Digital Fiber Sensor For Leak / Liquied Detection Fiber FX-301(P)-F

MJE-FX301F No.0082-43V

MODE indicator / ADJ (Yellow)

35mm width DIN rail

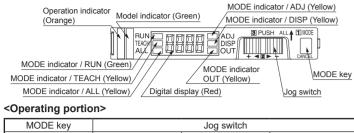
Thank you very much for purchasing Panasonic products Please read this Instruction Manual carefully and thoroughly for the correct

and optimum use of this product. Kindly keep this manual in a convenient place for guick reference.

<u>✓!</u> WARNING

• Never use this product as a sensing device for personnel protection. In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

1 PART DESCRIPTION



Operating portion>			
MODE key	Jog switch		
Press	Press	Turn to "+" side	Turn to"-" side
Used for mode selection or cancellation during setting. (Note)	Used to select each item.	Used to ente	er each item.

Note: When MODE key is pressed for 1 sec., or more, the sensor returns to the RUN mode.

2 MOUNTING

How to mount the amplifier

- 1. Fit the rear part of the mounting section of the amplifier on a 35mm width DIN rail.
- 2. Press down the rear part of the mounting section ² of the unit on the 35mm width DIN rail and fit the front part of the mounting section to the DIN rail.

2. Lift up the front part of the amplifier to remove it.

How to remove the amplifier

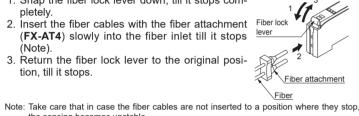
1. Push the amplifier forward.

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

Make sure to connect the fiber attachment (FX-AT4), enclosed with the

fiber, to the fibers. Refer to the Instruction Manual of the fiber attachment for the connecting method.

- 1. Snap the fiber lock lever down, till it stops com-



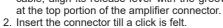
the sensing becomes unstable

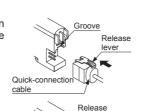
3 CONNECTION

Make sure to connect or disconnect the quick-connection cable in the power supply off condition.

Connection method 1. Holding the connector of the guick-connection

cable, align its release lever with the groove at the top portion of the amplifier connector.





Disconnection method

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

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

<Terminal arrangement diagr



two ends.

ΠĘ	ingement diagrams		
	Terminal No.	Terminal name	
	1	+V	
	2	0V	
	2	Output	

4 CASCADING AMPLIFIERS

- Make sure that the power supply is off while adding or removing the amplifiers.
- Make sure to check the allowable ambient temperature, as it depends on the number of amplifiers connected in cascade.
- In case two, or more, amplifiers are connected in cascade, make sure to
- mount them on a DIN rail. When the amplifiers move on the DIN rail depending on the attaching condition or the amplifiers are mounted close to each other in cascade, fit them between the optional end plates (MS-DIN-E) mounted at the
- Up to maximum 15 amplifiers can be added (total 16 amplifiers connected in cascade).
- When connecting more than two amplifiers in cascade, use the sub cable (CN-71-C□) as the quick-connection cable for the second amplifier onwards
- When connecting amplifiers not close to each other in parallel, be sure to mount the optional end plate (MS-DIN-E) at both sides of each amplifier or affix the communication window seal of the accessory amplifier protection seal (FX-MB1) to the communication windows.
- Communication function is different between this amplifier and other digital fiber amplifier. If those amplifiers are mounted in cascade, affix the communication window seal of the accessory amplifier protection seal (FX-MB1) to the communication windows.
- In case of cascading, wait for 10 minutes, or more, to use the teaching function after the power is switched on.

For mounting and removing the amplifier, refer to " MOUNTING."

Cascading method

- 1. Mount the amplifiers, one by one, on the 35mm width DIN rail.
- 2. Slide the amplifiers next to each other, and connect the quick-
- connection cables. Mount the optional end plates (CN-73-C-a) (Optional) (MS-DIN-E) at both the ends to
- hold the amplifiers between their

4. Tighten the screws to fix the end

Dismantling method 1. Loosen the screws of the end

- plates. 2. Remove the end plates.
- 3. Slide the amplifiers and remove them one by one.

(CN-71-C-□) (Optional)

End plate (MS-DIN-E) (Optional)

7 RUN MODE • When MODE indicator / RUN (green) lights up, the display setting or the

Note: In Liquied setting (F9 mode) only.

sensitivity select setting can be checked Refer to "B SENSITIVITY SELECTION FUNCTION" for further details of sensitivity select setting. How to change to "percentage display"

Output can be compulsory changed to ON or Press 3 sec. | SELECTION FUNCTION."

• When pressing Jog switch for 2 sec., or more, the display changes as

5 I/O CIRCUIT DIAGRAMS

Internal circuit ← → Users' circuit

6 OPERATION PROCEDURE

shows the incident light intensity.

RUN Refer to TRUN MODE."

This indicates normal sensing operation

ING MODE.

TEACH Refer to " INDIVIDUAL TEACH-ING MODE."

Threshold value can be set on a single amplifier.

Threshold value can be collectively set to

FINE ADJUSTMENT MODE."

MAIN mode

Terminal No. Color code of quick-connection cable

Terminal No. Color code of quick-connection cable

Notes: 1) The quick-connection sub cable does not have +V (brown) and 0V (blue).

• When the power supply is switched on, normal condition is displayed

• When MODE key is pressed, the mode changes as per the diagram

below. Further, if the jog switch is pressed for 3 sec., or more, in "ADJ,"

[MODE indicator / RUN (green) lights up] and the digital display (red)

The power is supplied from the connector of the main cal

3) Do not use the amplifiers in a series (AND) connection

"DISP" or "OUT" condition, SUB mode can be set.

Press

Refer to "
COLLECTIVE TEACH-

Refer to " 10 THRESHOLD VALUE

Press

Refer to " III DIGITAL DISPLAY SET-TING MODE."

The digital display (red) can be switched to the or more

OFF regardless of the incident light intensity. or more

OUT Refer to "TO FORCED OUTPUT MODE."

Press

Allows fine adjustment of the threshold value. or more

2) 50mA max, if five, or more, amplifiers are connected together

+12 to 24V DC -12 ±10%

_12 to 24V DC

SUB mode

FUNCTION

on the threshold value at the reference

Press 3 sec.

Brown) +V (Note 1)

(Black) Output Load

100mA max. (Note 2)

(Brown) +V (Note 1)

100mA max. (Note 2)

(Black) Output Load

(Blue) 0V (Note 1)

(Blue) 0V (Note 1)

<NPN output type>

<PNP output type>

per the diagram below.



How to check the sensitivity state

• If turning Jog switch to "+" or "-" side, the present sensitivity state can be confirmed. After 2 sec., the display returns to "digit display" or "percentage display."



8 INDIVIDUAL TEACHING MODE

Step Digital display

Step Digital display

คืนโฉ " at the time of factory shipment. In case sensitivity selection setting is done, make sure to carry out "teaching" after the sensitivity selection setting.

For the sensitivity selection setting, refer to "B SENSITIVITY SELEC-TION FUNCTION.

 When MODE indicator / TEACH (yellow) lights up, threshold value can be set on a single unit.

Description

The sensitivity selection function is set to the automatic sensitivity setting

Otop	Digital alopias	2000p
1		 Insert leak detection fiber (FD-F7□) or liquid detection fiber (FT-F9□).
2		Press MODE key to light up MODE indicator / TEACH (yellow Turn the jog switch to "+" or "-" side to set to either Lea (F7) mode "
3		Press Jog switch in no-leak condition with leak detectio fiber (FD-F7□) or no-liquid condition with liquid detectio fiber (FT-F9□). Then, "; " on the digital display moves from left to righ
4	=Jood	• When teaching is accepted, the result of threshold valusetting is displayed. In case stable sensing is possible: "\$\frac{9}{0}\text{ad}\text{"}\text{on the digital display (red) blinks 3 times.} In case stable sensing is not possible: "\$\xi^2\text{r}\text{-3}\text{"}\text{on the digital display (red) blinks. (Note 1)}
5		 If the teaching result is "goad," the sensor returns t RUN mode automatically and the incident light intensit is shown on the digital display (red). MODE indicator / RUN (green) lights up. The setting is complete.

Notes: 1) For details, refer to "16 ERROR INDICATION." 2) The initial setting at the time of factory shipment is Liquid (F9) mode "-Fg-."

9 COLLECTIVE TEACHING MODE

• When MODE indicator / ALL (yellow) lights up, a threshold value can be collectively set to amplifiers mounted in cascade.

		1		Insert leak detection fiber (FD-F7□) or liquid detection fiber (FT-F9□).
		2		Press MODE key to light up MODE indicator / ALL (yellov Turn the jog switch to "+" or "-" side to set to either Lea (F7) mode " -F7-" or Liquid (F9) mode " -F9-" In case Liquid (F9) mode " -F9-" is set, the model indicator (green) lights up.
		3		 Press Jog switch in no-leak condition with leak detection fiber (FD-F7□) fitted or no-liquid condition with liquid d tection fiber fitted (FT-F9□). Then, " [□] " on the digit display moves from top left to top right and from botto right to bottom left (twice).
	4		When teaching is accepted, the result of threshold valuestting is displayed. In case stable sensing is possible: "good" on the digital display (red) blinks 3 times In case stable sensing is not possible: "{r-}}" on the digital display (red) blinks. (Note	
		5		If the teaching result is " good," the sensor returns RUN mode automatically and the incident light intensi is shown on the digital display (red). MODE indicator / RUN (green) lights up. The setting is complete.

Notes: 1) For details, refer to "16 ERROR INDICATION."

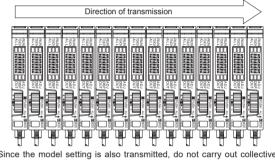
Percentage display

2) In collective teaching, only an instruction of the teaching operation is transmitted, the threshold value is not copied. The threshold value taught at the respective amplifier is set. 3) When the collective teaching is done, the following setting conditions are copied. In case an individual setting condition is desired to be set, set it individually after the collective teaching.

o: Copied. -: Not copied

Model setting | Digital dis-play setting | lection function Timer function | NO / NO Series tion function

4) The collective teaching transmits the information only in the direction of the arrow shown on the following diagram. The collective teaching is also possible from the middle of the amplifiers mounted in cascade. Check the direction of the transmission before collective teaching is done



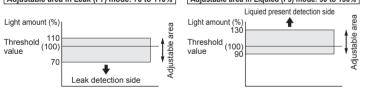
5) Since the model setting is also transmitted, do not carry out collective teaching when the amplifiers in Leak (F7) mode " - F7- " and in Liquid mode (F9) mode " - £9- " are mixed in cascade connection

10 THRESHOLD VALUE FINE ADJUSTMENT MODE

• When MODE indicator / ADJ (yellow) lights up, the set threshold value can be fine adjusted.

Step	Digital display	Description	
1		Press MODE key to light up MODE indicator / ADJ (yellow).	
2		Turn Jog switch to "+" side, to increase the threshold value. Turn Jog switch to "-" side, to decrease the threshold value.	
3		When Jog switch is pressed, the changed threshold value blinks 3 times and is confirmed.	
4		When MODE key is pressed 3 times, or for 1 sec., or more, the sensor returns to RUN mode and the incident light intensity is shown in the digital display (red). MODE indicator / RUN (green) lights up. The setting is complete.	

Note: The adjustable area is limited as shown below. In order to adjust the threshold outside the adjustable area, confirm it within the area once and then adjust it again Adjustable area in Leak (F7) mode: 70 to 110% Adjustable area in Liquied (F9) mode: 90 to 130%



11 DIGITAL DISPLAY SETTING MODE

• When MODE indicator / DISP (yellow) lights up, the digital display (red) can be switched to the light-up mode, eco mode or inverse mode.

Step	Digital display	Description	
1	Ecof	Press MODE key to light up MODE indicator / DISP (yellow).	
2	Erof Eron Euro	• When Jog switch is turned to "+" side or "-" side, the mode in the digital display changes. £cof: This is the light-up mode in the digital display (red). The digital display (red) always lights up. £con: This is the eco mode. After confirmation, if key operation has not been done for 8 sec., or more, "£co" flashes, and then the digital display (red) is turned off. When a key operation is done after the digital display is carried out, the digital display (red) lights up. £ucn: This is the inverse mode of the digital display (red). In the normal display condition, the display changes to the inverse display and in the inverse condition, the display changes to the normal display changes to the normal display.	
3	=Econ=	When Jog switch is pressed, the set display blinks 3 times and is confirmed.	
4		When MODE key is pressed twice or for 1 sec., or more, the sensor returns to RUN mode and the incident light intensity is displayed in the digital display (red). MODE indicator / RUN (green) lights up. The setting is complete.	

Note: The initial setting at the time of factory shipment is the light-up mode " £cof."

12 FORCED OUTPUT MODE

• When MODE indicator / OUT (yellow) lights up, the output can be compulsory changed to ON or OFF regardless of the incident light intensity.

	_ '	, ,	<u> </u>	,
	Step	Digital display	Description	
	1	<u> ធ្</u> រា	Press MODE key to light up MODE indicator / O (Present output state is displayed.)	
When Jog switch is turned to output is compulsory changed. Since the emitting element or possible to check the fiber core. When the output is compulsory eration indicator (orange) light.		o ON or OFF. the amplifier blinks, it is nected to the amplifier. or changed to ON, the op		
	3	<u> ព្</u> រា	Press MODE key to return the s	sensor to Step 1.
	4		When MODE key is pressed, the mode and the incident light intidigital display (red). MODE indicator / RUN (green)	ensity is displayed in the

13 SENSITIVITY SELECTION FUNCTION

• If Jog switch is pressed for 3 sec., or more, when MODE indicator / ADJ (yellow) lights up, the sensitivity can be fixed to low sensitivity or high sensitivity, or set to automatic sensitivity.

Step	Digital display	Description	
1		Press MODE key to light up MODE indicator / ADJ (yellow).	
2	#Ruto=	Press Jog switch for 3 sec. or more. (The sensor goes into the sensitivity setting condition.) MODE indicator / RUN (green) blinks.	
3		When turning Jog switch to "+" side or "-" side, the digital display (red) and MODE indicator / RUN (green) blinks, and the sensitivity can be selected. Buta: Automatic sensitivity setting After selecting the automatic sensitivity, the optimum sensitivity is set by carrying out teaching. La: Low sensitivity setting H:: High sensitivity setting When Jog switch is pressed, the setting display blinks 3 times and is confirmed. MODE indicator / TEACH (yellow) lights up and "-F?-" or "-F?-" is displayed in the digital display (red). After sensitivity selection, carry out the teaching. For the setting method of teaching, refer to "INDIVIDUAL TEACHING MODE."	
4			
5			

Note: The initial setting at the time of factory shipment is the automatic sensitivity setting

14 TIMER FUNCTION [Liquid (F9) mode only]

bubbles, etc.

<Time chart>

• The timer setting can be done by pressing the jog switch for 3 sec., or more, when Liquid (F9) mode " -Fg-" has been set and MODE indicator / DISP (yellow) lights up. In case of Leak (F7) mode " - F7-," the display

does not change to the timer function. For the selection method of Leak (F7) mode / Liquid (F9) mode, refer to "B INDIVIDUAL TEACHING MODE" or "D COLLECTIVE TEACHING MODE." • This product incorporates a delay timer which reduces the effect of air

presen operation NO/NC Liquied -ON (Normal close) (Normal open) (Normal close) NO (Normal open)

Timer period: T = 10ms, 100ms, 1,00			
Step Digital display Description		Description	
1		Confirm if the sensor is in Liquid (F9) mode " -Fg- " ir INDIVIDUAL TEACHING MODE" or " COLLEC TIVE TEACHING MODE."	
2		Press MODE key to light up MODE indicator / DISP (yellow).	
3	# กฎก	Press Jog switch for 3 sec., or more. (The sensor goes into the timer setting condition.) MODE indicator / RUN (green) blinks.	
4		• When Jog switch is turned to "+" side or "-" side, the digital display (red) and MODE indicator / RUN (green) blinks, and the timer period can be chosen. • Without timer • 10 : 10ms timer • 100 : 1,000ms timer • 100 : 1,000ms timer	
5		When Jog switch is pressed, setting display blinks 3 times and is confirmed.	
6		The sensor returns to Step 2.	
		When MODE key is pressed twice or for 1 sec., or more,	

Note: The initial setting at the time of factory shipment is the without timer condition " กุฎก."

The setting is complete

MODE indicator / RUN (green) lights up.

the sensor returns to RUN mode and the incident light

intensity is displayed in the digital display (red).

15 NO / NC SELECTION FUNCTION [Liquid (F9) mode only]

• The NO / NC selection can be done by pressing the jog switch for 3 sec., or more, when Liquid (F9) mode " -Fg- " has been set and MODE indicator / DISP (yellow) lights up. In case of Leak (F7) mode " - F7-," the display does not change to NO / NC selection function.

For the selection method of Leak (F7) mode / Liquid (F9) mode refer to "B INDIVIDUAL TEACHING MODE" or "9 COLLECTIVE TEACHING MODE."

Step	Digital display	Description	
1	- - -	Confirm if the sensor is in Liquid (F9) mode " -F9- " in INDIVIDUAL TEACHING MODE" or " COLLECTIVE TEACHING MODE."	
2	📙 ฎก	Press MODE key to light up MODE indicator / OUT (yellow).	
3	יים או ביים אוניים אוניים אוניים אוניים	Press Jog switch for 3 sec., or more. (The sensor goes into the NO / NC setting condition.) MODE indicator / RUN (green) blinks.	
4		• When Jog switch is turned to "+" side or "-" side, the digital display (red) and MODE indicator / RUN (green) blinks, and NO / NC can be chosen. nc: Normal close (OFF in liquid absent condition.) no: Normal open (OFF in liquid present condition.)	
5		When Jog switch is pressed, setting display blinks 3 times and is confirmed.	
6	an	The sensor returns to Step 2.	
7		When MODE key is pressed, the sensor returns to RUN mode and the incident light intensity is displayed in the digital display (red). MODE indicator / RUN (green) lights up.	

 The setting is complete. Note: The initial setting at the time of factory shipment is the normal close setting "nc."

16 ERROR INDICATION

Error indication

• When an error is displayed, remedy as follows.

Cause

	LITOI IIIUICALIOIT	Cause	rteineuy
		Excessive current flows due to a short-circuit.	 Switch off the power supply and check the load.
		The teaching is abnormal.	• Check the installation condition of the fiber, or whether the fiber has come out, and then do teaching again. • Press MODE key to cancel "{r-3." After the cancellation, the sensor oper ates at the set value conditions before the error. However, in case the sensitivity selection function has been set to the automatic sensitivity setting "Ruba." the sensor operates at optimum sensitivity.
		The communication is abnormal.	 Check if the amplifiers mounted in cascade are disconnected. After the confirmation, do the teaching again.

17 CAUTIONS

- This product has been developed / produced for industrial use only. • Make sure that the power supply is off while wiring and cascading.
- 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.
- Take care that short-circuit of the load or wrong wiring 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.

- 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 product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Make sure to use the optional quick-connection cable for the connection of the amplifier. Extension up to total 100m is possible with 0.3mm², or more, cable.
- However, in order to reduce noise, make the wiring as short as possible. Make sure that stress by forcible bend or pulling is not applied to the sensor cable joint. • Take care that the sensor is not directly exposed to fluorescent lamp
- from a rapid-starter lamp, a high frequency lighting device or sunlight etc. as it may affect the sensing performance. . This product is suitable for indoor use only.
- · Avoid dust, dirt, and steam.
- Take care that the product does not come in contact with oil, grease, organic solvents, such as thinner, etc., strong acid or alkaline.
- When the fiber head gets dusty or dirty etc. the sensitivity deteriorates.
- To keep stable detection, wipe the fiber head to remove dust or dirt etc. and carry out sensitivity teaching periodically.
- This product cannot be used in an environment containing inflammable or explosive gases. Never disassemble or modify the product.
- EEPROM is adopted to this product. It is not possible to conduct teaching 100 thousand times or more, because of the EEPROM's lifetime.

TO SPECIFIC ATIONS

	Туре	NPN output type	PNP output type
Ite	m Model No.	FX-301-F	FX-301P-F
Аp	plicable fiber	FD-F7 series,	FD-F9 series
Su	ipply voltage	12 to 24V DC±10% R	Ripple P-P 10% or less
Power consumption		Eco-operation: 600mW or less	or less at 24V supply voltage
Οι	utput	NPN open-collector transistor • Maximum sink current: 100mA (Note 1) • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1.5V or less [at 100mA (Note 1) sink current]	PNP open-collector transistor Maximum source current: 100mA (Note 1 Applied voltage: 30V DC or less (between output and +V Residual voltage: 1.5V or less [at 100mA (Note 1) source current
	Output operation	When Leak is set (F7 mode): 0 When Liquid is set (F9 mode):	
	Short-circuit protection	Incorp	orated
Re	esponse time	250µs or le	ess (Note 2)
	ensitivity setting ethod	Individual teaching	Collective teaching
	ne sensitivity ad- stment function	Incorp	orated
Ambient temperature		0 to +50°C (If 8 to 16 units are of (No dew condensation or icing a	
Ambient humidity		35 to 85% RH, Storage: 35 to 85% RH	
Emitting element		Red LED (modulated)	
Ma	aterial	Enclosure: Heat-resistant ABS, T	ransparent cover: Polycarbonate
Weight Approx. 20g		ox. 20a	

2) If a leak is detected (output: OFF) in Leak (F7 mode), since the emission is put in blinking operation, only the response to return to ON gets delayed. (approx. 1 sec.) Leak occurs Leak removed 3) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cables given below.

connected together

CN-71-C1 (cable length 1m), CN-71-C2 (cable length 2m), CN-71-C5 (cable length 5m)

CN-73-C1 (cable length 1m), CN-73-C2 (cable length 2m), CN-73-C5 (cable length 5m)

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PRINTED IN JAPAN

September, 2022

Panasonic Industrial Devices SUNX Co., Ltd.