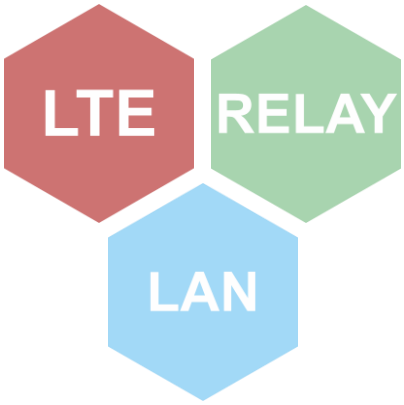
Manual

Radon Scout Everywhere

Remote controlled radon sensor
with switch output



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Referenced documents
Manual Radon Vision
Manual RegServer

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Introduction

Radon Scout Everywhere is a revolution among the conventional radon measuring devices available on the market.

Alongside the high measurement sensitivity characteristic for SARAD devices, which enables the radon concentration to be determined quickly and accurately, the device offers direct access to the measurement data via the Internet without additional hardware (plug & play solution).

Whether with a LAN cable connection or Wireless with the integrated LTE modem, the measurement date is available instantly on the PC or server, always secure with end-to-end encryption.

With its appealing design, adjustable measuring interval, the switch output and the calibration certificate from our DAkkS-accredited radon calibration laboratory, the device offers both flexible usage scenarios and recognized measurement quality.

The device is exceptionally suitable everywhere where autonomous operation is advantageous or where data needs to be collected simultaneously from a number of locations without personal involvement (e.g. residential areas).

Like all of our measurement instruments the Radon Scout Everywhere is designed locally in Dresden, GERMANY. It is also manufactured and calibrated at the Dresden site.

Getting Started

Screw the two supplied antennas onto the antenna sockets and connect the plug-in power supply. The red power LED lights up and after a few seconds the green status LED starts to flash. A few seconds later, the status LED lights up continuously. This indicates that the device is working and is in contact with the SARAD MQTT broker via the mobile connection.

Install Radon Vision, the MQTT keys, and the SARAD Registration Server Service from the supplied CD-ROM. To do this, follow the installation instructions in Chapter 2 of the Radon Vision manual.

Now you can configure the device with Radon Vision and read out measurement data.

The instrument

Controls

Fig. 1. Front panel controls

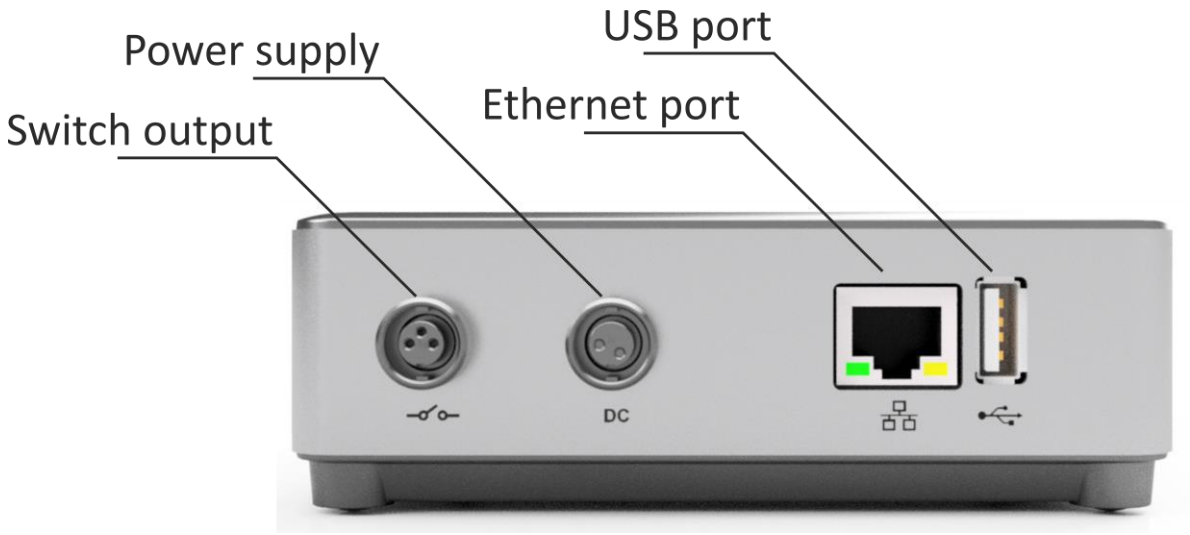

Fig. 2. Back panel controls

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Power supply

The Radon Scout Everywhere requires an external 5V power supply unit. During normal operation the power consumption is approx. 2 W.

The power connection socket is shown in Figure 2 and is located on the back panel of the device, labelled *DC*.

No batteries are required to power the unit. The internal real-time clock is automatically set once power is applied.

Warning: Do not use any power supply other than the one supplied.

Selection of the right location for exposure and installation

The instrument should be placed at a location which is representative for the indoor air quality of a room. The incidence of direct light as well as exposure to strong heat sources should be avoided.

Care should be taken when placing the device close to a wall, as the wall itself may be the source of radon in a room. This would result in an increased concentration in the surrounding of the surface. Some comparison measurements in the preferred placing position and in the middle of the room (each for at least a few days under similar weather conditions) will show whether this is the case or not.

If the connection to the device is established using the LTE standard, special attention must be paid to the quality of the connection. Checking the mobile phone's LTE signal can provide an initial estimate. In case of a weak LTE signal, a different location for the device may be more appropriate.

Selection of the right integration interval

It is possible to adjust the sampling interval of the Radon Scout Everywhere between 1 and 255 minutes. From the physical point of view, it makes no sense to choose intervals shorter than 30 minutes because the response time of the instrument is in that order. If the expected Radon concentrations are in the range or less than the statutory reference level of 300 Bq/m³, an interval of 60 minutes (default setting) should be used. Frequent zero readings for individual sampling intervals indicate that the chosen interval is too short.

Measurement

The measurement starts automatically after connecting the main power supply. As soon as the connection to the Internet is established (indicated by the status LED, Tab. 1.), the real-time clock is set. At the same time, the remote connection to the instrument via the Radon Vision PC software will be available.

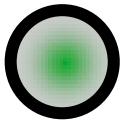
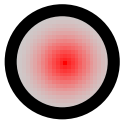
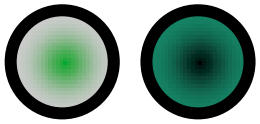
The first measurement result is available and stored in the instrument's non-volatile memory as soon as the first sampling interval is completed. Newly acquired values are periodically appended to the previously stored results.

The measurement cannot be stopped by the user unless the device is completely disconnected from the power supply. There are no back-up batteries, so without an external power supply the unit cannot perform any measurements. In the event of a power failure, the instrument automatically resumes measurement when power is restored.

It is recommended to delete the unnecessary data from the instrument's memory using the Radon Vision software. Each time data is downloaded from the device, all stored records are read. This can result in long download times if the internal memory is full. When several measurement campaigns (over a longer period of time) are required for data analysis, multiple saved files with measurement results belonging to the same measuring device can be opened at once in the Radon Vision software.

LED indicators

The Radon Scout Everywhere has two coloured LEDs on the front panel to indicate the status of the units. The meaning of the signals is explained in Table 1 below.

	Green upper	ON	Unit online
	Red lower	ON	Power supply connected
	Green upper	Blinks	Establishing a network connection

Tab. 1. Signalling the device status with LEDs

Example: The red LED is on, the green LED is blinking – The device is connected to the power supply, but the network connection has not yet been established. It is not yet possible to download data or change settings.

Warning: Initializing the device, including establishing the network connection, can take up to 1 minute.

Communication interface

The Radon Scout Everywhere is designed as an autonomous device, connected remotely via the Internet. Two standard technologies are available to establish a connection to the Internet: wireless via LTE or by cable via a router connected to the Internet.

LTE

Wireless communication is the default setting. A SIM card with a 1NCE IoT Lifetime Flat subscription is already pre-installed in the internal LTE modem. Once the software provided by SARAD GmbH

(Radon Vision, SARAD Registration Server service and MQTT-Keys*) is installed on the user's PC, the connection to the devices is established via the SARAD-MQTT-Broker*. Alternatively, the customer has the option of operating their own MQTT server and obtaining SIM cards from different providers.

*Additional costs may be charged for initialization and for using the SARAD-MQTT-Broker. For further information on this subject, please contact SARAD GmbH directly.

Ethernet Port

In the rare case that wireless communication is not possible, the device can be connected to the local network using an Ethernet cable. As with LTE, communication between the device and the software on your PC takes place via the Internet and the SARAD-MQTT-Broker. However, the mobile data volume is conserved. As long as port 1883 is not blocked by a firewall, switching between LTE and Ethernet is done automatically when the Ethernet cable is plugged in or unplugged.

USB (SARAD-HUB)

The additional interface in accordance with the USB standard (Fig. 2.) serves as a special SARAD-HAB port for another SARAD device, which can also be accessed remotely via the Internet. Connect your Radon Scout Plus, Radon Scout Professional or RTM instruments to the USB port of the Radon Scout Everywhere and the attached device can be also managed via the Internet in exactly the same way as the Radon Scout Everywhere.

With a commercially available USB hub attached to the SARAD-HUB port, even more SARAD devices can be operated simultaneously. The only limitations to such an ad hoc device network are the number of ports on the USB hub and the maximum length of the USB cable.

The SARAD-HUB port can also be used to connect an external LTE modem (e.g. with a USB extension cable) if this results in better signal quality.

Switch output

The Radon Scout Everywhere comes with switch output which can be used directly or indirectly for signalling (e.g. alarm) and ventilation control. The potential-free contact is short-circuited at the end of the measurement cycle when the radon concentration has exceeded the limit value (alarm threshold) in this interval.

If the switch output is used directly the operating current must not exceed 200 mA and the voltage must not exceed 40 V.

The alarm threshold in Radon Scout Everywhere is factory-set to 300 Bq/m^3 (statutory reference value of the Radiation Protection Act) and can be changed by the user with respect to local regulations (via the instrument setup in the Radon Vision software).

The switch output port is shown in Figure 2.

The sampling interval should be set to a value between 60 and 120 minutes for an alarm threshold lower than 300 Bq/m³.

Supplementary equipment

According to the needs of the customer the Radon Scout Everywhere can be equipped with additional sensors for example: pressure or CO_2 sensor.

Pressure sensor

The barometric pressure can be measured in a range from 800 hPa to 1200 hPa. The sensor unit is fully calibrated and features temperature compensation.

CO_2 gas sensor

The integrated CO2 sensor uses the non-dispersive infrared (NDIR) operational principle and includes an automatic calibration routine which is described more in details below depending on the working mode.

Continuous operation

The automatic calibration procedure of the sensor uses the CO2 concentration of fresh air (400 ppm) as a reference. The instrument must be exposed to this “fresh air concentration” at least once during the last 24 hours. This can be achieved by short ventilation of the room. If there are no persons inside a room for a period of time (for example overnight), the concentration goes back to 400 ppm.

Attention: If the reference concentration cannot be reached within the past 24 hours, the sensor interprets the lowest measured result as 400 ppm. This results in a systematically increasing measurement error.

Occasional operation

If the CO_2 sensor is used for sampling periods less than 24 hours no calibration procedure as described above is carried out. Therefore, it is recommended to operate the sensor at least once per week for a period longer than 24 hours to force a calibration. Of course, the instrument must be exposed to the fresh air concentration of 400 ppm during that time.

Disposal instructions

This device does not contain any batteries or accumulators. Electronic measuring instruments must be disposed of as “electronic waste” at appropriate collection points or handed to the manufacturer at the end of their service life for proper disposal. If necessary, they have to be decontaminated before.

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Technical data

Radon Scout Everywhere

Radon measurement		
Operational principle	Lucas cell with gross alpha counting	
Sampling method	Diffusion	
Accuracy	≤ 6 %	
Sensitivity	3.7 cpm/(kBq/m³)	
Range	1–1 000 000 Bq/m³	
Uncertainty (1σ)	1 hour @ 300 Bq/m³	12 %
	1 day @ 300 Bq/m³	3 %
	1 day @ 50 Bq/m³	6 %
Ambient	-10–50 °C, 0–100 % rF non condensing	
Humidity		
Range	0–100 % rH	
Accuracy	< 4.5 % rH (3 % typ.) for 20–80 % rH	
Temperature		
Range	-40–120 °C	
Accuracy	< 0.4 °C (0.3 °C typ.) for 5–60 °C	
Pressure [1)]		
Range	760–1200 hPa	
Accuracy	< 0.5 % FSO	
CO_2 Sensor [1)]		
Principle of operation	Non dispersive infrared (NDIR)	
Range	400–5000 ppm	
Accuracy	< 5 % ± 50 ppm	
Response time	10 min	
Remark	Automatic calibration with respect to outdoor CO_2 level	

Device	
Power supply	Input voltage 100–240 VAC, 50/60 Hz, 2 W Output voltage 5 VDC, 2.5 A
Switch output	Optical relay with potential-free contacts max. switching current 0.2 A max. switching voltage 40 V 2 pin contact
Memory	16 383 data records (approx. 2 years @ 60 min interval) Measurement interval adjustable from 1 to 255 minutes
Interface	Ethernet RJ45 LTE modem, built-in or external
Indicators	Red LED for power supply Green LED for operating status
Controls	Automatic start after powering up
Software	Radon Vision, SARAD Registration Server
Standard software interfaces	MQTT messages to provide data (at extra cost) REST API (available with Ethernet connection only)
Dimensions	120 mm × 120 mm × 40 mm
Weight	approx. 250 g
Accessories	Base unit with integrated LTE modem 2 antennas Integrated SIM card (optional) Power adapter Manual & software (digital) Radon calibration with certificate USB extension cable (optional) Cable for switch output (optional)

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1) Available as an option

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