EN

TERA Radon Program

TSRP3 WLAN Wireless and USB Radon Soil Probe

Technical Specifications & Operation Manual

v.1 – 2019

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Manual also available on www.tesla.cz

Users should be familiar with operation basis of used product. If you experience any problems with your product, please contact us at:

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1 Introduction

This document describes technical specifications and user operation of the TSRP3 WLAN Wireless and USB Radon Soil Probe.

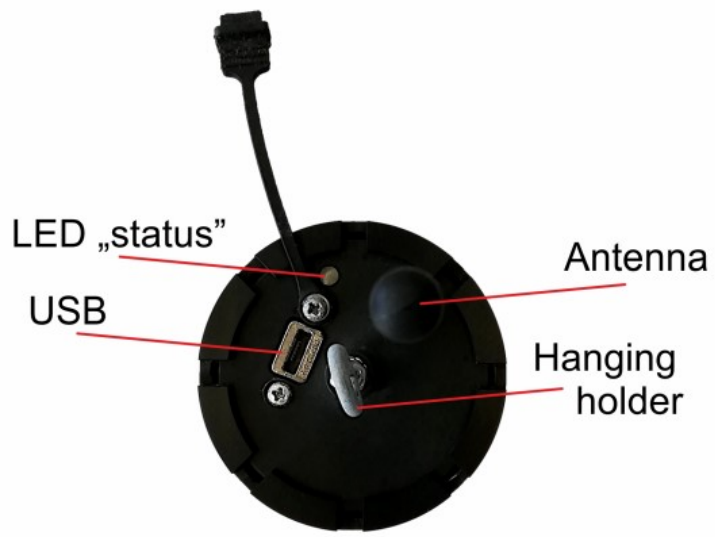
Product was developed and manufactured in the Czech Republic. All rights reserved TESLA. Offer or delivery of products or services related to the product does not include transfer of ownership rights.

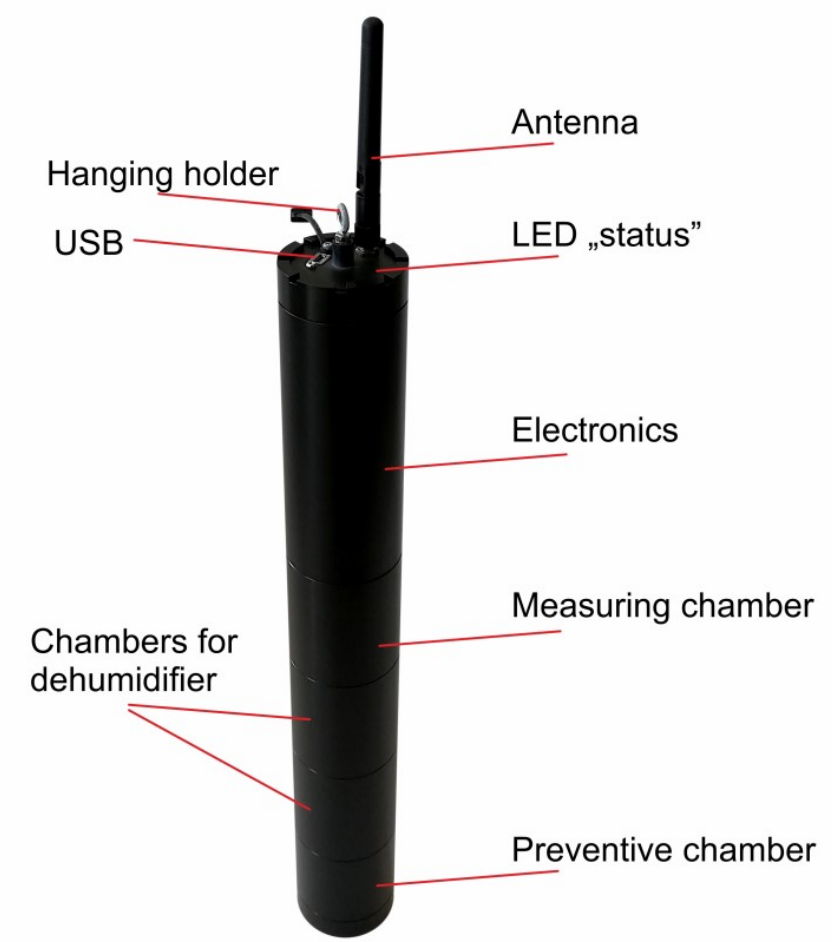
Before using the product, please read this manual carefully and understand all operating and safety precautions. Compliance with operational and safety precaution can prevent from damage to equipment or injuries to personnel. Operating and safety instructions in the document are marked as follows:

Attention! This formatted text indicates the operating and safety instructions.

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.

2 Description and Utilization





Radon Soil Probe is adapted for insertion into a bore hole of minimum diameter 50mm and for operation in places with increased humidity as are caves and mines. Two probe chambers are filled with replaceable special dehumidifier for decreasing of humidity in measuring chamber if the probe operates in humidity environment with relative humidity above 90%. If it operates in humidity environment with relative humidity above 90% the dehumidifier needs to be replaced or dried. If the relative humidity of environment is above 90% and temperature 10 °C the change interval of dehumidifier is 6 weeks. The accumulator will last for up to 1 year after one full charging ensuring autonomous operation of the probe within the bore. It depends on frequency of wireless data downloading from probe and on humidity condition also.

The TSRP3 Radon Soil Probe is designed to continually measure radon volume activity in soil. Soil radon concentration changes may precede certain behavior of Earth's crust and various elements in the bedrock. For example, long-term monitoring of the soil gas radon concentration can be used to predict seismic activity or earthquakes.

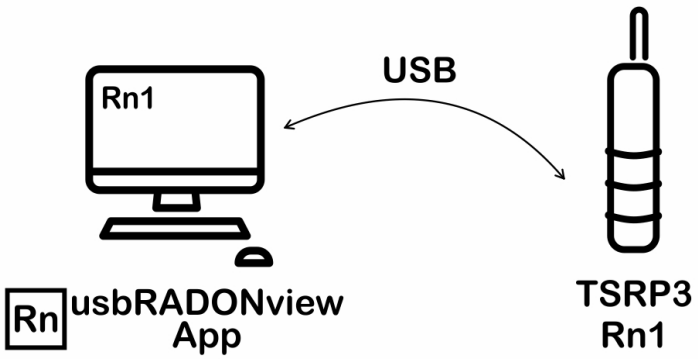
Portable probe basis is a measuring chamber with a semiconductor photodetector. Radon enters the chamber by diffusion through the input filter on the bottom of probe. The probe measures in autonomous and time continuous way. It processes results every 2-minute intervals and from this counts short-term moving average of radon concentration (1 hour moving average - average of 30 2-minute process intervals). It also counts long-term moving average of radon concentration (24 hours moving average). The probe saves time records of these radon concentration values 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). Bottom of the probe cannot be covered. The probe permanently measures and saves data into internal memory if accumulator is charged. LEDs „STAT“ indicate current status of probe see ´Operation manual´ below.

The resulting values can be downloaded continuously during measurement or at once at the end of measurement. Data from the radon probe can be downloaded to a PC directly via USB interface or wirelessly via antenna and Central Unit. Central Unit is not included with package of probe and it is sold and delivered extra.

Radon Probe can be operated by these ways:

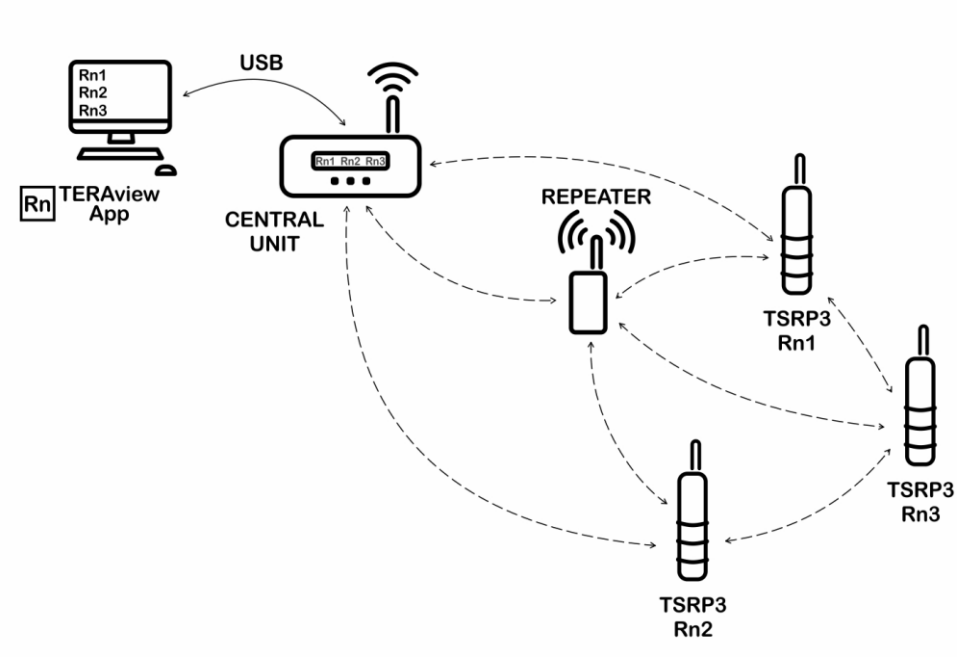
A) **Standalone probe** - Thanks to its independent accumulator power, portable radon measuring probe supports flexible placing options within monitored structures. Accumulator will last for more than 1 year after full charging. The resulting values are downloaded after end of the measurement by B) or C) way.

B) **Probe connected via USB** – Using usbRADONview app and USB cable is possible to download results to PC continuously during measurement or at once at the end of measurement. usbRADONview application, drivers and user manual is free downloaded on website of producer.

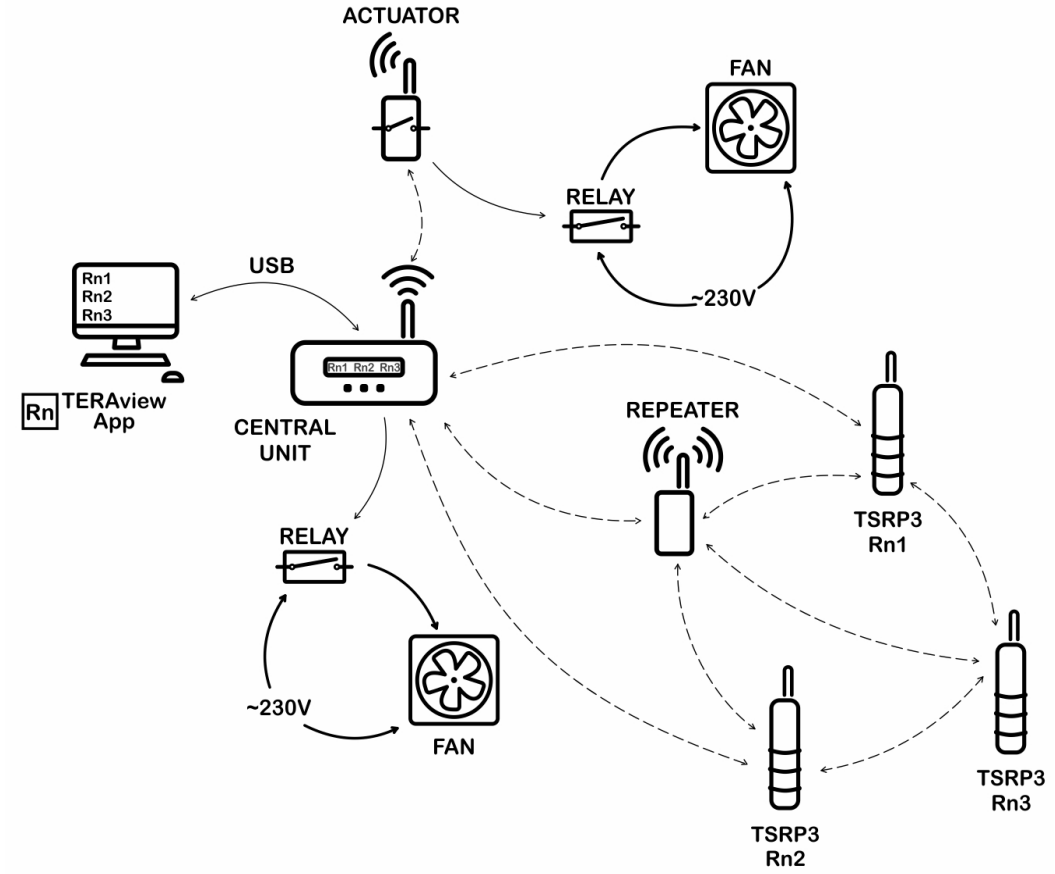


C1) **Wireless network for radon measurement** - Central Unit supports simultaneous data downloads from up to 16 probes. All values are saved again into central unit memory. Via connected computer to Central Unit and TERAview application on PC it is possible to download and process all data from system and configure whole system. Setting and configuration of Radon Soil Probe and whole system is also managed by TERAview application on PC. TERAview application version 3.11.6 and higher, drivers and user manual with detail configuration description is free downloaded on website of producer.

In case of time continuous measurement of radon concentration or in case of setting in regulation system the probe must be placed in radio range of Central Unit. Distance (radio range) between probes and central unit is up to 600m in open space. In buildings it depends on number of walls, building material, etc. Strength of radio signals (RSSI) is monitored by Central Unit. If radio signal strength between individual elements is insufficient, another radon probe or repeater TRR must be inserted and used to extend the signal.



C2) **Wireless network for radon regulation –** Features of system are same as in C1) way. Radon measuring probes located in building transmit their current radon concentration values to central unit wirelessly. Central unit analyzes this information and on the basis of measured (set) concentration level value it sends command to actuator (wireless actuator or actuator in central unit can be use) which is hardwired with power relay. Power relay switches on a fan which decreases radon concentration within an area. After decreasing of radon concentration, actuator receives command to switch off fan. This cycle repeats depending on increasing or decreasing volume activity of radon in building.



3 Scope of Delivery

- TSRP3 WLAN Wireless and USB Radon Soil Probe
- Power adapter 230VAC/5VDC
- USB cable A-micro
- Antenna
- 2 pcs of dehumidifiers
- Operation Manual

4 Product Specification

Product	TSR3P WLAN Wireless and USB Radon Soil Probe
Type symbol	042 127 192 000
Average measurement sensitivity	0,06 count/hour/Bq.m-3 (method RaA+RaC; 15°C ÷ 30°C; rel. hum. 20% ÷ 40%)
Measuring range	MDA – 100 000 Bq/m^3; MDA = 100 Bq/m^3 per 1 hour or 20 Bq/m^3 per 24 hours
Measurement uncertainty	< 25% at 300 Bq/m^3 per 1 hour; < 6% at 300 Bq/m^3 per 24 hours
Measuring chamber capacity	0,044 dm3
Response rate	< 30 minutes (RaA); < 3 hours (RaA + RaC)
Radon records	calculated from RaA (quicker, less sensitive) calculated form RaA + RaC (slower, more sensitive)
Measuring relative humidity range	10 – 90 %
Measuring temperature range	-20 to + 60 °C
Radio interface	868MHz
Max number of measuring network elements	16
Probe to terminal unit distance (RF range)	depends on number of walls and building material, up to 600 m in open space
Possibility of using repeater for RF range extending	yes
Results reading interval (from probe)	240-65535 sec (4 min - 18.2 hours)
Records saving interval (probe)	1- 255 minutes, default 1 hour
Results memory capacity in probe	4096 (150 days of 1 hours records)
Powering	internal rechargeble accumulator; charging via USB
Accu life after full charging	>1 year
Current radon concentration results	short-term (0,5 hour running average from RaA) long-term (24 hours running average from RaA + RaC)
Dimension	Ø 50 x 280 mm

5 Operating Instructions

Switching on and off:

The probe measures radon concentration autonomously and communicates in wireless network only if aínternal accumulator is charged.

By discharging of internal accumulator the probe doesn´t lose previous records of measurement.

LED diode „STAT“:

It signalizes status radon probe according to following chart:

Color	Description
Green blink after 5s	Radon probe measures and works correctly
Green / Yellow blink after 5s	Radon probe measures but troubles are occur. – especially low capacity of accumulator. Warnings and errors are shown in PC application.
No light, No blinking	Radon probe doesn´t measure or accumulator is empty or device is damaged. Charging process of accumulator is described in chapter „Basic Maintenance/ Accumulator charging“

Antenna installation:

Supplied antenna is screwed on antenna connector. When installing antenna, hold antenna by knurled end.

Power supply:

According to operation method the radon probe can be supplied:

1) By internal accumulator for portable use – Radon probe includes internal accumulator which is able to ensure autonomous operation of probe for more than 12 months without charging. Depends on frequency of wireless data downloading from probe and depends on climatic condition of probe use. Accumulator is charged with USB port and provided USB cable. The USB cable is possible to connect to PC or to delivered power adapter. Status of accumulator and charging process are described in paragraph ´Basic Maintenance/Accumulator charging´
2) By mains power supply 230V/50Hz for stationary use – Radon probe is permanently supplied by delivered power adapter. Power adapter is connected to probe via provided USB cable. In case of blackout internal accumulator ensures UPS function.

Configuration:

Setting and configuration is different according to operation way of radon probe.

If the probe is used for autonomous measurement and data downloading via USB interface then the setting and configuration are realized by usbRADONview application. UsbRADONview application, drivers and user manual with detail configuration description are free downloaded on website of producer .

If the probe is used for wireless measurement and wireless data downloading then setting and configuration of probe and whole measuring system is realized by Central Unit connected to PC and TERAview application. Central Unit is not included with package of probe and it is sold and delivered extra. TERAview application, drivers and user manual with detail configuration description are free downloaded on website of producer. For successful probe configuration in measuring system is essential to know probe radio channel number (communication wireless channel) and P2P address (identification in wireless net). Both parameters are printed out on probe serial number plate. Probe radio channel number is possible to change by TERAview application and it must be identical to central unit radio channel number. P2P address is permanent and it can occur in one big wireless net only once. Central Unit P2P address can be identical to P2P address of other elements in network.

Installation

The probe has hanging holder for installation into hole or in places where is risk of water flowage. Generally probe is possible to place in random position but it is necessary not to cover of botom of probe and bottom of probe prevent from drops of water. Therefore vertical position is the best.

6 Basic Maintenance

Accumulator charging:

During portable use of radon probe is essential to monitor state of internal accumulator and recharge it if necessary. If accumulator is discharged the probe automatically turns off. The probe is switched on again powering USB port. Current state of accumulator can be determined in three ways:

1) By LED diode ´STAT´ - If LED starts blinking in green-yellow color it indicates that system is working incorrectly and one of main case is low voltage of accumulator. (see paragraph “Operation Manual / LED diode “STAT””)

2) On wireless Central Unit display – Symbol "#" on left edge of display second line means that accumulator voltage is low.

3) In TERAview and usbRADONview application - where you can check current accumulator voltage. Voltage should not fall below 3.5 V, in limit conditions falls below 3.3V.

Accumulator is charged via USB port using supplied USB cable. USB cable can be connected to PC or to supplied power adapter.

Dehumidifier replacing

For correct measuring and low consumption the probe has to work in environment with relative humidity max up to 90%. In places with higher humidity it is needed to insert 1 dehumidifier into 2 chambers of probes. For inserting dehumidifier to probe is necessary to screw and disassemble 2. and 3. chamber from the bottom; see picture in chapter2. If the relative humidity of environment is above 90% and temperature 10 °C the change interval of dehumidifier is 6 weeks. Humid dehumidifier is possible to use repeatedly after drying it up in oven with 80°C for 6 hours.

7 EC Declaration of Conformity

EC Declaration of Conformity will be delivered by Tesla producer on request. If interested, please use contacts on the web www.tesla.cz .

8 Repairs

Any repairs and non basic maintenance must be performed exclusively by TESLA manufacturer.

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9 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.

10 Accessories

Radon Probe accessories are available at producer www.tesla.cz or at distributor.

Reserve antenna

11 Revision History

Revision	Date	Comments
Rev.1:	31.1.2017	Initial release