

INSTRUCTION MANUAL

Photoelectric Sensor Digital Fiber Sensor FX-100-Z Series

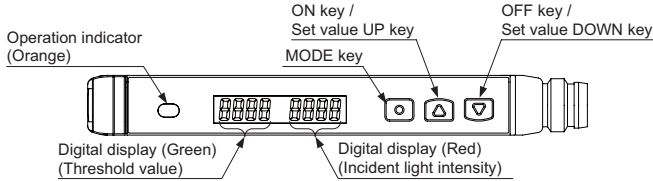
MJE-FX100Z No.0005-47V

Thank you very much for using SUNX 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 quick reference.

⚠ 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	ON key / Set value UP key	OFF key / Set value DOWN key
<ul style="list-style-type: none"> • Selection of setting items • Confirmation of set contents 	<ul style="list-style-type: none"> • Selection of setting contents • Settings in teaching mode 	

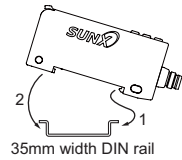
Note: Cancellation is possible when MODE key is pressed for 2 sec. or more in process of settings except for RUN mode, then return to RUN mode.

2 MOUNTING

<When using a DIN rail>

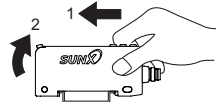
How to mount the amplifier

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 of the unit on the 35mm width DIN rail and fit the front part of the mounting section to the DIN rail.



How to remove the amplifier

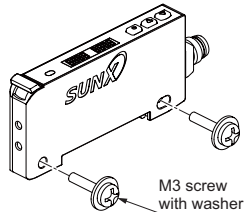
1. Push the amplifier forward.
2. Lift up the front part of the amplifier to remove it.



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

<When using screws with washers>

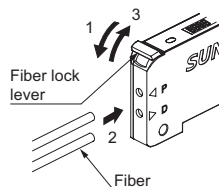
- Use M3 screws with washers for mounting. The tightening torque should be 0.5N·m or less.



How to connect the fiber cable

Be sure to fit the attachment to the fibers first before inserting the fibers to the amplifier. For details, refer to the Instruction Manual enclosed with the fibers.

1. Snap the fiber lock lever down, till it stops completely.
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. Since a flexible fiber is easily bent, take care when it is inserted.

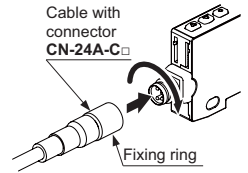
- 2) With the coaxial reflective type fiber, such as, FD-G4 or FD-FM2, insert the single-core fiber cable into the beam-emitting inlet "P" and the multi-core fiber cable into the beam-receiving inlet "D." If they are inserted in reverse, the sensing performance will deteriorate.

3 WIRING

- Make sure to use the cable with connector CN-24A-C□ (optional) when connecting to this product.
- Tighten the fixing ring of the cable with connector completely by hand when mounting. (The tightening torque: 0.3 to 0.4N·m)
- Make sure to hold the side surface of this product when tightening or loosening the fixing ring of the cable with connector.
- If the fixing ring is tightened by a tool such as pliers, it may cause connector damage.
- If the tightening torque is not enough, the fixing ring may loosen due to vibration, etc.

Connection method

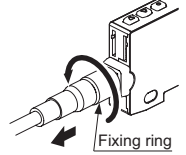
- Insert the cable with connector CN-24A-C□ (optional) into this product's connector area, and twist the fixing ring of the cable with connector to be fixed.



Disconnection method

- Loosen the fixing ring, and, holding the fixing ring, pull to separate the connector.

Note: Before disconnecting, make sure to check that the fixing ring is completely loosened. If pulled by excessive force (15N or more) when the fixing ring is tightened, it may cause the breakage.

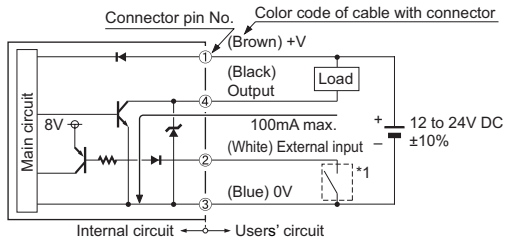


<Connector pin arrangement>

Connector pin No.	Terminal name
1	+V
2	External input
3	0V
4	Output

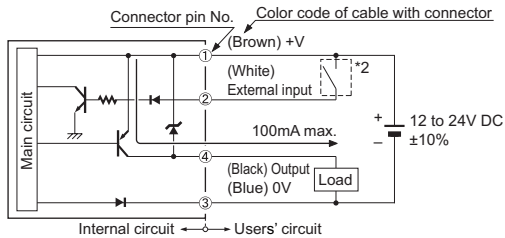
4 I/O CIRCUIT DIAGRAMS

<NPN output type>



*1
Non-voltage contact or NPN open-collector transistor
High (+8V to +V DC or Open): Invalid
Low ([0 to +2V DC (Source current 0.5mA or less)]: Valid

<PNP output type>

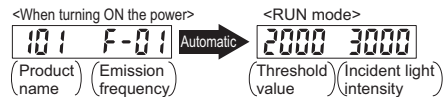


*2
Non-voltage contact or PNP open-collector transistor
High [+4V to +V DC (Sink current 0.5 to 3mA or less)]: Valid
Low (0 to +0.6V DC or Open): Invalid

5 RUN MODE

<Digital display>

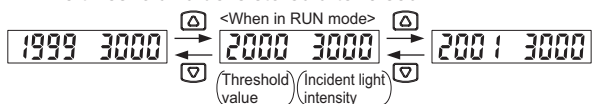
- When turn ON the power, the product name is displayed in the green digital display, while the emission frequency is displayed in the red digital display. Then switch into RUN mode [digital display (green: threshold value, red: incident light intensity)].



- "E-σF" is displayed in the red digital display when emission halt is selected in the external input setting mode and externally received the signal.
- When ECO setting mode is ON, the digital display turns off in approx. 20 sec. In case of lighting up the digital display again, press any key for 2 sec. or more.
- For the setting of external input or ECO, refer to "8 PRO MODE."

Threshold value fine adjustment function

- Fine adjustment of the threshold value can be done when in RUN mode.
- Press the set value UP key or set value DOWN key to change the threshold value. (Hold down the key to make the value change faster.)
- The threshold value is stored after 3 sec.

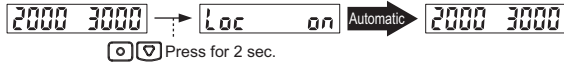


Key lock function

- The key lock function prevents key operations so that the conditions set in each setting mode are not inadvertently changed.
- In the key lock condition, "Loc on" is displayed when any key is pressed.

[Key lock set]

<When in RUN mode>



[Key lock released]

<When in RUN mode>



6 SETTING MODE

- Setting mode appears after pressing MODE key for 2 sec. in RUN mode.
- RUN mode appears after MODE key is pressed for 2 sec. in process of setting. However, changed items before pressing MODE key for 2 sec. have been set.

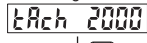
<RUN mode>



<Setting mode>

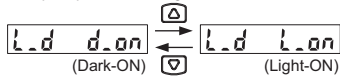


<Teaching mode>

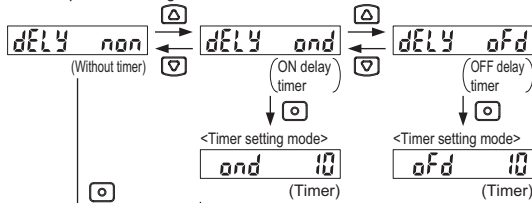


For details, refer to "7 TEACHING MODE."

<Output operation setting mode>

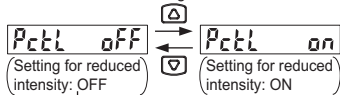


<Timer operation setting mode>

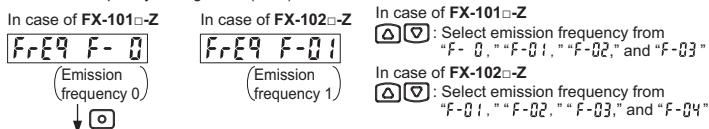


△▽: Select timer from 1ms, 5ms, 10ms, 20ms, 40ms, 50ms, 100ms, 500ms, and 1,000ms.

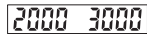
<Emission amount setting mode>



<Emission frequency setting mode (Note)>



<RUN mode>



Note: The operation indicator and the beam-emitting inlet blink while setting emission frequency. (When emission frequency 0 is set, they light up.) The blinking cycle depends on each emission frequency. (Emission frequency 1: fast ↔ Emission frequency 4: slow)

Setting item	Factory setting	Description
Teaching mode	tRch	Threshold value can be set in 2-level teaching, limit teaching, or full-auto teaching. For details, refer to "7 TEACHING MODE."
Output operation setting mode	L_d d_on	Light-ON or Dark-ON can be set.
Timer operation setting mode	dELY non	Without timer, ON delay timer, or OFF delay timer can be set.
Timer setting mode	onD 10 oFd 10	In case of setting ON delay timer or OFF delay timer in the timer operation setting mode, timer can be set. When timer is not set, this mode is not displayed.
Emission amount setting mode	Pctl oFF	Setting for reduced intensity of emission amount is possible when the incident light intensity is saturated.
Emission frequency setting mode	FX-101-Z FrE9 F-0 FX-102-Z FrE9 F-01	In case of using the fiber heads in parallel, interference can be prevented by setting different emission frequency. However, when emission frequency 0 is set, interference cannot be prevented. Response time corresponds to emission frequency. For details, refer to "18 SPECIFICATIONS."

7 TEACHING MODE

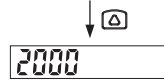
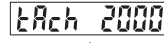
Make sure that detection may become unstable if less margin is applied in the use environment when teaching.

In case of 2-level teaching

- This is the method of setting the threshold value by teaching two levels, corresponding to object present and object absent conditions. Normally, setting is done by this method.
- The output operation setting of Light-ON or Dark-ON is reflected automatically.

[For output ON when in object present condition]

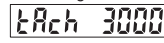
<Teaching mode>



- Press ON key in object present condition. Thru-beam type Light interrupted condition
- The first incident light intensity is set and indicated on the green digital display. (Cancellation of the setting for the first incident light intensity is possible when MODE key is pressed.) Reflective type Light received condition
- The present incident light intensity blinks in red at the digital display. Thru-beam type Light received condition
- Press OFF key in object absent condition. Reflective type Light interrupted condition
- The threshold value which is set between the first and the second incident light intensity is indicated on the green digital display.
- Margin for the threshold value to the first or the second incident light intensity is indicated on the red digital display. When the margin is 200% or more, "Full" is displayed.
- The setting is done.

[For output ON when in object absent condition]

<Teaching mode>

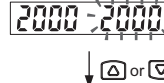
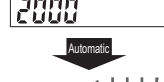
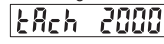


- Press ON key in object absent condition. Thru-beam type Light received condition
- The first incident light intensity is set and indicated on the green digital display. (Cancellation of the setting for the first incident light intensity is possible when MODE key is pressed.) Reflective type Light interrupted condition
- The present incident light intensity blinks in red at the digital display. Thru-beam type Light interrupted condition
- Press OFF key in object present condition. Reflective type Light received condition
- The threshold value which is set between the first and the second incident light intensity is indicated on the green digital display.
- Margin for the threshold value to the first or the second incident light intensity is indicated on the red digital display.
- The setting is done.

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.

<Teaching mode>

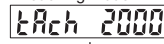


- Press OFF key (the threshold value is shifted to lower side) twice when using thru-beam type fiber, and press ON key (the threshold value is shifted to higher side) twice when using reflective type fiber. Thru-beam type Reflective type Background
- Reference incident light intensity is set by the first key input and indicated on the green digital display. (Cancellation of the setting for the reference incident light intensity is possible when MODE key is pressed.)
- The present incident light intensity blinks in red at the digital display.
- Press ON key or OFF key which is pressed in the previous step. (For example, when ON key is pressed in the previous step, press ON key again for the second time. The incident light intensity at the second key input is not related to the threshold value.)
- The set threshold value is indicated on the green digital display. The threshold value depends on the shift amount. For setting mode of the shift amount, refer to <Shift setting mode> in "8 PRO MODE."
- Margin for the threshold value to the incident light intensity is indicated on the red digital display. When the margin is 200% or more, "Full" is displayed. High Threshold value Incident light intensity with object absent Threshold value Low
- The setting is done.

In case of full-auto teaching

- Full-auto teaching is used when it is desired to set the threshold value without stopping the assembly line, with the object in the moving condition.

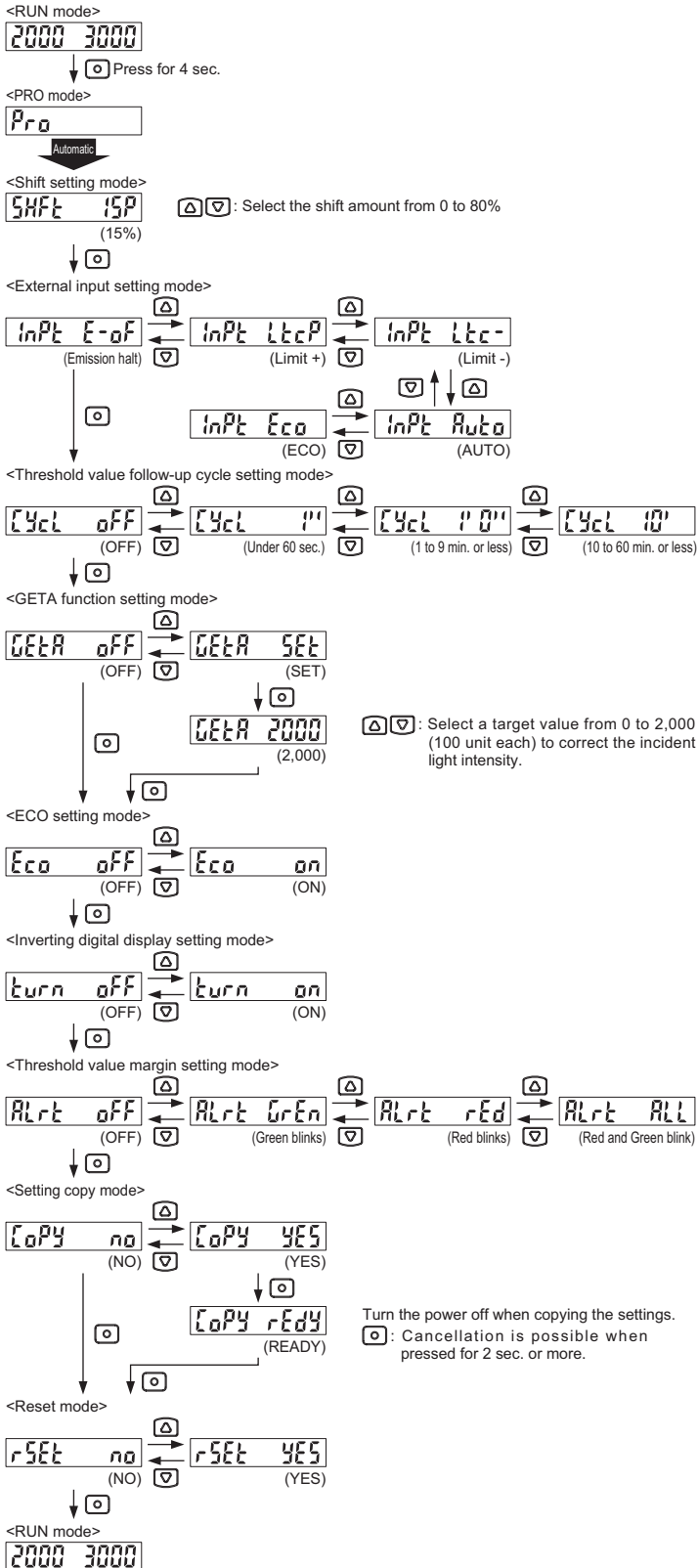
<Teaching mode>



- Hold down ON key or OFF key.
- "Auto" appears in the green digital display after approx. 2 sec., and starts sampling the incident light intensity from that point.
- The threshold value is set when ON key or OFF key is released.
- The set threshold value is indicated on the green digital display.
- Margin for the threshold value to the incident light intensity is indicated on the red digital display. When the margin is 200% or more, "Full" is displayed.
- The setting is done.

8 PRO MODE

- PRO mode appears after pressing MODE key for 4 sec. in RUN mode.
- RUN mode appears after pressing MODE key for 2 sec. in process of setting. However, changed items before pressing MODE key for 2 sec. have been set.



Setting item	Factory setting	Description
Shift setting mode	SHFt 15P	Shift amount can be selected from 0 to 80% in the limit teaching. Select 0% when it is desired to set the present incident light intensity as a threshold value.
External input setting mode	InPt E-oF	External input can be selected from emission halt, limit +, limit -, AUTO, and ECO.
Threshold value follow-up cycle setting mode (Note 1)	Cycl OFF	When incident light intensity exceeds threshold value, this mode can change the threshold value with each set cycle depending on variations of the incident light intensity. The follow-up shift amount is same as the one set in the shift setting mode. However, the threshold value is not stored.
GETA function setting mode (Note 2, 3)	GETA OFF	Variations can be reduced by correcting the present incident light intensity in each amplifier to a target value. Target value to offset incident light intensity can be selected from 0 to 2,000 by 100 unit each. For example, if the target value is set to 2,000 when the incident light intensity is 1,500, the incident light intensity becomes 2,000.
ECO setting mode	Eco OFF	It is possible to light up / turn off the digital display. When ECO setting mode is ON, the display turns off in approx. 20 sec. in RUN mode. To light up the display again, press any key for 2 sec. or more.
Inverting digital display setting mode	turn OFF	Digital display can be inverted.
Threshold value margin setting mode	ALrt OFF	Margin for threshold value to the present incident light intensity can be checked. When there is no margin, it is possible to make the digital display blink. "GrEn": Green blinks. "rEd": Red blinks. "ALL": Red and Green blink.
Setting copy mode	COPY NO	The settings of the master side amplifier can be copied to the slave side amplifier. For details, refer to "■ SETTING COPY FUNCTION."
Reset mode	rSEt NO	Returns to default settings (factory settings).

- Notes: 1) If the incident light intensity becomes "300" or less, the follow-up operation stops. In that condition, threshold value [digital display (green)] blinks. This function can be used when thru-beam type or retroreflective type fiber is applied to this product. If reflective type fiber is applied, the function cannot be used depending on use conditions.
- 2) If pressing MODE key in RUN mode when GETA function is used, the incident light intensity before setting GETA function is displayed on the red digital display for approx. 2 sec.
- 3) When GETA function is used in saturation of incident light intensity (4,000 or more), "HARd" is indicated on the red digital display. Correction value is up to 4,000.

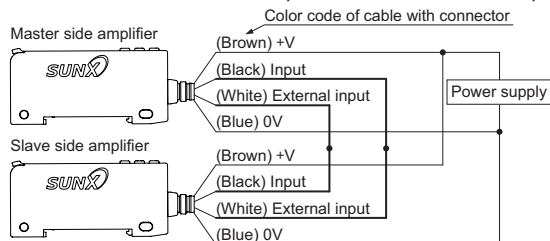
9 SETTING COPY FUNCTION

- This can copy the settings of the master side amplifier to the slave side amplifier.

- Be sure to use the setting copy function between the identical models. This function cannot be used between different models.
- Only one sensor can be connected on slave side with a master side sensor for the setting copy function.
- Threshold value, output operation setting, timer operation setting, timer setting, emission amount setting, shift setting, ECO setting, inverting digital display setting, and threshold value margin setting can be copied.

<Setting procedures>

1. Set the setting copy mode of the master side amplifier to "Copy sending ON," and press MODE key so that "COPY rEdy" is shown on the digital display and the sensor is in copy ready state. For the setting method, refer to <Setting copy mode> in "■ PRO MODE."
2. Turn off the master side amplifier.
3. Connect the master side amplifier with the slave side amplifier as shown below.



4. Turn on the master side amplifier and the slave side amplifier at the same time. (Note)
5. "COPY" is shown on the green digital display of the master side amplifier and 4-digit code is shown on the red digital display of it, then the copying starts.
6. When the copying is completed, "Good" is shown on the green digital display of the slave side amplifier, while the 4-digit code (the same code as the master side amplifier) is shown on the red digital display of it.
7. Turn off the power of the master side amplifier and the slave side amplifier and disconnect the wire.

* If copying the settings to another amplifier repeatedly, follow the steps 3 to 7.
Note: Take care that if the power is not turned on at the same time, the setting contents may not be copied.

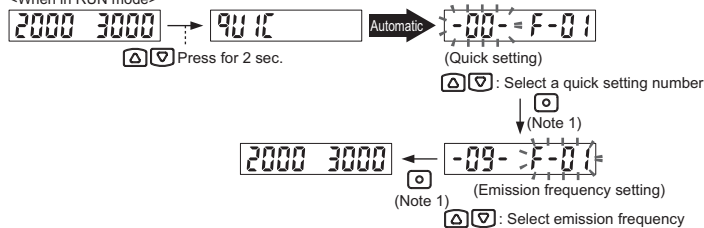
<To cancel the setting copy mode of the master side amplifier>

1. While the slave side amplifier is disconnected, turn on the power of the master side amplifier.
2. Press MODE key for approx. 2 sec.

10 QUICK SETTING FUNCTION

- Settings for output operation, emission amount, timer, and emission frequency are possible simply by selecting a setting number.
- For the setting numbers, refer to <Table of quick setting numbers>.

<When in RUN mode>



- Notes: 1) Cancellation is possible when MODE key is pressed for 2 sec. or more before finalizing, then return to RUN mode.
 2) When the present setting is out of the quick setting range, " -88- " is shown. When " -88- " is selected, the set content is not changed.

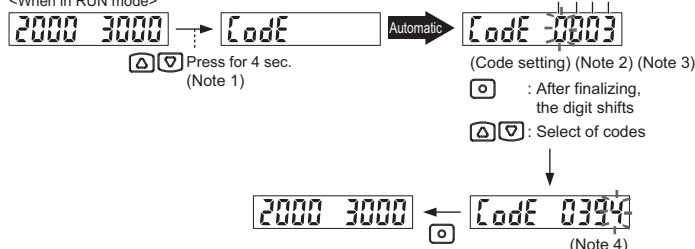
<Table of quick setting numbers>

No.	Output operation	Emission amount setting	Timer	No.	Output operation	Emission amount setting	Timer
-00-	D-ON	OFF	non	-10-	L-ON	ON	ond 40ms
-01-	D-ON	ON	non	-11-	L-ON	OFF	ond 40ms
-02-	D-ON	OFF	ofd 10ms	-12-	L-ON	ON	ond 10ms
-03-	D-ON	ON	ofd 10ms	-13-	L-ON	OFF	ond 10ms
-04-	D-ON	OFF	ofd 40ms	-14-	L-ON	ON	ofd 40ms
-05-	D-ON	ON	ofd 40ms	-15-	L-ON	OFF	ofd 40ms
-06-	D-ON	OFF	ond 10ms	-16-	L-ON	ON	ofd 10ms
-07-	D-ON	ON	ond 10ms	-17-	L-ON	OFF	ofd 10ms
-08-	D-ON	OFF	ond 40ms	-18-	L-ON	ON	non
-09-	D-ON	ON	ond 40ms	-19-	L-ON	OFF	non

11 CODE SETTING FUNCTION

- Settings for output operation, timer, emission amount, emission frequency, ECO, external input, and shift amount are possible by selecting codes discretionary.
- For the codes, refer to <Code table>.

<When in RUN mode>



- Notes: 1) Although the quick setting function appears 2 sec. after the set value UP key and set value DOWN key are pressed, keep pressing the key.
 2) Cancellation is possible when MODE key is pressed for 2 sec. or more before the digit blinks, then return to RUN mode.
 3) Cancellation of set value is possible when MODE key is pressed for 2 sec. or more while the digit is blinking.
 4) When the fourth digit is determined, the settings are reflected.

<Code table>

Code	1st digit		Emission amount setting	2nd digit		ECO	External input	Shift (Note 5)
	Output operation	Timer (Note 5)		FX-101-Z	FX-102-Z			
0	D-on	non	OFF	0	1	OFF	E_oF	5%
1		ond 10ms		1	2		Limit [+]	10%
2		ond 40ms		2	3		Limit [-]	15%
3		ofd 10ms		3	4		Auto	20%
4		ofd 40ms		0	1	Eco	25%	
5	L-on	non	ON	1	2	ON	E_oF	30%
6		ond 10ms		2	3		Limit [+]	35%
7		ond 40ms		3	4		Limit [-]	40%
8		ofd 10ms					Auto	45%
9		ofd 40ms					Eco	50%

- Notes: 5) When the present setting is out of the code setting range, " - " is shown. When " - " is selected, the set content of the digit is not changed.
 6) The factory setting is " 0002 ".

12 ERROR INDICATION

- In case of errors, attempt the following measures.

Display	Error description	Measures
Er-0	EEPROM writing error	Contact our office.
Er-1	The load has short-circuited and excess current is flowing.	Turn off the power, then check the load.
Er-5	Communication error (Disconnection, connection failure, etc.)	Check the wiring before using the setting copy function.

13 SPECIFICATIONS


Item	Type		Standard	Long sensing range
	Model No.	NPN output	FX-101-Z	FX-102-Z
		PNP output	FX-101P-Z	FX-102P-Z
Supply voltage	12 to 24V DC±10% Ripple P-P 10% or less (within the rated range)			
Power consumption	Normal operation: 720mW or less (Current consumption 30mA or less at 24V supply voltage) ECO mode: 600mW or less (Current consumption 25mA or less at 24V supply voltage)			
Output	<NPN output type>		<PNP output type>	
	NPN open-collector transistor · Maximum sink current: 100mA · Applied voltage: 30V DC or less (between output and 0V) · Residual voltage: 1.5V or less (at 100mA sink current)		PNP open-collector transistor · Maximum source current: 100mA · Applied voltage: 30V DC or less (between output and +V) · Residual voltage: 1.5V or less (at 100mA source current)	
Output operation	Light-ON or Dark-ON, selectable			
Short-circuit protection	Incorporated			
External input	<NPN output type>		<PNP output type>	
	NPN non-contact input · Signal condition High: +8V to +V DC or Open Low: 0 to +2V DC (Source current 0.5mA or less) · Input impedance: Approx. 10kΩ		PNP non-contact input · Signal condition High: +4V to +V DC (Sink current 0.5 to 3mA or less) Low: 0 to +0.6V DC or Open · Input impedance: Approx. 10kΩ	
Response time	Emission frequency 0: 250µs or less Emission frequency 1: 450µs or less Emission frequency 2: 500µs or less Emission frequency 3: 600µs or less		Emission frequency 1: 2.5ms or less Emission frequency 2: 2.8ms or less Emission frequency 3: 3.2ms or less Emission frequency 4: 5.0ms or less	
Ambient temperature	-10 to +55°C (No dew condensation or icing allowed) (Note) Storage: -20 to +70°C			
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH			
Emitting element	Red LED (peak wavelength = 632nm)			
Material	Enclosure: Polycarbonate, Fiber lock lever: PBT			
Weight	Approx. 15g (Main body only)			

- Note: When using the products in parallel, the ambient temperature is as follows.
 4 to 7 units: -10 to +50°C, 8 to 16 units: -10 to +45°C

14 CAUTIONS

- This product has been developed / produced for industrial use only.
- Make sure that the power supply is off while wiring.
- Take care that if a voltage exceeding the rated range is applied, or if an AC power supply is directly connected, the product may get burnt or damaged.
- Take care that short-circuit of the load or wrong wiring may burn or damage the product.
- 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.
- 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 product 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.
- 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.

15 INTENDED PRODUCTS FOR CE MARKING

- The models listed under " 13 SPECIFICATIONS " come with CE Marking. 
- As for all other models, please contact our office.

SUNX Limited

URL : sunx.jp

Overseas Sales Dept. (Head Office)

2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan
 Phone: +81-(0)568-33-7861 FAX: +81-(0)568-33-8591

Europe Headquarter: Panasonic Electric Works Europe AG

Rudolf-Diesel-Ring 2, D-83607 Holzkirchen, Germany
 Phone: +49-8024-648-0

US Headquarter: Panasonic Electric Works Corporation of America

629 Central Avenue New Providence, New Jersey 07974 USA
 Phone: +1-908-464-3550

PRINTED IN JAPAN