Technical description and user manual

UV Radiometer
MUV 2.4 WR MD

Version 1.2

UV Radiometer MUV 2.4 WR MD

Description

The UV measuring device MUV2.4 WR MD is used in conjunction with UV sensors of various types as a mobile handheld device for checking ballast water UV systems. The display range of this device has been extended upwards for strong medium pressure lamps.
By comparing the measured values between the system sensor and the UV sensor of the device, it can be determined whether the system sensor needs to be recalibrated or replaced.
A robust metal housing with degree of protection IP65 protects the device from external influences. It is powered by rechargeable batteries, has an LCD display with backlight, automatic measuring range switching and is easy to operate using three buttons. It is possible to supply / charge via a plug-in power supply and to connect a data logger or a computer. The delivery takes place in the transport case.

Operators

System designer and system builder
Technicians in water plants
Health offices
Laboratories

Technical data

housing	handheld aluminum housing, colored matt black
size L x H x D	110/85 x 230 x 35 mm
weight	790 g incl. sensor and rechargeable battery
power supply	internal: 2 x 1.2 V / 2 Ah, size AA (Mignon), operating time fully charged approx. 8-10 h, plug-in power supply 100-240 V AC / 50-60 Hz with EU adapter (US, UK adapter on request) charging time max. 5 h, during charging the control LED in the connection compartment is lit
display	LCD, 2 x 16 characters with backlight function
measuring range	1-20000 W/m², measuring ranges with end value of 2, 20, 200, 20000 W/m2 - automatic switching, “overload" is displayed when the measuring range is exceeded
memory	storage of the last measured value and the maximum value
reference sensors	reference sensors are equipped with 1.3 m cable and M12 socket, the connection is made via M12 plug on the upper right, only registered sensors in the device are detected (maximum 8 possible), the serial numbers of the registered sensors can be found on the sticker on the back
analogue output	voltage output: 0.1 to 4.1 V for each measuring range (0.1V=0W/m², 4.1V=2/20/200/20000W/m²) Ri = 10 kΩ, jack socket 2.5 mm in the connection compartment at the bottom of the device
serial interface	RS232 output: 9600 baud, no parity, 1 stop bit, 8 data bits, GND/TxD/RxD connection via jack socket 3.5 mm in the connection compartment at the bottom of the device
degree of protection	IP 65 with sensor connected and battery / connection compartment closed
temperature range	ambient temperature 0 to 30° C
recalibration	recommended after a useful life of 100 hours

Commissioning

After having connected the sensor at the upper bushing of the unit, switch on the device by shortly pushing the red button. Pushing the red button for a longer while will switch off the device. After having switched on the MUV, the device does automatically check the connected sensor and read out its calibration value. If there is no sensor, a broken sensor (cable break) or a sensor connected that does not belong to the device, the error message “invalid sensor” is shown. For a sensor exchange, the device shall be switched off (3 seconds red button). When switched on, the number of the software version occurs in the display. From version 1.0, an automated offset-adjustment follows. During this procedure, “zero check” is shown in the display. Do not expose the sensor to UV radiation during this process! Daylight does not influence the adjustment since the sensors do not detect it.

Measurement

As soon as the starting routine is finished, the device goes into the measuring mode. The first line shows the sensor that is connected, e.g. “DVGW 40/160°”, “ÖNORM M5873-1” or similar. The second line indicates the current measured UV irradiation value. In the whole measurement range from 1 to 20000 W/m² an automatic switching to the optimum measurement range is being made. A hysteresis function with time delay avoids a permanent switching between the measurement ranges if irradiation values are around the threshold values. The indicated value relates to the underlying DVGW/ÖNORM protocols. From software version 0.3 onwards, the changeover from “low pressure” to “medium pressure” (standard after switch-on) calibration is possible via the menu lamp type. Thereby, the calibration value for low pressure lamps at 253.7 nm or the value of the medium pressure calibration will be read out of the integral memory. If MP mode has been chosen, an „md“ is shown in the second line in front of the measurement value indication. If required, the unit can be changed in the menu between W/m², mW/cm² and µW/cm². The conversion of the measured value is done by the device.
Under bad lighting conditions the display backlight can be switched on/off by pressing the blue button (LIGHT). To extend the duration of battery operation, the display illumination is automatically switched off after 1 minute. If the backlight is used frequently, it is recommended to use mains supply (Attention: no IP65!). To safe the battery, the device provides a control option which cuts-off the unit after 10 minutes if no button has been pushed. For longer measuring procedures or other applications, this function may be deactivated. When the batteries are nearly empty, the display shows a flashing “low bat” message alternating with the sensor information.
After having opened the connection box flap, the wall power supply can be connected via the marked plug. The flap can be opened easily by slightly pressing against the hinge from the back. The last measured value is saved by pushing the yellow button (HOLD). The display then indicates a flashing *“hold”* alternating with the stored value information. By pushing the yellow button again, the unit goes back into the measurement mode. In addition, a max. value memory was implemented from version 1.0. The max. value is shown by pushing the yellow button (HOLD) for a long time. The display then switches between “max” and the measured max. value. It is possible to reset this max. value via the menu. Reset is done as well in case of switching off the unit or changing the sensor.

Output of measured values

For the output of the measured values both an analogue and a digital interface are provided. The analogue output is designed as voltage output 0.1 to 4.1 V per measuring range. 0.1 V belongs to 0 W/m²; 4.1 V belongs to 2/20/200/20000 W/m², which are the end values of the automatically adjusted range. To connect y-t-printers or other devices a special adaptor cable is available, which can be connected to the suitable device by using standard adaptors.
The digital output is designed as bi-directional RS232 interface. The communication with a PC is possible using a standard software, i.e. “Hyperlink”, which is part of Microsoft operating systems. After having sent the ASCII-character “U” the MUV2.4WR MD responds with “U”, followed by the actual UV intensity value, a space character, the measuring unit and a finalizing semicolon.
Aside from a special computer connecting cable, the transmission software RV2 is available as an option for transferring an analyzing the measurement readings. For details, please refer to the related documentation.

Calibration and certification

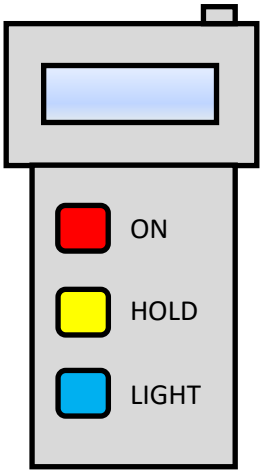
The radiometer is intended for checking the calibration of plant sensors according to DVGW worksheet W294 or ÖNORM M5873. It is possible to use several sensors alternately on one device. In this case, please order the device with the required sensors. To change the sensors, the device should be switched off. After switching on again, the device automatically recognizes the connected sensor and assigns the respective calibration value internally. For calibration / recalibration a special software is available, which allows corrections without instrument intervention. This software is made available free of charge to approved calibration laboratories on request.
It is recommended to have the calibration of the device checked regularly, at the latest after 100 operating hours. For this purpose, the device with all sensors must be sent to us.

Reference sensors

The device must be ordered will all required sensors. The following sensors are available:
- **SUV 20.2 Y1 R 40° MP**, Art.-No.: 321 11103 0000, sensor according DVGW W 294
- **SUV 20.2 A2 Y1 R 160°MP**, Art.-No.: 321 11104 0000, sensor according DVGW W 294

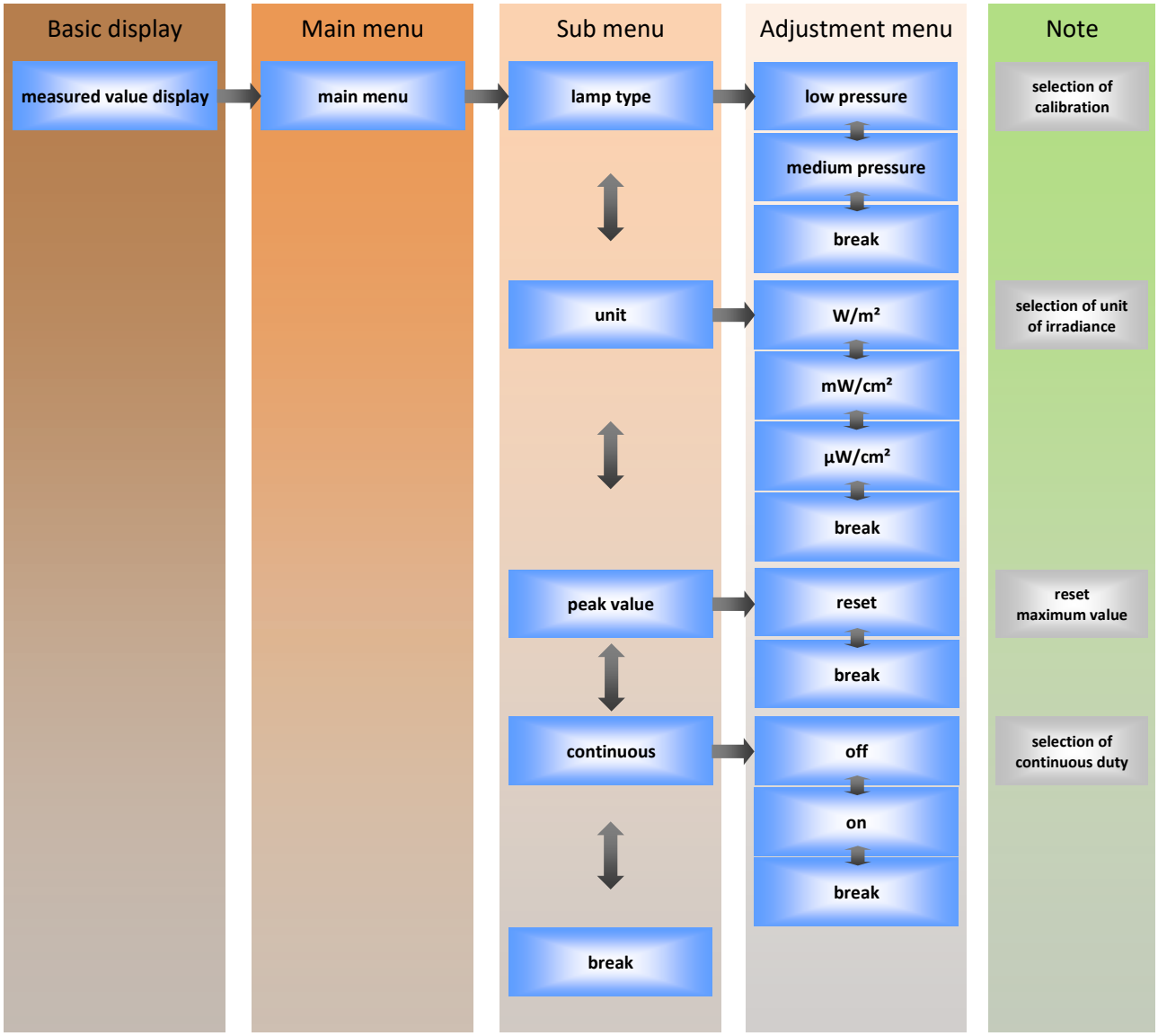
The sensors are equipped with 1.3 m connection cable and plug M12 (IP65). Every supplied sensor is registered in the device. The registered sensors are shown on the sticker at the back side of the MUV2.4WR MD.

Operation



button	keystroke	while measurement	menu navigation
ON	short	switch on device call menu	selection/confirmation of adjustments
	long	switch off device	
HOLD	short	memorize measured value	navigation upwards
	long	show maximum value	
LIGHT	short	LCD light on/off	navigation downwards

Menu structure



Return to basic display will be carried out after break or selection of a setting.