

UV RADIOMETER UV-M03A OPERATION MANUAL

ORC

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- 日本語は反対側にあります。 -

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UV-M03A Operation Manual

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If this meter will be exported, please inform us in advance so that we can provide the appropriate compliance documents based on the *Japanese Foreign Exchange and Export Control* laws.

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Safety/Handling Precautions

 注意	 CAUTION
紫外線障害 測定中は紫外線を直接皮膚、目等をさらさない様に保護具を着用してください。	Ultra Violet Light During measurement, protect your skin, eyes from UV radiation.

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 CAUTION
<small>Ultra Violet Light During measurement, protect your skin, eyes from UV radiation. 95732-1</small>

The description under the word CAUTION refers to latent danger that might invite slight or medium level of physical disorder.

To prevent ultraviolet radiation injuries during measurement, use protective goggles, gloves, anti-suntan cream, face mask, etc. appropriately, covering over your skin and eyes.



Safety/Handling Precautions

- 1. Even short-time exposure of unprotected skin and eyes to spilled UV light from the UV irradiation system or the exposure system will cause serious injury. To prevent risk of injury, wear protective goggles, etc., and cover your skin.**
- 2. When measuring UV light of the UV irradiation system or the exposure system, fit a mesh type attenuator (a dimming filter) to the photodetector, otherwise it might be damaged. The measuring interval should be at least 2 to 3 minutes to allow the photodetector to cool. Heating may be the cause of impossible of measurement.**
- 3. The dimming filter temperature may reach 60°C during the measurement of UV light of UV irradiation system or the exposure system. Take care not to touch the filter otherwise you may receive a burn.**
- 4. Never expose UV light or high temperature to the UV-M03A main unit, otherwise it may be damaged beyond repair.**
- 5. Before mounting and dismounting the photodetector or sensor cords to UV-M03A main unit, turn off the power of the UV-M03A main unit, otherwise an operation error may occur.**
- 6. Never give strong shock to the UV-M03A main unit or photodetector, otherwise optical element or electronic parts inside of UV-M03A may be damaged.**
- 7. Do not bend the sensor cords and connectors excessively; otherwise the cords or connectors may break. Strong shock or heat above 60°C may cause incorrect operation.**

8. When power switch is on, the entire indications display momentarily, but this is not an error.
9. Never turn ON/OFF the POWER switch repeatedly, otherwise the operation may become unstable.
10. When the measured intensity exceeds the measurement RANGE, an overscale error occurs and the measurement unit's display (mW/cm^2) blinks. Change to a higher measurement RANGE and measure the intensity.
11. When UV energy exceeds the measurement RANGE ($19999 \text{ mJ}/\text{cm}^2$), an overscale error occurs and the measurement unit's display (mJ/cm^2) blinks. Put a dimming filter to the photodetector and then measure the UV energy again.
12. LOBAT indicates the timing of battery replacement. Replace battery immediately.
Before replacing battery, turn OFF the POWER switch. Check that the LOBAT display disappears and other displays are normal after battery replacement.
13. The UV-M03A does not save measured data. The intensity display is updated at 0.5 seconds intervals and the UV energy display is updated at 0.1 seconds intervals.
The measured value is cleared when RANGE and MODE are switched over.
14. Dust, dirt, etc., on the window of the photodetector remarkably reduce the measurement accuracy. Before measurement, check that it is clean. If it is dirty, wipe it clean with a handy wipe, gauze, or cloth, etc., moistened with alcohol.

15. **Plugging of a dimming filter mesh reduces the measurement accuracy. Before measurement, check that it is clean. If it is plugged, clean it with detergent, etc.**
16. **When connecting a sensor cord to the sensor connector on the UV-M03A main unit, take care not to subject the connector to strain, otherwise it may be broken.**
17. **Never touch electrical components inside the UV-M03A main unit or the photodetector, otherwise they may be broken.**
18. **Never touch volumes for sensitivity correction inside the UV-M03A main unit or the photodetector. ORC uses them only when calibrating.**
19. **UV-M03A has “Auto Power-Off” function. Power automatically goes off when using battery as a power source or less than 0.0005 mW/cm^2 incoming light input to a photodetector continues approximately 4 minutes.**

Auto power off does not work when using AC adapter.

20. Battery

- **Danger: Never short-circuit a plus and minus pole of battery or mount a battery plus and minus pole reverse side. Battery over-heats.**
- **Never use together new battery, used battery or different type of battery.**
- **Remove battery from main unit if UV-M03A is not used for long period (2 to 3 months). Liquid spill from battery may occur. (Leakage current when battery power off = approx. $20 \mu\text{A/h}$)**

21. DC-output (1 V full scale) is output in real time from recorder output port. Instrument reading is displayed as an actual value.
22. RS-232C communication output communicates intensity value and light energy value with ASCII character code.
23. The emission line of high-pressure mercury vapor lamp calibrates photodetector. The photodetector of same type and same model shows the almost same instrument reading under the measurement with the specified light source. If the light source has some wavelength distribution, the instrument reading may show some deviation by the spectral sensitivity characteristic. Fig. 1 in this operation manual shows the representing value of the relative spectral sensitivity characteristic for each photodetector.

Two kinds of photodetector, SN and SD model, are available. They have the same relative spectral sensitivity characteristics.

24. The models of the photodetectors are described here.

SN model: UV-SN \square \square -M10
(1) (2) (3)

SD model: UV-SD \square \square -M10
(1) (2) (3)

(1): SN/SD classification

(2): Wavelength code...25, 35, 42 etc.

(3): Photodetector form segment

Connection of the UV-M03A Sensor Cord

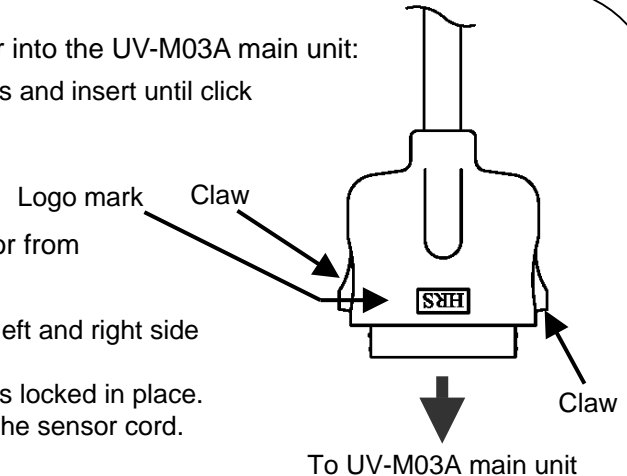
This section describes how to connect the accessory sensor cord. Use the accessory sensor cord.

Precautions when inserting the sensor cord connector into the UV-M03A main unit:

The logo-mark side is the front. Position the connectors and insert until click sound comes. The connector is locked in place.

Precautions when pulling out the sensor cord connector from UV-M03A main unit:

Pull the sensor cord out by pressing the claws on both left and right side of the plug. Pressing the claws release the lock. Do not pull with excessive force when the sensor cord is locked in place. Excessive force will damage both of the main unit and the sensor cord.



Precautions when connecting and disconnecting the sensor cord connector to the sensor:

Connection: Put the connector to the keyway and insert until click sound comes. The sensor cord is locked in place.

Disconnection: Hold the part near the connector sensor and pull out to disconnect. The lock will be released.

Handling of the UV-M03A AC Adapter

This section describes how to connect the accessory AC adapter.

Precautions when inserting the power connector of AC adapter to the main unit:

Insert the connector properly.

The connector will become unstable if it is not inserted properly.

Precautions when inserting the AC adapter into AC outlet:

Check the input voltage (AC 100 to 240 V) and insert the AC adapter into the AC outlet.

Precaution when disconnecting the AC adapter from the AC outlet:

Hold the AC adapter itself and pull it from the AC outlet.

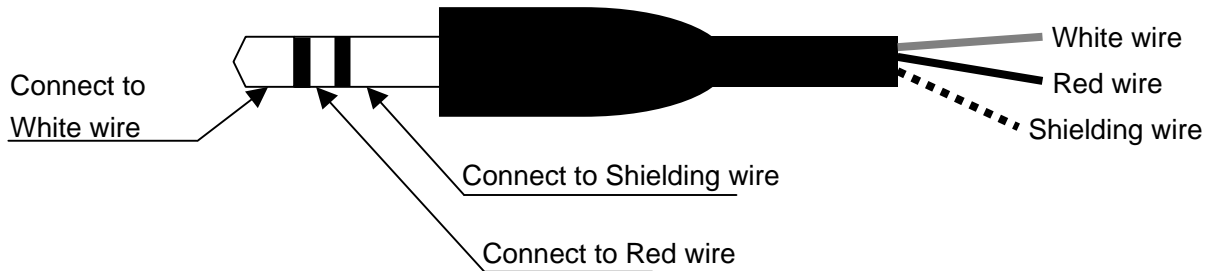
Do not pull the cord only. It may be cause of failure.

UV-M03A Connection of the UV-M03A Recorder Output Cord
Recorder Output Wiring Diagram

White (signal wire): Connect to the recorder input +side terminal.

Red (ground wire): Connect to the recorder input –side terminal.

Net (shielding wire): It is grounded at the main unit. Do not connect to the recorder



[1] Overview

This is a separate (main unit and photodetector) and compact type UV radiometer with UV energy meter. It is used to measure the intensity of UV light at a surface of object. This meter is as of the radiometer of visible light.

A radiometer for visible light measures in unit of lx that sensitivity is based on the spectral luminous efficiency. UV light is not the visible light to the human eyes, so any strong UV light indicates “0 lx” on the radiometer.

UV light is measured as the energy density of UV at the surface of object. The units are as W/m^2 , mW/cm^2 , $\mu\text{W/cm}^2$. The UV-M03A measures UV intensity as mW/cm^2 and UV energy as mJ/cm^2 .

[2] Features

1. The UV-M03A is a handy type UV radiometer with UV energy meter, which consists of a main unit and photodetector.
2. It can be used as a radiometer or an energy meter.
3. Three photodetectors cover three different wavelength ranges respectively and they can be detached with one touch operation.
4. Dual power supplies are available, DC (battery) and AC (100 to 240 V AC input).
5. There are two outputs for easy usage, analog output and RS-232C.

[3] Measuring Wavelength Range, Peak Wavelength, and Angular response

Figures 1 to 6 show the photodetector relative spectral sensitivity characteristics and angular response. The measured wavelength range and peak wavelength depend on the photodetector.

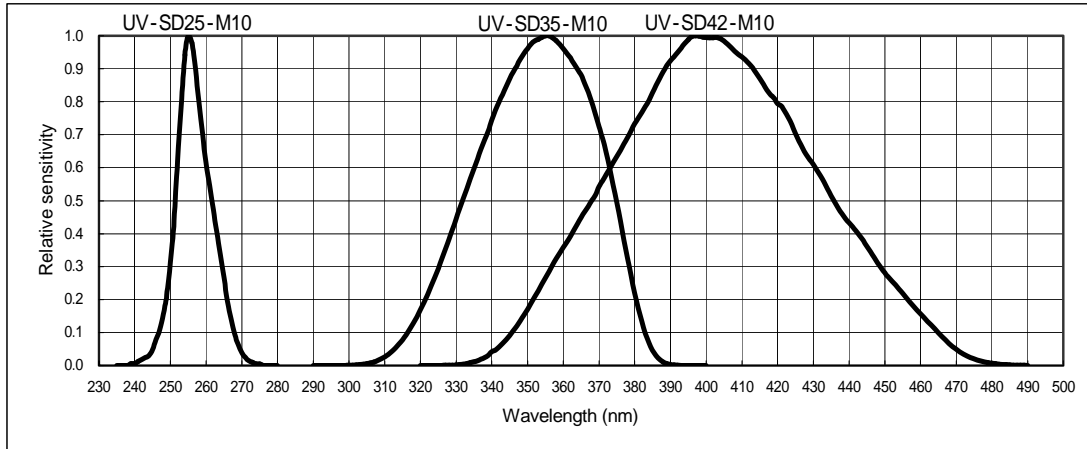


Fig. 1 Relative Spectral Sensitivity Characteristics of Photodetector

Table 1 Measured wavelength range and peak wavelength

Photodetector (Display model)	Measured wavelength range	Peak wavelength
UV-SD25-M10 (UV-SD25)	240 to 270 nm	254 nm
UV-SD35-M10 (UV-SD35)	310 to 385 nm	355 nm
UV-SD42-M10 (UV-SD42)	340 to 470 nm	400 nm

Table 1 shows the characteristics of SD model photodetector. SN model photodetector also has the same characteristics. See p.6 for the descriptions on models.

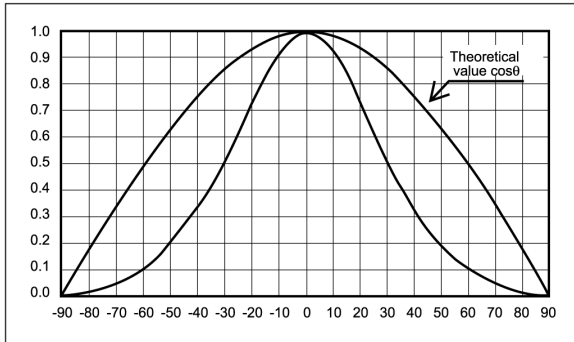


Fig. 2 UV-SD25 Light Angular Response

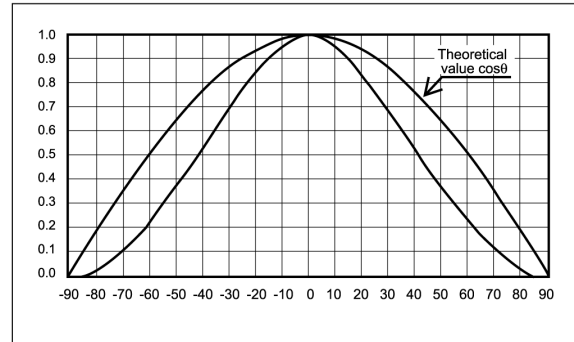


Fig. 3 UV-SD35/42 Light Angular Response

Table 2 Light Angular Response

Angle of acceptance	UV-SD25	UV-SD35	UV-SD42	cosθ
0°	1.000	1.000	1.000	1.000
10°	0.929	0.961	0.953	0.985
20°	0.732	0.851	0.842	0.940
30°	0.507	0.692	0.688	0.866
40°	0.310	0.523	0.519	0.766
50°	0.188	0.358	0.368	0.643

Table 2 shows the characteristics of SD model photodetector. SN model photodetector also has the same characteristics. See p.6 for the descriptions on models.

60°	0.096	0.214	0.225	0.500
70°	0.036	0.099	0.112	0.342
80°	0.007	0.015	0.019	0.174
90°	0.000	0.000	0.000	0.000

[4] Instrument reading

1. Meaning of instrument reading

It assumes that wavelength 355 nm UV light and intensity 10 mW/cm² comes in to UV-SD35-M10 photodetector. The relative sensitivity measured by this meter is 1.00. The radiometer indicates 10.0 mW/cm². The meter counts up 10 per second under integration indication. Next, a 332 nm wavelength of UV light and the intensity 10 mW/cm² comes in to UV-SD35 photodetector. The relative sensitivity measured by this instrument is 0.50. The radiometer indicates 5.00 mW/cm². The meter counts up 5 per second under integration indication. The readings of both the intensity and the integration indicate the relative sensitivity ratios.

2. SD model photodetector

The traceability system of SD model photodetector is entirely traceable to National Measurement Standard. SN model photodetector has the different instrument reading to SD model photodetector. ORC recommends shifting to SD model. When the customer shifts the photodetector from SN model to SD model, kindly contact a local agent or ORC.

[5] Operation

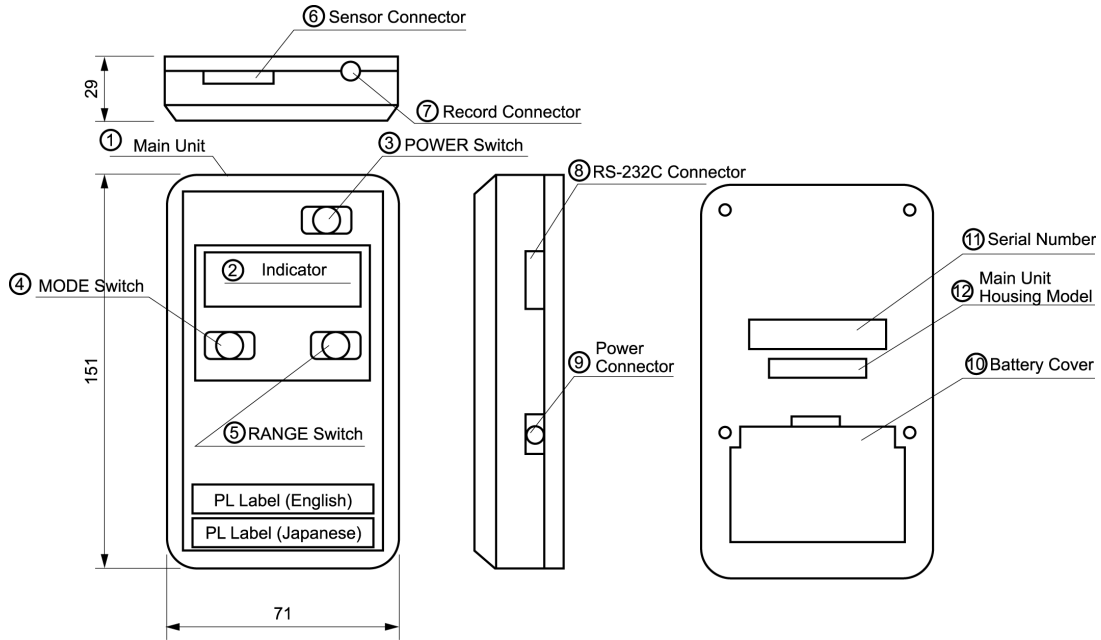
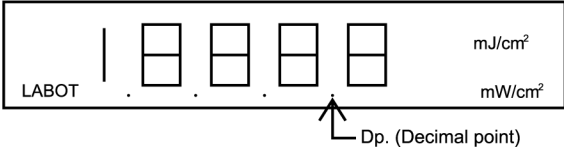
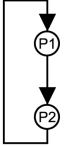
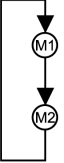
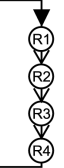
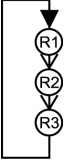




Fig. 4 Name of Components of UV-M03A Main Unit

1. Explanation of each part

Name	Function
1) Main unit	The main unit is made of ABS resin coated with conductivity shield plating. It contains the display, CPU printed circuit board, and battery.
2) Display	<p>Below illustration shows the all indication of LCD Display.</p>  <p>The meaning of words, units, and Dp are explained below:</p> <p>(1) Lamp ON: Indicates selection and measurement states.</p> <p>LOBAT : Indicates battery replacement.</p> <p>mW/cm² : Indicates that intensity measurement selected.</p> <p>mJ/cm² : Indicates that energy measurement selected.</p> <p>Dp : Indicates selected RANGE (AUTO, ×1, ×10, ×50)</p> <p>(2) Lamp blinking: Indicates selection warning and error warning.</p> <p>mW/cm² mJ/cm² : Indicate error warning for each item.</p>
3) POWER switch	This is the power switch. It has the functions of power ON and OFF and start of measurement.

Name	Function
	<p>(1) POWER ON: Displays 0.000 mW/cm^2 and starts measurement state.</p> <p>(2) Start of measurement: It starts measurement when $0.1 \text{ }\mu\text{W/cm}^2$ or more UV light comes in.</p> <p>(3) POWER OFF: Stops display and enters standby state.</p> <p>The POWER switch repeats the (1) to (3) operations.</p> <p>Note: When power is on, the all of indications are displayed momentarily.</p>
<p>4) MODE switch</p> 	<p>Selects measurement item as intensity or UV energy</p> <p>(1) Intensity: mW/cm^2 indicates intensity measurement selected.</p> <p>(2) UV energy: mJ/cm^2 indicates UV energy measurement selected.</p> <p>The MODE switch repeats the (1) to (2) operations.</p>
<p>5) RANGE switch</p> 	<p>Selects range for each measured item</p> <p>[1] RANGE selection for intensity measurement</p> <p>(1) RANGE: AUTO 0 mW/cm^2</p> <p>(2) RANGE: $\times 50$ 0.0 mW/cm^2</p> <p>(3) RANGE: $\times 10$ 0.00 mW/cm^2</p> <p>(4) RANGE: $\times 1$ 0.000 mW/cm^2</p> <p>The RANGE switch repeats the (1) to (4) operations.</p>

Name	Function
	<p>[2] RANGE selection for UV energy measurement</p> <p>(1) RANGE: $\times 50$ 0.0 mJ/cm²</p> <p>(2) RANGE: $\times 10$ 0.00 mJ/cm²</p> <p>(3) RANGE: $\times 1$ 0.000 mJ/cm²</p> <p>The RANGE switch repeats the (1) to (3) operations.</p>
6) Sensor connector	Connect the photodetector cord.
7) Record connector	Connecting the data recorder output plug. Output voltage: Full-scale DC +1000 mV, 500 mV at 50.0 of RANGE $\times 50$
8)  RS-232C Connector	Connect the RS-232C cord.
9) AC Adapter Connector 	Connect the AC adapter output plug. Voltage: DC 5 V, 0.1 A
10) Battery cover	Detach when replacing AA batteries. Batteries: UM-3 $\times 2$ pcs.
11) Serial number	Serial number is printed. Indicate 7-digit like K301001 .
12) Main unit housing model	Indicate as MODEL UV-M05.

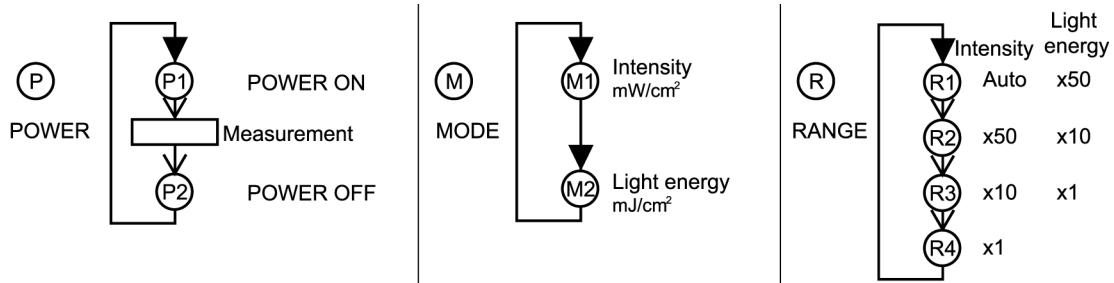
2. Measuring items

Item	Function
1) Intensity (real time) mW/cm ²	<p>When 0.0001 mW/cm² or more UV light comes in, the intensity value indicates in real time (at 0.5 sec. interval). It is possible to measure up to 50.00 mW/cm² maximum. The following five RANGES can be selected at AUTO/MANUAL. The measuring range of each is as follows:</p> <p>RANGE: AUTO: 0.001 to 50.00 mW/cm²</p> <p>RANGE: ×50: 0.1 to 50.0 mW/cm²</p> <p>RANGE: ×10: 0.01 to 10.00 mW/cm²</p> <p>RANGE: ×1: 0.001 to 1.000 mW/cm²</p> <p>RANGE: ×0.1: 0.0001 to 1.0000 mW/cm² (high-sensitivity range when selected)</p>
2) UV Energy mJ/cm ²	<p>When 0.001 mW/cm² or more UV light comes in, energy integrating starts. The indication is at 0.1-second interval and the total light energy up to 19,999 mJ/cm² can be measured. The position of the decimal point changes automatically. The following three RANGES can be selected manually. The measuring range of each is as follows:</p> <p>RANGE: ×50: 0.1 to 19999 mJ/cm²</p> <p>RANGE: ×10: 0.01 to 19999 mJ/cm²</p> <p>RANGE: ×1: 0.001 to 19999 mJ/cm²</p>

3. Operation

1) Switch functions

Each item is selected by pressing the POWER, MODE, and RANGE switches.



2) Selection of measuring item



Each time POWER switch is ON: 03.01 :

Display

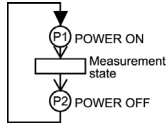
The program version number is displayed momentarily.

mW/cm^2 :

The measuring item is displayed and the measurement state is established.

At selection of the measured item, the measurement unit (mW/cm^2 or mJ/cm^2) is selected using the MODE switch (M).

(1) Intensity



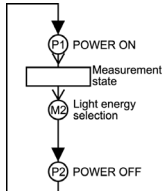
0 mW/cm² :

Displays RANGE AUTO momentarily.

0.459 mW/cm² :

Displays UV intensity as it comes in.

(2) Light energy



Change of display

0 mW/cm² :

Displays RANGE AUTO momentarily.

0.459 mW/cm² :

Displays UV intensity as it comes in.

0 mJ/cm² :

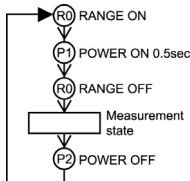
UV energy mode selection

1.358 mJ/cm² :

Displays energy when UV light of 0.001 mW/cm² or more comes in.

(3) High-sensitivity range (RANGE × 0.1) intensity measurement

It is possible to measure UV intensity in the range of 0.0001 to 50.00 mW/cm² (RANGE AUTO selected).



The high-sensitivity range is set as the POWER switch is turned ON for about 0.5 seconds while the RANGE switch is turned ON.

.0000 mW/cm² :

High-sensitivity range is selected.

.0123 mW/cm² :

Displays UV intensity as it comes in.

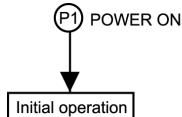
4. Measurement



To prevent risk of injury, wear protective articles for not bearing skin or eyes direct to UV light during measuring. (Use goggles, gloves, tanning cream, face mask etc. for your own safety).

1) Initial operation

At factory shipment, MODE, RANGE, and the time constant are set as MODE Intensity, RANGE AUTO, and 0.15 ms. respectively.



(1) : Displays program version number momentarily.

(2) : Displays RANGE AUTO momentarily.

(3) : Displays intensity in RANGE covering intensity value.

After this, (1), (2), and (3) above are displayed in order every time POWER is ON. However, (2) depends on the last condition of the previous measurement.

Note: Special operation of POWER switch

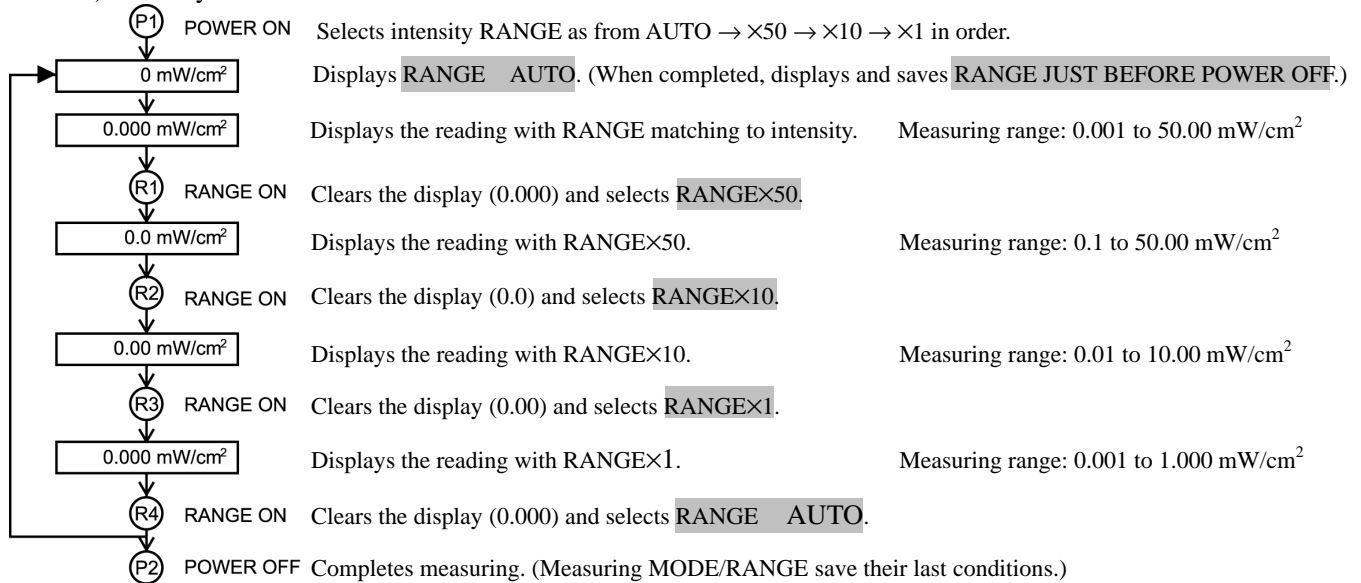
(1) Check program version number

When the POWER switch is pressed for 0.5 seconds or longer, the program version number is displayed momentarily and then the POWER switch is OFF.

(2) Repeated pressing of POWER switch (strictly prohibited)

If the POWER switch is operated ON/OFF repeatedly in a short time, reset-operation may become unstable and the POWER switch may not be OFF. Wait 5 to 10 seconds and do switch operation. The indication disappears and returns to the original state.

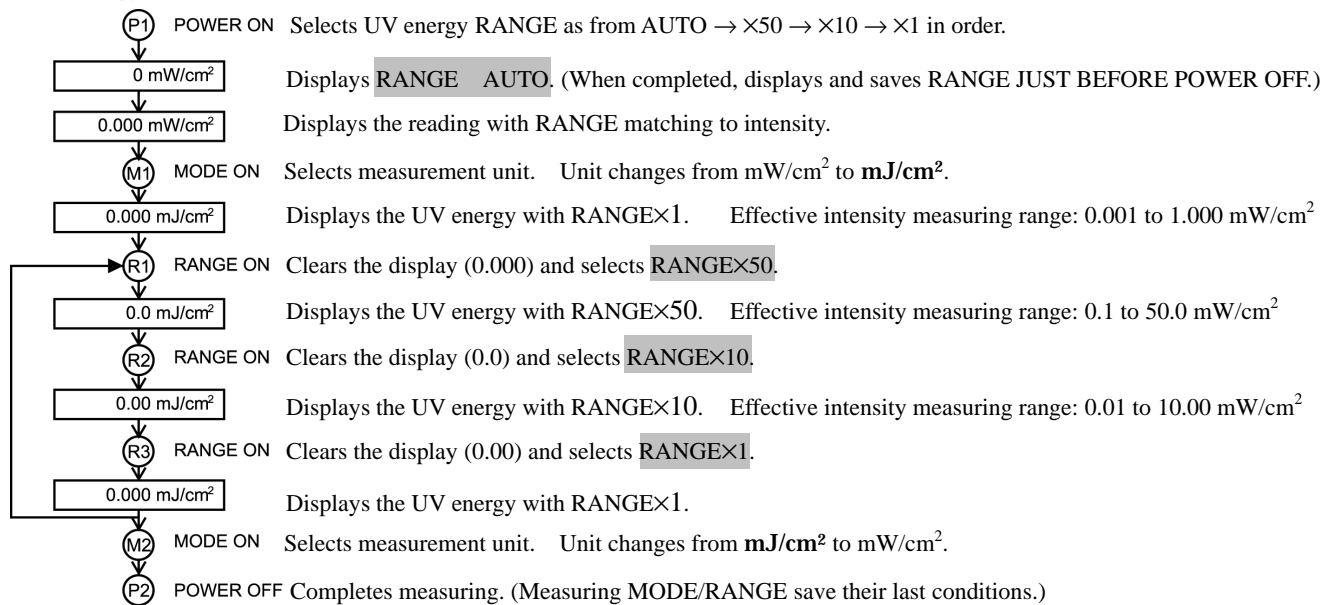
2) Intensity measurement



Note: (1) When each RANGE exceeds the upper limit of the measuring range by 20%, the unit indication (mW/cm²) blinks and notices the error.

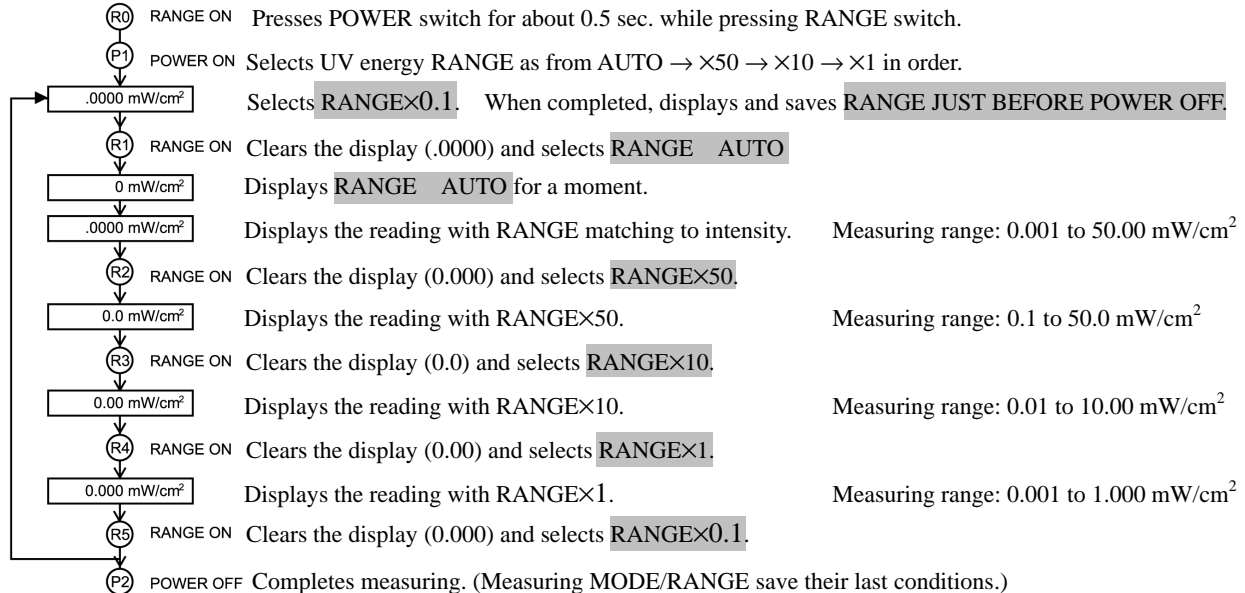
(2) When the meter is switched off (power OFF) in intensity mode, it restarts from intensity mode.

3) UV Energy measurement



- Note: (1) When each RANGE exceeds the upper limit of the measuring range by 20%, the unit indication (mW/cm²) blinks and notices the error.
 (2) When exceeding UV energy range (19999 mJ/cm²), unit indication (mJ/cm²) blinks and notices the error.
 (3) When the meter is switched off (power OFF) in UV energy mode, it restarts from UV energy mode.

4) High-sensitivity intensity measurement



Note: (1) When each RANGE exceeds the upper limit of the measuring range by 20%, the unit indication (mW/cm²) blinks and notices the error.

(2) When the meter is switched off (power OFF) in intensity mode, it restarts from intensity mode.

5. Dimming Filter

- 1) When measuring 50 mW/cm^2 or more UV light intensity or UV energy, use one of the dimming filters, 1/10, 1/20, and 1/50. The filter permits measurement of UV light up to about 2500 mW/cm^2 . The magnification is marked on each filter.
- 2) The dimming filter can be mounted/dismounted with one-touch operation as illustrated below:

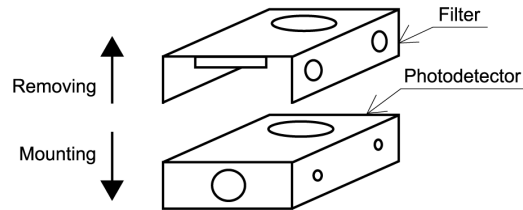


Fig. 5 Mounting Dimming Filter

6. Error warning (Over-scale)

When the UV intensity or UV energy exceeds the defined value, the measurement unit display blinks, indicating an error.

Table 3 Error warning value

	Defined value	Blinking
Intensity $\times 1$	1.200 mW/cm^2	mW/cm^2
Intensity $\times 10$	12.00 mW/cm^2	mW/cm^2

Intensity ×50	51.0 mW/cm ²	mW/cm ²
Light energy	19999 mJ/cm ²	mJ/cm ²

- (1) When the UV intensity exceeds 1.2 mW/cm² during intensity measurement at RANGE ×0.1 or RANGE ×1, mW/cm² blinks.
- (2) When the UV intensity exceeds 12.00 mW/cm² during intensity measurement at RANGE ×10, mW/cm² blinks.
- (3) When the UV intensity exceeds 51.0 mW/cm² during intensity measurement at RANGE × 50 or at RANGE AUTO, mW/cm² blinks.
- (4) When UV energy exceeds 19999 mJ/cm² during UV energy measurement, mJ/cm² blinks.
- (5) When the UV intensity exceeds the defined value for the intensity measurement RANGE during UV energy measurement in (4) above, mW/cm² blinks. However, UV energy measurement continues.

When an error warning display appears, the measured value is unreliable so measure again after changing the measurement RANGE or mounting the filter.

7. Precautions on using



To prevent risk of injury, wear protective articles for not bearing skin or eyes direct to UV light during measuring. (Use goggles, gloves, tanning cream, face mask etc. for your own safety).

- (1) When measuring 50 mW/cm² or more intensity or energy of UV light, use a filter.
- (2) When using a filter, the intensity or light energy is calculated as follows:

Meter reading × magnification = UV intensity (mW/cm²) or UV energy (mJ/cm²)

The magnification is marked on each filter.

- (3) Do not use the photodetector if the temperature of it is higher than 60°C.

After measuring the intensity or UV energy of spot UV, UV conveyor, etc., measure again after the photodetector returns to the normal temperature.

- (4) Do not bend the sensor cords excessively (heat resistance: 80°C). It causes of break of signal cables or connector. Also, do not use the sensor cord when the temperature is higher than 60°C.
- (5) Before attaching/detaching the cord and photodetector, check that the POWER switch is OFF.

8. Maintenance and calibration

- (1) Periodical calibration

This meter uses precise electronic and optical components. The meter is recommended to calibrate once a year or more to keep the accurate measurement, since the meter may be used under the various using conditions.

- (2) Dirt on the window of photodetector

Dust, dirt, etc., on the window of the photodetector remarkably reduce the measurement accuracy of the intensity or light energy. Check that it is clean. If it is dirty, wipe it cleans with a handy wipe, gauze, or cloth, etc., moistened with alcohol.

Pay attention that if fingerprint or dirt leaves on the window and do measuring, the UV light may harden them and it will be difficult to remove them.

- (3) Plugging of dimming filter mesh

Plugging of the dimming filter mesh reduces the measurement accuracy. Before measurement, check that it is clean. If it is plugged, clean it with detergent, etc.

(4) Battery replacement

The LOBAT indicates the battery requires replacement. The replacement steps are as follows:

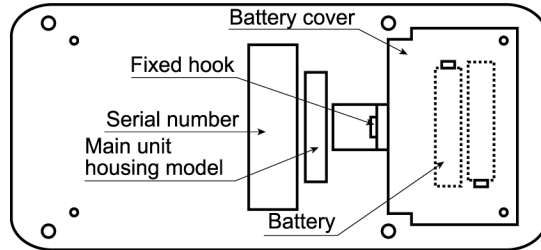


Fig. 6 Backside of Main Unit

- (A) Remove the battery cover at the backside of the main unit.
- (B) Lift the hook while pressing towards the battery cover.
- (C) Remove the batteries.
- (D) Insert new batteries. Pay attention the correct polarity.
- (E) Put backs the battery cover and presses the hook lightly to secure it.

Battery: UM-3 (AA size), LR6 (alkaline battery), or R6P (manganese battery); ×2 pcs.

Note: Do not touch the electric parts on the printed circuit board in the main unit.

[6] External Output

This meter has two outputs, a recorder output and an RS-232C communication port.

1. Recorder output

The recorder output is the real-time analog output for a data recorder. The recorder output can be used to control the intensity, lamp ON state, etc. Also, it can switch the time constant of the output waveform.

- (1) Output voltage: Full-scale range (1.000 mW/cm², and 10.00 mW/cm² range) is DC1000 mV, and 50.0 mW/cm²; ranges are DC 500 mV
- (2) Time constant: Three position switching as 0.15, 15, and 150 ms. (The time constant is a value defined at design, not a measured value).

The time constant is set to 0.15 ms (fastest) at factory.

UV-M03A Time constant, setting analog output

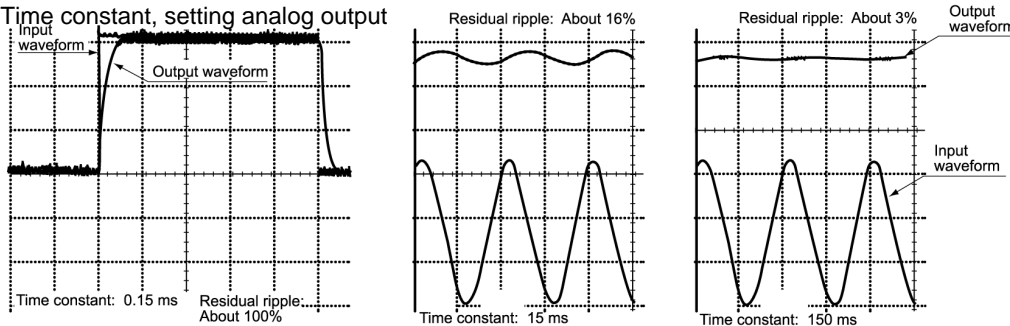


Fig. 7 Recorder Output Waveform

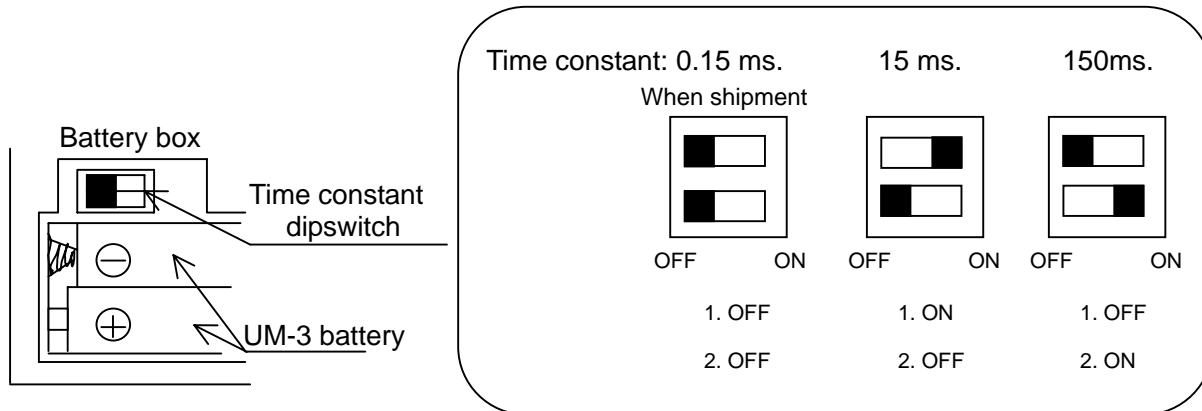


Fig. 8 Time Constant Dipswitch Position/Selection

2. RS-232C communication port

The RS-232C port enables to communicate with an external computer.

The data accepted are UV intensity and UV energy as measuring items, measured data and error signals.

Intensity data and UV energy data corresponds at 0.5 sec. and 0.1 sec. intervals respectively.

When communicating with RS-232C, purchase the optional RS-232C cord UV-232C150-M05.

As for the communication operation, refer the communication operation manual.

[7] Specifications

1. Measurement wavelength range ····· UV-SN35-M10: 310 to 385 nm (peak wavelength: 355 nm)
(SD model is same as SN model.) UV-SN25-M10: 240 to 270 nm (peak wavelength: 254 nm) option
UV-SN42-M10: 340 to 470 nm (peak wavelength: 400 nm) option
2. Intensity measurement ·········· mW/cm^2
 - 1) Measurement range ·········· 0.001 to 50.00 mW/cm^2 (without filter)
RANGE ·········· AUTO: 0.001 to 50.00 mW/cm^2
×50: 0.1 to 50.0 mW/cm^2
×10: 0.01 to 10.00 mW/cm^2
×1: 0.001 to 1.000 mW/cm^2
×0.1: 0.0001 to 1.0000 mW/cm^2 (when selecting the high sensitivity range)
 - 2) Range over ·········· If the intensity exceeds 50 mW/cm^2 or the specified range, the display of measurement unit (mW/cm^2) blinks.
3. UV Energy measurement ·········· mJ/cm^2
 - 1) Measurement range ·········· 0.001 to 19999 mJ/cm^2
RANGE ·········· ×50: 0.1 to 19999 mJ/cm^2
×10: 0.01 to 19999 mJ/cm^2
×1: 0.001 to 19999 mJ/cm^2

- 2) Range over If the UV energy exceeds 19999 mJ/cm^2 , the display of measurement unit (mJ/cm^2) blinks. (At the intensity case, the display of measurement unit (mW/cm^2) blinks. The blinking is kept until changing of MODE/RANGE or POWER is OFF.)
- 4. Warning When a warning occurs, the display of measurement unit blinks or lit on.
 - 1) Intensity range over If the intensity exceeds 50 mW/cm^2 or the specified range, the display of measurement unit (mW/cm^2) blinks.
 - 2) UV Energy range over If the UV energy exceeds 19999 mJ/cm^2 , the display of measurement unit (mJ/cm^2) blinks.
 - 3) Low battery detection When the battery voltage becomes about 2 V, the LOBAT is displayed. Replace batteries.
- 5. External input/output
 - 1) Recorder output Output voltage: 1000 mV (at each range full-scale)
 $\times 50$ ranges is 500 mV at the indication of 50.0.
 Response speed: 0.15, 15, or 150 msec. selected by dipswitch
 - 2) Communication output RS-232C
 - (1) Intensity measurement: The intensity data corresponds at 0.5 sec. interval.
 - (2) UV Energy measurement: Both the intensity and the UV energy data correspond 0.1 sec. interval.

- 3) Communication input Communication output start/stop command
- 6. Display 7-segment LCD; 4.1/2 digits; display interval: 0.5 seconds for intensity measurements; 0.1 seconds for UV energy measurements
- 7. Light detecting element Silicon photodiode with 10 × 10 mm receiving area
- 8. Operating temperature range Main unit: 0° to 40°C (no condensation)
 Photodetector: 0° to 60°C (no condensation)
 Sensor cord: 0° to 80°C (no condensation)
- 9. Accuracy Within ±1.5% for ORC UV standard photodetector (temperature is within above operating range.)
- 10. Repeatability Within ±1.5% (temperature is within above operating range.)
- 11. Power supply Dual power supply system: UM-3 battery (size AA) × 2, 1.5 V × 2
 AC adapter: AC input 100 to 240 V, DC output 5 V 1000 mA
 (or DC output 5 V 500 mA)
- 12. Auto OFF function When using battery power, the power is shut off about 4 minutes after UV intensity of 0.0005 mW/cm² or less.
- 13. Dimensions and mass Main unit: 71 (W) × 151 (D) × 29 (H) mm/ approx. 210 g
 Photodetector: 35 (W) × 55 (D) × 18 (H) mm/ 60 g
- 14. Dimming filter 1/10, 1/20, and 1/50 (Actual measuring value is engraved.)

[8] Standard Configuration

1. Main unit	UV-M03A	1 unit
2. Photodetector	UV-SN35-M10	1 unit
3. Sensor cord	UV-CN150-M03A, 1.5 m	1 pce.
4. Recorder output cord	JJ-6520, 1.5 m	1 pce.
5. AA Battery	UM-3	2 pcs.
6. AC Adapter	JJ-3233	1 pce.
7. Handy wipe	NM-0760	1 pce.
8. Box	C3-0995	1 pce.
9. Operation manual	TL-9016B	1 pce.
10. Packing box	C3-0387-01, 02, 03	1 pce.
11. Calibration inspection report		1 pce.

[9] Option

1. Photodetector: SN model (Previous calibration standard model)
 UV-SN25-M10
 UV-SN42-M10
- SD type (New calibration standard model)
 UV-SD25-M10
 UV-SD35-M10
 UV-SD42M10
2. Dimming filter UV-FL10-M10 (1/10)
 UV-FL5-M10 (1/20)
 UV-FL2-M10 (1/50)
3. Sensor cord: UV-CN150-M03A 1.5 m (standard model)
 UV-CN300-M03A 3 m (standard model)
 UV-CN500-M03A 5 m (standard model)
 UV-CH150-M03A 1.5 m (heat resistant model)
 UV-CH300-M03A 3 m (heat resistant model)
 UV-CH500-M03A 5 m (heat resistant model)

4. RS-232C cord: UV-232C150-M05 1.5 m (Operation manual for communication is attached.)

The accuracy of this meter is as shown in the Specifications, but the accuracy may not be expected due to high temperatures or strong UV light.

To maintain the expected accuracy, the annual calibration is recommended.

For calibration, kindly contact local agent or ORC.

5. Reference drawings:

(1) Photodetector: UV-SN35-M10

UV-SN25-M10 (option)

UV-SN42-M10 (option)

(2) Dimming filter: UV-FL2-M10 (1/50 attenuation) (option)

UV-FL5-M10 (1/20 attenuation) (option)

UV-FL10-M10 (1/10 attenuation) (option)

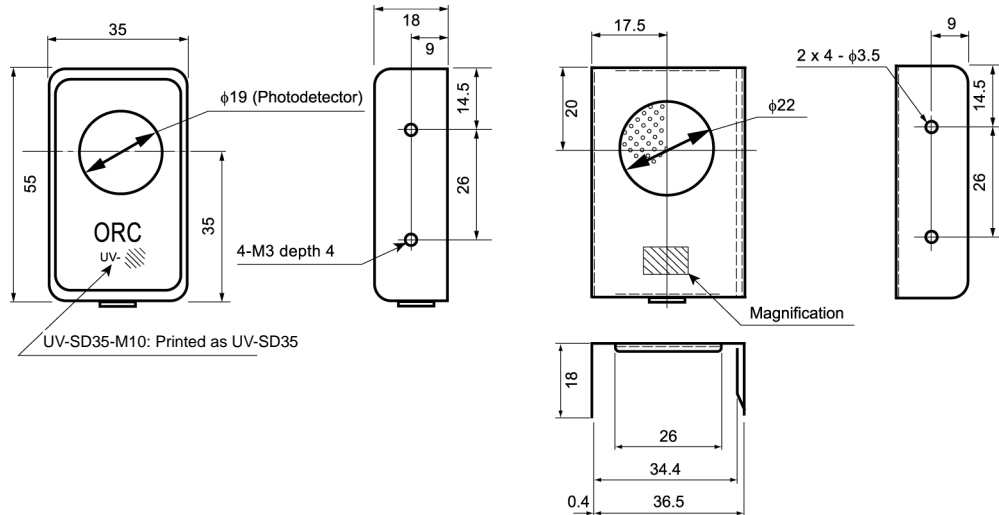


Fig. 9 External Views of Photodetector and Dimming Filter

(3) Sensor cord external drawing

- Standard sensor cord: UV-CN150-M03A
UV-CN300-M03A (option)
UV-CN500-M03A (option)
- Heat resistant sensor cord: UV-CH150-M03A (option)
UV-CH300-M03A (option)
UV-CH500-M03A (option)

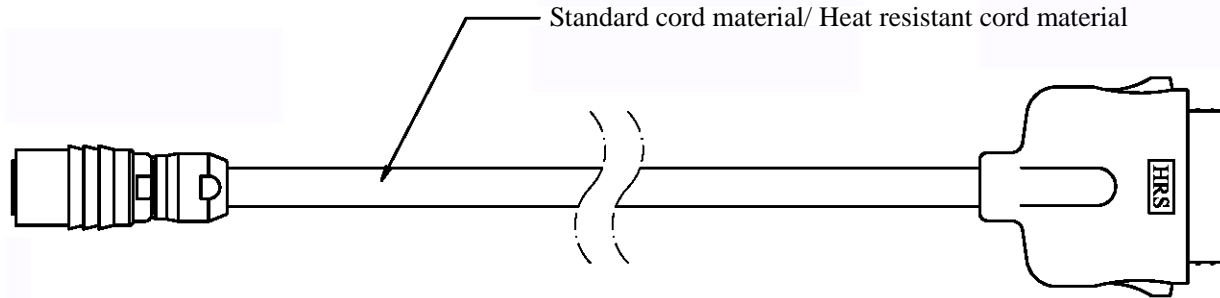


Fig.10 Sensor Cord External Drawing

(4) External drawing of main unit

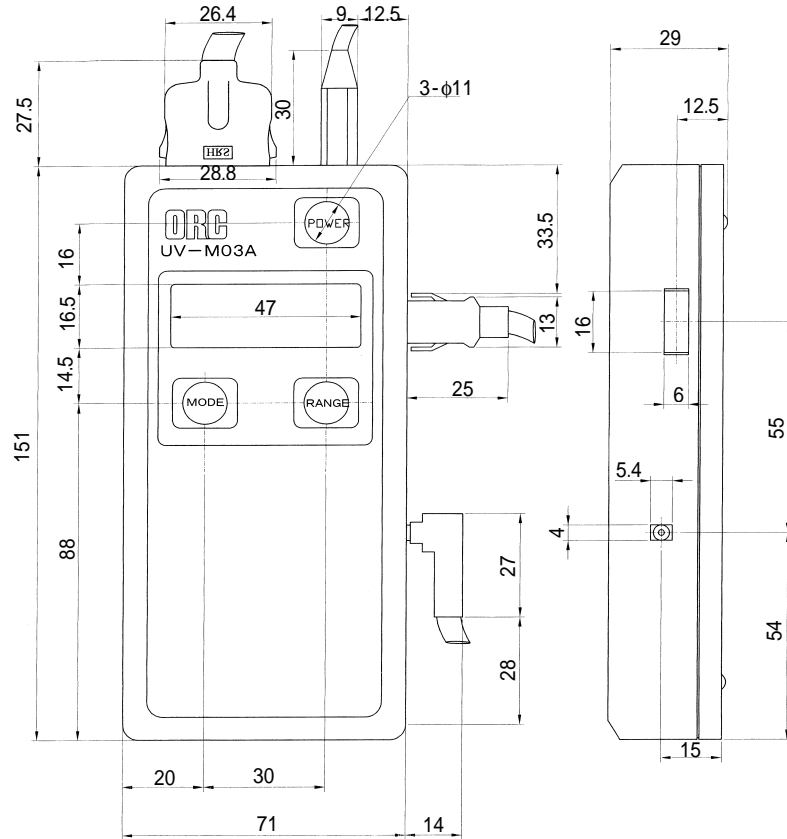


Fig.11 External Drawing

(5) Block diagram

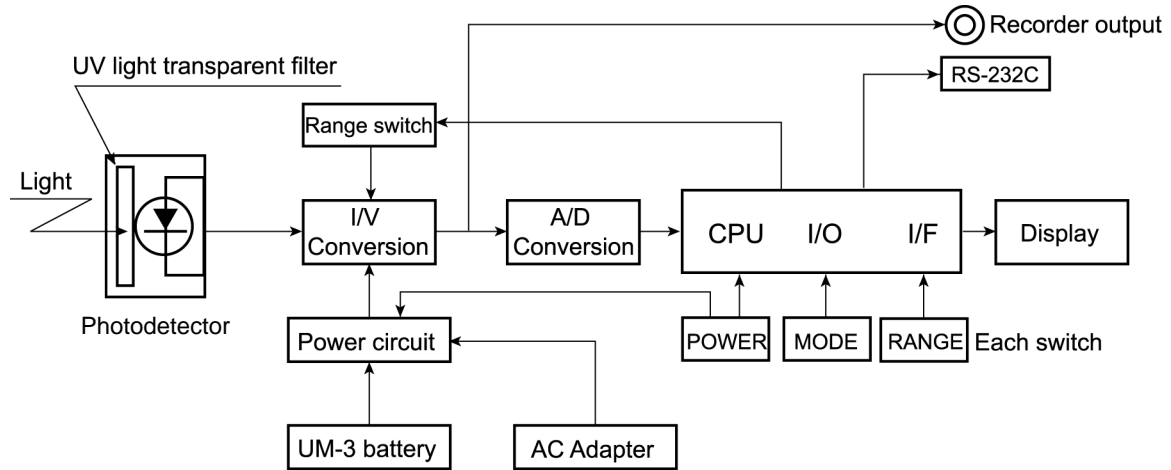


Fig. 12 Block Diagram

[10]

Calibration Record

UV-M03A

Serial No. K30

Date	Test before adjustment	Test after adjustment	Parts replacement	Parts name	Remarks	Person In charge
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			
• •	Accepted/Unaccepted	Accepted/Unaccepted	Yes/No			

Appendix: RS-232C communication

1) Communication method

Table 4 Communication Method

Item	Specification	Remarks
Connection	RS-232C	
Communication speed	19200 bps	
Data length	8 bit	
Stop bit	1 bit	
Parity	Nil	
Flow control	Nil	
Data format	ASCII character code	
Top symbol	‘ : ‘	
Classification ID	“03”	UV-M03A
Terminal symbol	CR/LF	

2) Communication command/ format

Data requirement command : "D 1"

Data requirement stop command : "D 0"

Communication format : [Top symbol], [Classification ID], [Command], [Sub command], [Parameter] & [Terminal symbol]

Table 5 Communication Command/Format

Position	Content	AN	Description
1	Top symbol	' : '	
2	Other side classification ID	'0'	Classification character 2 digit
3	Other side classification ID	'3'	Classification character 2 digit
4	Command	'D'	Requiring current measuring mode data
5	Sub command	'0' '1'	0: Stop 1: Start
6	Parameter		Nil
·	Parameter		
·	Terminal symbol	C R	
·	Terminal symbol	L R	

AN: ASCII alphameric symbols