

TERA Radon Program

TSR2 Wireless Radon Probe
Technical Specifications & Operation Manual



v.2 – 2016

Table of Contents

1	Introduction.....	2
2	Description and Utilization	2
3	Scope of Delivery	4
4	Product Specification.....	4
5	Operating Instructions.....	5
6	Basic Maintenance	6
7	Certificate of Czech Metrology Institute	7
8	EC Declaration of Conformity	8
9	Repairs.....	8
10	Warranty.....	8
11	Accessories	8
12	Revision History	8

Instruction also available on www.tesla.cz

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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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www.tesla.cz

1 Introduction

This document describes technical specifications and user operation of the TSR2 Wireless Radon 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

TSR2 is designed for continuous measuring of radon concentrations in buildings.

Portable probe basis is a measuring chamber with a semiconductor detector. 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 at given intervals (default 4-minute intervals) and it counts moving average of radon concentration value at an interval of 1 hour (default moving average of 15 4-minute process intervals). It also counts moving average of radon concentration value at an interval of 24 hours. 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). The resulting values can be downloaded continuously during measurement or at once at the end of measurement.

Attention! For downloading of measured values from probe it is essential to have wireless Central Unit in system; see <http://www.tesla.cz/en/tera-centrala> . Central Unit is not included with package of TSR2 and it is sold and delivered extra.

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 TERAvue application on PC it is possible to download and process all data from system and configure whole system.

Setting and configuration of TSR2 Wireless Radon Probe and whole system is also managed by TERAvue application on PC.

TERAvue application, drivers and user manual with detail configuration description is free downloaded on website: <http://www.tesla.cz/en/ke-stazeni/>.

Thanks to its independent battery power, portable radon measuring probe supports flexible placing options within monitored structures. Battery will last for more than 1 year.

Probe is supplied by AA non-rechargeable replaceable 3.6V lithium battery or by power adapter 230V; see paragraph 'Accessories'. After battery insertion TSR2 immediately starts to run time-continuous measurement.

TSR2 Wireless Radon Probe can be used in these systems:

- A) TERA System for Radon Concentration Measurement (Figure 1)
- B) TERA System for Regulating Radon Concentrations (Figure 2)

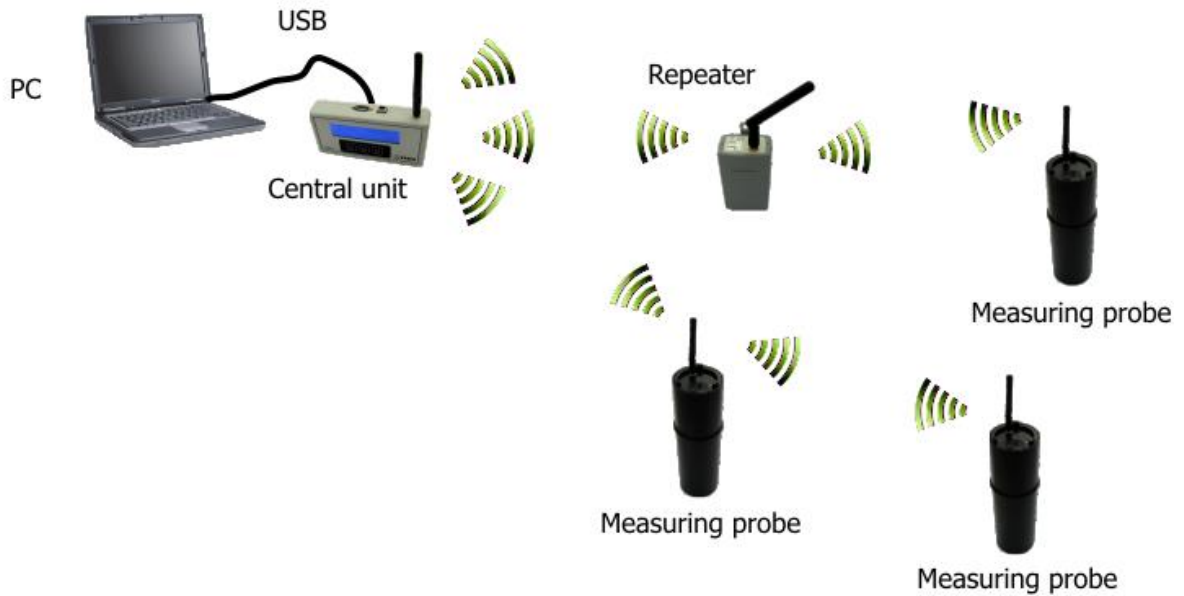


Figure 1 - TSR2 Wireless Radon Probe in TERA System for Radon Concentration Measurement

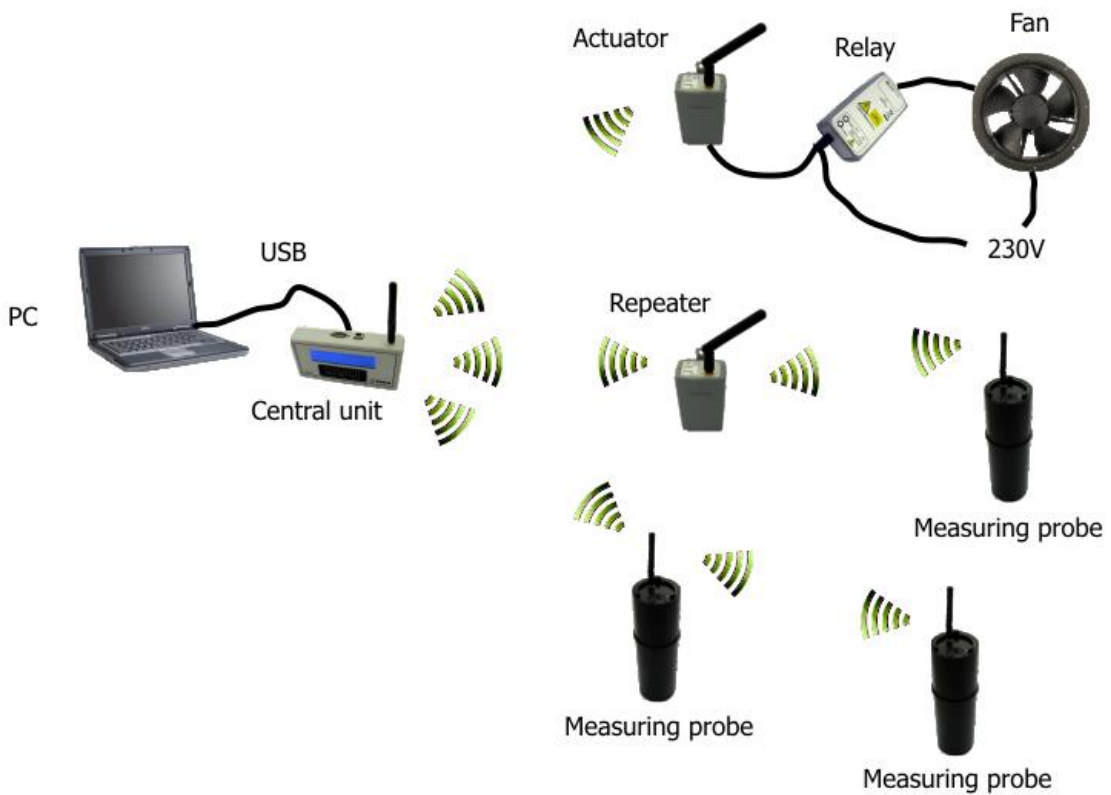


Figure 2 - TSR2 Wireless Radon Probe in TERA System for Regulating Radon Concentrations

Regulating system diagram description - 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 wireless command to actuator 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.

The probe is random for location in measured place, but generally it is put on the bottom of the probe. Bottom of the probe cannot be covered. 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 TSR2 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.

Attention! If radio signal strength between individual elements is insufficient, TSR2 radon probe must be inserted or repeater must be used to extend the signal; see <http://www.tesla.cz/en/tera-retranslator/>

3 Scope of Delivery

- TSR2 Wireless Radon Probe
- 3.6V Li-Ion battery
- Antenna
- Operation Manual

4 Product Specification

Product	TSR2 Wireless Radon Probe
Type symbol	042 127 167 000
Measurement sensitivity	0,15 count/hour/ Bq·m ⁻³ (typically)
Measuring range	5 – 65535 Bq. m ⁻³
Measurement uncertainty	15% at 300 Bq per 1 hour
Measuring relative humidity range	10 – 90 %
Measuring temperature range	-20 to + 60 °C
Radio interface	868MHz (IQRF® system by Microrisc)
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	150 days
Probe	Li-Ion battery 3.6 V, 2.6Ah
Battery life	>1 year
Radon concentration results display	short-term (1 hour running average) long-term (24 hours running average)
Measurement sensitivity	0,15 count/hour/ Bq·m ⁻³ (typically)
Battery: SAFT LS 14500 3.6V, 2.600Ah (or equivalent)	

5 Operating Instructions

Switching on:

To switch the probe on, remove protective band under the cover and then reinstall the cover. Reverse the procedure to switch device off or for battery replacement. (Switching the device off is appropriate only when unused for long periods of time.)



Antenna installation:

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



Configuration:

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 TSR2 and it is sold and delivered extra; see <http://www.tesla.cz/en/tera-centrala/>.

TERAview application, drivers and user manual with detail configuration description is free downloaded on website: <http://www.tesla.cz/en/ke-stazeni/>.

For successful probe configuration in measuring system it 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.

6 Basic Maintenance

Battery replacement:

Current battery charge status of probe can be monitored wirelessly by Central Unit (see 'Operating instruction/Configuration'). In case of low battery capacity Central Unit displays warning message. Twist battery cover to the left to remove discharged battery and replace it with appropriate type (see 'Product Specification'). Batteries can be ordered from TESLA manufacturer or distributor (see 'Accessories'). Positive pole pointing up and inserted directly under the battery cover. Close the battery by pushing and turning the battery cover.



Replacing of particulate filter:

In extremely dusty environments congestion in the particulate filter, which is part of the radon probe bottom, can occur. Congestion of the particulate filter by dust particles prevent from optimal diffusion of measured gas to detector and thus distort measurement results.

By loosening and unscrewing inner ring nuts on the bottom of the probe perforated black plastic cover, metal grille and white particulate filter get released. Only these three circular elements can be taken away from the bottom of the probe. Replace the particulate filter, which is available from TESLA manufacturer or distributor and return three circular elements in reverse order to the bottom of probe. Arrange assembly by screwing the inner ring nut.



7 Certificate of Czech Metrology Institute

Certificate number TCM 442/15-5344 is valid until 16.12.2025.

	Český metrologický institut
Type Approval Certificate No. 0111-CS-A034-15	
Czech Metrology in accordance with the Law of metrology No. 505/1990 Coll. as amended	
approved	
radon volume activity monitor type TERA	
under observation of technical data referred to in Annex of this Certificate.	
Type approval mark:	TCM 442/15 - 5344
Applicant:	TESLA, akciová společnost Poděbradská 56/186 180 66 Praha 9 Czech Republic ID: 00009709
Manufacturer:	TESLA, akciová společnost Czech Republic
Valid until:	16 December 2025
Information on judicial remedies: The judicial remedies against this decision are available to the applicant through Czech Metrology Institute to Czech Office for Standardization, Metrology and Testing within 15 days since the receipt of this Certificate.	
Description: Essential characteristic, approved conditions special conditions, examination results including technical drawings and schemas are set out in the technical test report appertaining to this certificate. The certificate comprises the front page and the technical test report totally having 3 pages.	
Brno, 17 December 2015	
	RNDr. Pavel Klenovský Director General

8 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.

9 Repairs

Any repairs and non basic maintenance must be performed exclusively by TESLA manufacturer. As part of the warranty period, we can provide ONE probe calibration test in our facility.

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10 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.

11 Accessories

TSR2 Wireless Radon Probe accessories are available at producer www.tesla.cz or at distributor.

Probe holder



Particulate filter



Reverse antenna



Reverse battery



Power adapter for TSR2 probes



You can connect TSR2 probe to supply network 230V/50Hz or supply it autonomously inside accumulator for 2 months. Accumulator also provides UPS function.

12 Revision History

Revision	Date	Comments
Rev.1:	22. 7. 2015	Initial release
Rev.2:	30. 4. 2016	Extended release