EN

TERA Radon Program

TSRS2 Radon Sensor (RS485 – MODBUS RTU)

Technical Specifications & Operation Manual

v.2 – 2019

Table of Contents

Manual also available on www.tesla.cz

TESLA
Rubeska 215/1
190 00 Prague 9 - Vysocany
www.tesla.cz

1 Introduction

This document describes technical specifications and user operation of the TSRS2 Radon Sensor.

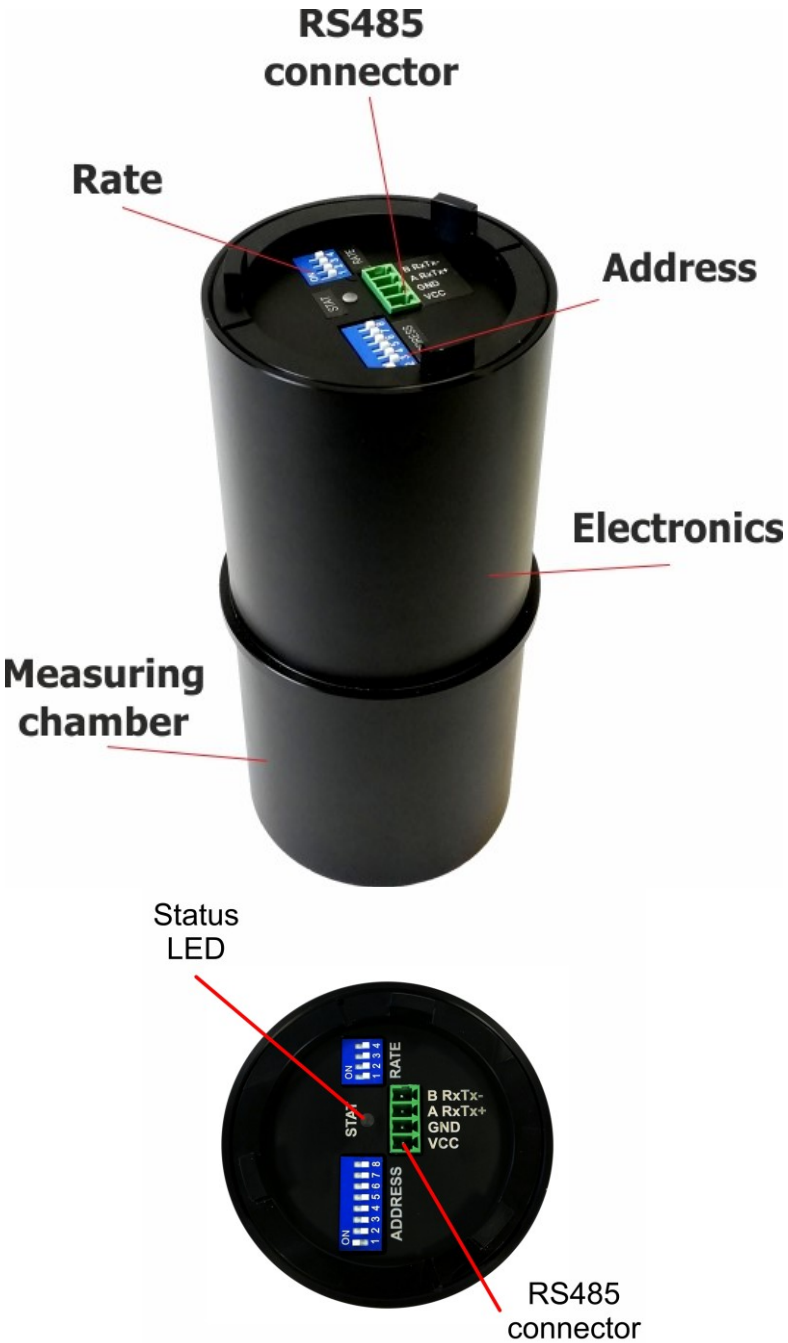
Product was developed and manufactured in the Czech Republic. All rights reserved TESLA. Offer or delivery of products or services related to the product does not include transfer of ownership rights.

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

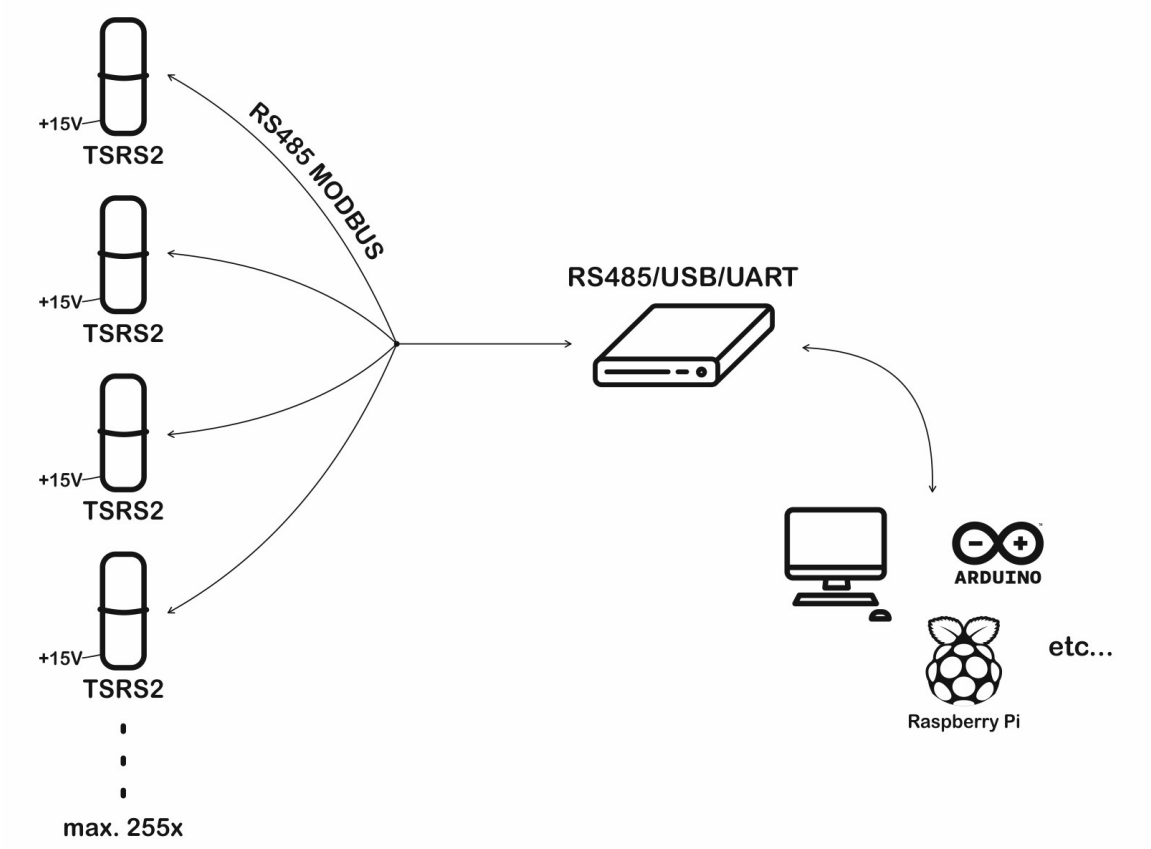


TSRS2 is designed for continuous measuring of radon concentrations in buildings.

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. It processes current results every 4-minute intervals and from this it counts short-term moving average of radon concentration (1 hour moving average - average of 15 4-minute process intervals). It also counts long-term moving average of radon concentration (24 hours moving average). The sensor also 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 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.

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 (+15V, 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.tesla.cz .

TSRS2 sensor with wired serial interface RS485 is design for bus connection of more sensors with processor 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.



Schematic diagram of TSRS2 (RS485-MODBUS) sensor bus connection

3 Scope of Delivery

- TSRS2 Radon Sensor
- Opposite cable connector into sensor connector
- Install cover
- Install holder of probe
- Operation Manual

4 Product Specification

Product	TSRS2 Radon Sensor
Type symbol	042 127 196 000
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; 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 algorithm	quicker, less sensitive (calculated from RaA) slower, more sensitive (calculated form RaA + RaC)
Measuring relative humidity range	10 – 90 %
Measuring temperature range	-20 to + 60 °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	7-15VDC/max. 5mA
Serial interface	RS485 – MODBUS RTU
Radon concentration results display	short-term (1 hour running average) long-term (24 hours running average)
Dimension	Ø 80 x 175 mm

5 Operating Instructions

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.tesla.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 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:

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

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 in package too.

6 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 .

7 Repairs

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

TESLA
Rubeska 215/1
190 00 Prague 9 - Vysocany
www.tesla.cz

8 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.

9 Accessories

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

Probe holder

For better SW debugging or possibility to try http://www.tesla.cz/ application.

10 Revision History

Revision	Date	Comments
Rev.1:	31.1.2018	Initial release
Rev.2:	30.9.2019	LED status