



TERA Radon Program

TCR3 Central Unit-OS3.08NP
Technical Specifications & Operation Manual



v.1 – 2016

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

1 Introduction

This document describes technical specifications and user operation of the TCR3- OS3.08NP Central Unit.

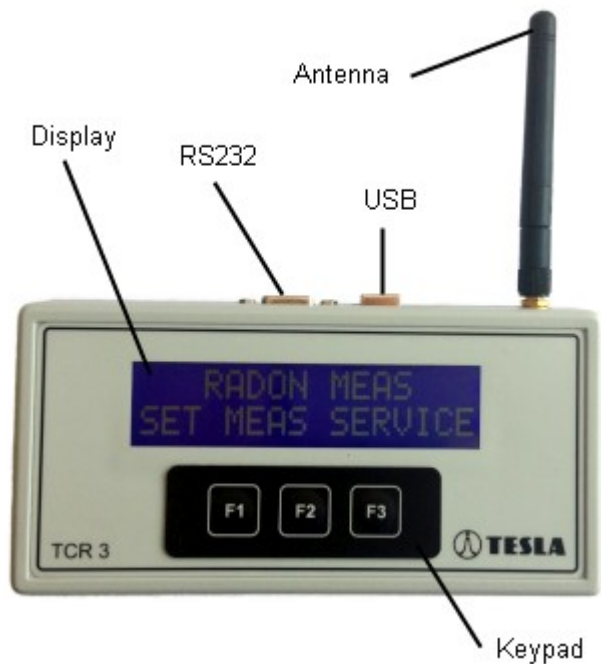
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Before using the product, please read this manual carefully and understand all operating and safety precautions. Compliance with operational and safety precaution can prevent from damage to equipment or injuries to personnel. Operating and safety instructions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



This product is designed to control and analyze wireless system measurements of radon volume activity in buildings.

Portable central unit controls operation of wireless network, it collects data from individual measuring elements and it eventually operates actuating units. Measuring elements are TSR2 Wireless radon probes from TERA program made by TESLA; see <http://www.tesla.cz/> and actuating units are TAR2 Wireless Actuator from TERA program made by TESLA; see <http://www.tesla.cz/>.

Central Unit is provided with two-line alphanumerical display and with three-key keyboard for operating. Display shows basic measuring values of a selected probe (short and long-term radon concentrations, temperature, humidity) and values of central unit itself (temperature, pressure, humidity). Via the keypad it is possible to select type of shown data.

Central Unit supports simultaneous data downloads from up to 16 probes. All values are saved again into central unit memory. Via connected computer over USB (RS232) to Central Unit and TERAvie application on PC it is possible to download and process all data from system and configure whole system. Resulting values can be download continuously during measurement or at once at the end of measurement.

Setting and configuration of Central Unit and whole system is also managed by connected computer to Central Unit and TERAvie application on PC. TERAvie application, drivers and user manual with detail description of building and configuration network is free downloaded on website: <http://www.tesla.cz/>.

USB port of Central Unit is also used for charging internal unit accumulator, either from computer, USB port or USB power adapter. USB cable and USB power adapter are included in package.

Central Unit can be used in these systems:

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

Regulating system diagram description - Radon measuring probes located in a building transmit their current radon concentration values to central unit wirelessly. The 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 a command to switch off the fan. This cycle repeats depending on increasing or decreasing volume activity of radon in building.

Thanks to its independent accumulator power, the portable Central Unit supports flexible placing options within monitored structures. In case of time continuous radon concentration measurement or in case of setting in regulation system Central Unit must be placed in radio range of other wireless elements of network. Distance (radio range) between elements and central unit is up to 600 m in open space. In buildings it depends on number of walls, building material, etc. Strength of radio signals (RSSI) with all elements is monitored by Central Unit.

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

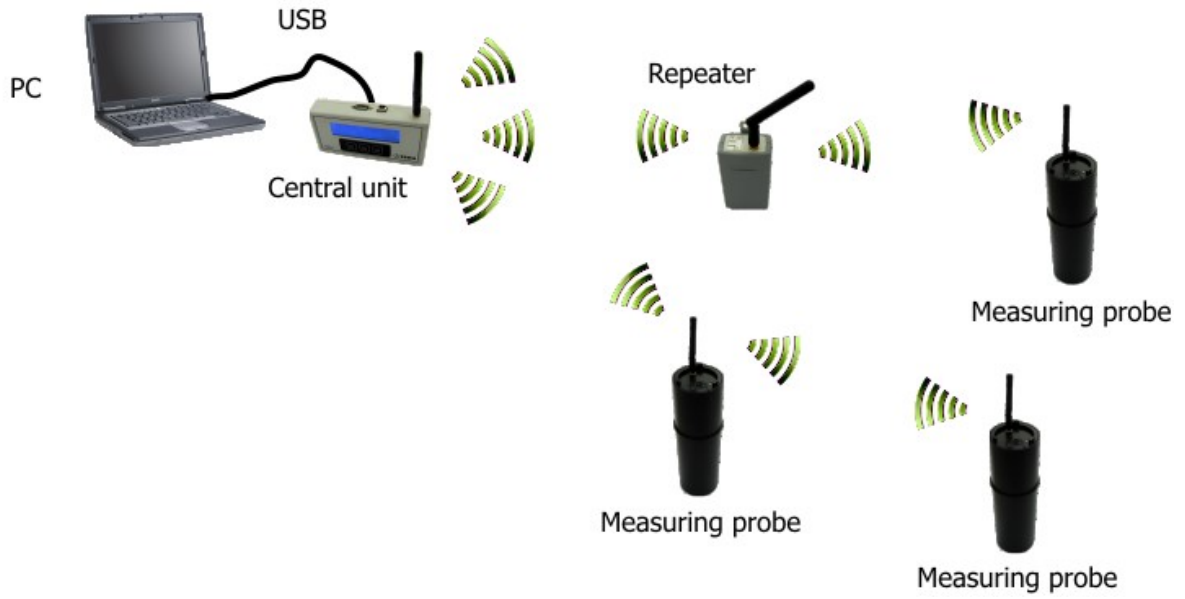


Figure 1 - TCR3 Central Unit in TERA System for Radon Concentration Measurement

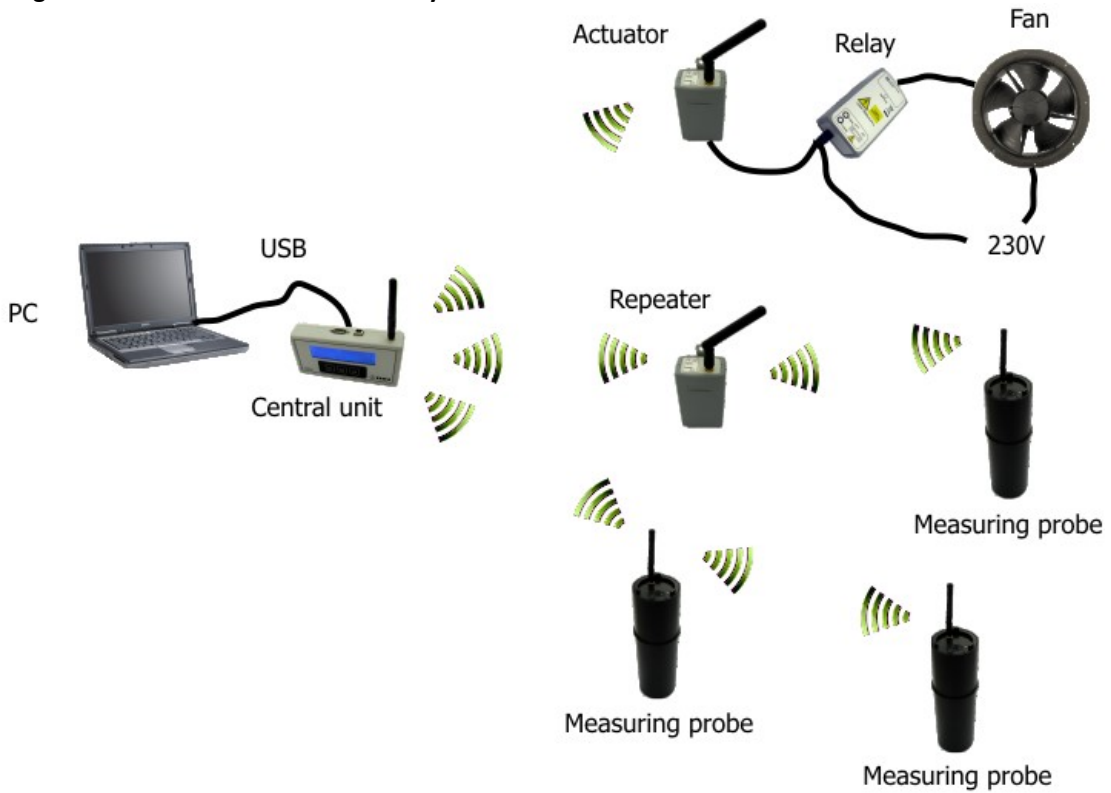


Figure 2 - TCR3 Central Unit in TERA System for Regulating Radon Concentrations

Version comparison

version	wireless	USB	diag. LED	rela y	ext. power supply 12V	enhanced FW/SW	compatibility (newer)	compatibility (older)
TCR4A	x	x	x	x	x	x	x	
TCR4–OS3.08NP*	x	x	x	x		x	x	
TCR4	x	x	x	x				x
TCR3–OS3.08NP*	x	x				x	x	
TCR3	x	x						x

* TCR4/TCR3–OS3.08NP – terminals TCR4/TCR3 with company upgraded FW/SW

* Enhanced FW/SW:

Measuring algorithm selection –RaA only or RaA+RaC measurement

Automatic data download and storage in preselected intervals

Selecting of spectra recording intervals

Date and time of storing a spectrum is also recorded

Faster data download when downloaded directly from probes

An identification string can be stored in the probe's memory

Compatibility

TCR3 - OS 3.08 NP terminal is communication compatible only with the following equipment:

TSR2- OS 3.08 NP (company's FW/SW upgrade),

TSR3,

TCR4A,

TCR4 - OS 3.08 NP,

TRR2 - OS 3.08 NP (company's FW/SW upgrade),

TAR2 - OS 3.08 NP (company's FW/SW upgrade).

TCR3 - OS 3.08 NP terminal is not compatible with:

TSR2, TCR3, TCR4, TRR2, TAR2.

3 Scope of Delivery

- TSR2 Wireless Radon Probe
- USB adapter 230V including USB-B cable
- Antenna
- Operation Manual

4 Product Specification

Product	TCR3 Central Unit
Type symbol	042 127 166 000
Measuring temperature range	-20 to + 60 °C
Measuring barometric pressure range	150 – 1150 hPa
Radio interface	868 MHz
PC interface	USB B, RS232
Max number of radio network elements	16
Probe to terminal unit distance (RF range)	Dependent on number of walls and building material, up to 600 m in open space
Possibility of using repeater for RF range extending	yes
Measurement reading interval	240-65535 sec (4 min - 18.2 hours)
Results memory capacity in terminal unit	100 days (1 probe,1 hour records)
Terminal unit power supply	Rechargeable battery (USB charged)
Radon concentration results display	short-term (1 hour average) long-term (24 hours average)
Accumulator Panasonic NCR 18650B 3.7V 3400mAh - Li-ion MH12210 (or equivalent)	

5 Operating Instructions

Switching on:

Central Unit is delivered in standby mode. To switch Central Unit display on, press any of three buttons (F1, F2, or F3). Central Unit display switches off automatically after 1 minute. However, you can set display to be permanently on (see 'Hand Operation'). Central Unit is impossible to switch off completely.

Before connecting Central Unit to PC, install drivers see paragraph 'Configuration'.

Antenna installation:

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



Power supply:

According to operation method Central Unit can be supplied:

- 1) By internal accumulator for portable use – Central Unit includes internal accumulator which is able to ensure autonomous operation of Central Unit for 2-8 months according to frequency of downloading and operation mode of display. Accumulator is charged with USB port and provided USB cable. 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 – Central Unit is permanently supplied by delivered power adapter. Power adapter is connected to Central Unit via provided USB cable. In case of blackout internal accumulator ensures UPS function.

Configuration:

Setting and configuration of Central Unit and whole system is managed by connected computer via USB interface to Central Unit and TERAview application on PC. TERAview application, drivers and user manual with detail description of building and configuration network is free downloaded on website:

<http://www.tesla.cz/>.

For successful actuator configuration in measuring system it is essential to know actuator radio channel number (communication wireless channel) and P2P address (identification in wireless net). Both parameters are printed out on actuator serial number plate. Actuator 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.

Manual control:

For manual control terminals are equipped with a two-line display and three function keys F1, F2 and F3. An inactive display is activated to the last state by pressing any key.

Display menus are set in 3 levels. The upper row is informational (with the exception of data displaying) and it displays the description of the activity determined by the selection F2 in the lower row (middle position with inward arrows). The lower row information can be left/right rotated by the keys F1/F3. The description in the upper row is changed accordingly.

Three leftmost positions in the lower row do not rotate and display status information. Its description is in Tab. 4.

By pressing of the F2 key is the appropriate command executed. The command is either executive or has the meaning of passing one level lower in the display menu (one level higher in the case of the **Ret** command).

Manual control of the terminal allows by pressing of the F2 key in the level 1 selection of the following functions:

- 1) **Set (System adjusting)**
- 2) **Dat (Actual data view)**
- 3) **Srv (Service action)** – This menu is not accesible by the user and an access attempt invokes the message **Err: Unavailable** and a forced return by pressing F2.

Set (System adjusting)

In this menu the display parameters, an external actuator (if used) and the terminal actuator are set-up. All the possibilities are summarized in Tab. 1.

Level2 (F2) selection	Level 3 (F2) selection	Description
LCD (LCD adjusting)	Dsp (Display:)	Periodically switches between Fixed On display is on permanently and Auto Off (display is switched off automatically after cca 1 minute)
	Inc (Contrast setting)	Contrast is increased
	Dec (Contrast setting)	Contrast is decreased
	Ret (Return)	Return to the level 2
Act (Actuator relay)		If there is no actuator– Err: No Device OK – return
	Red (Read Actuator Status)	Actuator state is read and displayed on the upper row
	Set (Act Relay: 1=1Aut)	Periodically changes setting of an actuator relay. By entering the menu the upper row displays actual state (e.g. 1=1Aut)
	Wr0 (WriteOneAddress)	The preset state of the relay is written to the external actuator (one address in case of several actuators)
	Adm (AddressMesh)	Periodically changes actuator addresses in case of more actuators, otherwise of no effect
	Ret (Return)	Return to the level 2
Ter (Terminal relay)	Set (Ter Relay: 0=0Aut)	Periodically changes setting of the relay according to the Tab. 2. By entering the menu the upper row displays actual state (e.g. 0=0Aut)
	Wrt (Write: Terminal)	The preset state of the relay is written to the terminal
	Ret (Return)	Return to the level 2
Ret (Return)		Return to the basic level 1

Tab. 1 Menu **Set** - control options

Setting	Description
0 Man	Forced switching off of the relay contacts
1 Man	Forced switching on of the relay contacts
0 Aut	Automatic mode setting initial state of the relay contacts is off Relay is set according to the preset radon concentration limit after the first measurement results reading
1 Aut	Automatic mode setting initial state of the relay contacts is on Relay is set according to the preset radon concentration limit after the first measurement results reading

Tab.2 Relay contacts setting

Dat (Actual data view)

All the results and measurement parameters are displayed in this menu. Possibilities are summarized in Tab. 3. An attempt for access into the menu Dat in case the measurement is not running invokes the message **Err: Unavailable** and a forced return by pressing F2.

Rem: Starting/stopping of the measurement can not be performed from the terminal

Level 2 (F2) selection	Level 2 (F2) selection	Description
Rdn	In case of several probes switches periodically between them, otherwise of no effect	Sliding hourly and daily values of radon concentration in (h – hour) (d – day) Bq/m ³ are displayed. The displayed result has maximum of 5 digits, from the value 32768 the engineering notation is used e.g. 47k12 (47120) or 120k1 (120100). On the leftmost position the probe's number is displayed (MX)
Err	In case of more errors switches periodically between the list items, otherwise of no effect	All the current errors are displayed. More detailed description – chapter Error messages
RhT	N/A	It displays a temperature in Celsius degrees (°C) and a relative humidity (RH) measured in the terminal (Ter)
Prs	N/A	It displays an atmospheric pressure in hectopascals (hPa) measured in the terminal (Ter)
Ret (Return)		Return to the basic level 1
Act (Relay:)	Act – In case of several actuators in the system switches periodically between them, otherwise of no effect	Current status and setting of the relay in an external actuator is displayed, according to the Tab. 2. Changes are possible in the basic menu Set . On the leftmost position the actuator's number is displayed (MX)
Ter (Relay:)	N/A	Current status and setting of the relay in the terminal is displayed, according to the Tab. 2. Changes are possible in the basic menu Set .
Env	In case of several probes switches periodically between them, otherwise of no effect	It displays a temperature in Celsius degrees (°C) and a relative humidity (RH) measured in the selected probe On the leftmost position the probe's number is displayed (MX)

Tab. 3 Control options in menu **Dat**

Meaning of the three leftmost symbols in the lower row is described in the following Tab. 4

Symbol position from the left Meaning	Symbol	Description
1. Accumulator state	c # void	Accumulator is being charged Accumulator voltage is lower than 3,5V Accumulator is fully charged
2. Measurement and RF communication state	R Q void q e, x, E, X	Measurement is running Communication is in progress (data are downloaded) Measurement is not running, no error is indicated Measurement is not running, communication is in progress Lasting appearance means an error – service action is needed
3. Local relay state	* # = void	relay contacts are on, control error relay contacts are off, control error relay cotacts are on relay contacts are off

Tab. 4 Meaning of the status symbols

Error messages

Errors, relating to the terminal itself are indicated by the status symbols, see Tab. 4.

If error/errors arise connected with operation of the measuring system (an element is out of the radio range, does not communicate or have a low supply voltage), this error is indicated by the LED STATUS shining yellow. More detailed information can be obtained in the menu **Dat**, item **Err**. The current error is displayed together with the appropriate element number (**MXX**) on leftmost positions in the upper row. In case of more errors one can periodically switch between them by pressing the F2 key.

On the rightmost positions of the upper row the error type is indicated:

- **RF** radio communication error (an element does not respond or responds erroneously)
- **Bat** low supply voltage of an element (the battery must be replaced or the accumulator charged)

After error/errors removing the appropriate records from the error list disappear. If there are no errors, the message **No errors** is displayed.

6 Basic Maintenance

Accumulator charging:

During portable use of Central Unit it is essential to monitor state of internal accumulator and recharge it if necessary. If accumulator is discharged (accumulator voltage falls below 3.1V), Central Unit automatically turns off (display does not respond to any keys and it is still off). Central Unit is switched on again powering USB port.

Current state of Central Unit accumulator can be determined in three ways:

- 1) In TERAview PC application - where you can check current accumulator voltage. Battery voltage should not fall below 3.5 V, in limit conditions falls below 3.3V.
- 2) On Central Unit display – Symbol "#" on left edge of second line of display in service mode 'SERV' (see paragraph 'Operation Manual / Hand operation') means that accumulator voltage fell below 3.5V.

Accumulator is charged via USB port using supplied USB cable. USB cable can be connected to PC or to supplied power adapter. Connect USB cable with power to USB port of Central Unit.

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 TESLA.

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

9 Warranty

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 the product was undergoing warranty repairs.

After the end of its life, product must be handled as e-waste

10 Accessories

The TCR3 Central Unit accessories is available at producer www.tesla.cz or distributor.

Reverse antenna



11 Revision history

Revision	Date	Comments
Rev.1:	31. 1. 2015	Initial release