-311(P)

- Adjust the sensitivity, observing the operation indicator (orange). However, since the condition for lighting up of the indicator depends on the combination of the sensing condition and selected operation for L/D-ON, verify it from the table on the right.

Sensing condition	MODE		Operation indicator
	L-ON (ON when not immersed)	D-ON (ON when immersed)	
Immersed	L-ON (ON when not immersed)	D-ON (ON when immersed)	●
	L-ON (ON when not immersed)	D-ON (ON when immersed)	☀
Not Immersed	L-ON (ON when not immersed)	D-ON (ON when immersed)	☀
	L-ON (ON when not immersed)	D-ON (ON when immersed)	●

☀ : Lights up ● : Lights off

- The sensitivity adjuster is a 12-turn potentiometer. The maximum sensitivity is obtained by turning it fully clockwise.
- The pointer shows the present sensitivity level.



<Sensitivity indicator>

<Assist function>

- This product incorporates an 'assist function', which helps to easily search the optimum sensitivity position by blinking of the pointer. In order to make 'assist function' effective, switch the operation selection switch in the order L-ON (not immersed ON) → D-ON (immersed ON) → L-ON (not immersed ON).

Notes: 1) 'Assist function' turns off automatically once the sensitivity adjustment has been completed.
 2) In case 'assist function' is not to be used, set the operation selection switch to D-ON (immersed ON) and wait for 2 sec., or more, to make 'assist function' ineffective.

Step	Sensing method	Operation	Sensitivity indicator
①	★Make sure that the operation selection switch is set to L-ON (not immersed ON). In case 'assist function' is to be used, switch the operation selection switch in the order of L-ON (not immersed ON) → D-ON (immersed ON) → L-ON (not immersed ON).	Turn the sensitivity adjuster fully counterclockwise. (Minimum sensitivity)	
②	Fiber not immersed 	In the fiber not immersed condition, slowly turn the adjuster clockwise and find the point (A) where the sensor is switched ON. The pointer blinks once at the point (A). (Note 1)	
③	Fiber immersed 	In the fiber immersed condition, slowly turn the adjuster further clockwise until the sensor goes into the ON state again. Once it is switched on, turn the adjuster counterclockwise a little and find the point (B) where it is switched OFF. The pointer blinks twice at the point (B). (Note 2) (If the sensor does not go into the ON state, MAX is the point (B).)	
④		Turn the adjuster towards the point (A) from the point (B) slowly. The pointer starts blinking when it approaches the optimum sensitivity point and blinks faster at the optimum sensitivity point for 3 sec. This point is the optimum sensitivity point. (Note 2)	
⑤		Select either L-ON (not immersed ON) or D-ON (immersed ON) according to your application.	

- Notes: 1) When 'assist function' is not used, the pointer does not blink.
 2) When 'assist function' is not used, the middle point of (A) and (B) is regarded as the optimum sensitivity point.
 3) In order to protect the mechanism, the sensitivity adjuster idles when over turned, which may result in a backlash of 1 to 2 divisions.
 4) Depending upon the sensing conditions, stable sensing may be possible at a position which is slightly shifted from the optimum sensitivity point.
 5) Do not move or bend the fiber cable after the sensitivity adjustment. Detection may become unstable.

DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>
 Refer to p.102/p.127/p.143/p.170 for amplifier dimensions.

FD-F8Y

Free-cut With FX-AT3

