Thank you very much for purchasing Panasonic products. 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
- ON key / Set value UP key
- OFF key / Set value DOWN key
- Digital display (Green) 
  - Threshold value
- Digital display (Red)
  - Incident light intensity
- MODE key
  - Selection of setting items
  - Confirmation of set contents
- Digital display (Orange)
  - Selection of setting contents
  - Settings in teaching mode
  - Settings in PRO 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 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 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.

**<When using a DIN rail>**
- For details, refer to "PART DESCRIPTION".
- Make sure to return to RUN mode before turning OFF the power. If the power is turned OFF while setting, the changed contents have not been set.
- Press for 2 sec.
- Press for 2 sec. or more

3 WIRING

**Connection method**
- Insert the cable with connector CN-14A-C into this product’s connector area as shown in the right figure.

**Disconnection method**
- Pressing the release lever of the cable with connector, pull out the connector.

Note: Take care that if the connector is pulled out without pressing the release lever, cable or connector may break.

4 I/O CIRCUIT DIAGRAMS

**NPN output type**
- Connector pin No. 1: (Brown) +V
- Connector pin No. 2: (White) External input
- Connector pin No. 3: (Blue) 0V

**PNP output type**
- Connector pin No. 1: (Brown) +V
- Connector pin No. 2: (White) External input
- Connector pin No. 3: (Blue) 0V

5 RUN MODE

**<Digital display>**
- When turning ON the power, the product name is indicated on the green digital display, while the emission frequency is indicated on the red digital display. Then switch- es into RUN mode [digital display: green: threshold value, red: incident light intensity].

**<When turning ON the power>**
- Press the mode selection key for 2 sec.
- Press for 2 sec.
- Press for 2 sec. or more

**<When turning ON the power>**
- "PRO" is displayed when pressing any key.
- For details, refer to "PART DESCRIPTION".
- Make sure to return to RUN mode before turning OFF the power. If the power is turned OFF while setting, the changed contents have not been set.
- Press for 2 sec.
- Press for 2 sec. or more

**<Setting mode>**
- Threshold value fine adjustment function

**<Keylock function>**
- The keylock function prevents key operations so that the conditions set in each setting mode are not inadvertently changed.
- In the keylock condition, "Loc on" is displayed when pressing any key.

**<Keylock set>**
- When in RUN mode
- Press for 2 sec.

**<Keylock released>**
- When in RUN mode
- Press for 2 sec. or more

6 SETTING MODE

**<Setting mode>**
- Setting mode appears after pressing MODE key for 2 sec. in RUN mode.
- RUN mode appears when MODE key is pressed for 2 sec. while setting and the changed contents have been set.
- Make sure to return to RUN mode before turning OFF the power. If the power is turned OFF while setting, the changed contents have not been set.
- Press for 2 sec.
- Press for 2 sec.

**<Output operation setting mode>**
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-point teaching
- This is the method of setting the threshold value by teaching two points, corresponding to object present and object absent conditions. Normally, setting is done by this method.
- The operation output 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.
- The first incident light intensity is set and indicated on the green digital display.
- The present incident light intensity blinks in red at the digital display.
- The threshold value which is set between the first and the second incident light intensity is indicated on the red digital display.
- The setting is done.

<For output ON when in object absent condition>

<Teaching mode>
- Press ON key in object absent condition.
- The first incident light intensity is set and indicated on the green digital display.
- The present incident light intensity blinks in red at the digital display.
- The threshold value which is set between the first and the second incident light intensity is indicated on the green digital display.
- The 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 the object absent condition (stable incident light condition). This is useful for detection in the presence of a background body or for detection of small objects.
- When selecting “Auto” (displayed with “Auto”) in the emission amount setting mode, proper light intensity can be automatically set. For the setting method, refer to "SETTING MODE".
- The first incident light intensity is displayed on the green digital display. When the margin is 200% or more, "\( \text{F}_{\text{MAX}} \)" is displayed.

<Output operation setting mode>
- Press ON key or OFF key which is pressed in the previous step.
- The margin for the threshold value to the incident light intensity is indicated on the green digital display.
- When the margin is 200% or more, "\( \text{F}_{\text{MAX}} \)" is displayed.
- 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.
- When selecting "Auto" (displayed with “Auto”), the emission amount is automatically set to let the incident light intensity in proper range (1000 to 3800).
- "\( \text{F}_{\text{MAX}} \) 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.
- Margin for the threshold value to the incident light intensity is indicated on the red digital display.
- The setting is done.

<Teaching mode>
- Hold down ON key or OFF key.
- "\( \text{F}_{\text{MAX}} \) appears in the green digital display after approx. 2 sec., and starts sampling the incident light intensity from that point. When the margin is 200% or more, "\( \text{F}_{\text{MAX}} \)" is displayed.
- Margin for the threshold value to the incident light intensity is indicated on the red digital display.
- The margin for the threshold value is automatically set to let the incident light intensity in proper range (1000 to 3800).
- The setting is done.
<External input setting model>

When selecting ECO setting in the external input setting mode and receiving the signal externally "f1" - "f4" is indicated on the red digital display.

When selecting ECO in the external input setting mode, key operation on the main body is invalid during external input.

When selecting 2-point teaching in the external input setting mode, "f2 - f4" is indicated on the green digital display after inputting the first point.

For the setting of external input, refer to 9 PRO MODE.

<Time chart when setting external input>

<table>
<thead>
<tr>
<th>External input signal</th>
<th>25ms or more</th>
<th>2ms or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission halt (Note 1)</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Normal operation</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Teaching in progress</td>
<td>Normal operation</td>
<td>Normal operation</td>
</tr>
<tr>
<td>Normal operation</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>ECO in progress</td>
<td>Normal operation</td>
<td>Normal operation</td>
</tr>
</tbody>
</table>

Notes:
1) Output may turn ON / OFF when emission is halted or is released depending on setting of threshold value.
2) When emission starts, output operation will be undetermined only during the response time. If the output signal is received by something such as a PLC, set the timer to a value of 20ms amplifier response time or greater. Example: For the FX-10, with emission frequency (response time 250μs or less)
3) After teaching is complete, output operation will be undetermined only during the response time. If the output signal is received by something such as a PLC, set the timer to the amplifier response time or greater.
4) Move the sensing object past once during the time that the external input signal is being input.
5) After teaching is complete, output operation will be undetermined only during the response time. If the output signal is received by something such as a PLC, set the timer to the amplifier response time or greater.

<Alert output of external input teaching>

When conducting limit teaching or 2-point teaching by external input, if the alert output of external input teaching "f1 - f4" is set in the threshold value margin setting mode, output turns ON / OFF every 100ms in case the rate of reference incident light intensity and threshold value after teaching is 20% or more, or in case it is less than half of the shift amount.

For the setting method, refer to "Threshold value margin setting mode" under 9 PRO MODE.

1) If the margin is no good, output turns ON / OFF every 100ms during the time that the external input signal is being input after teaching.
2) In case the margin is no good, output turns ON / OFF every 100ms during the time that the external input signal is being input after the second teaching.

10 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, external input setting, threshold value storing 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 "f1 - f4" is shown on the digital display and the sensor is in copy ready state. For the setting method, refer to <Setting copy mode> in 10 PRO MODE.
2. Turn off the master side amplifier.
3. Connect the master side amplifier and the slave side amplifier as shown below. Color code of cable with connector.

<table>
<thead>
<tr>
<th>Master side amplifier</th>
<th>Slave side amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Black)Input</td>
<td>(Black)Input</td>
</tr>
<tr>
<td>(White)External input</td>
<td>(White)External input</td>
</tr>
</tbody>
</table>
1. Turn on the master side amplifier and the slave side amplifier at the same time. (Note 2)
2. "G4" 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.
3. When the copying is completed, "G5" 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.
4. Turn off the power of the master side amplifier and the slave side amplifier and disconnect the wire.
5. 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.

11 QUICK SETTING FUNCTION
- Simply by selecting a setting number, output operation, emission amount, timer, and emission frequency can be set.
- For the setting numbers, refer to "Table of quick setting numbers".
- Make sure to return to RUN mode before turning OFF the power. If the power is turned OFF while setting, the changed contents have not been set.

When in RUN mode:
- Press MODE key for 2 sec. (Note 1)
- Select a quick setting number
- Select emission frequency

When in SET mode:
- Press MODE key for 4 sec. (Note 1)
- After finalizing, the wire shifts
- Select codes

10 CODE SETTING FUNCTION
- By selecting codes arbitrarily, output operation, timer, emission amount, emission frequency, ECO, external input, and shift amount can be set.
- For the codes, refer to "Code table".
- Make sure to return to RUN mode before turning OFF the power. If the power is turned OFF while setting, the changed contents have not been set.

When in RUN mode:
- Press the MODE key for 2 sec. (Note 1)
- Select shift amount

When in SET mode:
- Press the MODE key for 4 sec. (Note 1)
- After finalizing, the wire shifts
- Select codes

<table>
<thead>
<tr>
<th>Code table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output operation</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>D-ON</td>
</tr>
<tr>
<td>D-ON</td>
</tr>
<tr>
<td>D-ON</td>
</tr>
<tr>
<td>L-ON</td>
</tr>
<tr>
<td>L-ON</td>
</tr>
<tr>
<td>L-ON</td>
</tr>
</tbody>
</table>

- When the present setting is out of the quick setting range, "G6" is shown. When "G6" is selected, the set content of the digit is not changed.
- EEPROM is adopted to this product. It is not possible to conduct teaching 100 thousand times.
- Never disassemble or modify the product.
- 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 burn or damaged.
- Take care that the product is not directly exposed to fluorescent lamp from a rapid-starter lamp, 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.
- EEPROD is adopted to this product. It is not possible to conduct teaching 100 thousand times or more, because of the EEPROM’s lifetime.

12 APPLICATION STANDARD/REGULATIONS
- This product complies with the following standards / regulations.
  - [EU Directive]
    - EMC Directive 2004/108/EC
    - [Standards in US / Canada]
      - ANSI/UHL 60847-5-2: CAN/CSA C22.2 No.14
  - [About UL recognition]
    - In case requiring conformity of UL listing mark or C-UL listing mark, use class 2 power supply unit.
    - Contact for CE
      - [Until June 30 ,2013]
        - Panasonic Electric Works Europe AG
          - Rudolf-Diesel-Ring 2, D-83607 Holzkirchen, Germany
        - [Since July 1,2013]
          - Panasonic Marketing Europe GmbH Panasonic Testing Center
            - Winsbergweg 15, 22255 Hamburg, Germany
  - Overseas Sales Division (Head Office)
    - 2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0091, Japan
    - Phone: +81-568-33-7861 FAX: +81-568-33-8591

13 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 burn 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.
- Caution 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 sun light 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.
- EEGPRD is adopted to this product. It is not possible to conduct teaching 100 thousand times or more, because of the EEPROM’s lifetime.

14 SPECIFICATIONS
- For the present setting is out of the quick setting range, "G6" is shown. When "G6" is selected, the set content of the digit is not changed.
- EEPROM is adopted to this product. It is not possible to conduct teaching 100 thousand times.
- Never disassemble or modify the product.
- EEPRDM is adopted to this product. It is not possible to conduct teaching 100 thousand times or more, because of the EEPROM’s lifetime.

15 ERROR INDICATION
- In case of errors, attempt the following measures.
  - [Error display]
    - Error description
    - Measures
  - [Communication error]
    - Contact the power, then check the load.
    - Check the wiring before using the setting copy function.

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