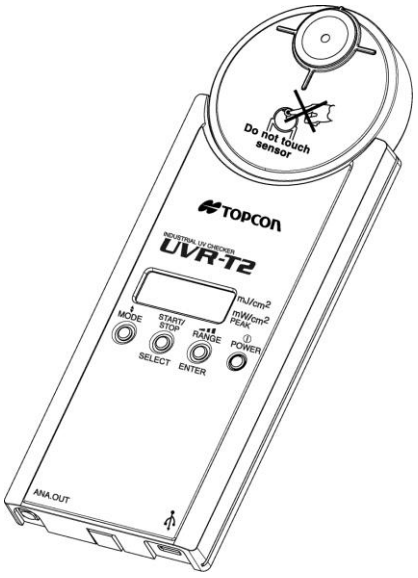
TOPCON



INSTRUCTION MANUAL

INDUSTRIAL UV CHECKER

UVR-T2

Rev.3

INTRODUCTION

Thank you so much for your purchasing our TOPCON TECHNOHOUSE Industrial UV Checker UVR-T2 series.

UVR-T2 is most appropriate to manage the lamp output of the UV radiation device which is used for the following processes: sealing and adhering for electric/electronic parts, printing/drying/installing line of PCB, sterilization process in various industries, etc. By using the measurement result of this instrument for managing the conveyor speed and the lamp strength distribution/replacement period, it is possible to improve the customer's yield rate. Moreover, this instrument can be used to manage the lamp of an exposure device which is used for the photolithography of semiconductor, FPD, PCB and others.

This manual describes an outline, basic operation procedure and specifications regarding the Industrial UV Checker UVR-T2. Always keep this instruction manual at hand to make a good use of it.

HANDLING PRECAUTIONS

■Handling

- Be sure to turn off the power switch before connecting/disconnecting the detector unit and USB cable.
- Do not bring any radio-communication unit such as transceiver, etc. close to this system. This may cause the displayed values to be uneven.
- Do not use the instrument where there is much dust and extremely high humidity and where corrosive gas is generated.
- Do not use the instrument where the temperature is sharply changed. The temperature compensation circuit is built in the instrument. However, it cannot measure an object correctly from time to time in the environment where the temperature is suddenly changed.
- Do not use and store the instrument where strong shock may be given to it by dropping or it is constantly vibrated. Precision optical parts are built in the instrument. Such shock or vibration will cause the instrument to malfunction.
- When measuring on the UV conveyor, set the heatproof cover to the instrument. The surface of the instrument may be heated. Protect your hand with gloves, etc.
- When measuring on the UV conveyor, after measuring once, wait until the instrument is cooled to normal temperature. Then, use it again.

■Measured value

- This instrument is used to decide the proper radiation levels of all ultraviolet ray radiation devices. The measuring unit is "mW/cm²" and "mJ/cm²". <u>The instrument does not show the absolute value of ultraviolet rays.</u>

- This instrument is calibrated on condition that the spectral distribution value of the calibration light source is regarded as standard. When two or more same-type detector units measure any other light source except the calibration light source, differences occur in the measured values between the units because of the dispersion in the spectral sensitivity characteristics. In this case, use the correction factor function.
- If the detector window is dirty, any measurement error may occur. If dust adheres to the detector window, blow away dust with the airbrush prepared for cleaning the lens. If the detector window is very dirty or if oil or grease must be removed, moisten dry soft cloth or cotton swab with alcohol and wipe away dust with it. Do not use solvents such as thinner, benzine or acetone.

■Maintenance

- When storing or transporting, put the instrument into the case.
- Do not store the instrument at a place having a temperature of either “+60°C or higher” or “-20°C or lower”.
- Take out the battery to avoid leakage and store the instrument when it will not be used for a month or more.
- When a calibration test is performed, the correction factor stored in this instrument is erased. Before you ask for calibration, record the necessary correction factor.
- When the power switch is ON, the battery is being consumed. When this instrument is not in use, turn off the power switch for saving the energy.
- Do not use and store this instrument where it is splashed with water or other liquids because it does not have a waterproof structure.
- The materials applicable to recycling are used in this instrument. When disposing of the instrument, entrust it to the professional recycling company.
- When delivered, this instrument meets the specifications. But the instrument is changed according to the using condition of the customer or the measured quantity of integral irradiance. Make a calibration once a year to keep the measurement accuracy. If the measured integral irradiance exceeds the amount which our company assumed, do the calibration test at a shorter period.

MEMO

- The yearly integral irradiance which our company assumes is 3600J/cm².
  (The above-mentioned integral irradiance is the value obtained by calculating the irradiance 10mW/cm^2 of 100 hours. The object of irradiance is the whole ultraviolet range of the light source. Because of the light source characteristics, sometimes the value is different from the measured value of the product.)
- In calibration, the detecting sensitivity is adjusted. The measured lamp values of the customer are changed before and after asking for calibration. Take the correlation of the measured values before and after calibration into consideration and manage the ultraviolet rays.

DISPLAY FOR SAFE USE

In order to encourage the safe use of products and prevent any danger to the operator and others or damage to existing facilities, important warnings are put on the products and inserted into the instruction manuals.

We suggest that everyone understand the meaning of the following displays and icons before reading the “SAFETY PRECAUTIONS” and text.

Display	Meaning
 **WARNING**	Ignoring or disregarding this display may result in serious injury or lead to life threatening situations.
 **CAUTION**	Ignoring or disregarding this display may lead to personal injury*1 or damage of facilities*2.

*1: “Personal injury” means an injury, burn or electric shock which does not require entering or going to hospital.

*2: “Damage of facilities” refers to extensive damage to buildings, household belongings, livestock or pets.

Icons	Meaning
	This icon indicates Prohibition (“you must not do it”). Specific content is expressed with words or an image located in the icon or close to it.
	This icon indicates Mandatory Action (“you must do it without fail”). Specific content is expressed with words or an image located in the icon or close to it.
	This icon indicates Hazard Alert (including warning). Specific content is expressed with words or an image located in the icon or close to it.

SAFETY PRECAUTIONS

⚠ WARNING

Don’t use this instrument where ignitable/combustible steam (for example, gasoline) occurs.
It may cause a fire.

Do not use and store this instrument where it is splashed with water or other liquids.
It may cause a fire or electric shock.

Don’t disassemble or modify this instrument.
It may cause a fire or electric shock.

Set the heatproof cover.
The instrument may malfunction because of heat.

When transferred to the conveyor, the instrument may be heated. Protect your hand with gloves, etc.
If the instrument is heated, you may be burned.

If an abnormal noise, smell or smoke comes out of this instrument, turn off the power at once.
A fire will occur if using the instrument without repairing the trouble point. Consult your dealer or TOPCON TECHNOHOUSE CORPORATION.

⚠ CAUTION

Install the battery to fit to the specified polarity.
Leakage may cause an injury or malfunction.

Don’t put out or insert the plug by a moistened hand.
It may cause an electric shock.

ESCAPE CLAUSES

- TOPCON TECHNOHOUSE shall not take any responsibility for damage due to fire, earthquakes, actions by the third persons and other accidents, or the negligence and misuse of the user and use under unusual conditions.
- TOPCON TECHNOHOUSE shall not take any responsibility for damage derived from the inability to use this equipment, such as a loss of business profit and suspension of business.
- TOPCON TECHNOHOUSE shall not take any responsibility for damage caused by operations other than those described in this Instruction Manual.
- TOPCON TECHNOHOUSE shall not take any responsibility for damage caused by operation failures due to combination with other devices.

USAGE AND MAINTENANCE

Unless specified in this manual, the maintenance work shall be conducted only by a trained service technician, to ensure the safety and performance of the instrument. The following maintenance tasks, however, may be executed by the customer. Regarding the maintenance method, review the applicable text in this manual.

Cleaning of the instrument case and detector window

Wipe the instrument case with a soft cloth imbued with diluted neutral cleanser and then wipe it with a dry soft cloth.

Blow away dust from the detector window with the airbrush prepared for cleaning the lens.

If the detector window is very dirty or if oil or grease must be removed, moisten dry soft cloth or cotton swab with alcohol and wipe away dust with it. Do not use solvents such as thinner, benzine or acetone.

CONTENTS

NOTATION IN THIS MANUAL

The following notation rules are used in this manual.

Notation	Description
[MODE], [▲]	Shows the switches on the keyboard and signs indicated on the liquid crystal display unit.
☞ “ ”	Shows the place to which the user should refer in this manual.
☞ “ ”	Shows other manuals to which the user should refer.
NOTICE	Explains the things that the user should understand or take care about to operate the instrument.
MEMO	Explains the things that the user should refer to or that are convenient for operating.

1. PREPARATIONS BEFORE USING THE INSTRUMENT

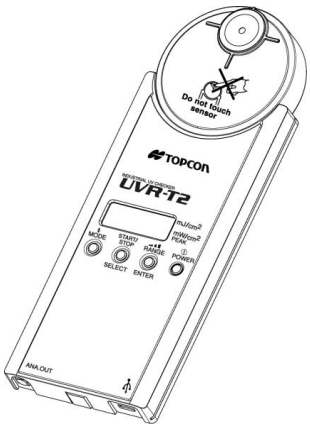
1.1 CHECKING THE INSTRUMENT AND ACCESSORIES

Make sure that the instrument and all the accessories are completely supplied.

If any of them is missing, contact your dealer or TOPCON TECHNOHOUSE CORPORATION.

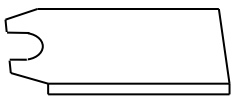
Instrument

- UVR-T2 1

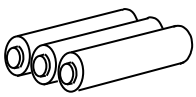


Accessories

- Quick manual 1
- Inspection certificate 1
- Heatproof cover 1
- AAA size dry battery (Separately sold parts) 3
- Screw 4
- Analog output plug 1
- Carrying case 1
- USB driver/Instruction manual/Measurement program (CD-ROM) 1
- USB cable (USB2.0 [A] Male - USB [Micro-B] Male) 1

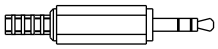


Heatproof cover

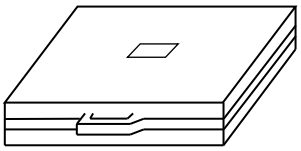


AAA size dry battery

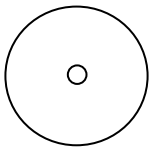
Screw



Analog output plug



Carrying case



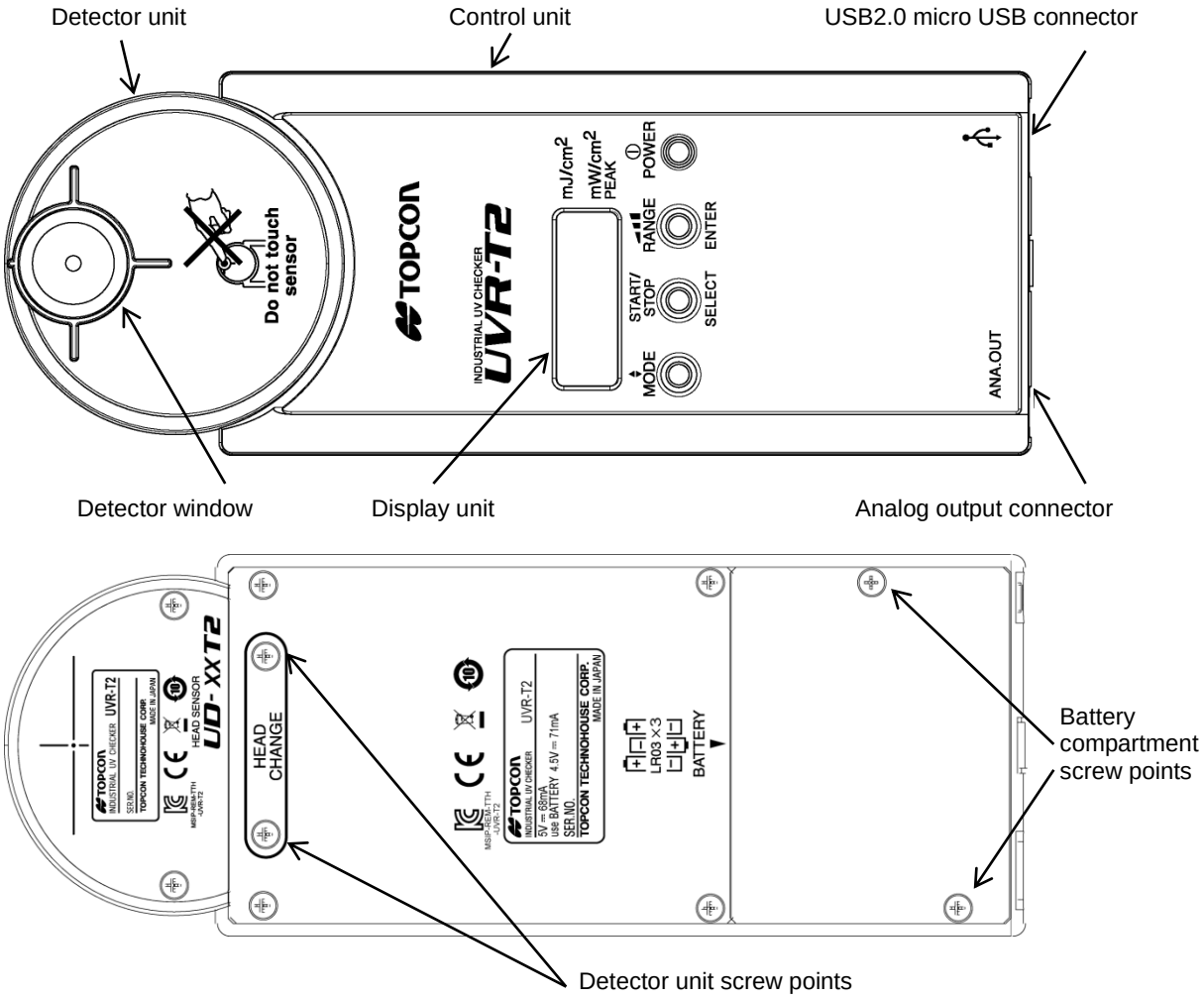
USB driver/Instruction manual/Measurement program (CD-ROM)

USB2.0 cable

1.2 NAMES OF COMPONENTS AND FUNCTIONS

■Names of the instrument components and functions

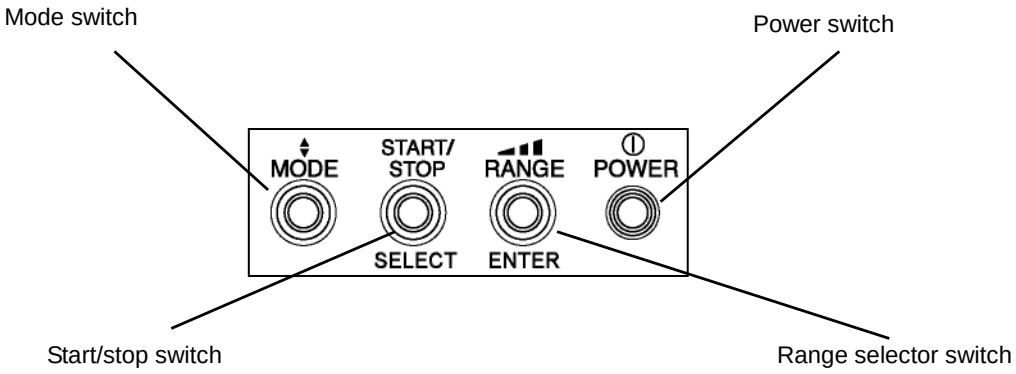
UVR-T2



Name	Description
Display unit	This is a liquid crystal display unit which indicates the measured value, measurement conditions and other information.
USB2.0 micro USB connector	When supplying the power to the instrument and performing remote measurement, this connector is used to connect to a personal computer (PC). Connecting with PC: ☞ “1.3.6 How to connect to personal computer”.
Detector window	This is the unit receiving light on this instrument. Make the whole surface of the detector window receive light and measure the irradiance.

Do not loosen any screws except detector unit and battery compartment screw point.

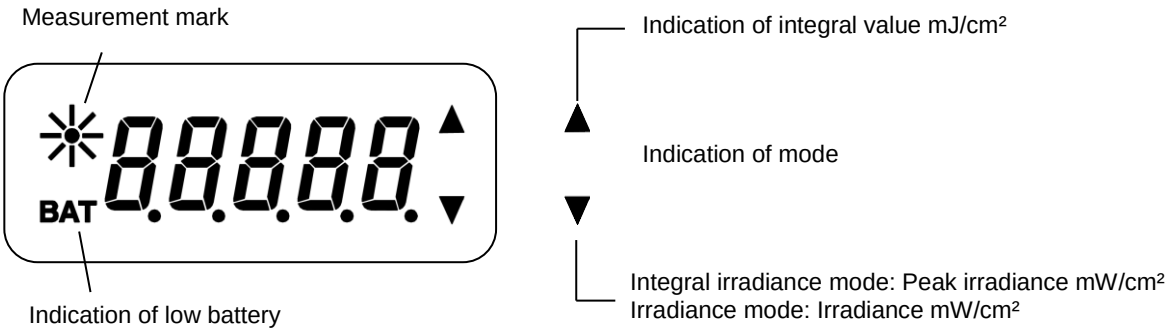
■Names and functions of switches



The following table shows the functions of the above switches.

Switch	Description
[POWER]	Used to turn ON/OFF the power. To turn OFF the power, press the switch for 2 seconds or more and then release it.
[RANGE]	Used to change the measurement range and to decide the set items. When changing the range, the range is changed alternately each time you press the switch as shown below. Auto→A1→A2→A3→F1→F2→F3 Display range: ☞ Refer to “SPECIFICATIONS & PERFORMANCE” in “6. APPENDICES”
[START/STOP]	Used to start/stop measurement and to change the set item.
[MODE]	Used to change the measurement mode and to return from the set item screen.

■Names of display unit



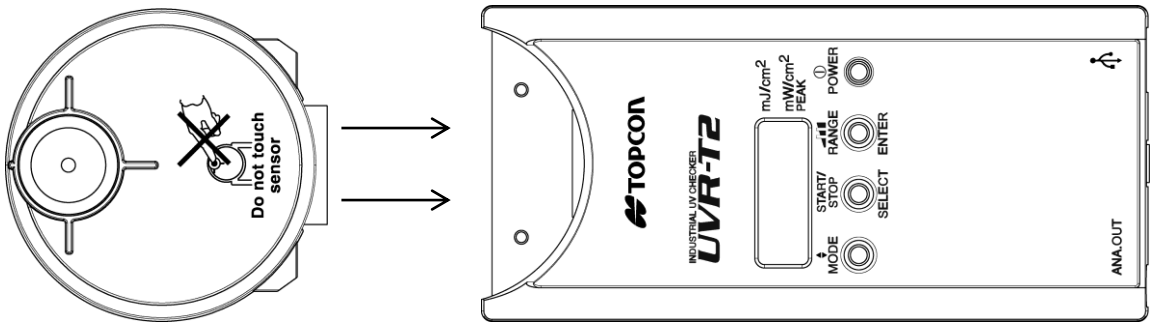
Indication	Description
[∗]	This is indicated when performing measurement and zero calibration.
[BAT]	This is indicated when the remaining capacity of the batteries is not sufficient. It is recommended to replace the batteries as early as possible. If the voltage is below the specified value, the instrument stops.
[▲]	This is indicated when the integral irradiance mode is set. This means that the integral value is indicated when finishing the measurement with the integral irradiance.
[▼]	This is indicated when the irradiance mode is set. This means that the peak irradiance value is indicated when finishing the measurement with the integral irradiance.
[▲▼]	This is indicated when the remote measurement mode is set.
Indication of measured value	Indicates the measured value.

1.3 PREPARATION

1.3.1 How to mount the detector unit

Do not loosen any screws except detector unit and battery compartment screw point.

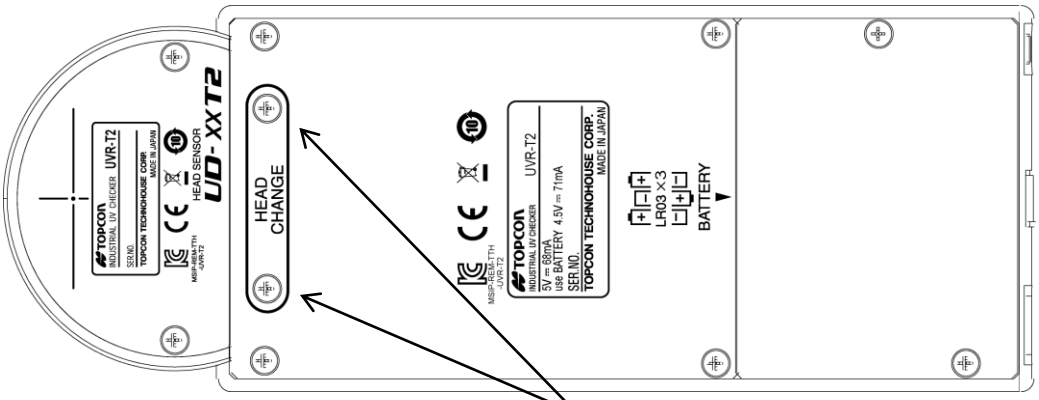
1 Push in the connector in the arrow direction.



MEMO

- Be sure to turn off the power switch before connecting/disconnecting the detector unit.

2 Attach the screws at the rear of the instrument to fix the detector unit.



NOTICE	• If you turn on the power on condition that the detector unit and the control unit are not fitted securely, the instrument will malfunction.

MEMO

- The detector unit is not mounted when shipped. Fit the detector unit and the control unit to each other securely.

1.3.2 How to load a battery

Install the battery to fit to the specified polarity.
Leakage may occur to cause an injury or malfunction.

Do not loosen any screws except detector unit and battery compartment screw point.

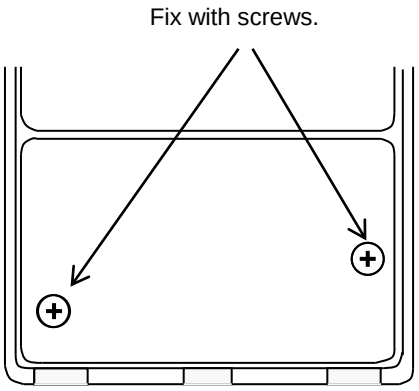
AAA size battery for operation check do not attach at the time of shipment.
Purchase those at your dealer.

1 Turn off the power switch and uncover the battery compartment.

2 Insert batteries according to the polarity indication shown on the battery compartment.

MEMO : Use LR03 (AAA size alkaline battery).

3 Re-cover the battery compartment and then tighten the screws securely.

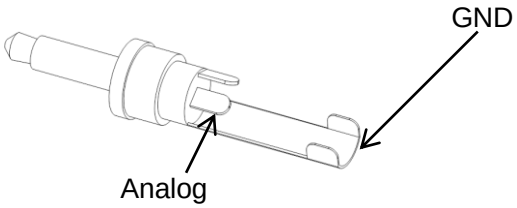


1.3.3 How to use the analog output connector

The analog output connector is used to output the voltage corresponding with the ultraviolet ray amount that is emitted to the detector window.
The voltage output is max. 2V for each measurement range.
When using the analog output, use [F Range] for which the range is fixed.

	UD-T25T2	UD-T36T2	UD-T40T2	UD-T3040T2
Irradiance of analog output 1mV (Unit: mW/cm²)	Measurement range F Range1 0.015 F Range2 0.15 F Range3 1.5	Measurement range F Range1 0.03 F Range2 0.3 F Range3 3	Measurement range F Range1 0.015 F Range2 0.15 F Range3 1.5	Measurement range F Range1 0.03 F Range2 0.3 F Range3 3

The analog output plug has a polarity as illustrated. Connect the analog output plug with an outer recorder by soldering the cable.



The output impedance of the instrument is 1KΩ.

MEMO

- When using the analog output, use [F Range] for which the range is fixed. When carrying out normal measurement, use [Auto] or [A Range].
- When you use [F Range], set an optimal range. If an improper range is set, the measured value and analog output may be abnormal.

1.3.4 Setting of heatproof cover

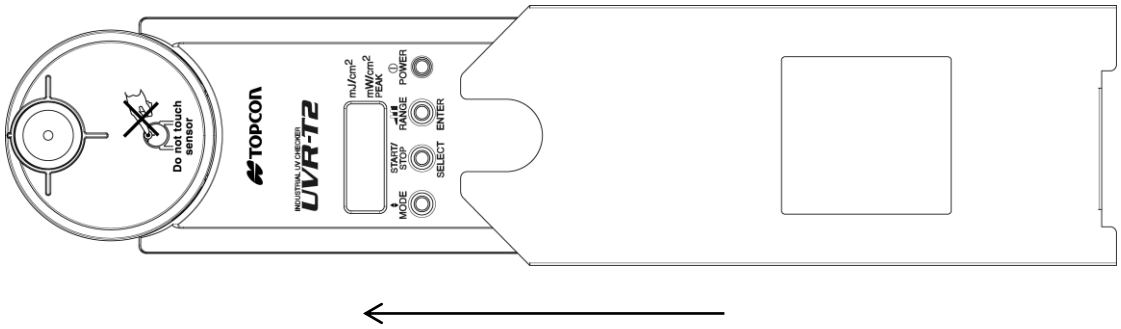
When measuring, set the heatproof cover.

The instrument may malfunction because of heat.

Don’t touch the detector window when mounting/removing the heatproof cover.

If the detector window is dirty, a correct value cannot be obtained.

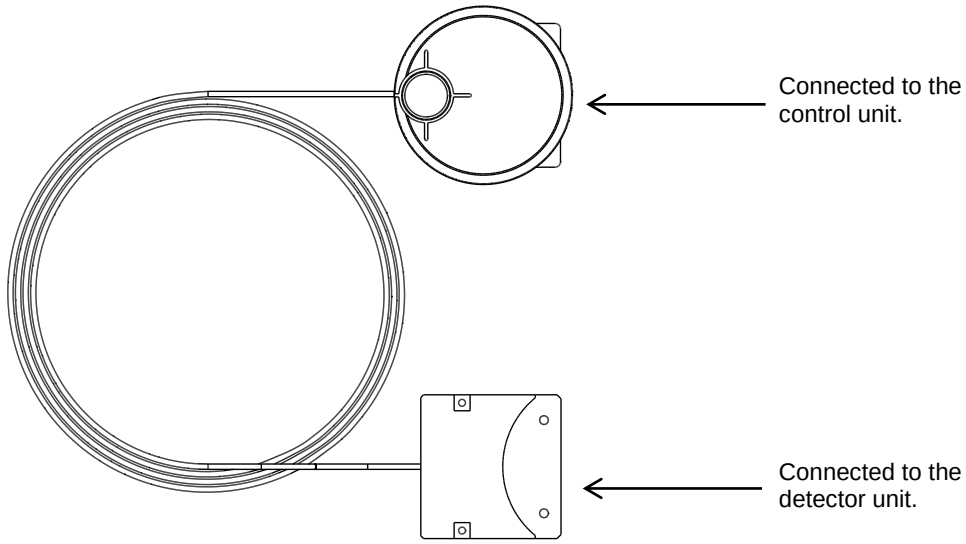
Set the heatproof cover by sliding along the guide.



1.3.5 How to use the extension cable (optional accessory)

Do not loosen any screws except detector unit and battery compartment screw point.

If the extension cable is used, measurement can be performed with the detector unit which is separated from the control unit.

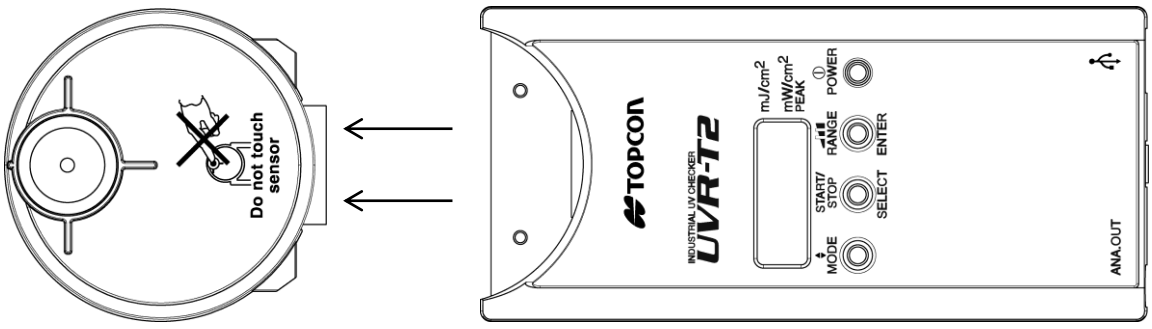


Cable length: Approx. 2m

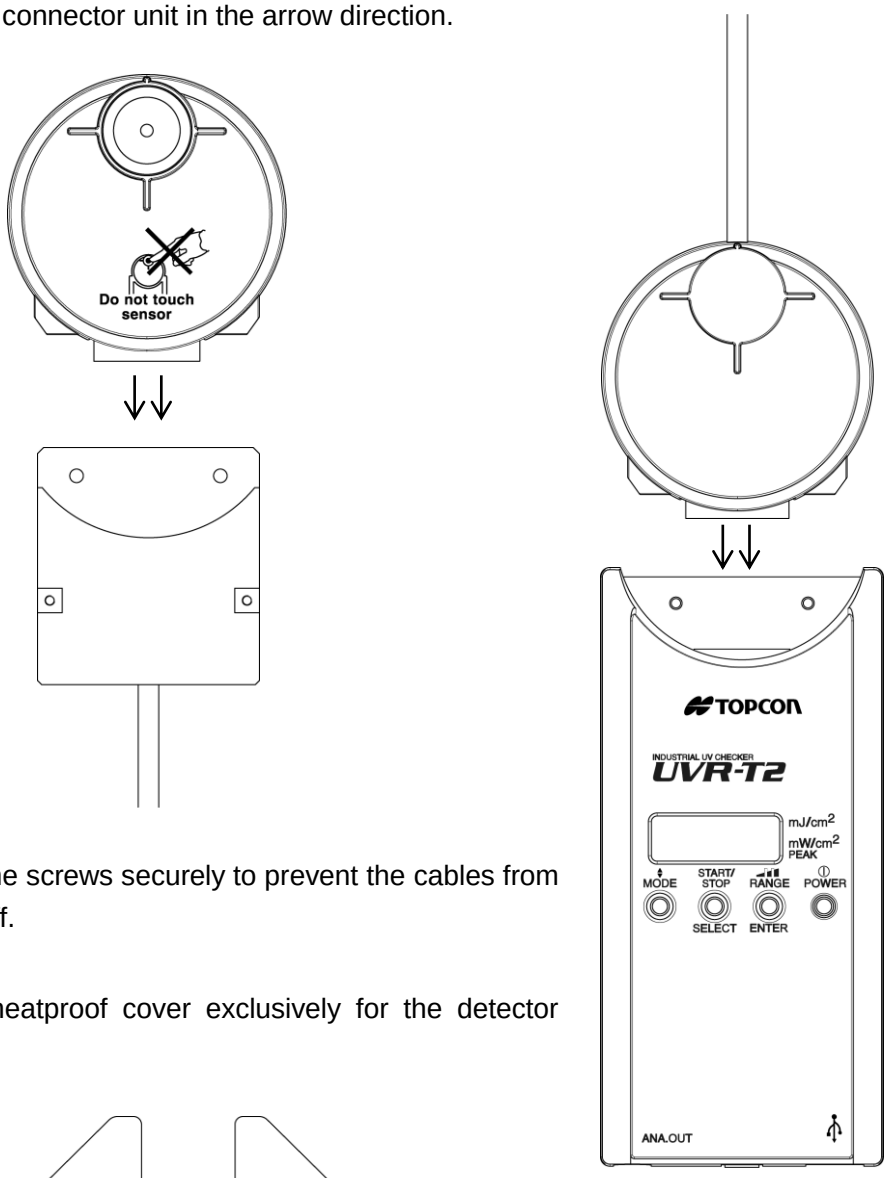
How to connect the extension cable

1 Remove the set screws at the rear of the control unit.

2 Separate the detector unit by pulling out in the arrow direction.

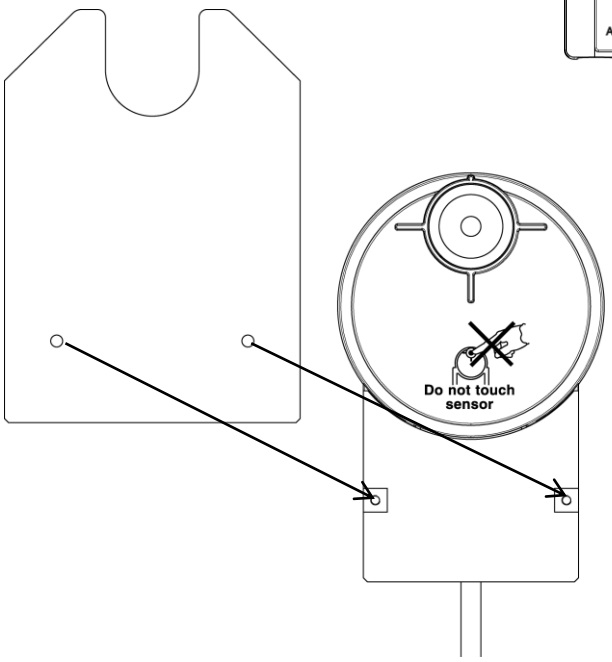


3 Fit the connector unit in the arrow direction.



4 Tighten the screws securely to prevent the cables from coming off.

5 Set the heatproof cover exclusively for the detector unit.



MEMO

- The heatproof cover for the detector unit and the extension cable are regarded as a set.

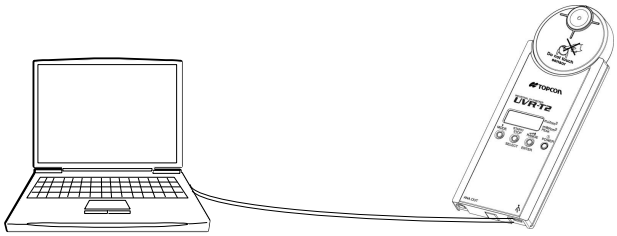
1.3.6 How to connect to personal computer

When using the instrument by connecting to a personal computer, connect it to a personal computer through the accessory USB cable (cable type: “A” connector - Micro “B” connector).

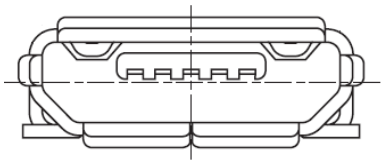
MEMO

• For the connection on a personal computer, refer to the manual of the personal computer being used at the same time.

NOTICE	• Don’t disconnect/connect the connectors on condition that the instrument is turned on.



■Arrangement of connector pin



Micro USB standard “B” socket (Instrument side)

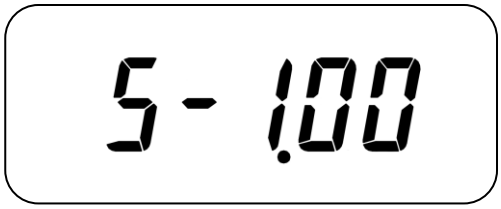
Instrument connector side

Pin No.	Signal
1	VBUS
2	D-
3	D+
4	GND
5	GND

1.3.7 How to turn on/off the power

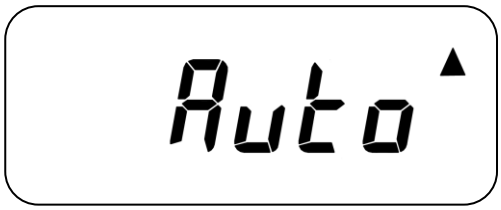
1 Press the [POWER] switch to turn on the power or connect to powered-on PC with USB cable.

2 The software version is indicated.



3 When zero calibration at startup is valid, “CAL” is indicated on the display unit and zero calibration starts.

4 When startup is ended normally, “Auto▲” is indicated.



5 To turn off the power, press the [POWER] switch for 2 seconds or more and then release it.

NOTICE	• Do not press the [POWER] switch for 2 seconds more, when you turn on the power. If you press for a long time and then release it, the power may be turned off. • After turning off the power, if you want to connect with USB cable again, please open more than one second interval.

MEMO

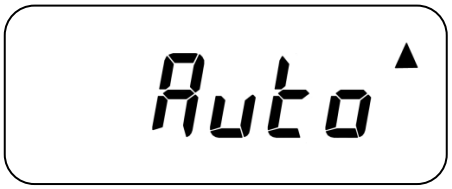
- When the recognition of the detector unit has failed, “E-01” is indicated.
- Cover the detector window to prevent it from the light when executing zero calibration.
- When zero calibration has failed, “E-02” is indicated for approx. 3 seconds.

2. MEASUREMENT OPERATION

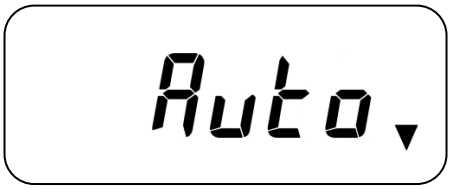
2.1 CHANGING THE MEASUREMENT MODE

1 When startup is ended normally, “Auto▲” is indicated.

2 Each time you press the [MODE] switch, the display of [▲][▼] is changed and the measurement mode is also changed.



Integral irradiance mode

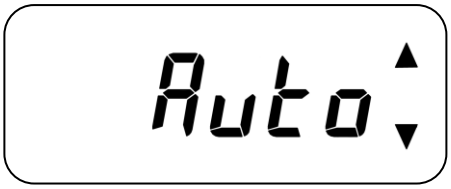


Irradiance mode

■Remote measurement mode

1 In the remote measurement mode, [▲][▼] is displayed.

2 Press the [RANGE] switch, and the remote measurement mode is canceled.

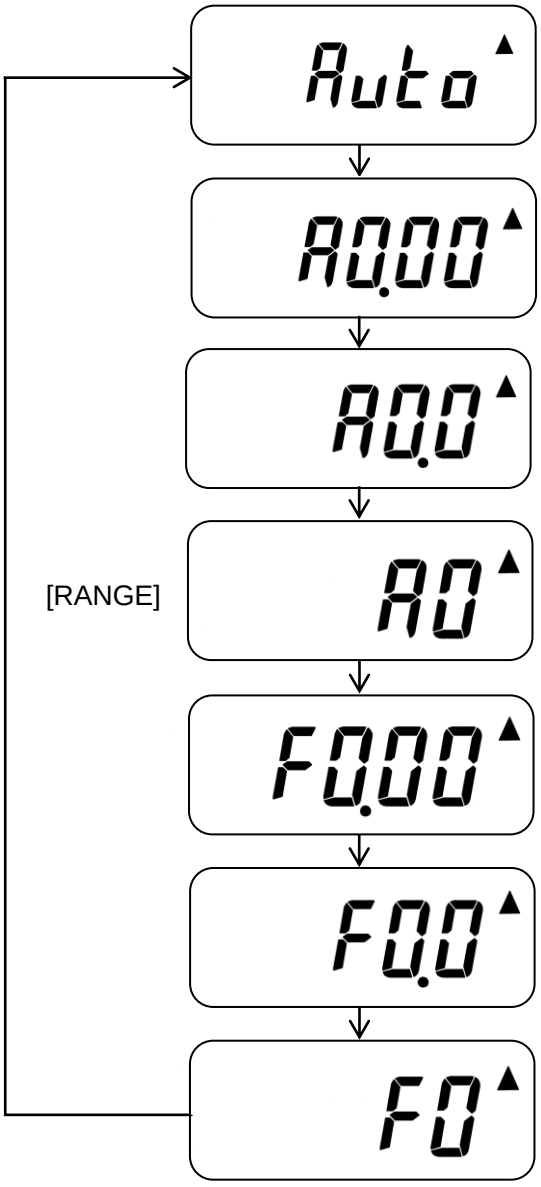


☞ “4. COMMUNICATION WITH PERSONAL COMPUTER”

2.2 CHANGE OF MEASUREMENT RANGE

1 When startup is ended normally, “Auto▲” is indicated.

2 Each time you press the [RANGE] switch, the measurement range is changed with the displayed digit.



“Auto” range
Automatically measures with the optimal range.

A Range 1
It's measured in setting RANGE1, but when over range, the most suitable range is used automatically.

A Range 2
It's measured in setting RANGE2, but when over range, the most suitable range is used automatically.

A Range 3
It's measured in setting RANGE3, but when over range, the most suitable range is used automatically.

F Range 1
It's measured in setting RANGE1, but when over range, the range will not be changed.

F Range 2
It's measured in setting RANGE2, but when over range, the range will not be changed.

F Range 3
It's measured in setting RANGE3, but when over range, the range will not be changed.

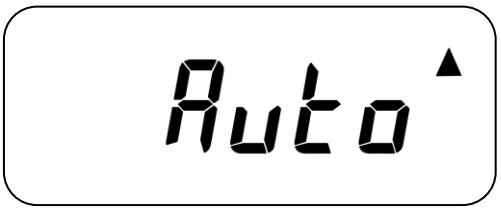
The displayed digit of irradiance mode	The Minimal displayed digit of integral irradiance mode
Measurement range 1 : 0.00	Setting range 1 : 0.00
Measurement range 2 : 0.0	Setting range 2 : 0.0
Measurement range 3 : 0	Setting range 3 : 0

MEMO

- When using the analog output, use [F Range] for which the range is fixed. When carrying out normal measurement, use [Auto] or [A Range].
- When you use [F Range], set an optimal range. If an improper range is set, the measured value and analog output may be abnormal.

2.3 INTEGRAL IRRADIANCE MODE

1 When startup is ended normally, “Auto▲” is indicated.

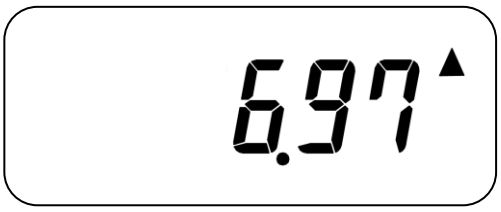


2 Press the [RANGE] switch to change the measurement range.

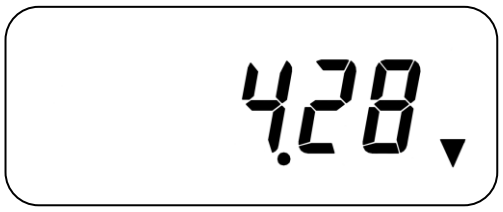
3 When pressing the [START/STOP] switch, measurement starts. The [*] mark is indicated during measurement.

4 The integral irradiance value is indicated during measurement.

5 When pressing the [START/STOP] switch again, measurement stops. The integral irradiance and the peak irradiance are alternately indicated at intervals of approx. 3 seconds.



Integral irradiance



Peak irradiance

About the integral irradiance measurement limit of each range
☞ “SPECIFICATIONS & PERFORMANCE” in “6. APPENDICES”

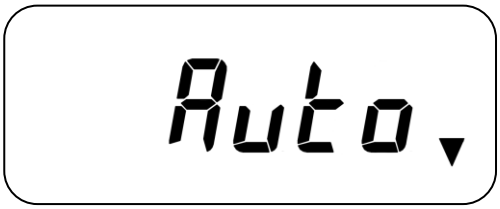
MEMO

- When the measured irradiance exceeds the measurable limit of range 3, “E-05” is displayed.
- When the measured integral irradiance exceeds the measurable limit(99999mJ/cm^2), “E-04” is displayed.
- The data during measurement are saved in the instrument’s memory. When measurement frequency is 50 Hz it is possible to save the data obtained for 18 minutes and when measurement frequency is 60 Hz is possible to save the data obtained for 15 minutes. Measurement stops when the time to save data is passed. The data saved in the memory is extracted by the remote mode.

☞ “4. COMMUNICATION WITH PERSONAL COMPUTER”

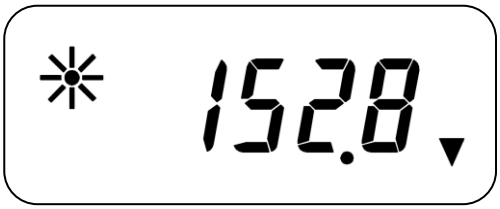
2.4 IRRADIANCE MODE

1 Press the [MODE] switch to change the measurement mode.



2 Press the [RANGE] switch to change the measurement range.

3 When pressing the [START/STOP] switch, measurement starts. The [*] mark is indicated during measurement.



4 The irradiance value is indicated during measurement.

5 When pressing the [START/STOP] switch again, measurement stops.

MEMO

- When the measured irradiance exceeds the measurable limit of range 3, “E-05” is displayed.

About the irradiance measurement limit of each range

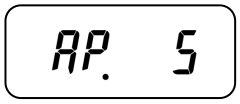
☞ “SPECIFICATIONS & PERFORMANCE” in “6. APPENDICES”

3. OPERATION FOR A VARIETY OF SETTING

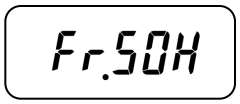
3.1 USER MODE

User mode is used to change a variety of set values and check the status of the instrument. In the user mode, you can change the set values of the following twelve items and the instrument's status.

1. Setting automatic ON/OFF of the power supply

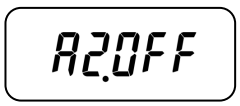


2. Changing the measurement frequency



3. Setting ON/OFF of the user zero calibration

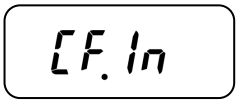
4. Setting ON/OFF of the automatic zero calibration at startup



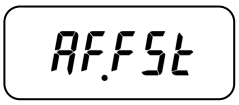
5. Manual zero calibration

6. Setting ON/OFF of the user correction factor application

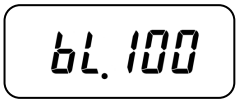
7. Inputting the user correction factor



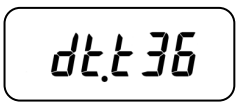
8. Changing the analog output response speed



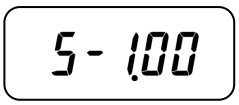
9. Checking the battery level



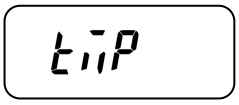
10. Checking the type of the connected detector unit



11. Checking the software version



12. Checking the instrument's temperature



MEMO

- Item 4 and Item 5 are displayed only when Item 3 is ON.
- Item 7 is displayed only when Item 6 is ON.

3.1.1 Shifting/resetting to/from user mode

■User mode menu

Perform a variety of setting in the user mode.

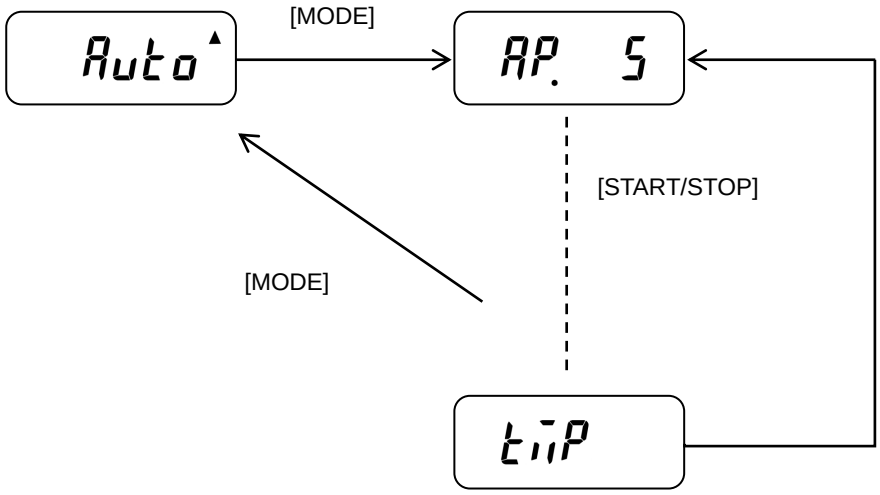
Shift to the user mode by the following procedure.

1 When startup is ended normally, “Auto▲” is indicated.

2 Press the [MODE] switch for 2 seconds or longer and then release it.

3 Each time you press the [START/STOP] switch, the displayed menu is changed.

4 Press the [MODE] switch, and the measurement screen appears again.



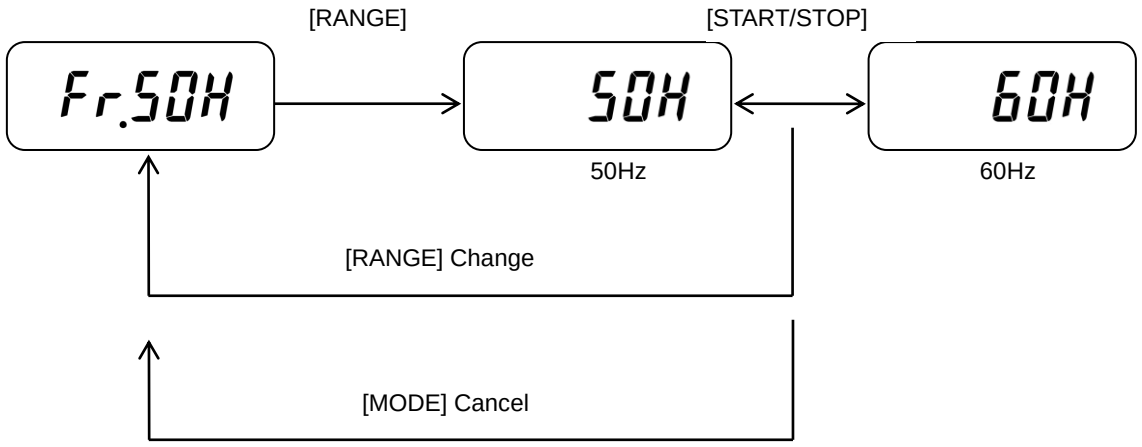
■Changing the set value/checking the display

1 Access the user menu.

2 Press the [START/STOP] switch to change the item to be set.

3 Press the [RANGE] switch to shift to the setting change screen.

4 Press the [START/STOP] switch to change the set value. To determine the changed value, press the [RANGE] switch. To cancel the changed value, press the [MODE] switch.



About how to input the correction factor

☞ “3.2.7 Input of the user correction factor”

3.2 USER MENU

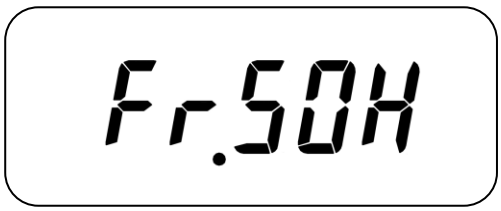
3.2.1 Setting automatic ON/OFF of the power supply

When the keys on the instrument are not operated within the set time, the instrument is automatically turned off.
This setting is not applied when measurement is performed and when the remote mode is in use.
The measurement represents the period that [∗] mark is displaying after pressing the [START/STOP] switch, remote mode represents the period that [▲▼] mark is displaying after sending RM command in USB communication.

Setting range : 5/10/15/30 minutes
: InF “Automatic power OFF” is not valid.

3.2.2 Changing the measurement frequency

Change the measurement frequency.



Setting range: 50/60 Hz

3.2.3 Setting ON/OFF of the user zero calibration

Set ON/OFF of the user zero calibration.　When OFF is set, zero calibration is performed according to the calibration data when shipped.

Setting range: ON/OFF

3.2.4 Setting ON/OFF of the zero calibration at startup

*This menu is displayed only when the user zero calibration is ON.

Set ON/OFF of the automatic zero calibration at startup.　When ON is set, after the software version is displayed at startup, zero calibration is automatically executed.

Setting range: ON/OFF

3.2.5 Execution of zero calibration

*This menu is displayed only when the user zero calibration is ON.

Perform zero calibration manually.

1 Press the [RANGE] switch, and the display blinks.

2 Press the [RANGE] switch again, and zero calibration starts. Press the [MODE] switch, and blinking is ended and the original menu screen appears again.

3 While zero calibration is being executed, the [*] mark is lit.

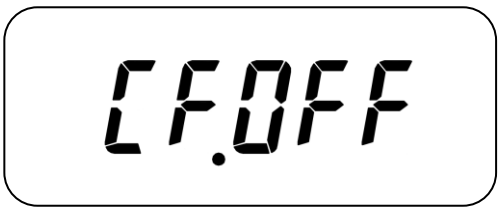
4 When zero calibration for approx. 20 seconds is successful, the original menu screen appears again. When zero calibration has failed, “E-02” is displayed for approx. 3 seconds.

MEMO

- Cover the detector window to prevent it from the light when executing zero calibration.
- When zero calibration has failed, “E-02” is indicated for approx. 3 seconds. In the case of failure, do not update the correction value but use the value at the last calibration.

3.2.6 Setting ON/OFF of the user correction factor

Set ON/OFF of the user correction factor application.



Setting range: ON/OFF

3.2.7 Input of the user correction factor

*This menu is displayed only when the user correction factor is ON.

Input the correction factor by which the measured value will be multiplied.

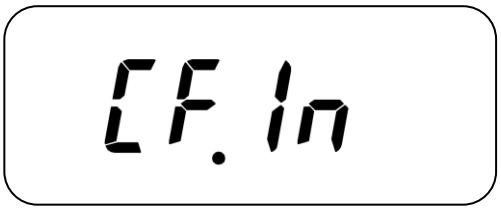
How to set the correction factor

- Regard the value measured by the device which you have managed so far, as “A”
- Regard the value measured by this instrument as “B”

Under the above condition, input the values of A/B as the correction factor.

Then, correction is done so that the value displayed by the instrument may be “A”.

Setting range: 0.001 - 9.999



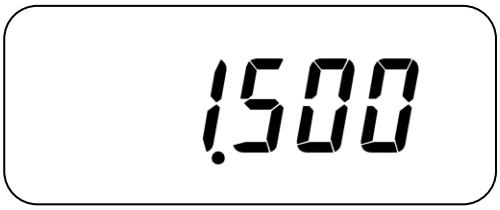
1 Press the [RANGE] switch, and the current set value is displayed.

2 Press the [RANGE] switch longer than usual, and the numeral at the highest digit blinks.

3 Press the [RANGE] switch, and the blinking digit is shifted to the right.

4 Each time you press the [START/STOP] switch, the value at the blinking digit is increased by “1”.

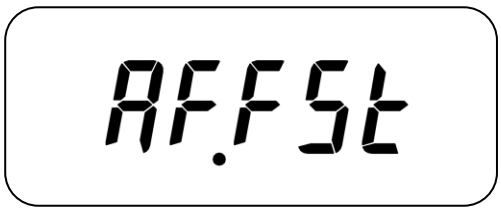
5 Press the [MODE] switch. Blinking is ended and the updated value is displayed.



6 Press the [MODE] switch again, and the item selection screen appears again.

3.2.8 Setting the analog output response speed

Set the analog output response speed.

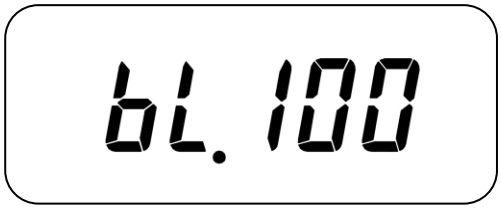


Setting range: FAST/SLOW

- FAST: (Response speed≤5 msec) Recommended when measuring waveforms by an oscilloscope and when measuring the DC light source.
- SLOW: Recommended when measuring the AC light source and when measuring by a data logger.

3.2.9 Display of the battery level

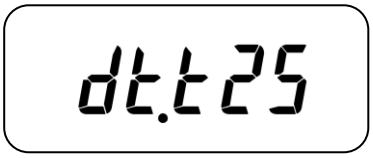
The battery level is displayed by 5%. The unit is [%].
“100” is always displayed while the power is being supplied through USB.



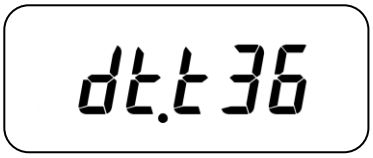
* When the voltage of the battery is below the specified level, the instrument automatically stops.

3.2.10 Display of detector unit

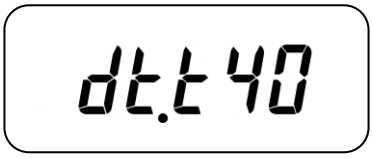
The type of the connected detector unit is displayed.



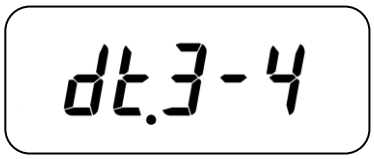
T25T2



T36T2



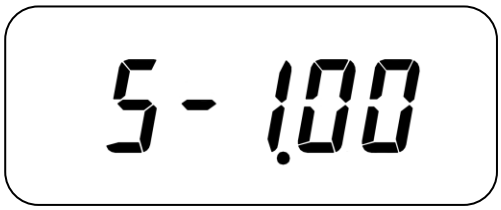
T40T2



T3040T2

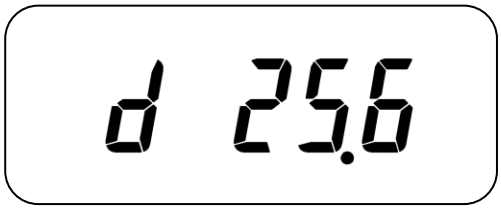
3.2.11 Display of software version

The version of the instrument's software is displayed.

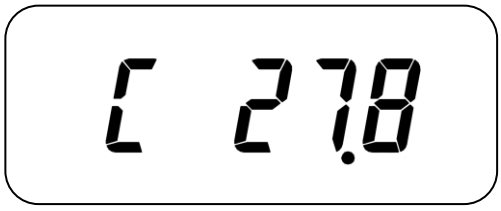


3.2.12 Display of the instrument's temperature

The internal temperature of the detector unit and control unit is displayed. The unit is [°C].



Detector unit temperature



Control unit temperature

4. COMMUNICATION WITH PERSONAL COMPUTER

4.1 COMMUNICATION COMMAND

This instrument can communicate with a personal computer through USB2.0.
This chapter will explain the commands which will be used when the customer makes a unique program for the communication with this instrument.

* Delimiter: CR: 0x0d is added to each of communication data. Use an exclusive cable as the USB communication cable.

4.2 COMMAND LIST

The communication commands and functions are listed below. "_" means a space and "#" means a value.

Communication command	Function
RM	Sets the remote mode.
LM	Sets the local mode. (Cancels the remote mode.)
WHO	Acquires the model name.
VER	Acquires the software version.
SRL	Acquires the serial number of the control unit.
MT	Acquires the calibration date of the control unit.
ST	Executes measurement.
CST	Starts continuous measurement. The measured value is output according to the average times, which is set by ACW command. When this command is sent during continuous measurement, "NO" is returned.
STP	Stops continuous measurement. When this command is sent during continuous measurement, continuous measurement stops.
MRW_#	Sets the measurement range. -1: AUTO range 1: A Range 1 2: A Range 2 3: A Range 3 4: F Range 1 5: F Range 2 6: F Range 3
MRR	Acquires the measurement range.
FRQW_#	Sets the measurement frequency. 0: 50Hz 1: 60Hz
FRQR	Acquires the measurement frequency.

Communication command	Function
TMP_#	Acquires temperature. The unit is [°C]. 0: Detector unit 1: Control unit
CAL	Performs the user zero calibration. It takes approx. 20 seconds to finish this calibration.
ZCW_#	Sets “Valid/Invalid” of the user zero calibration. 0: Invalid 1: Valid
ZCR	Acquires “Valid/Invalid” of the user zero calibration.
CFSW_#	Sets “Valid/Invalid” of the user correction. 0: Invalid 1: Valid
CFSR	Acquires “Valid/Invalid” of the user correction.
CFW_#######	Sets the user correction factor. Setting range: 0.001 - 9.999
CFR	Acquires the user correction factor.
ACW_#	Sets the average times at remote measurement. Setting range: 1 - 5
ACR	Acquires the average times at remote measurement.
APW	Sets the time of “Auto power OFF”. 0: “Auto power OFF” is not valid. 1: 5 minutes 2: 10 minutes 3: 15 minutes 4: 30 minutes
APR	Acquires the “Auto power OFF” setting.
AFW	Sets the analog filter response speed. 0: Slow 1: Fast
AFR	Acquires the analog filter response speed setting.
LOG	Acquires the log data saved in the integral irradiance measurement mode.
ERR	Acquires the newest error code.

“_” means a space and “####” means a value.

When the personal computer sends a communication command, the UVR-T2 returns “OK” as the reception check command. When the UVR-T2 receives an irrelevant command, it returns “NO”. When an error occurs while a communication command is being processed, the UVR-T2 returns “NG”. Send the ERR command to check the error code.

4.3 COMMUNICATION PROTOCOL

The communication protocol in USB communication (UVR-T2) is shown below.

The instrument returns “OK” as the command response when receiving a command normally, “NO” when a command cannot be analyzed and “NG” when receiving normally but the processing is not normal.

In the description below, “_” means a space and “#” means a value.

4.3.1 RM command

Sets the remote mode.

External control device **Command** **UVR-T2**

“RM”+CR →

← “OK”+CR

4.3.2 LM command

Sets the local mode.
When receiving this command while the local mode is set, “NO” is returned.

External control device **Command** **UVR-T2**

“LM”+CR →

← “OK”+CR

4.3.3 WHO command

Acquires the model name. The type of the detector unit is added after the model name.

External control device **Command** **UVR-T2**

“WHO”+CR →

← “OK”+CR

← “UVR-T2-T36”+CR

← “END”+CR

4.3.4 VER command

Acquires the software version.
Acquisition range: 0.00 - 99.99

External control device **Command** **UVR-T2**

“VER”+CR →

← “OK”+CR

← “#.##”+CR

← “END”+CR

4.3.5 SRL command

Acquires the serial number of the control unit.
Acquisition range: 00000000 - 99999999

External control device **Command** **UVR-T2**

“SRL”+CR →

← “OK”+CR

← “########”+CR

← “END”+CR

4.3.6 MT command

Acquires the serial number of the control unit.
Acquisition range: 00000000 - 99999999

External control device **Command** **UVR-T2**

“MT”+CR →

← “OK”+CR

← “########”+CR

← “END”+CR

4.3.7 ST command

After measurement is done once, the measurement data is returned.

External control device **Command** **UVR-T2**

"ST"+CR →

← "OK"+CR

Measurement starts.

. . . . .

Measurement is ended.

← Measured Value + CR

← "END"+CR

4.3.8 CST command

Starts continuous measurement. During continuous measurement, the measured value is output at regular intervals according to the average times set by the ACW command.

During continuous measurement, only the STP command is received.

When the CST command is received during continuous measurement, "NO" is returned.

External control device **Command** **UVR-T2**

"CST"+CR →

← "OK"+CR

Continuous measurement starts.

← "END"+CR

4.3.9 STP command

Stops continuous measurement. When the STP command is received except during continuous measurement, "NO" is returned.

External control device **Command** **UVR-T2**

"STP"+CR →

← "OK"+CR

Continuous measurement stop processing

← "END"+CR

4.3.10 MRW_# command

Sets the measurement range.

Setting range -1: AUTO range 1: A Range 1 2: A Range 2 3: A Range 3
4: F Range 1 5: F Range 2 6: F Range 3

External control device **Command** **UVR-T2**

"MRW_####"+CR →

← "OK"+CR

Range change processing

← "END"+CR

4.3.11 MRR command

Acquires the measurement range.

Acquisition range -1: AUTO range 1: A Range 1 2: A Range 2 3: A Range 3
4: F Range 1 5: F Range 2 6: F Range 3

External control device **Command** **UVR-T2**

"MRR"+CR →

← "OK"+CR

← "#"+CR

← "END"+CR

4.3.12 FRQW_# command

Sets the measurement frequency.

Setting range 0: 50Hz 1: 60Hz

External control device **Command** **UVR-T2**

"FRQW_#"+CR →

← "OK"+CR

Frequency change processing

← "END"+CR

4.3.13 FRQR command

Acquires the measurement frequency.
Acquisition range 0: 50Hz 1: 60Hz

External control device **Command** **UVR-T2**

“FRQR”+CR →

← “OK”+CR

← “#”+CR

← “END”+CR

4.3.14 TMP_# command

Acquires the internal temperature of the instrument. The unit is [°C].

Setting range 0: Detector unit 1: Control unit

External control device **Command** **UVR-T2**

“TMP_#”+CR →

← “OK”+CR

← “##.#”+CR

← “END”+CR

4.3.15 CAL command

Performs the user zero calibration. It takes approx. 20 seconds to perform the calibration.

External control device **Command** **UVR-T2**

“CAL”+CR →

← “OK”+CR

Calibration processing

← “END”+CR

4.3.16 ZCW_# command

Sets “Valid/Invalid” of the user zero correction.

Setting range 0: Invalid 1: Valid

External control device **Command** **UVR-T2**

“ZCW_#”+CR →

← “OK”+CR

Setting processing

← “END”+CR

4.3.17 ZCR command

Acquires “Valid/Invalid” of the user zero correction.

Acquisition range 0: Invalid 1: Valid

External control device **Command** **UVR-T2**

“ZCR”+CR →

← “OK”+CR

← “#”+CR

← “END”+CR

4.3.18 CFSW_# command

Sets “Valid/Invalid” of the user correction.

Setting range 0: Invalid 1: Valid

External control device **Command** **UVR-T2**

“CFSW_#”+CR →

← “OK”+CR

Setting processing

← “END”+CR

4.3.19 CFSR command

Acquires “Valid/Invalid” of the user correction.

Acquisition range 0: Invalid 1: Valid

External control device **Command** **UVR-T2**

“CFSR”+CR →

← “OK”+CR

← “#”+CR

← “END”+CR

4.3.20 CFW_#### command

Sets the user correction factor.

The correction factor is valid to third decimal point. It is truncated when the numbers beyond the fourth decimal point is sent.

Setting range: 0.001 - 9.999

External control device **Command** **UVR-T2**

“CFW_####”+CR →

← “OK”+CR

Setting processing

← “END”+CR

4.3.21 CFR command

Acquires the user correction factor.

Acquisition range: 0.001 - 9.999

External control device **Command** **UVR-T2**

“CFR”+CR →

← “OK”+CR

← “#.###”+CR

← “END”+CR

4.3.22 ACW_# command

Sets the average times at remote measurement.

Setting range: 1 - 5

External control device **Command** **UVR-T2**

“ACW_#”+CR →

← “OK”+CR

Setting processing

← “END”+CR

4.3.23 ACR command

Acquires the average times at remote measurement.

Acquisition range: 1 - 5

External control device **Command** **UVR-T2**

“ACR”+CR →

← “OK”+CR

← “#”+CR

← “END”+CR

4.3.24 APW_# command

Sets the time of “Auto power OFF”.

Setting range 0: Invalid 1: 5 minutes 2: 10 minutes 3: 15 minutes 4: 30 minutes

External control device **Command** **UVR-T2**

“APW”+CR →

← “OK”+CR

← Setting processing

← “END”+CR

4.3.25 APR command

Acquires the time of “Auto power OFF”.

Acquisition range 0: Invalid 1: 5 minutes 2: 10 minutes 3: 15 minutes 4: 30 minutes

External control device **Command** **UVR-T2**

“APR”+CR →

← “OK”+CR

← “#”+CR

← “END”+CR

4.3.26 AFW_# command

Sets the analog filter response speed.

Setting range 0: Slow 1: Fast

External control device **Command** **UVR-T2**

“AFW”+CR →

← “OK”+CR

← Setting processing

← “END”+CR

4.3.27 AFR command

Acquires the analog filter response speed.
Acquisition range　0: Slow　1: Fast

External control device　**Command**　**UVR-T2**
“AFR”+CR　→
←　“OK”+CR
←　“#”+CR
←　“END”+CR

4.3.28 LOG command

Reads out the log data saved in the internal memory when the integral irradiance measurement mode is set.

External control device　**Command**　**UVR-T2**
“LOG”+CR　→
←　“OK”+CR
←　“#”+CR
←　“END”+CR

About log format　☞ “4.4 Output Format”

4.3.29 ERR command

Acquires the newest error code.
Acquisition range : 0 - 99

External control device　**Command**　**UVR-T2**
“ERR”+CR　→
←　“OK”+CR
←　“#”+CR
←　“END”+CR

About the acquired error code　☞ “5.1 Instrument Error Code”

4.4 OUTPUT FORMAT

4.4.1 Output format at remote measurement

The output format from the instrument is shown below.

Communication command	Format	
WHO	T25T2 : UVR-T2-T25 T36T2 : UVR-T2-T36 T40T2 : UVR-T2-T40 T3040T2 : UVR-T2-T3040	
VER	#.##: Shows the software version.	
SRL	########: Shows the serial number of 8 digits.	
MT	########: Shows the date of calibration.	
ST	#.###E±#: Shows irradiance.	
CST	#.###E±#_#.####E±#_#.###E±# Shows (Irradiance_Integral irradiance_Peak irradiance). This is output at regular intervals according to the average times set by the ACW command. The output interval is “Average times×100msec”.	
TMP_#	##.#: Shows the internal temperature of the part specified by the communication command argument.	
CFR	#.###: Shows the user correction factor.	
LOG	#.###E±# D1 #.####E±# D2 #.###E±# R# #.###E±# R# • • #.###E±# R# D3	Peak irradiance Data 1 is ended. Integral irradiance Data 2 is ended. Irradiance 1 Range Irradiance 2 Range • • Irradiance N Range Data 3 is ended.

4.5 USB DRIVER INSTALLATION

Install the USB driver by the following procedure.

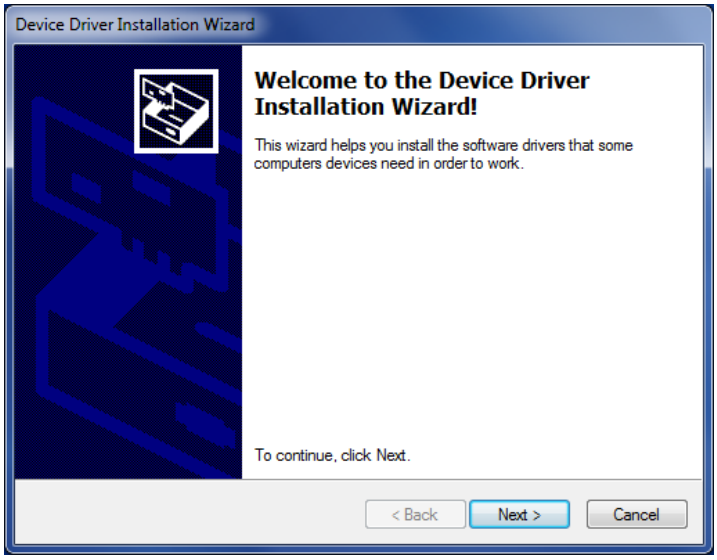
1 Set the CD-ROM of this software to the CD-ROM drive.

2 Select and double-click the “dpinst.exe” file in [¥USB_DRIVER¥{os name}¥x86 or x64] folder in the CD-ROM via Explorer.

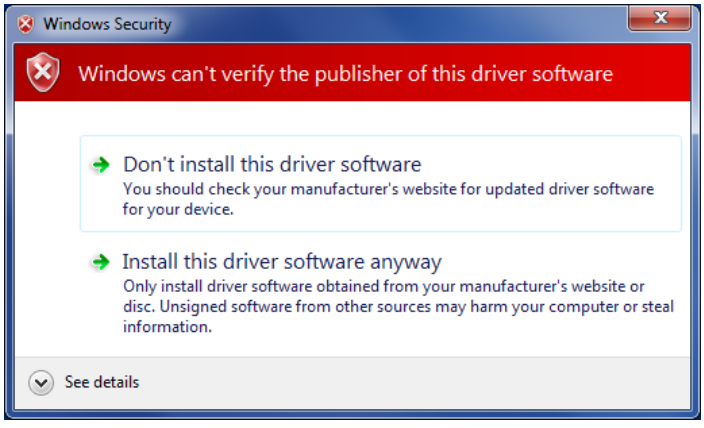
For example, in the case of Windows7(32bit), it becomes [USB_DRIVER¥Windows7¥x86]
For example, in the case of Windows10(64bit), it becomes [USB_DRIVER¥Windows10¥x64]

3 The “User account control” dialog box is displayed. Click the [Yes] button.

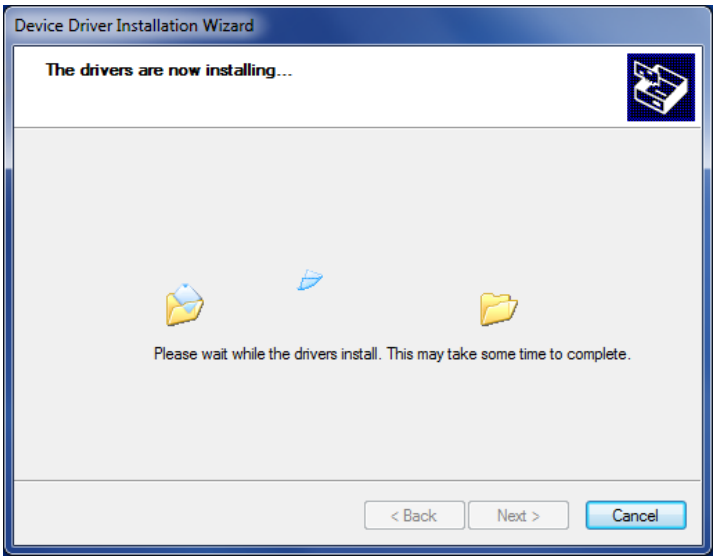
4 The “Device driver install wizard” dialog box is displayed. Click the [Next] button.



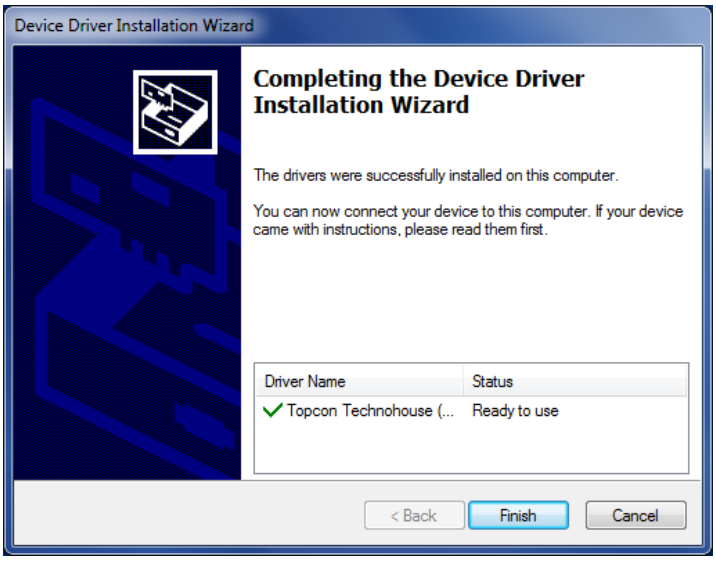
5 Windows security dialog may be displayed depending on OS type and security setting. If it is displayed, select [Install] and continue. (In the case of Windows 7, the following dialog may be displayed.)



6 The following screen is displayed. Installation starts.



7 When the driver installation is completed, the following screen appears. Click the [Complete] button.



5. ERROR DISPLAY

5.1 INSTRUMENT ERROR CODE

This chapter will explain the error codes that are displayed on the instrument and acquired by the "ERR" command.

Instrument code	Code	Contents	Remedial measure
	0	Normal	Remedial measure is not necessary.
E-01	1	Recognition of detector unit has failed.	Check whether the detector unit is connected to the control unit correctly.
E-02	2	Zero calibration has failed.	Check whether the detector window is covered against light.
E-03	3	Temperature error	Lower the internal temperature.
E-04	4	Integral irradiance is exceeded.	The upper limit of the integral irradiance measurement is exceeded. Perform measurement again.
E-05	5	"Over range" error	Set a measurement range properly.

6. APPENDICES

SPECIFICATIONS & PERFORMANCE

Specifications for each detector unit

	UD-T25T2	UD-T36T2	UD-T40T2	UD-T3040T2
Measurement wavelength range	230 - 280nm	300 - 390nm	350 - 490nm	290 - 430nm
Peak sensitivity wavelength	Approx. 255nm	Approx. 355nm	Approx. 410nm	-
Irradiance display (Peak irradiance) mW/cm²	Range Limit 1 0.01 - 30.00 2 0.1 - 300.0 3 1 - 3000	Range Limit 1 0.01 - 60.00 2 0.1 - 600.0 3 1 - 6000	Range Limit 1 0.01 - 30.00 2 0.1 - 300.0 3 1 - 3000	Range Limit 1 0.01 - 60.00 2 0.1 - 600.0 3 1 - 6000
Irradiance (Peak irradiance) mW/cm²	Range Limit 1 1.50 - 30.00 2 15.0 - 300.0 3 150 - 3000	Range Limit 1 3.00 - 60.00 2 30.0 - 600.0 3 300 - 6000	Range Limit 1 1.50 - 30.00 2 15.0 - 300.0 3 150 - 3000	Range Limit 1 3.00 - 60.00 2 30.0 - 600.0 3 300 - 6000
Integral irradiance mJ/cm²	Range Limit 1 0.01 - 99999 2 0.1 - 99999 3 1 - 99999	Range Limit 1 0.01 - 99999 2 0.1 - 99999 3 1 - 99999	Range Limit 1 0.01 - 99999 2 0.1 - 99999 3 1 - 99999	Range Limit 1 0.01 - 99999 2 0.1 - 99999 3 1 - 99999
Irradiance of analog output 1mV mW/cm²	Range F Range1 0.015 F Range2 0.15 F Range3 1.5	Range F Range1 0.03 F Range2 0.3 F Range3 3	Range F Range1 0.015 F Range2 0.15 F Range3 1.5	Range F Range1 0.03 F Range2 0.3 F Range3 3

※ Analog output accuracy ±1mV

- Detector element: Silicone photodiode
- Detector window

Detector unit	Diameter of detector window
UD-T25T2	Φ5mm
UD-T36T2/T40T2 /T3040T2	Φ3mm

- Data sampling: 50/60Hz selection type (The following table shows the integral irradiance mode.)

	50Hz	60Hz
Sampling time	10ms	8.33ms
Sampling rate	50 times/sec	60 times/sec

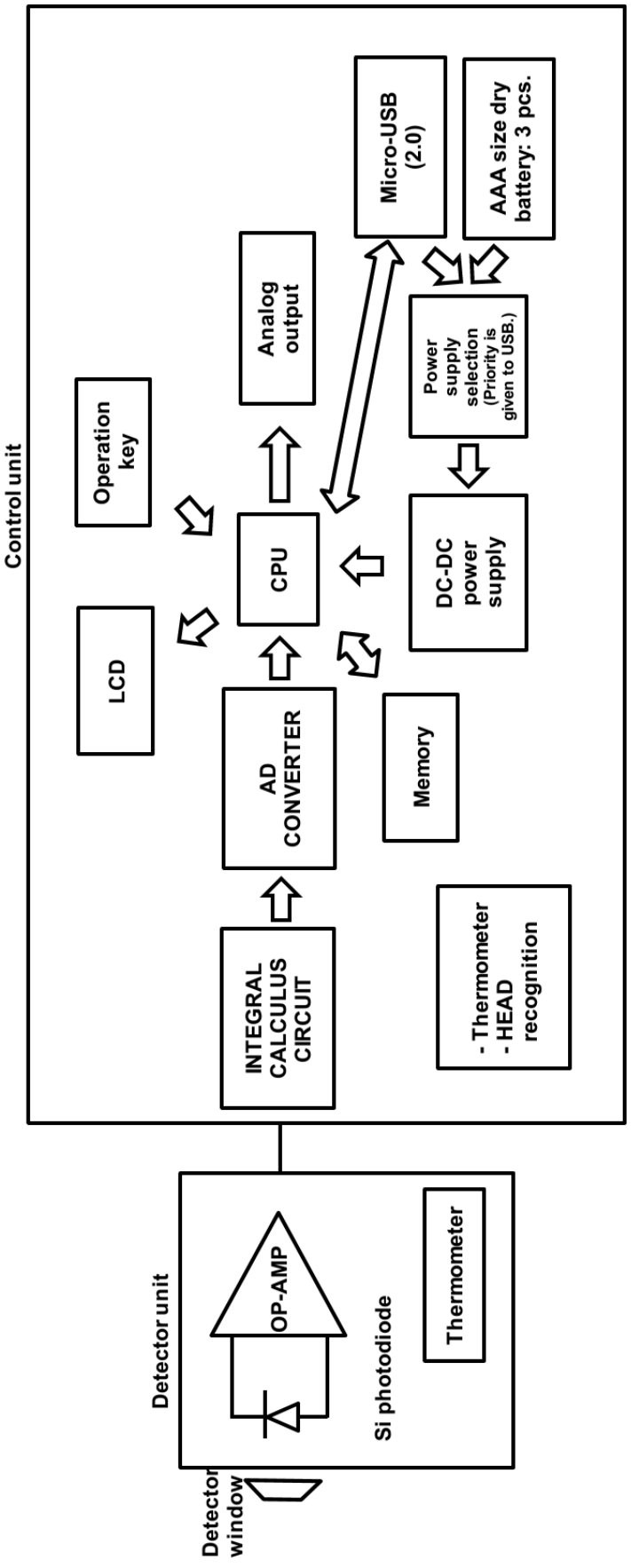
- Display: 5-digit LCD
- Calibration accuracy: ±2% (as to the value of the standard machine provided for calibration, which has already been calibrated by the reference light source of our company)
- Linearity: ±3% (when there is 5% or more of a full scale light quantity in each range and when zero calibration is used)
- Oblique incident light characteristics

Incidence angle	Common to UD-T25T2/T36T2/T40T2/T3040T2.
30°	Within ±5%
60°	Within ±25%

• Temperature characteristics	Within ±4% (in the range of 10°C to 60°C: 23°C is standard.)
• Humidity accuracy	The instrument should operate normally at 85%R.H. or less.
• Analog output voltage	0 - 2Vmax (Common to each F Range.)
• Interface	USB2.0 (USB A connector - USB micro B connector)
• Power supply	Alkaline AAA size dry battery: 3 pcs.
• Operating conditions	Temperature 10 - 60°C/Humidity 85%R.H. or less (without dew condensation)
• Dimensions	Approx. 201×75×16 mm (Detector unit is mounted/without heatproof cover) Approx. 208×83×17 mm (Detector unit is mounted/with heatproof cover)
• Weight	Approx. 320g (Including the batteries/without heatproof cover) Approx. 370g (Including the batteries/with heatproof cover)
• Calibration light source	UD-T25T2 Germicidal lamp GL-15 UD-T36T2 Black light FL20S-BLB UD-T40T2 Spectral irradiance standard bulb UD-T3040T2 Spectral irradiance standard bulb

BLOCK DIAGRAM

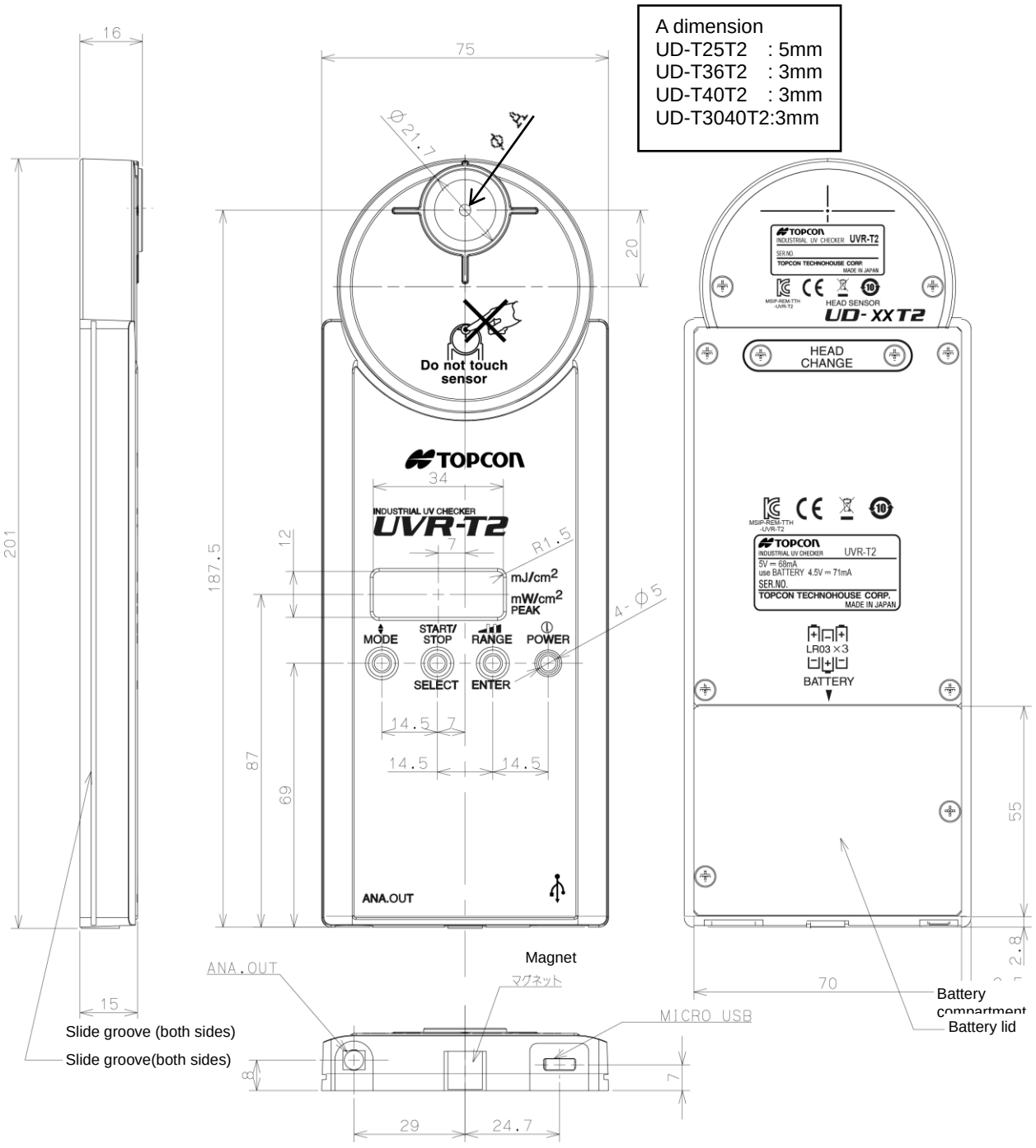
■UVR-T2



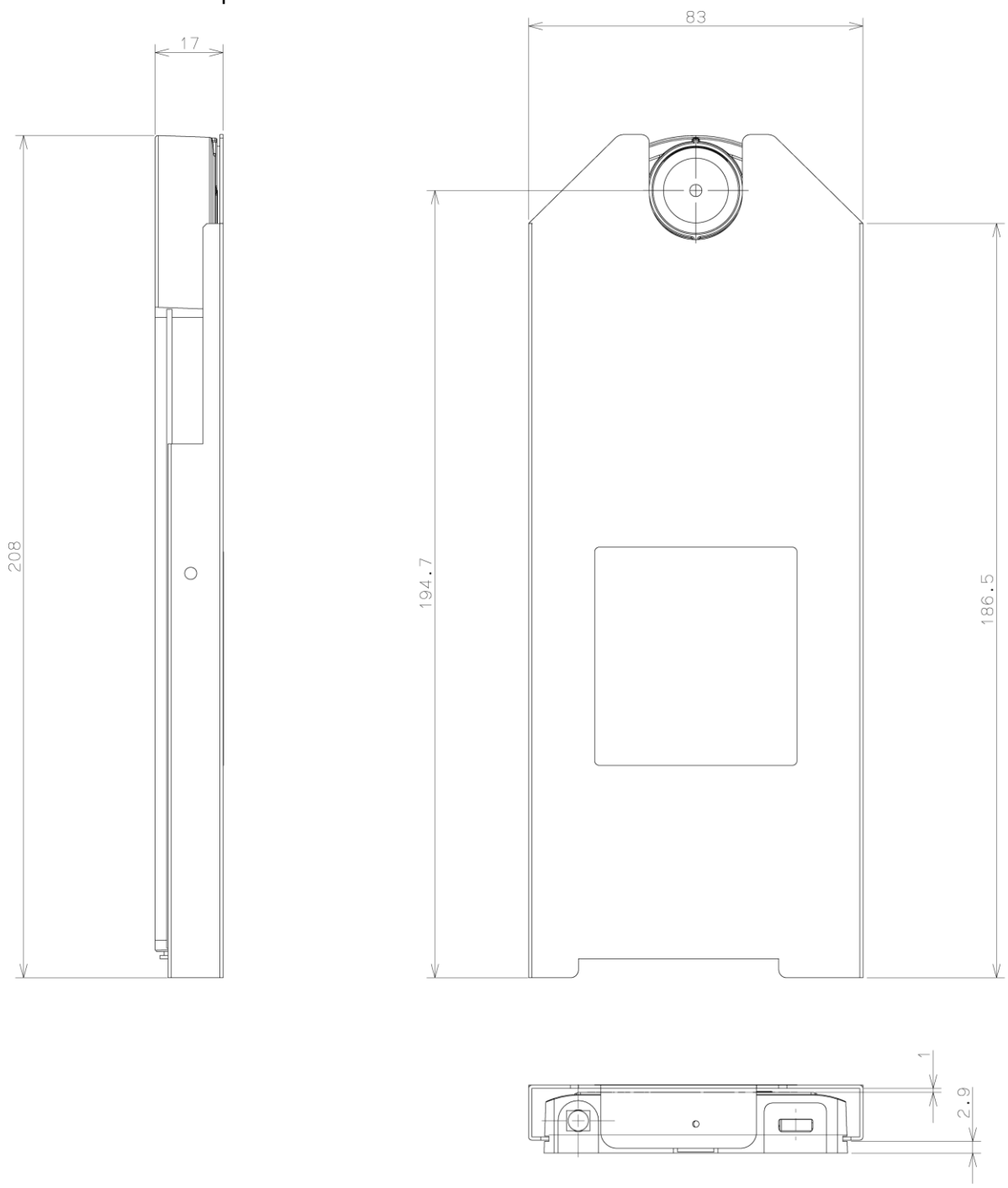
APPEARANCE/DIMENSIONS

■UVR-T2

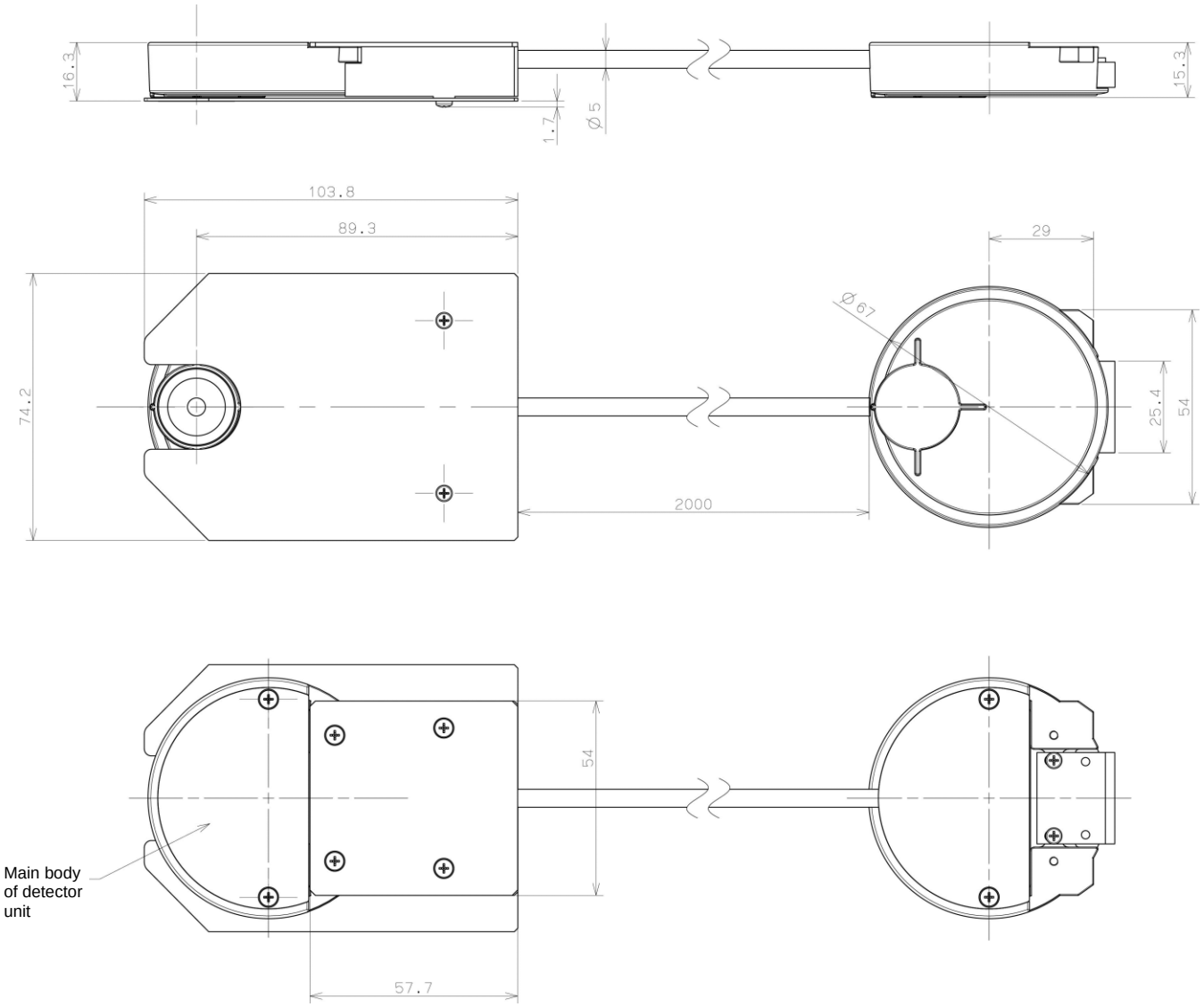
Instrument/Detector unit (Unit: mm)



Instrument with heatproof cover

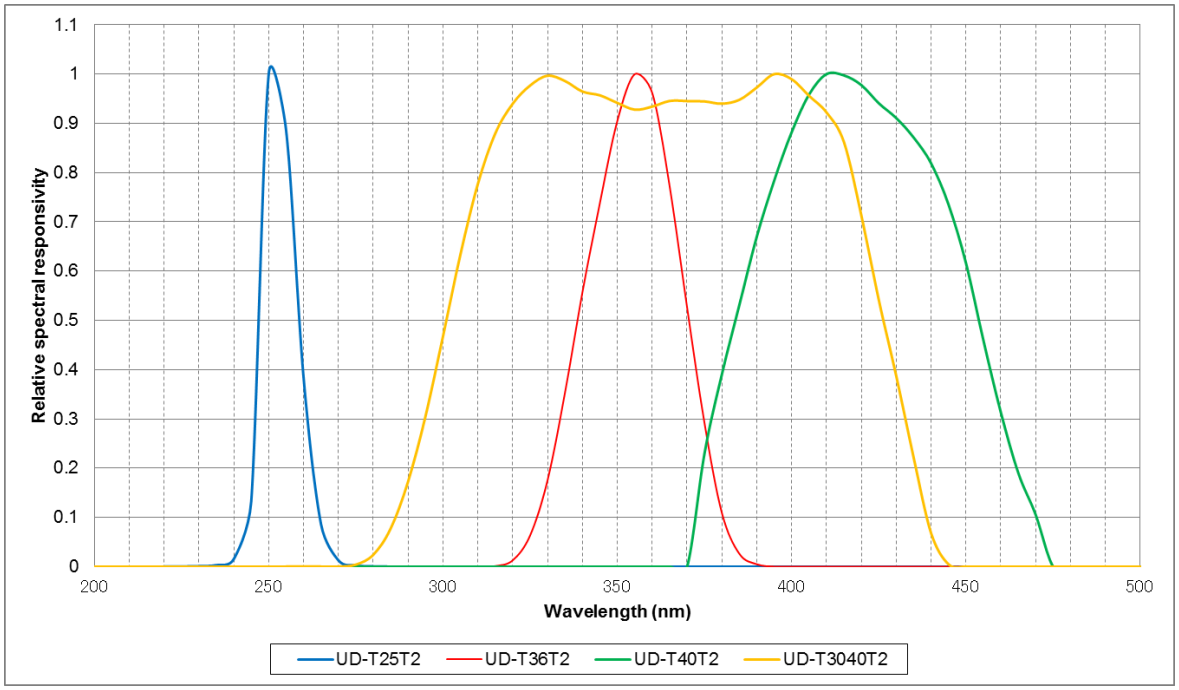


Extension unit of detector unit

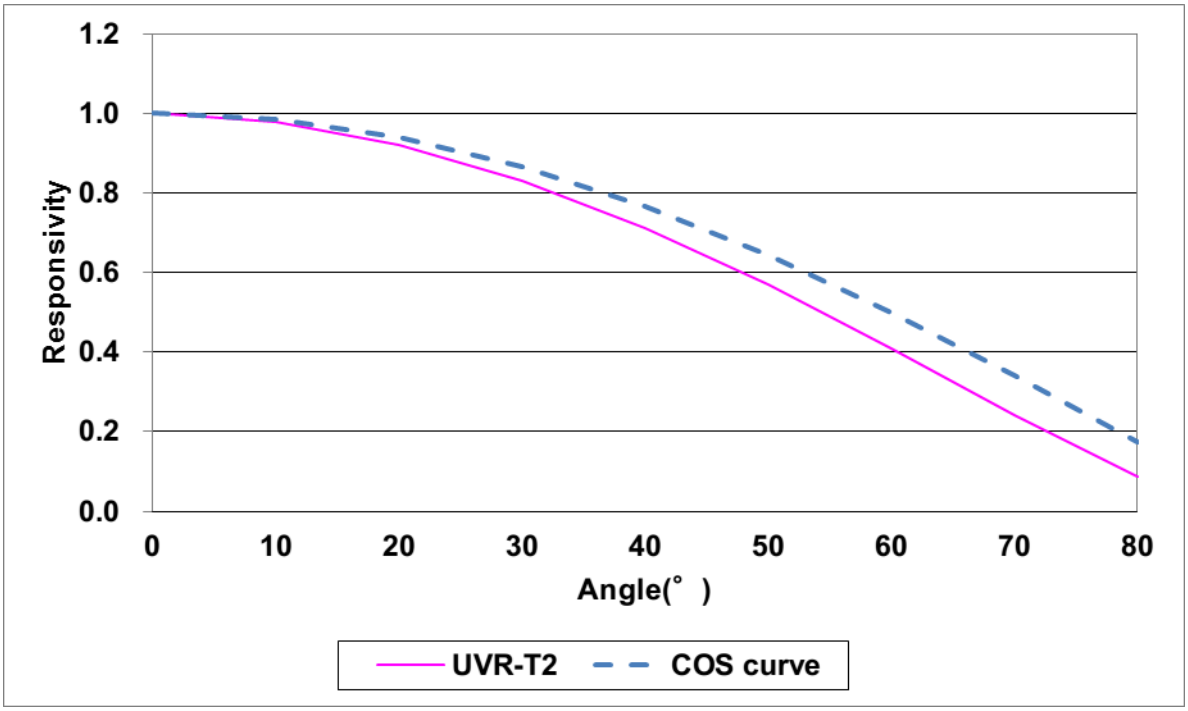


GRAPH

Relative spectral sensitivity characteristics



Oblique incident light characteristics



MEMO

- The characteristics in the above graphs have been calculated from one sample of this instrument. There is some dispersion in the characteristics for each product.

INFORMATION ABOUT OVERSEAS REGURATION

EU Battery Directive

This symbol is applicable to EU members states only.

Battery users must not dispose of batteries as unsorted general waste, but treat properly.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:
Hg: mercury(0.0005%), Cd: cadmium(0.002%), Pb: lead(0.004%)

These ingredients may be seriously hazardous to human and the global environment.

Warranty Period

One year from the date of shipment from TOPCON TECHNOHOUSE.

Repair During Warranty Period

If trouble should arise during normal use of the UVR-T2, we will make repairs resulting from design or manufacturing defects at no charge.

Repair After Warranty Period

If functionality can be restored through repair, we will repair your instrument for a charge.

Maintenance Period

We will stock functional repair parts(*1) for eight years(*2) from the date of manufacture.

We will repair the UVR-T2 while these parts remain in stock.

After the stocking period, we may be able to repair the UVR-T2. Consult with your retailer or TOPCON TECHNOHOUSE for futher details.

(*1) Functional repair parts are those parts required to make the UVR-T2 function.

(*2) Although we strive to meet this stocking period, it may be shortened due to unforeseen circumstances.

Disposal

Follow local disposal and recycling ordinances when disposing of the UVR-T2.

Please have the following information available when making an inquiry:

· Serial number:	Noted on the specification plate on the bottom of the instrument.
· Use period:	The dates of purchase as well as the last calibration.
· Environment:	Type of measurement light source, instrument settings, measurement values, measurement status, etc.
· Description of problem:	As detailed as possible.
Inquiries:	Refer to the back cover of this manual for contact information.

INDUSTRIAL UV CHECKER

UVR-T2

Contact information:

TOPCON TECHNOHOUSE CORPORATION

75-1 Hasunuma-cho, Itabashi-ku, Tokyo 174-8580 Japan

◆ **Inquiries regarding the product**

Tel +813(3558) 2666 Fax +813(3558) 4661

◆ **Inquiries regarding repairs and maintenance**

Tel +813(3558) 2710 Fax +813(3558) 3011

Industrial UV Checker UVR-T2

Instruction Manual

Date of Issue of 1st edition December, 2015

3rd edition April, 2019

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