

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 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.

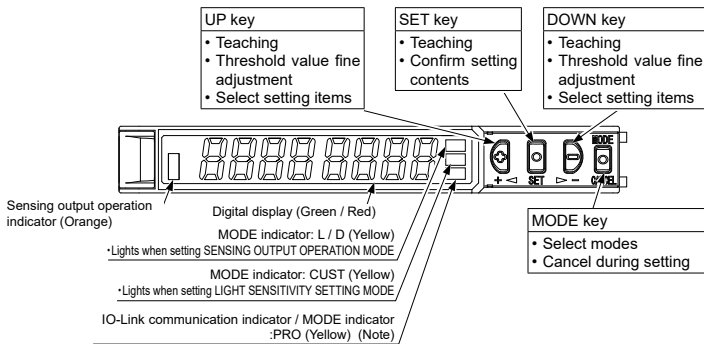
This product is not equipped with an automatic interference prevention function. By setting different frequencies, interference can be prevented for up to four units. For the setting method, refer to <PRO3> in **"12 PRO MODE."**

**1 INTENDED PRODUCTS FOR CE MARKING**

- This product complies with the following standards / regulations.  
 <EU Directive>  
 EMC Directive



**2 PART DESCRIPTION**

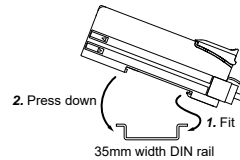


Function	During IO-Link non communication		During IO-Link communication	
	Normal status	Main unit PRO mode	Normal status	Main unit PRO mode
Lamp OFF	Lights up	Flashes	Lights up	

**3 MOUNTING**

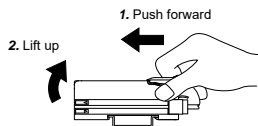
**How to mount**

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



**How to remove**

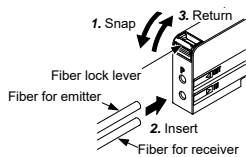
1. Push the amplifier forward.
2. Lift up the front part of the amplifier to remove it.



**How to connect the fiber cable**

- Mount the fiber cables in the state power is not supplied.
- Be sure to fit the attachment to the fiber cables first before inserting that to the amplifier. For details, refer to the instruction manual enclosed with the fiber cables.
- Insert the fiber cables slowly into the inlets until they stops. Excessive force may damage the product.

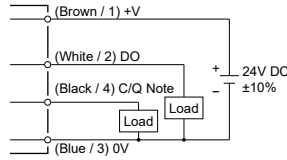
1. Snap the fiber lock lever down till it stops completely.
2. Insert the fiber cables slowly into the inlets until they stops. (Note)
3. Return the fiber lock lever to the original position till it stops.



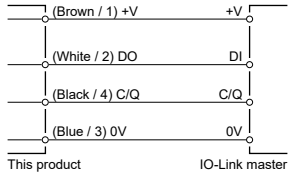
Note: With the coaxial reflective type fiber, insert the single core fiber cable into the beam-emitting inlet "P" and the multi-core fiber cable into the beam-receiving inlet. If they are inserted in reverse, the sensing performance will deteriorate.

**4 WIRING**

• When used as general-purpose sensor



• When connected to IO-Link master



<Terminal arrangement of M12 connector type>



Terminal No.	Terminal name
1	+V
2	Control output (DO)
3	0V
4	IO-Link communication (C/Q) Note

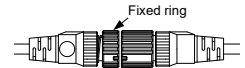
- Recommended extension cable  
 Extension cable with connectors on both ends  
 XS5W series  
 [OMRON Corporation]

Note: When the product is used as a general-purpose sensor, the IO-Link communication (C/Q) is generated in the same way as control output (DO).

**How to mount M12 connector**

If the fixed ring loosens, the connector will come off, causing this product to generate a communication error. Before use, be sure to check that the fixed ring is not loose.

- Firmly tighten the fixed ring by rotating it.



**5 LIST OF FUNCTIONS**

Function	Setting on main unit	IO-Link communication setting (Note)
Teaching	2-point teaching (SET Key)	Index2
	Limit-teaching (UP Kye)	Index2
	Limit-teaching (DOWN Kye)	Index2
	Full-auto teaching (SET Kye)	Index2
	Teaching cancel	Index2
	Threshold value fine Adjustment	Index60
Key lock function	Set / Release	Index12
Output Operation Setting	Light-ON/Dark-ON	Index61_1
Light sensitivity setting	Light sensitivity select	Index77
Response time setting	Selection from 4-mode	Index66
Timer setting	Timer mode	Index64_1
Timer time setting	Timer time	Index64_2
Shift amount setting	Amount select	Index74_1
Shift threshold value setting	Shift threshold value	Index74_2
Teaching lock setting	Lock ON / OFF	Index85
Setting items in digital display setting	Incident light intensity / Displayed in percentage / Peak/bottom value	Index83_1
Time period hold setting	Hold ON / OFF	Index83_2
Setting of digital display turning	Turning ON / OFF	Index82
ECO Setting	FULL / ON / OFF	Index80

Function	Setting on main unit	IO-Link communication setting (Note)
Display adjustment setting	Set / Release	Index2
Reset setting	Execution	Index2
Emitting frequency setting	Disabled / Interference revention/Ambient environment resistance	Index76_1
Emitting frequency (Interference revention setting)	Selection from 4-mode	Index76_2
Threshold value tracking Cycle setting	Cycle (time)	Index75_1
Threshold value tracking Output Operation Setting	ON / OFF	Index75_2
Threshold value tracking Storage cycle setting	Storage cycle (each time)	Index75_3
Threshold value tracking Algorithm setting	Teaching mode select	Index75_4
Preventive maintenance threshold value 1 setting	—	Index160
Preventive maintenance threshold value 2 setting	—	Index161
Preventive maintenance threshold value detection lag time setting	—	Index162
Operating time	—	Index163
Number of data save operations	—	Index164
Notification Flag Setting	—	Index168
Notification Event Code	—	Index169

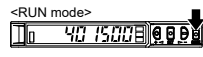
Note: For the IO-Link communication setting, refer to the attached sheet, "Index List."(IMJE-FXLINK)

**6 OPERATION PROCEDURE**

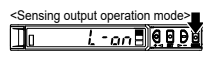
The changed settings are not stored if turning the power OFF while setting. Therefore, confirm the settings by pressing the SET key before turning the power OFF.

If settings are configured simultaneously on the main unit side and on the IO-Link communication side, the settings that are applied last will be enabled.

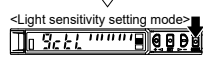
- When turning ON the power, RUN mode is displayed and the digital display shows the threshold value (green) and the incident light intensity (red).



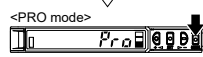
- Displays threshold value (green) and incident light intensity (red).
- Teaching, threshold value fine adjustment and key lock function can be set.
- For setting method of each function, refer to **"7 TEACHING MODE," "8 THRESHOLD VALUE FINE ADJUSTMENT FUNCTION,"** or **"9 KEY LOCK FUNCTION."**



- Select either Light-ON or Dark-ON.
- For the setting, refer to **"10 SENSING OUTPUT OPERATION MODE."**
- The default setting is "L - on" (Light-ON).



- Displays light sensitivity setting and enables its setting.
- For detailed information, refer to **"11 LIGHT SENSITIVITY SETTING MODE."**



- Detailed settings can be set for maximizing the performance of individual functions.
- For setting items and setting method, refer to **"12 PRO MODE."**

**7 TEACHING MODE**

Be sure that detection may become unstable depending on the use environment in teaching if less margin is applied.

- Teaching can be set in RUN mode (And during IO-link communication).

## Useful when sensing object can be set

**2-point teaching** This is basic teaching method.

**<Thru-beam type>**

**<Mirror reflection type>**

**<Reflective type>**

1. Press the SET key in the sensing object present condition (System command / Index2: 0x43).

2. Press the SET key in the sensing object absent condition (System command / Index2: 0x44).

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 back ground are existing.

**<Common to thru-beam type, mirror reflection type and reflective type>**

or

1. Press the SET key in the sensing object present condition or non sensing object present condition.

2. Thru-beam type, mirror reflection type: Threshold level is shifted to high value (low sensitivity) when UP key is pressed down, and it is shifted to low value (high sensitivity) when DOWN key is pressed down. (Note 1) (Note 2)

Reflective type: Threshold level is shifted to high value (low sensitivity) when DOWN key is pressed down, and it is shifted to low value (high sensitivity) when UP key is pressed down. (Note 1) (Note 2)

Stable sensing is possible

Stable sensing is not possible

Note 1: The shift value of approx. 15% is an initial value. Display of the shift value can be changed to percentage [approx. 0 to 999% (unit 1%) or incident light intensity [0 to 9999 (unit 1)]. For setting the shift amount, refer to <PRO1> in **PRO MODE**.

Note 2: At the time of limit teaching. UP key (System command / Index2: 0x4B)  
DOWN key (System command / Index2: 0x4C)

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

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

**<Common to thru-beam type, mirror reflection type and reflective type>**

1. Pressing SET key down

Pressing down long

2. Run the sensing object on the line and hold down the SET key (System command / Index2: 0x47)..

Automatic

3. "Auto" is displayed on the digital display (green) and when the sensing object passed through, release the SET key (System command / Index2: 0x48)..

Stable sensing is possible

Stable sensing is not possible

## 8 THRESHOLD VALUE FINE ADJUSTMENT FUNCTION

- Set the fine adjustment of threshold value in RUN mode (And during IO-link communication).

Press down UP / DOWN key

Press down SET key

Confirmed

(Automatically set without pressing down SET key in approx. 2 sec.)

## 9 KEY LOCK FUNCTION

- The key lock function prevents key operations so that the conditions set in each setting mode are not inadvertently changed (It is also possible to set at IO-link communication).
- If operating key switch after key lock is set, "Lac on" is indicated on the digital display.

**<Set key lock>**

Press down SET + MODE keys simultaneously for 3 sec or longer

Automatic

"Lac on" is displayed

**<Release key lock>**

Press down SET + MODE keys simultaneously for 3 sec or longer

Automatic

"Lac off" is displayed

(Lac on, 2000 1500 are displayed)

## 10 SENSING OUTPUT OPERATION MODE

- When MODE indicator: L / D (yellow) lights up, sensing output operation can be set (And during IO-link communication).

Press down UP / DOWN key

Press down SET key

Confirmed

Confirmed

## 11 LIGHT SENSITIVITY SETTING MODE

- When the MODE indicator: CUST (yellow) lights up, light sensitivity setting can be displayed (And during IO-link communication).
- By pressing down UP key or DOWN key, light sensitivity setting can be changed.
- Press SET key to confirm the setting.

SET key UP key DOWN key MODE key

MODE indicator CUST (Yellow)

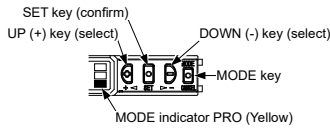
Press down UP / DOWN key

Press down SET key

Confirmed

# 12 PRO MODE

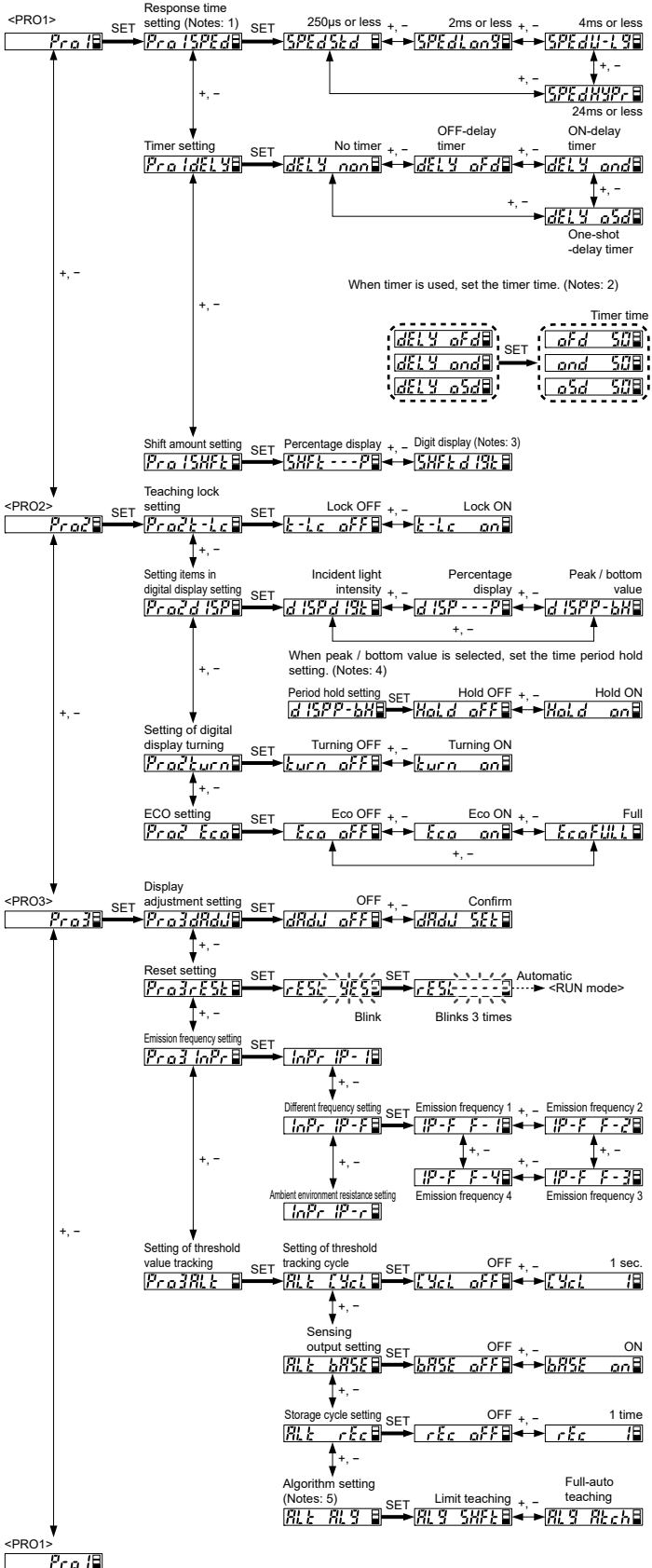
- When MODE indicator: PRO (yellow) lights up, PRO mode can be set (And during IO-link communication).



## Procedure

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.

If settings are configured simultaneously on the main unit side and on the IO-Link communication side, the settings that are applied last will be enabled.



Notes: 1) Display of incident light intensity depends on the response time.

Response time	Incident light intensity
"5td"	Max. 4,000
"Lon9"	Max. 8,000
"U-L9", "HYPr"	Max. 9,999

Notes: 2) When timer is used, set the timer time.

Timer range	Timer time	Display
"1/10ms"	Approx. 0.1 to 999.9ms	1~9999

Notes: 3) When setting the shift value using the digit display, the setting range differs depending on the response time, as shown in the table below.

Response time	Shift value setting range
"5td"	Max. 4,000
"Lon9"	Max. 8,000
"U-L9", "HYPr"	Max. 9,999

Notes: 4) To clear the value, turn off the time period holding function. Turning off the power switch also clears the value.

Notes: 5) When "SHFt" is set, limit teaching is conducted according to the change in the incident light intensity, and then the threshold value is reset. Shift direction of the threshold value differs depending on the combination of sensing output status and sensing output operation, as shown in the table below.

Sensing output status	Sensing output operation	Shift direction of threshold value
Sensing output ON	Light-ON	Limit teaching is conducted for the negative (-) side of the threshold value.
Sensing output ON	Dark-ON	Limit teaching is conducted for the positive (+) side of the threshold value.
Sensing output OFF	Light-ON	Limit teaching is conducted for the positive (+) side of the threshold value.
Sensing output OFF	Dark-ON	Limit teaching is conducted for the negative (-) side of the threshold value.

Item	Default setting	Description	
PRO1 mode	Response time setting	5PEd5td	Set response time.
	Timer setting	dELY non	Set timer operation.
	Timer range setting	ofd 50	Set timer range and timer time (Display example is when the OFF-delay timer is selected).
Shift amount setting	SHFt ---P	Set shift amount of threshold value in limit teaching.	
PRO2 mode	Teaching lock setting	t-Lc off	Be able to prevent from wrong operation of teaching. "off": Teaching mode is valid "on": Teaching mode is invalid
	Digital display item setting	dISPd 19t	Incident light intensity can be displayed in percentage or the peak / bottom value can be displayed on the digital display (red).
	Period hold setting	Hold off	"off": Peak / bottom value in the digital display refreshing condition can be displayed. "on": Peak / bottom value in the hold condition can be displayed.
Digital display turning on setting	tURN off	Sets the viewing orientation of the digital display.	
ECO setting	Eco off	Power consumption can be lowered. "off": ECO OFF "on": If any key operation is not carried out for 20 sec. in RUN mode, the digital display turns OFF. "FULL": If key operation is not done in 20 sec. or setting the key lock function in Run mode, all indicators turns OFF.	
PRO3 mode	Display adjustment setting	dRdd off	Incident light intensity can be set to "0". When the correction amount is large, "QUEr" is blinked as the setting cannot be conducted normally. "off": Display adjustment OFF "SEt": Incident light intensity is offset (in the negative direction) to cancel sneaking light.
	Reset setting	-	If setting to "SEt" returns to default settings (factory settings).
Emission frequency setting		inPr ip-1	"ip-1": Interference prevention function is disabled. "ip-f": Set this when emission frequency is changed and interference prevention function is used. The maximum number of sensor heads for adherence mounting is 4 units when 4 types of emission frequency are set. "ip-r": Set this to minimize the effect of ambient environment. When this setting is set, mutual interference prevention function is disabled.
	Response time		Response time is as follows when "ip-f" or "ip-r" is selected. "ip-f": F-1: 0.8ms or less, F-2: 0.9ms or less, F-3: 1.0ms or less, F-4: 1.7ms or less (Not affected by "Pro 1SPEd" setting). (Response time setting) "ip-r": STD: 500 μs or less, LONG: 4ms or less, U-LG: 8ms or less, HYPR: 48ms or less (selectable)
Setting of threshold value tracking	tYcl off	This mode can change the threshold value depending on the cycle (1 to 9,999 sec.) that is set with the variations of the incident light intensity. The tracking shift amount is the one which is set at the shift setting.	
Sensing output setting	bRSE off	Selects whether tracking threshold when the output is OFF or when the output is ON.	
Storage cycle setting	rEc off	Selects a threshold storage cycle in Non-volatile memory from 1 to 250 times.	
Algorithm setting		RL9 SHFt	"SHFt": Limit teaching Threshold value is followed up on the basis of shift amount. (recommended when using thru-beam-type fiber or mirror-reflection-type fiber) "Rtch": Full-auto teaching Threshold value is followed up on the basis of each cycle. (recommended when using reflective-type fiber)

## 13 ERROR INDICATION

- In case of errors, attempt the following measures.

Error indication	Description	Remedy
Er01	Non-volatile memory is broken or reached the end of its working life.	Please replace the product.
Er02	Non-volatile memory writing error	
Er11	Load of the sensing output is short-circuited causing an over-current to flow.	Turn OFF the power and check the load.

## 14 SPECIFICATIONS

Type	Discrete wire type	M12 connector type
Model No.	<b>FX-551L3-P-C2</b>	<b>FX-551L3-P-J</b>
Supply voltage	12 to 24V DC <sup>+10</sup> <sub>-15</sub> % Ripple P-P10% or less	
Power consumption	Normal operation: 960mW or less (current consumption 40mA or less at 24V supply voltage) Eco mode: 720mW or less (current consumption 30mA or less at 24V supply voltage)	
IO-Link communication (C/Q) (Notes: 1)	IO-Link specification: Ver1.1	
Baud rate	COM3(230.4kbps)	
Process data length	PD : 4byte	
Control output (DO) (Notes: 2)	PNP open-collector transistor • Maximum source current: 50mA • Applied voltage: 30V DC or less (Between sensing output and +V) • Residual voltage: 2V or less (Notes: 3) [At 50mA source current]	
Output operation	Switchable either Light-ON or Dark-ON	
Short-circuit protection	Incorporated	
Response time (Notes: 4)	STD: 250 μs or less, LONG: 2ms or less, U-LG: 4ms or less, HYPR: 24ms or less, Selectable	
Interference revention function	Incorporated Emission frequency selection method (Functions at emission frequency 1, 2, 3 or 4) (Notes: 5)	
Ambient environment resistance setting	Incorporated	
Protection	IP40 (IEC)	
Over voltage category	I	
Degree of pollution	2	
Operating altitude	2,000m or less (Notes: 6)	
Ambient temperature (Note 7)	-10 to +55°C (when 4 to 7 units are installed: -10 to +50°C, when 8 to 16 units are installed: -10 to +45°C) (No dew condensation or icing allowed), Storage: -20 to +70°C	
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH	
Material	Enclosure: Polycarbonate, Key: Polyacetal, Protective cover: Polycarbonate	
Cable	0.2mm <sup>2</sup> 4-core cabtire cable (2 m)	0.2mm <sup>2</sup> 4-core cabtire cable with M12 connector (0.3m)
Weight (Main body only)	Approx. 55 g	Approx. 90 g

- Notes: 1) For the IO-Link communication setting, refer to the attached sheet, "Index List."(IMJE-FXLINDEX)  
 2) When the product is used as a general-purpose sensor, the IO-Link communication (C/Q) is generated in the same way as control output (DO).  
 3) This value is applicable when the cable length is 2 m.  
 4) Response time varies depending on the emission frequency setting. Regarding the response time in the case "iP-F" or "iP-r" is selected, refer to <PRO3> in "PRO MODE."  
 5) When the interference prevention function is used, hysteresis increases. Before using this function, check the detection conditions.  
 6) Do not use or store in an environment pressurized to atmospheric pressure or higher at an altitude of 0m.  
 7) The number of units installed is applicable when units are installed close to each other.

## 15 CAUTIONS

- This product has been developed / produced for industrial use only.
- Make sure that the power supply is OFF while adding or removing the amplifiers.
- 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 be 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.
- The specification may not be satisfied in a strong magnetic field.
- 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.
- The ultra long distance (U-LG, HYPR) mode is more likely to be affected by extraneous noise since the sensitivity of that is higher than the other modes. Make sure to check the environment before use.
- Do not use during the initial transient time after the power supply is switched ON.
- When extending the cable length, use a cable with a conductor cross-sectional area of 0.3 mm<sup>2</sup> or more. Note that the maximum allowed cable length is 20 m. However, in order to reduce noise, make the wiring as short as possible.
- Set the power supply voltage by considering the voltage drop resulting from the conduction resistance of the cable.
- Make sure that the cable joint is not applied with stress, such as strain caused by forcible bending or pulling.
- This product is suitable for indoor use only.
- Avoid dust, dirt, and steam.
- Take care that the product does not come into contact with organic solvents such as thinner.
- Take care that the product does not come into contact with strong acids or alkalis.
- Take care that the product does not come into contact with oil or grease.
- This product cannot be used in an environment containing inflammable or explosive gasses.
- Never disassemble or modify the product.
- This product adopts Non-volatile memory. Settings cannot be done 1 million times or more because of the Non-volatile memory's lifetime.

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<http://panasonic.net/id/pidsx/global>

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PRINTED IN JAPAN

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