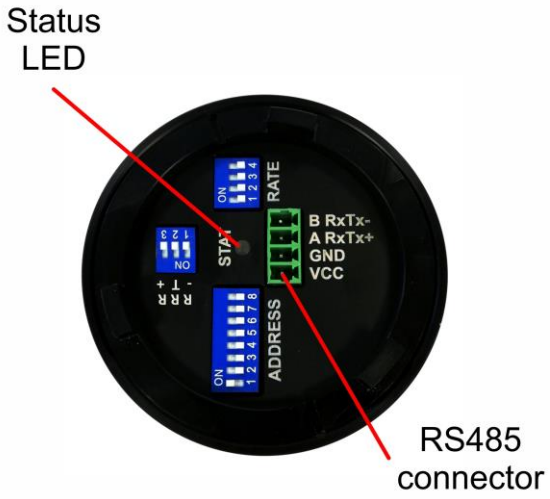
Operation Manual and Technical Specifications

RPP-R

Radon sensor with interface RS485 – MODBUS RTU

1 Meet



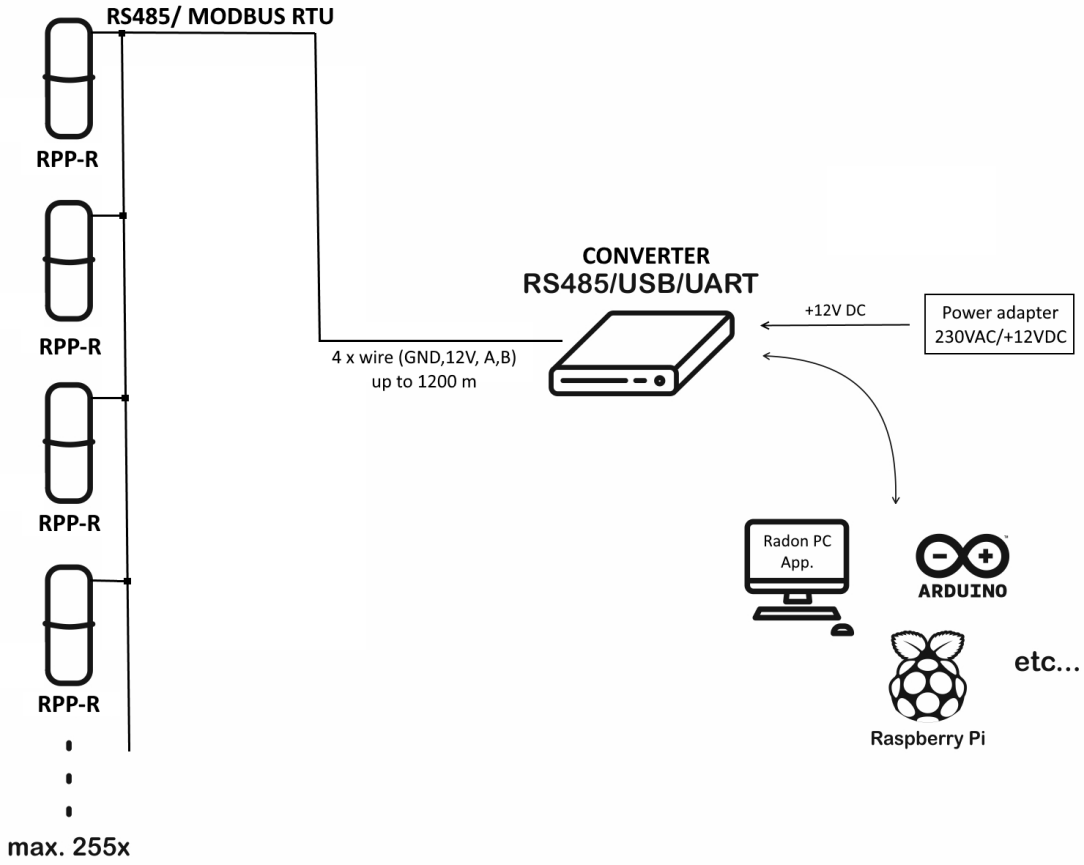
Probe is designed for continuous measuring of radon concentrations in buildings.

Sensor basis is a measuring chamber with a semiconductor photodetector. Radon enters the chamber by diffusion through the input filter on the bottom of sensor. The sensor measures only if power supply is present. The sensor also saves time records of these radon concentration values (continual monitor) including values of humidity and temperature within its internal memory (typically at an interval of 1 hour). Next saved value is time record of measuring energy spectrum (typically at an interval of 12 hours). The resulting values can be downloaded continuously during measurement or at once at the end of measurement from internal memory. Current measured data for RS485 interface is updated every 4 minutes. The sensor is random for location in measured place, but generally it is put on the bottom of the sensor. Bottom of the sensor cannot be covered.

Před použitím výrobku se prosím dobře seznamte s tímto návodem a se všemi provozními a bezpečnostními upozorněními. Dodržováním provozních a bezpečnostních opatření lze předejít poškození zařízení, či zraněním a úrazům obsluhy. Zařízení používejte pouze předepsaným způsobem a pro uvedené oblasti použití. Při předávaní výrobku třetím osobám předejte spolu s ním i tento dokument.

Sensor communicates over simple serial interfaces RS485 – MODBUS RTU for easy implementation into third party system. Suitable for integration into smart buildings, industrial systems and systems of air quality. Connection of probe is by 4 – wires, 2 wires are for serial half-duplex data and 2 wires for DC powering (+12V, GND). Coupled with sensor is delivered description of serial interface and protocol for easy development and implementation of processor program. It is available on company website: **http://www.piketronic.cz**

Sensor with wired serial interface RS485 is design for bus connection of more sensors with processor/computer unit for long distance (severel 100 meters). Powering is in range +7V to +15V. Communication type and rate is possible to set by external switches as well as bus address of device, termination resistor 120 Ohms and bias resistors 680 Ohms. More info in the „Installation“ chapter.



Schematic diagram of RPP-R (RS485-MODBUS) sensor bus connection

2 You get

- Radon Sensor
- Opposite cable connector into sensor connector
- Install cover
- IP67 cup
- Installation key for IP67 cup
- Calibration certificate
- Operation Manual

3 My parametrs

Product	Radon Sensor with interface RS485
Type symbol	RPP-R
Type approval certificate	TCM 422/25 - 6008
Measured quantity	Radon volume aktivity (RVA) in air.
Detection method	Alpha spektrometry. Diffusion into the chamber.
Other methods	Humidity correction; Elimination Pb-210; Elimination Po-212
Average measurement sensitivity	0,25 count/hour/Bq.m-3 (method RaA+RaC; 15°C ÷ 30°C; rel. hum. 20% ÷ 40%)
Measuring range	MDA – 100 000 Bq/m^3; in peak up to 10 MBq/m^3 MDA (minimal detectable activity) = 100 Bq/m^3 per 1 hour or 20 Bq/m^3 per 24 hours
Measurement uncertainty	< 13% at 300 Bq/m^3 per 1 hour; < 3% at 300 Bq/m^3 per 24 hour
Measuring chamber capacity	0,176 dm3
Response rate	< 30 minutes (RaA); < 3 hours (RaA + RaC)
Measuring algorithm	quicker, less sensitive (calculated from Po-218 (RaA)) slower, more sensitive (calculated from Po-218 + Po-214 (RaA + RaC))
Measuring relative humidity range	0 – 100 %
Measuring temperature range	-40 to + 125 °C
Current result of radon	short-term (1 hour running average); (Po-218 + Po-214 (RaA + RaC)) long-term (24 hours running average); (Po-218 + Po-214 (RaA + RaC))
Interval of current result calculating	every 4 min
Records saving interval	1- 255 minutes, default 1 hour
Records saving spectra	1- 720 minutes, default 720 min
Results internal memory capacity	3800 (158 days of 1 hour records)
Spectra internal memory capacity	262 (131 days of 12 hours records)
Powering	7-30VDC/max. 2mA
Serial interface	RS485 – MODBUS RTU
Dimension	Ø 80 x 175 mm
Waterproof protection	IP67 (electronic part only – IP67 cap in package - must be mounted)
Environment of use	Indoor and outdoor; soil air (according to condition below) Temperature: -10 ° C to +40 ° C Recommended relative humidity: 10% - 75% Maximum working relative humidity: 0% - 99% (with IP67 cap) * Increased humidity reduces the life of a charged battery. * There must be no condensation of water in the chamber - erroneous results
Detector life	50-100 million pulses; that means at an average concentration of 1000 Bq / m3 -> 12 years; 10 000 Bq / m3 -> 1 year
Recalibration	We recommend regular recalibration of the device at the manufacturer within 1-2 years. Within the warranty period, one recalibration is free from the manufacturer.

4 I work like this

Switching on and off:

The probe measures radon concentration autonomously only if the power supply from 7VDC to 15VDC is connected. The switching on is signalized by LED diode „STAT“ according chart below. If the probe is switched off the adjusted real time in probe is lost.

LED diode „STAT“:

It signalizes status radon probe according to following chart:

Color	Description
Green blinks after 5s	Radon probe measures and works correctly
Yellow blinks after 5s	Radon probe measures but troubles are occur. – especially low voltage of power supply or error of high voltage in chamber (high humidity in chamber or a few second after turning on of probe)
No light, No blinking	No power supply connected or device is damaged.

Communication protocol

Description of serial interface and protocol for easy development and implementation of processor program is available on company website: **http://www.piketronic.cz**

Setting device address „ADDRESS“

Address of slave device is possible to set in range 1-247 by switches “ADDRESS“. After changing of address is always necessary to make a restart of device. LSB (least significant bit) of address is switch with label „1“. Logical level „0“ is represented by switch in down possition.

Setting of parameters of communication „RATE“

Communication parameters is possible to set by switches „RATE“ according chart below. “. After changing of switches is always necessary to make a restart of device.

RATE 4 3 2 1	speed (kbaud)	parity	stop-bit
0 0 0 0	19,2	EVEN	1
0 0 0 1	9,6	EVEN	1
0 0 1 0	2,4	EVEN	1
0 0 1 1	1,2	EVEN	1
0 1 0 0	19,2	ODD	1
0 1 0 1	9,6	ODD	1
0 1 1 0	2,4	ODD	1
0 1 1 1	1,2	ODD	1
1 0 0 0	19,2	NONE	2
1 0 0 1	9,6	NONE	2
1 0 1 0	2,4	NONE	2
1 0 1 1	1,2	NONE	2
1 1 0 0			
1 1 0 1	Don´t use		
1 1 1 0			
1 1 1 1			

Installation - Setting of bus termination „RRR“

The basic rules for installing the RS485 bus are:

- Up to 32 probes can be connected to one bus section without an amplifier/repeater. If amplifiers/repeaters are used for every 32 probes, up to 255 probes can be connected to one bus.
- 120 Ohm wire termination resistors must be included at the beginning and end of each bus section. This can be done at the beginning on the bus control unit (Master) or on the first probe on bus using the **“RT”** switch to “1”. This setting is also made on the last probe connected to the bus/section.
- Only at the beginning of each section must 2 bias resistors of 680 Ohm be included. One to the positive pole of the power supply with the **“R+”** switch to “1” and the other to the negative pole of the power supply with the **“R-”** switch to “1”.
- Wire branches from the bus to the probes are not recommended and may be a maximum of 1 m long.
- It is recommended to connect the wires of bus directly from one probe to the other.
- Signals A and B must be connected by a twisted pair.
- The electrical shield of the bus cable can only be grounded at one end of the bus section.

Delivered package include cover of cable connector. After connection of cable the cover is possible to insert on top of the probe. Probe is possible to fix on wall for example by special holder which is extra available at producer.

5 Repairs

Any repairs and non basic maintenance must be performed exclusively by Piketronic s.r.o..

6 Warranty

- This product is covered by warranty of 24 months from purchase date.
- In case of warranty claim, please contact our Service Department.
- Warranty covers any defects in materials or workmanship and excludes any damage resulting from or caused by transport or handling or by any misuse.
- Warranty ceases if product has been used improperly or its seal is broken.
- In case of warranty claim, warranty period is prolonged by number of days product was undergoing warranty repairs.
- After the end of its life, product must be handled as e-waste.

7 Accessories

Radon Probe accessories are available at producer or at distributor.

Probe holder