piketronic

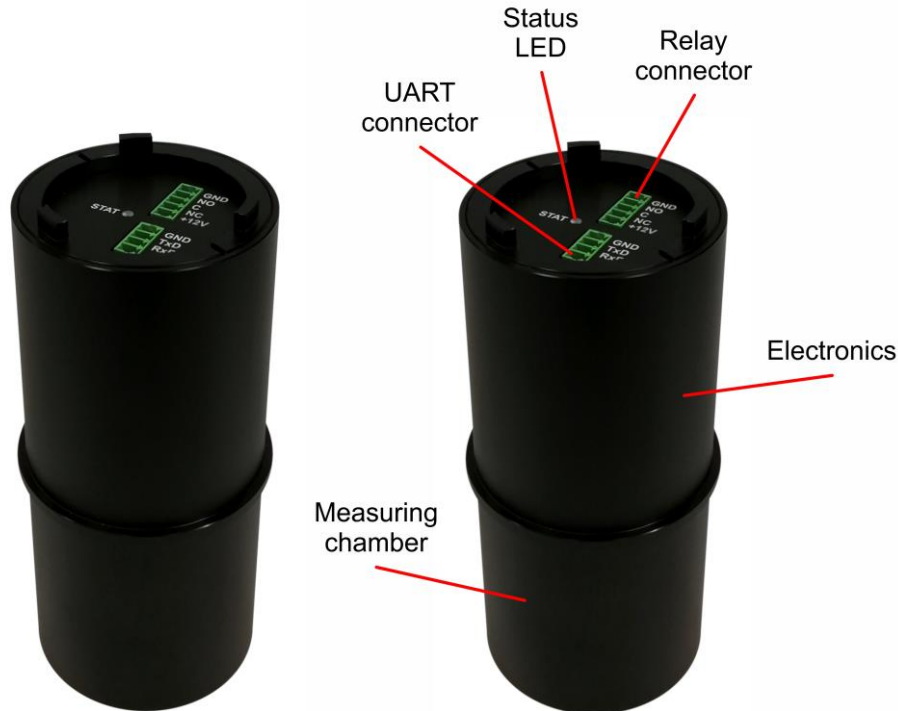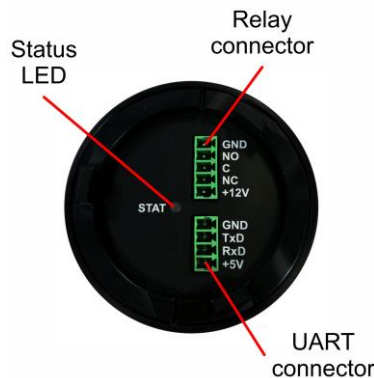**Operation Manual and Technical Specifications**

RPP-T
Radon sensor with interface UART and RELAY

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 values (data) are updated every 4 minutes in probe. 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.

Sensor can communicate over simple serial interfaces UART and/or can indicate crossing of adjusted limit of radon concentration by switching of alarm relay. Setting of limit value is possible to do by UART

Before using the product, please read this manual carefully and understand all operating and safety precautions. Compliance with operational and safety precaution can prevent from damage to equipment or injuries to personnel. The product may only be used in the specified manner and for its intended purpose. The product may be provided to third persons along with this documentation only.

interface or by USB<->UART cable converter (see in "Accessories") with usbRADONview application from producer. Application available for free on **http://www.piketronic.cz** . Default value of limit is set to 200 Bq/m3.

These interfaces are used for easy implementation into third party system. Suitable for integration into smart buildings, industrial systems and systems of air quality. Coupled with sensor is delivered description of serial interface UART and protocol for easy development and implementation of processor program. It is available on company website **http://www.piketronic.cz** .

2 You get

- Radon Sensor
- 2 opposite cable connectors for sensor connector
- Install cover
- Operation Manual

3 My parameters

|	
Product	Radon Sensor with interface UART and RELAY
Type symbol	RPP-T
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 = 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/switching algorithm	quicker, less sensitive (calculated from RaA)
	slower, more sensitive (calculated from RaA + RaC)
Measuring relative humidity range	0 – 100 %
Measuring temperature range	-40 to + 125 °C
Current result changing interval of Rn	every 4 min
Records saving interval	1- 255 minutes, default 1 hour
Results internal memory capacity	4096 (150 days of 1 hours records)
Powering	5-12VDC/max. 5mA
Switching load of alarm relay	250W DC/ 500W AC
Serial interface	UART (3V CMOS)
Radon concentration results display	short-term (1 hour running average)
	long-term (24 hours running average)
Dimension	Ø 80 x 175 mm
Operating conditions	Temperature: -10 ° C to +40 ° C
	Recommended relative humidity: 10% - 75%
	Maximum working relative humidity: 0% - 99%
	* 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 5VDC to 12VDC 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 / Yellow only once	Radon probe has just been connected to power supply.
Green blinks every 5 seconds	The set radon concentration alarm limit was not exceeded. (Valid for firmware 1.30 and higher.) *Measured value of radon concentration (1 hours moving average – updated every 4 minutes) doesn´t cross adjusted „limit" with 10% hysteresis. By setting the measuring/switching algorithm (method) in the probe, the LED diode "STAT" dynamics of warning can be influenced. Method " RaA ", measured only from RaA (Po218), reacts quickly to changes in concentration, but it is less accurate. On the contrary, the " RaA+RaC " method, measured from RaA (Po218) + RaC (Po214) is more accurate, but has a slower reaction to sharp changes in radon concentration. By default, the "AC" method is set in the probe. Setting the switching limit and the switching algorithm can be done via UART commands or using the USB<->UART converter for RPP-T (see the Accessories chapter) and the RADONreader application, which can be freely downloaded from the manufacturer's website.*
Yellow blinks every 1 second	Radon probe measures and works correctly. The set radon concentration limit has been exceeded. See paragraph above. (Valid for firmware 1.30 and higher.)
Green / Yellow 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.

UART connector is for 4 – wires, 2 wires are for serial half-duplex data (TxD, RxD) and 2 wires for DC powering (+5V, GND). TSRS sensor with wired serial interface UART is design for direct connection with processor unit for short distance (several meters). For powering is possible to use random pin „+5V" or „+12V" or both. On both of pin is possible to connect power supply from range 5VDC to 12VDC. Description of serial interface UART and protocol for easy development and implementation of processor program is available on company website **http://www.piketronic.cz** . UART connector can operate no matter if the RELAY connector is used or not.
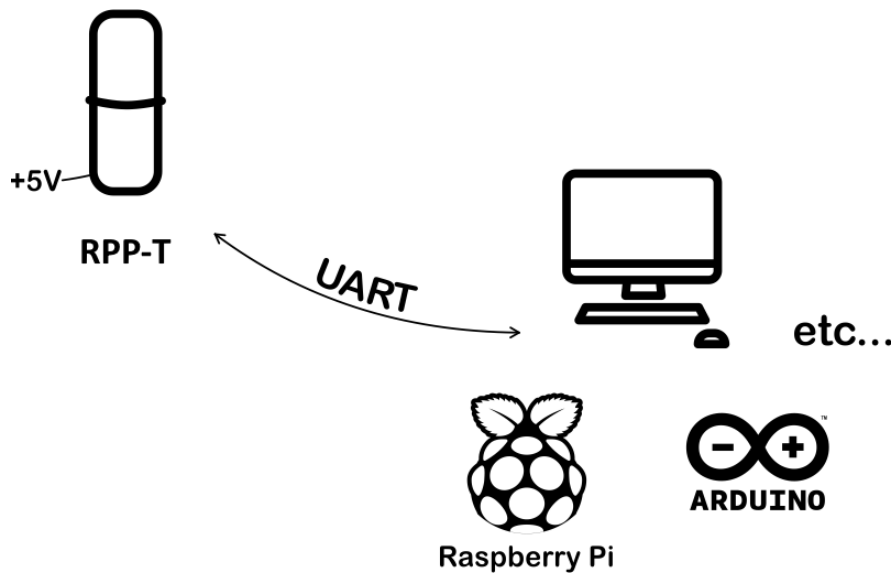
Schematic diagram of RPP-T (UART) sensor connection

RELAY connector is for 5 - wires, 3 pins are for relay (C, NO, NC) and 2 pins are for DC (+12V, GND). For connection of sensor only 4-wires cable can be, when 2 wires are for powering, 1 wire is always connected to C (Contact) and the last is connected to NO (Normally Open) or NC (Normally Close) according of sense of using. The sensor with relay is design for remote alarm signalization of crossing radon limit. For powering is possible to use random pin „+5V" or „+12V" or both. On both of pins is possible to connect power supply from range 5VDC to 12VDC. On figure below is shown principle of switching of relay in probe when measured value of radon concentration (1 hours moving average – updated every 4 minutes) cross adjusted limit and back. Switching off and switching on are made with 10% hysteresis around alarm limit of radon concentration. By setting the measuring/switching algorithm (method) in the probe, the relay switching dynamics can be influenced. Method "A", measured only from RaA (Po218), reacts quickly to changes in concentration, but it is less accurate. On the contrary, the "AC" method, measured from RaA (Po218) + RaC (Po214) is more accurate, but has a slower reaction to sharp changes in radon concentration. By default, the "AC" method is set in the probe. Setting the switching limit and the switching algorithm can be done via UART commands or using the USB<->UART converter for RPP-T (see the Accessories chapter) and the RADONreader application, which can be freely downloaded from the manufacturer's website. RELAY connector can operate no matter if the UART connector is used or not.
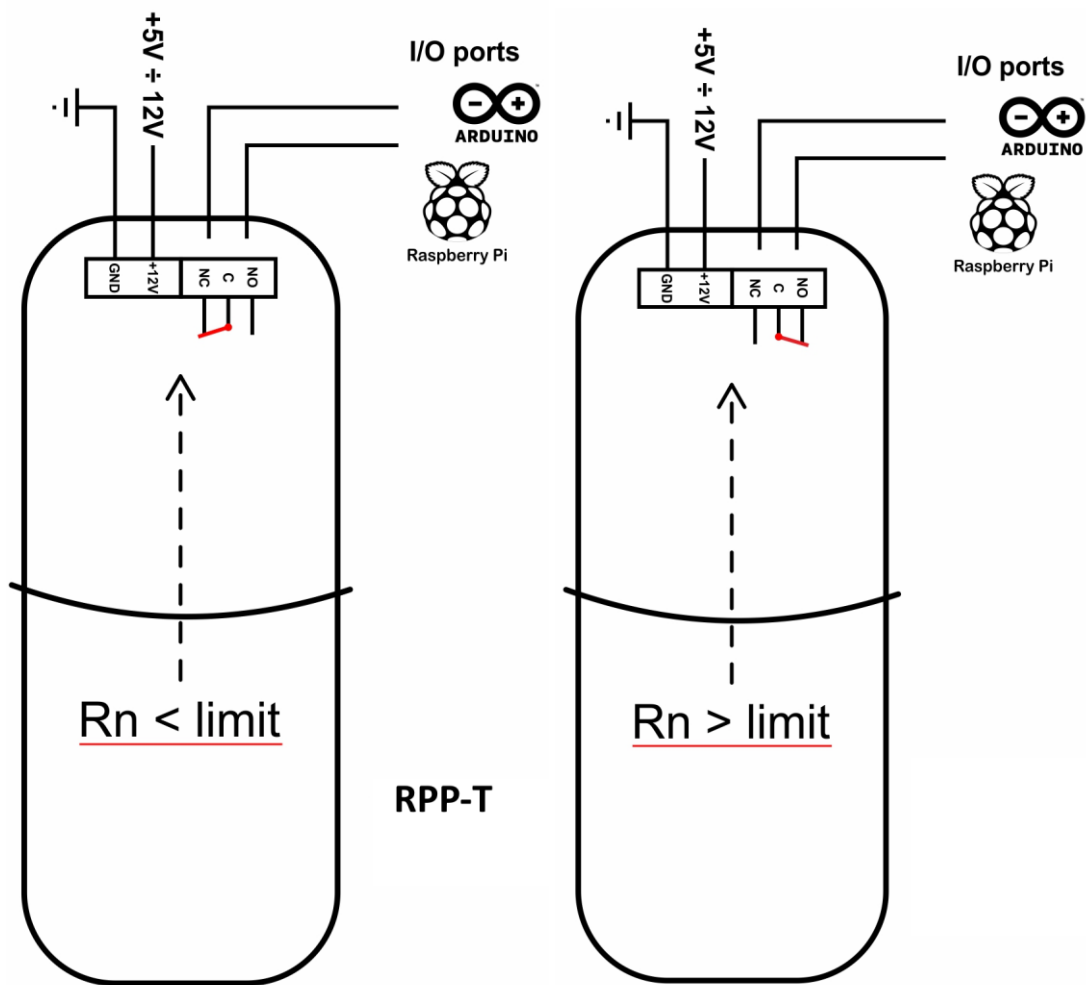
Schematic diagram of RPP-T (RELAY) sensor connection

Installation

Delivered package include cover of cable connectors. 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 delivered.

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.

USB<->UART converter for TSRS   **Probe holder**

Cable for better SW debugging or possibility to
connect over RADONreader application and set
the basic parameters of the probe – time,
limit, measurement method, etc.
– freely downloadable at
website **http://www.piketronic.cz** .