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Radiometer RM-32

Operating instructions

Version: 1.4

1 Table of Contents

2 Change history

Version	Modified from	Changes
1.1	Paravia	div. adjustments
1.2	Paravia	enhanced communication
1.3	Paravia	Advanced preset RS232
1.4	Small	RS232 adapter board inserted

3 Symbol overview

Significance:
Failure to follow the above instruction may result in injury to the user.

Significance:
Failure to follow these instructions may result in damage to the unit.

Significance:
Instruction is to be observed for regular operation.

4 Foreword

Dear Customer,

You have decided to purchase a high-quality precision UV measuring device.

The operation is simple, please follow exactly our explanations in the enclosed operating instructions, the measuring accuracy is then guaranteed.

In order to guarantee this measurement accuracy over a longer period of use, we recommend that you send your sensor to us for inspection every 12 months.

We recalibrate the sensor, if necessary we repair it. A short time later, your measuring equipment will be available again in mint condition with test certificate.

At the same time, we will keep you regularly informed about the latest UV measurement possibilities.

As you can see, customer service is still very important to us. We are happy to provide you with technical information and advice at any time.

Opsytec Dr. Gröbel GmbH

5 General description

The mains operated display unit RM-32 is designed for continuous monitoring of lamps mainly UV lamps. In addition to lamp monitoring, absorption, transmission and reflection measurements can also be carried out.

The display is digital (3 1/2 digits) in W/m2. Two light-emitting diodes (SP1, SP2) indicate the status in relation to two preselectable thresholds. Two relays with switching contacts are activated simultaneously. The relay functions can be triggered with a time delay.

The device is programmable and can control numerous parameters of the measurement process with its integrated measurement routines.

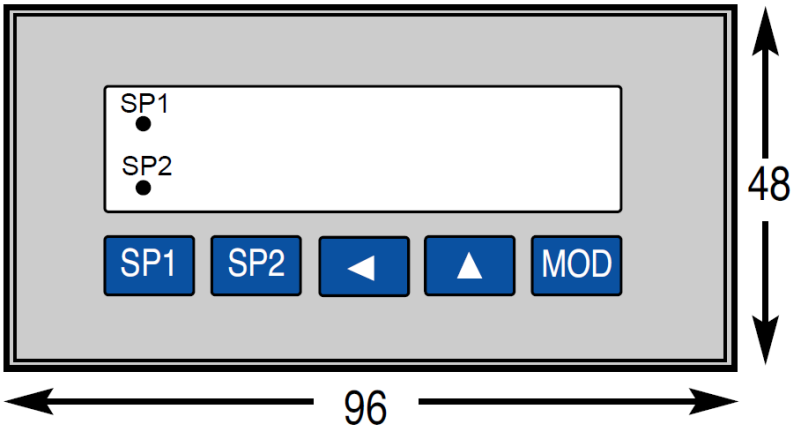
Optional USB, RS-232 or RS-485 interface is available.

Connect the supplied sensor to input 2 and 4. Only use the sensor type for which you ordered the device. Connecting a different sensor type can lead to malfunctions. Follow the instructions for the sensor carefully.

6 Settings and connections

2.1. Controls and display

The indicator lights up when the RM-32 is connected to mains voltage.



MOD enter or leave programming mode

▲ increment selected digit

◄ select next digit / position

SP1 display threshold value of SP1 relay

SP2 display threshold value of SP2 relay

SP1 ON : SP1 relay contact is closed

SP2 ON : SP2 relay contact is closed

Fig. 1: Control element RM32

SP1: When the button is pressed, the SP1 *pre-alarm* setpoint is displayed.

SP2: When the button is pressed, the SP2 *alarm* setpoint is displayed.

2.2 Terminal connection assignment

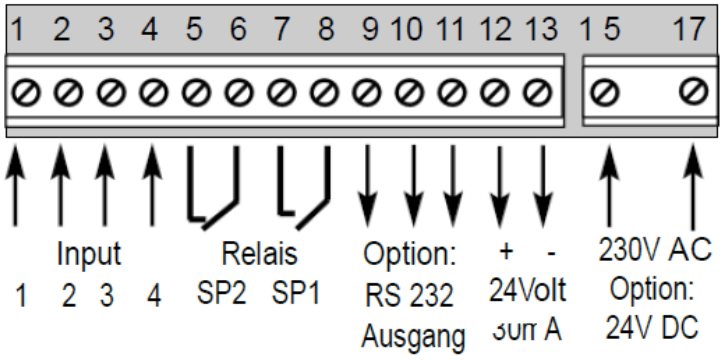


Fig. 2: Terminal assignment of the terminals

Relay SP2: potential-free switching output, alarm
Relay SP1: potential-free switching output, pre-alarm

PIN 9-11: RS232 output (optional via external board)
Connect the circuit board with the sockets pointing downwards

PIN 12: + 24 V, wire colour white
PIN 13: 0V, wire colour brown
230V Mains: Mains voltage connection

Sensors with voltage output 0-10 V must be connected to the RM32 as follows:

Input 2: Sensor signal High , wire color black
Input 4: Sensor signal low, wire colour grey (GND for measurement)
24V output: galvanically isolated supply voltage 24V DC (max. 30 mA)

Sensors with current output 4-20mA must be connected to the RM32 as follows:

Brown / white at terminal number 12 (+ 24V)
Blue /black at terminal number 2 (input)

2.3 Locking the keypad

There is a jumper on the motherboard that can be placed through the hole in the side of the case. When the jumper is open, the keyboard is locked. An input of commands is then no longer possible.

7 Programming of the installation instrument

The programmable panelmeter RM-32 can control numerous parameters of the measuring sequence with its integrated measuring routines. New values are set via the keyboard.

This way, the desired measuring routine can be selected at the RM-32:

Press MOD button	MOD
Select routine with the arrow key	△
Confirm with MOD button	MOD

Change values of the respective measuring routine:

Set desired value with arrow key	△
Select next position with back arrow key	◁
Set desired value with arrow key,....	△

When the desired value is entered,
Accept the value with the MOD key MOD

The device now operates in the measuring mode again.

Changes to the setting can greatly falsify the measurement result. Pay attention to the settings on delivery.

1. Error messages

If the measuring signal exceeds or falls below the permissible value of the input range, the following error message appears on the LED display:

"oooo" = measuring range is exceeded
"uuuu" = measuring range is undershot

8 Integrated program routines

Routine 1-5: not occupied

Routine 6: Set decimal point

The position of the decimal point on the LED display is set with

000: no decimal point (maximum display: 1999)
001: 1.000
002: 19.99
003: 199.9

dialed.

Changes to routine 6 can strongly falsify the measurement result. Only change the settings of the device after consulting the manufacturer.

Routine 7: Set switching point SP1 *pre-alarm*

With this function the threshold SP1 *pre-alarm* can be set in W/m.^{2} The maximum value is 1000.

Routine 8: Activate setpoint SP1 *pre-alarm*

This function routine can be used to switch the SP1 *pre-alarm* setpoint on and off. In the last digit
000: inactive or
001: active
set.

Routine 9: Set switching point SP2 *alarm*

With this function the threshold SP2 *alarm* can be set in W/m.^{2} The maximum value is 1000.

Routine 10: Activate setpoint SP2 *alarm*

This function routine can be used to switch the SP2 *Alarm* setpoint on and off. In the last digit
000: inactive or
001: active
set.

Routine 11: Switching point hysteresis SP1 *Pre-alarm*

The hysteresis is set in W/m.^{2}

Routine 12: Switching point hysteresis SP2 *Alarm*

The hysteresis is set in W/m.^{2}

Routine 15: Set relay function of SP1 *pre-alarm*

Routine 16: Set relay function of SP2 *alarm*

Each relay can act as a normally closed or normally open contact when the respective switching point is reached.

001: Opener
000: N/O contact

NC contact = the relay opens the circuit when the switching point is reached.
Normally open = the relay closes the circuit when the switching point is reached.

Routine 17: Timed pickup or dropout delay of SP1 *pre-alarm*

When the threshold value is reached, the relay function is triggered with a time delay. The time delay is proportional to the number of measuring cycles (max. 1999 cycles). The measuring rate is 2.5 measurements per second.

Number of measuring cycles: time delay

Routine 18: Timed on-delay or off-delay of SP2 *alarm*

When the threshold value is reached, the relay function is triggered with a time delay. The time delay is proportional to the number of measuring cycles (max. 1999 cycles). The measuring rate is 2.5 measurements per second.
Number of measuring cycles: time delay

Routine 19: Querying the maximum measured value

The maximum value is continuously determined and stored since the last RESET. The reset is carried out when the min. or max. value is displayed by pressing the SP1 *pre-alarm* and SP2 *alarm* keys simultaneously for 3 seconds.

Routine 20: Querying the minimum measured value

The minimum value is continuously determined and stored since the last RESET. The reset is carried out when the min. or max. value is displayed by pressing the SP1 *pre-alarm* and SP2 *alarm* keys simultaneously for 3 seconds.

Routine 21: Last digit round up/down

The value for the last decimal place can be rounded. The following settings are possible:

000: last digit is set to 0
001: last digit is displayed
002: last digit is set to 0 / 2 / 4 / 6 / 8
005: last digit is set to 0 / 5

Routine 22: Number of measurements for averaging

The display shows the average value.

Setting
000: no averaging
002: 2 measurements for average
003: 3 measurements for average
...
1999: 1999 measurements for average

Routine 23: not occupied

Default setting: "000" must be maintained.

Routine 24 and 25: not occupied

Routine 26: Divider factor of the measured value by 10

Setting
000: no divisor factor
001: Value is divided by 10

9 Communication RS232, RS485 or USB

Data transmission of the measured values of the SPE670 via serial interface.

Routine 25: Activate/deactivate the serial interface
Routine 27: Setting the baud rate of the serial interface
Routine 34: Transmission cycles for the serial interface

Jumper JP4 can be used to bypass the enable/disable by routine 25, the interface is then always active. The cycle setting of routine 34 remains valid. Thus, the interface can still be deactivated by a transmission cycle of 0.

The individual characters are transmitted in ASCII code. The sign of the measured value is sent as a minus for negative values, otherwise as a space. The transmission starts with the first character of the day and ends with LF (line feed - 10d, 0Ah) and CR (carriage return - 13d, 0Dh) to start a new line at a connected printer or screen.

Day.Month.Year Std:Min
-measured value with decimal point

Dimension Designation Special purpose
DD.MM.YY SS:NN -XXX,XDBS

TT = Day 00 - 31
MM= month 00 - 12
JJ = Year 2000 - 2099
SS = Hour 0 - 23
NN = Minute 0 - 59

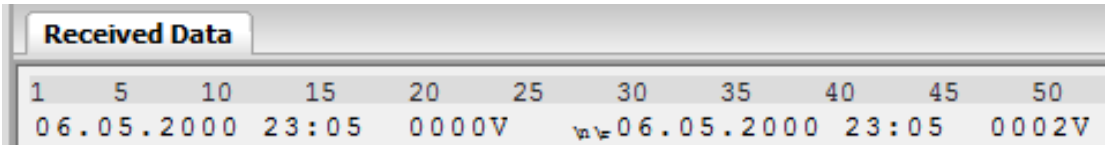
- = sign minus or space
XXX,X = measured value 0000 - 1999 with decimal point at correct position

D = dimension of the measured value m-milli, k-kilo,
B = Designation of the measured value V-Volt,
A-ampere, ...
S = User defined special character
. = point (ASCII - 2Eh, 46d)
: = colon (ASCII - 3Ah, 58d)
= Space (ASCII - 20h, 32d)
, = comma (ASCII - 2Ch, 44d)

Examples:
Telegram = 21.05.2001 13:15 1.234Bar

Characters	ASCII decimal
2	50
1	49
.	46
0	48
5	53
.	46
2	50
0	48
0	48
1	49
SP	32
1	49
3	51
:	58
1	59
5	53
SP	32
SP	32
1	49
,	44
2	50
3	51
4	52
B	66
a	97
r	114
LF	10
CR	13

Example log with software hterm (not included):



10 Programming RS232, RS485 or USB

The RM-32 contains a Real Time Clock for value output via the serial interface. The following routines are only used with the option RS 232 output. With the help of the routines, different parameters can be controlled.

Routine 5: Setting (analog output) DAC 670 - 204 or RS232/RTC (670 - 232) built-in

0 = DAC (670-204) or no extension
1 = RS232/RTC (670-232) board (default)

Routine 25: Enable and time setting of the RS232
000 = Locked,
001 = Cycle time in min,
002 = Cycle time in sec. (preset)

Routine 27:Setting the baud rate of the serial interface
0 = 150,
1 = 300,
2 = 600,
3 = 1200,
4 = 2400
5 = 4800, (Preset)
6 = 9600 baud

Routine 28: Real-Time Clock Minutes
This value is the minutes of the current time.
Setting range: 0-59 minutes

Routine 29: Real-Time Clock Hours
This value is the hours of the current time.
Setting range: 0-23 o'clock

Routine 30: Real-Time Clock Date Tag
This value is the day of the current date.
Setting range: 1-31

Routine 31: Real-Time Clock Weekday
This value is the day of the week of the current date.
0 = Sunday
1 = Monday
..
6 = Saturday

Routine 32: Real-Time Clock Date-Month
This value is the month of the current date. Setting range: 1-12
Ex.1 = January, ... 12 = December

Routine 33: Real-Time Clock Date-Year
This value is the low-order part of the year of the current date. The high-order part is always kept at 20. Setting range: 0-99
0 = 2000, ... 99 = 2099

Routine 34 Transmission cycles for the serial interface
At intervals of the set transmission cycles, the measured value is sent with date and time via the serial interface. The set number is evaluated in minutes and is the time interval between two transmission processes. Please note that the serial interface is generally enabled for transmission with routine 25.
must be. Setting range: 0-255

0 = Timer stop (no transmission)
1 = 1 minute
2 = 2 minutes
...
255 = 255 minutes (4h 15min)

The number of transmission cycles also affects the transmission of the measured values when jumper JP4 is closed. If set to 0, no transmission takes place.

Routine 35: Dimension of the measured value
The dimension is the physical size of the displayed measured value (e.g. m=milli, µ=micro, p=Piko.... °=degree) The dimension does not appear in the display of the SPE670 but only in its printout. The dimension is entered as ASCII code decimal. For special characters (codes 128-256) the international code table from IBM (code page 437) is used.

Examples:
° = 248, m = 109, n = 110, p = 112
k = 107, M = 77, G = 71

Routine 36: Naming the measured value
The designation is the physical type of the displayed measured value (e.g. V=Volt, A=Ampere, ...C=Celsius) The designation does not appear in the display of the SPE670 but only in its printout. The designation is entered as ASCII code decimal. For special characters (codes 128-256) the international code table from IBM (code page 437) is used. Examples:
A = 65, C = 67, V = 86, Û = 234 (Ohm)

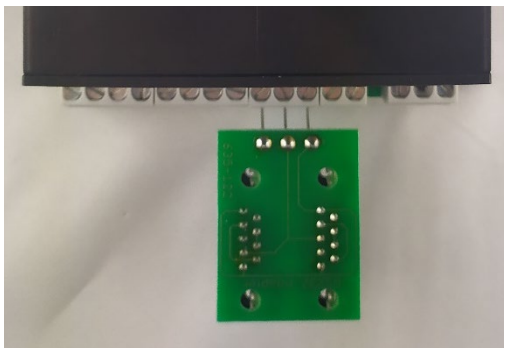
Routine 37: User-defined character of the measured value
The user-defined character extends the display to three characters, which allows information such as "Bar". The character does not appear in the display of the SPE670 but only in its printout. The character is entered as ASCII code decimal. For special characters (codes 128-256) the international code table from IBM (code page 437) is used.

Examples:
B - 66 in routine 35
a - 97 in routine 36
r - 114 in routine 37
m - 109 in routine 35
A - 65 in routine 36
- 32 in routine 37
Code table for routines 35, 36 and 37 See ASCII/special character table

Jumper and start display
Jumper JP4: If jumper JP4 is plugged in, measured values are transmitted via the serial interface in the set transmission cycle. Even if the interface is deactivated by routine 25. Routine 34 can be used to set the transmission cycles or to suppress transmission.

11 Sub-D RS232 adapter

The adapter is used to connect the device to a computer. The following pictures show how to connect the board to the device.



12 Technical data

Dimensions DIN 43700:	96 x 48 mm
Installation depth:	approx. 115 mm
Weight:	410 g
Working temperature:	-10 to +50° Celsius
Storage temperature:	-10 to +50° Celsius.
switching threshold:	programmable
Switching hysteresis:	programmable
Relay data:	2 x 230 VAC / 5 A
Mains supply:	230 V, 50-60 Hz, 3VA or 110 V, 50-60 Hz, 3VA, see type plate
Sensor output:	24 V / 30 mA DC
Working temperature:	0 to +40 °C
Storage temperature:	-10 to +40 °C
Humidity:	< 80 %, non-condensing

13 Radiation protection

UV radiation is harmful to humans, therefore observe the protective regulations when working. Furthermore, UVC radiation in particular has a material-destroying effect. It is therefore advisable not to expose the sensors to too much radiation. If possible, avoid - exceeding the measuring range in the least sensitive setting and use an aperture in good time.

If the thermal load caused by the radiators is too high, it may be useful to place a shielding hood over the sensors, which only exposes the receiver surface. This can significantly reduce the heating of the sensors.