Panasonic INSTALLATION INSTRUCTIONS

Digital Fiber Sensor Amplifiers FX-250 Series

MJE-FX251 No.0105-59V

Thank you for purchasing Panasonic products.
Before operating this unit, please read these instructions and precautions, and save them for future use.

1 SAFETY PRECAUTIONS(ALWAYS OBSERVE)

In this installation manual, ⚠Warning"is classified according to the degree of danger.

| ⚠ WARNING | Risk of death or serious injury. |

⚠ WARNING

- Never use this product as a sensing device for personnel protection.
- ⊘ Using this product as a sensing device for personnel protection may result in death or serious injury.
- When using sensing devices for personnel protection, use products that meet the laws and standards for personnel protection that apply in each region or country, such as OSHA, ANSI and IEC.
- ⊘ This product is intended to detect objects and dose not have a control function to prevent accidents or ensure safety.
- ⊘ Never attempt to disassemble, repair, or modify this product.

2 CAUTIONS

Specification

- This product was developed and manufactured for use in industrial environments.
- Do not use this product outside the range of the specifications. Risk of an accident and product damage. there is also a risk of a noticeable reduction of service life.
- This product uses an EEPROM. The EEPROM has a service life of one million setting operations.

Service Environment

- This product is suitable for indoor use only.
- Do not install the product in the following places:
  - Places where flammable or corrosive gases are present, or much of dust, dirt, and steam
  - Places with much dust, iron filings and salt
  - Places exposed to direct sunlight
  - Places that may come into contact with organic solvents such as thinners, strong acids, alkalis, pharmaceuticals, water, oils, and greases.
  - Places that will burden the product
  - Places surrounded by inflammables
- Do not use the product in an environment where the temperature changes dramatically and condensation is easy to attach.
- The specification may not be satisfied in a strong magnetic field.
- Do not impact it, such as falling. Otherwise, it may cause malfunction.
- Take care that the light curtain is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing operation.

Power Supply

- Make sure that the change of power supply voltage does not vary beyond the rated range when in use. If a voltage exceeding the rated range is applied, or if an AC power supply is directly connected, the product may get burnt or be damaged.
- Do not use during the initial transient time (H-SPD,FAST, STD: 0.5 sec., LONG, H-PWR: 1 sec.) after the power supply is switched ON.
- 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.
- The power input must meet the following requirements:
  1) Be certified for its region of use
  2) Have an output hold time of at least 20 ms
  3) Have a rated output voltage of 12 V to 24 V DC +/- 10% ripple P-P 10% or less and a current capacity of 0.5 A or more
  4) If CE marking compliance is required, have SELV (Safety Extra Low Voltage)/PELV (Protective Extra Low Voltage) in accordance with the EMC Directive
- In case of surge, it is necessary to connect a surge absorber at the source of surge.
- When using a transformer for the power supply section, be sure to use an insulated transformer. If an autotransformer (single coil transformer) is used, the product or power supply may be damaged.
- Please use an insulated power supply with a protection circuit to protect against abnormal voltage caused by the power line.
- If a power device without internal protective circuit is used, be sure to supply power with fuse or other protective means.
- Do not disconnect the power supply while teaching mode or detailed setting is still being set up, as the worst case may cause damage to the internal memory of the sensor and cannot be restarted.
- Depending on the time of the instantaneous power off, the system may continue to operate, or it may be in a newly power-on state. Do not use the product in the environment that will cause instantaneous power off.

Wiring

- Make sure that the power supply is OFF while performing wiring.
- 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.
- Upon load increase, make sure that the current of the control output line does not exceed 100 mA, and avoid miswiring such as incorrect power polarity, which may cause product damage or burn.
- To prevent noise, we recommend using shielded cables for signal wires such as input and output terminals.
- Input signal lines and output signal lines should be different from power lines and power supply lines, and should be separated as much as possible. In addition, signal line connections should be as short as possible.
- During cable extension, be sure to use cables which have 0.3 mm² or more of conductor cross-section area. Extension up to total 100 m is possible. 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 and fiber cable.
- Insulate the ends of unused cables so they don't come in contact with other wires.

Maintenance & Inspect

- Be sure to maintain or clean the product while the power is off.
- Do not perform wiring or maintenance with wet hands, as this may result in electric shock.
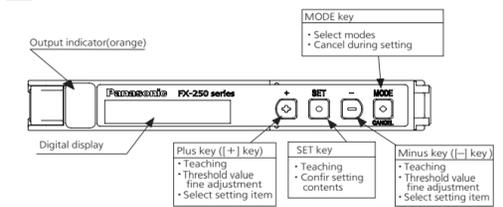
Others

- If the product cannot be used or is no longer needed, it should be properly disposed as industrial waste in compliance with local laws and regulations.
- When the product is exported or taken abroad, it is required to confirm with the customer about the applicable local specifications and regulations.

3 CONTENTS OF PACKAGE

☐ Sensor: 1 pc.
☐ INSTALLATION INSTRUCTIONS (English / Japanese): 1 pc.
☐ General Information for Safety, Compliance, and Instructions: 1 pc.

4 DESCRIPTION OF PARTS

MODE key
- Select modes
- Cancel during setting

Output indicator(orange)

Digital display

Plus key ((+) key)
- Teaching
- Threshold value fine adjustment
- Select setting item

SET key
- Teaching
- Confir setting contents

Minus key ((–) key)
- Teaching
- Threshold value fine adjustment
- Select setting item

<Reference>
Pressing down SET key + MODE key for 3 sec : Set key lock or release key lock(**10** KEY LOCK SETTING)

5 INSTALLATION AND CONNECTIONS

Attaching the amplifier to the DIN rail

1. On the bottom of the amplifier, hook the tab at the rear of the mounting area onto the 35 mm wide DIN rail.
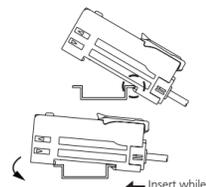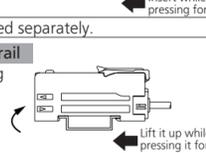
2. While pressing the rear part forward, insert the front tabs into the DIN rail.

● A 35 mm wide DIN rail must be provided separately.

Removing the amplifier from the DIN rail

1. You can remove the amplifier by lifting the front part up while pressing it forward.
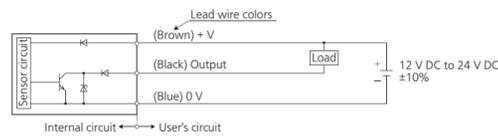
Attaching the fiber

1. Tilt down the fiber lock lever on the amplifier until it stops securely.
2. Insert the fiber into the insertion hole and gently push it until it stops.
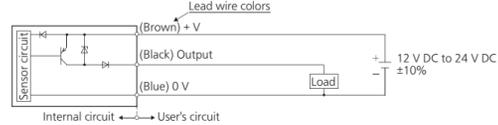3. Push the fiber lock lever back up until it stops.
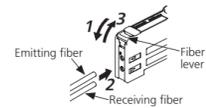
● In the case of coaxial reflective fiber, attach the center fiber (single-core) to the light emitter and the peripheral fiber (multi-core) to the light receiver. Note that the detection accuracy is reduced if this is reversed.
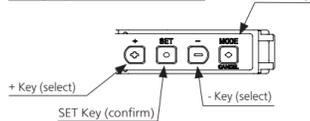
6 I/O CIRCUIT DIAGRAMS

<FX-251-C2>

Lead wire colors
(Brown) + V
(Black) Output
(Blue) 0 V

12 V DC to 24 V DC ±10%

Internal circuit · User's circuit

<FX-251P-C2>

Lead wire colors
(Brown) + V
(Black) Output
(Blue) 0 V

12 V DC to 24 V DC ±10%

Internal circuit · User's circuit

7 OPERATION PROCEDURE

Key operation method

MODE Key

SET: Set
MODE (short press) : Cancel / Return
MODE (long press) : Cancel / Jump to Run mode
● The changed settings are not stored if turning the power OFF while setting. Therefore, confirm the settings by pressing the SET key before turning the power OFF.

About each mode

<RUN Mode>

Displays threshold value and incident light intensity. Teaching, threshold value fine adjustment and key lock function can be set. For setting method of each function, refer to "**8**TEACHING", "**9**MANUAL FINE THRESHOLD ADJUSTMENT" and "**10**KEY LOCK SETTING".

<Sensing Output operation Mode>

Select either Light-ON or Dark-ON. For the setting, refer to "**11**LIST OF SETTING ITEMS". The default setting is "LIGHT-ON".

8 TEACHING

- Teaching can be set in RUN mode.
- For the setting, refer to the "**7**OPERATION PROCEDURE"
- Be sure that detection may become unstable depending on the use environment in teaching if less margin is applied. Revise the shift amount setting or the received light intensity setting.

Useful when sensing object can be set

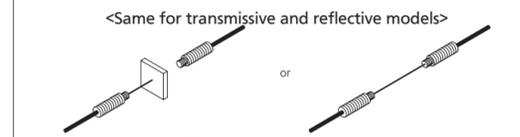| 2-pt teaching | This is basic teaching method. |

<For Transmissive models>   <For reflective models>

<RUN Mode>

1. With an object detected (or with no object), press the [SET] key.

2. "Teach" is displayed.

3. With no object (or with an object),press the [SET] key again.

Stable sensing is possible.

Stable sensing is not possible.

Useful when sensing object cannot be set

| Limit-teaching | This is teaching method in case small object or object in background are existing |

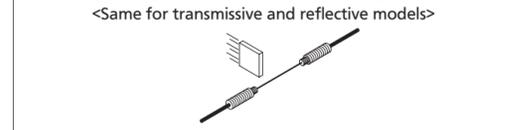<Same for transmissive and reflective models>

<RUN Mode>

1. With an object detected (or with no object), press the [SET] key.

2. "Teach" is displayed.

3. Press the [-] key or [+] key.

4. It displays "LMT+/-" .The threshold value is set by subtracting (or adding) the shift amount.

Stable sensing is possible.

Stable sensing is not possible.

(Note 1): If the received light intensity is too high and becomes saturated, automatically adjusts received light intensity.(Saturation avoidance)

Useful when not want to stop production line and to keep the sensing object moving

| Full-auto teaching | This is method to conduct teaching doing sensing object is moving. |

<Same for transmissive and reflective models>

<RUN Mode>

1. With an object detected (or with no object), press the [SET] key.

2. "Teach" is displayed.
3. Press and hold the [SET] key.

4. "AUTO" is displayed on the screen. Allow the sensed object to pass while pressing the [SET] key.

5. Once the sensed object has passed, release the [SET] key.

Stable sensing is possible.
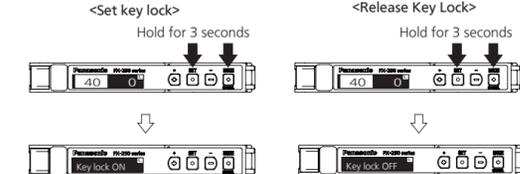
Stable sensing is not possible.

9 MANUAL FINE THRESHOLD ADJUSTMENT

● Set the fine adjustment of threshold value in RUN mode.

1. Press the [+] key, the [-] key. Display the "Threshold Adj." screen.

2. Press the [+] key or the [−] key until you reach the desired value.

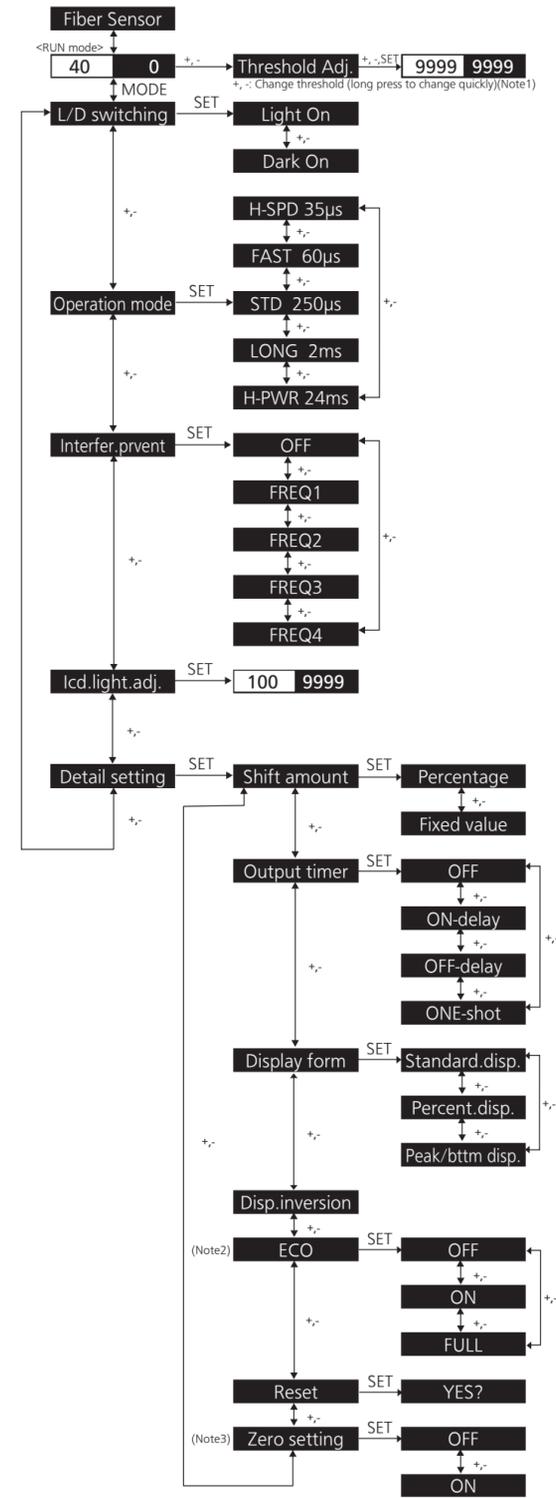3. Press the [SET] key to finalize the setting.

10 KEY LOCK SETTING

● The key lock function prevents key operations so that the conditions set in each setting mode are not inadvertently changed.
● If operating key switch after key lock is set, the OLED will display the screen of "Key lock ON".

<Set key lock>   <Release Key Lock>
Hold for 3 seconds   Hold for 3 seconds

Key lock ON   Key lock OFF

11 LIST OF SETTING ITEMS

- Pressing the [SET] key on each setting screen confirms the setting and returns to the previous screen.
- Pressing the [MODE] key while setting an item cancels the setting and returns to the previous screen.
- Pressing and holding the [MODE] key while setting an item cancels the setting and returns to the RUN mode screen.

Fiber Sensor
<RUN mode>

MODE

L/D switching → Light On / Dark On

Operation mode → H-SPD 35μs / FAST 60μs / STD 250μs / LONG 2ms / H-PWR 24μs

Threshold Adj. — Change threshold (long press to change quickly)(Note1)

Interfer.prvent → OFF / FREQ1 / FREQ2 / FREQ3 / FREQ4

lcd.light.adj. → 100 9999

Detail setting →
Shift amount → Percentage / Fixed value
Output timer → OFF / ON-delay / OFF-delay / ONE-shot
Display form → Standard.disp. / Percent.disp. / Peak/bttm disp.
Disp.inversion
ECO → OFF / ON / FULL
Reset → YES?
Zero setting → OFF / ON

12 ECO SETTING

- Turns off or dims the digital display.
- For setting method of this function, refer to "**11**LIST OF SETTING ITEMS".

Setting item	Description of Functions
OFF (initial value)	The digital display dims if there is no operation for 20 seconds. Press any key to switch the digital display to normal brightness.
ON	The digital display dims if there is no operation for 20 seconds. The digital display turns off if there is no operation for 2 minutes.
FULL	The digital display dims if there is no operation for 20 seconds. The digital display and output indicator turns off if there is no operation for 2 minutes.

13 INTERFERENCE PREVENTION FUNCTION

- When using fiber heads side by side, you can prevent interference by setting the emission frequency of each amplifier to a different value.
- Set the emission frequency of each amplifier in the setup menu "Interfer. prvent". FREQ1, FREQ2, FREQ3, and FREQ4 can be set.
- The response time depends on the setting of the flash frequency.
- When interference prevention function is enabled, the "Operation mode" response time does not apply.

14 ERROR INDICATION

● In case of errors, attempt the following measures.

Error Indication	Content	Measure
Er1 Output short Circuit	Load overcurrent	Automatic recovery when overcurrent is discharged
Er2 Memory R/W	EEPROM write / read error.	The amplifier should be replaced in case of an memory failure

15 SPECIFICATIONS

Type		Cable Type	
		NPN output type	PNP output type
Model No.		FX-251-C2	FX-251P-C2
Supply Voltage		12 V DC to 24 V DC ±10 % / Ripple P-P 10 % or less	
Power Consumption		Normal operation: 960mW or less (current consumption 40 mA or less at 24 V supply voltage)	
Sensing output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (Between sensing output and 0 V) • Residual voltage: 2 V or less (At maximum sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (Between sensing output and + V) • Residual voltage: 2 V or less (At maximum source current)
Output operation		Selectable either Light-ON or Dark ON	
Short-circuit protection		Equipment	
Response Time		H-SPD: 35 μs or less, FAST: 60 μs or less, STD: 250 μs or less, LONG: 2 ms or less, H-PWR: 24 ms or less, Selectable	
Interference Prevention Function		Equipment (4 amplifies set at most) (Note 2)	
Protective structure		IP40 (IEC)	
Operating temperature		-10 °C to +55 °C (If 4 to 7 units close mounting: -10 °C to +50 °C or if 8 to 16 units close mounting : -10 °C to +45 °C) (No dew condensation or icing allowed) Storage: -20 °C to +70 °C	
Operating humidity		35 % RH to 80 % RH; storage: 35 % RH to 80 % RH	
Materials		Case, Cover, Switch: Polycarbonate	
Cable length		0.2 mm² Score: cabtyre cable, 2 m long	
Weight		Approx. 55 g (main unit), approx. 80 g (packaging)	

(Note 1): Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C.
(Note 2): When the interference prevention function is activated, it is required to set the emission frequency for the two amplifiers to be covered by the interference prevention function to different frequency values.

16 OPEN SOURCE SOFTWARE (OSS)

● This product includes the following open source software (OSS). For information on the OSS, refer to our product page.
https://industry.panasonic.com/global/en/products/fasys/sensor/fibersoftware/fx-250_license

(Note 1): The setting range differs according to the operation mode.
(Note 2): When it is in the mode of energy saving, the screen turns off 2 minutes later. When the screen turns off 2 minute after the energy saving mode is adjusted to FULL (ultra-low energy consumption), the indicator light is off.
(Note 3): Please press the +/- key simultaneously for 3 seconds to make the product in zero setting with the current incident light intensity.