



RADON SCOUT



User Manual

RADON SCOUT

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The instrument

General

The new Radon Scout is a versatile, easy to use and state-of-the-art instrument focussed on the detection of Radon (Rn-222) in the ambient air. Beside the activity concentration of Radon, air temperature and relative humidity and barometric pressure in case of the RADON-SCOUT PLUS will be determined and saved to a non-volatile circular memory (first in - first out). Up to 670 (RADON-SCOUT PLUS up to 2047) chronological data sets will be available for data transfer to PC. An internal real time clock ensures a correct time regime, a tamper lock indicates dislocation during the measurement.

In case of the RADON-SCOUT PLUS a display informs about the actual readings.

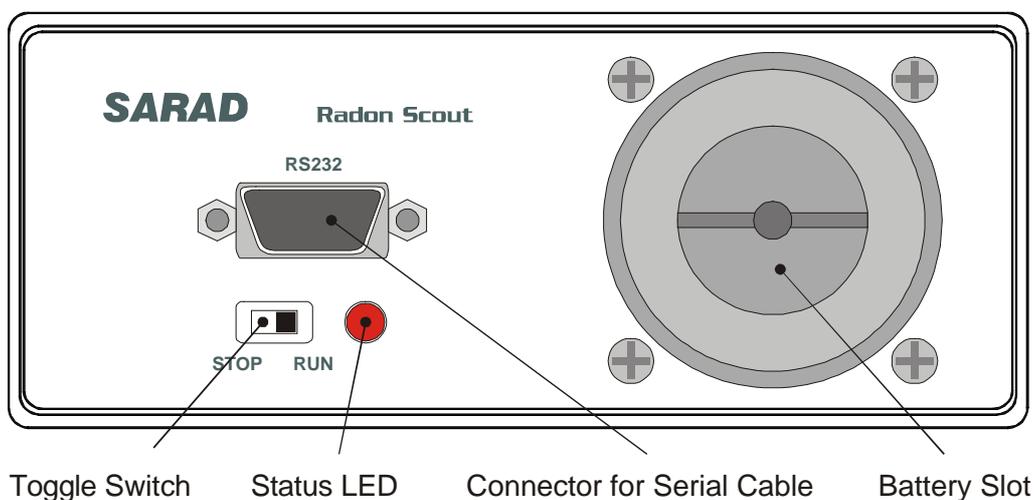
Neither mechanical parts like membrane pumps nor an external power supply are required. Therefore, use and exposition at home or at workplace is possible without any disturbance. A total duration of measurement of up to four month with continuous data recording is possible.

Due to its small dimensions and little weight, the Radon-Scout can be shipped by mail to the place of interest/measurement without any additional man-power required for installation or start-up of an analysis – even untrained staff is able to start a measurement.

Entire part of delivery will be a comfortable software for data read out and dose assessment, easy data back up and publishing of results in protocol prints.

- Read out of measurement data and adjustment of device parameter
- Interactive graphic display with zoom and pan
- Automatic backup of measurement data
- Protocol print of customised time periods with individual header
- Selective export and conversion of customised time periods to text files for additional tasks (like import to EXCEL)

Front panel elements



Power supply

Power supply of Radon-Scout is realised by two D size (Mono) batteries (also rechargeable). To open the battery slot, screw out the cover anticlockwise using a screw driver or a coin. Please pay special attention to the correct polarity of the batteries when inserted. The positive pole needs to be contacted to the front panel.

Change both batteries at the same time as differing charging levels may lead to failures. Use always batteries of the same type.

Close the battery slot by screwing clockwise for 45°. Ensure a tight sealing of the cover.

The RADON-SCOUT PLUS offers an external DC input to supply the instrument by an AC/DC mains power adapter.

ATTENTION: Connect the AC/DC adapter only if batteries had been inserted before. Never use the instrument without batteries even if it is supplied by an external voltage, otherwise malfunction can not be excluded.

If the AC/DC adapter is connected, the batteries will not be discharged. They will work as a buffer in case of mains power interruption. If rechargeable batteries are inserted, the batteries have to be recharged from time to time because of the self-discharge process dependent on the used chemistry. They will **NOT** be charged by the connected AC/DC adapter! Using alkaline batteries in combination with the external DC, the instrument can be operated over several years.

The connector for the AC/DC adapter (4.5V/500mA) is placed at the rear panel of the RADON-SCOUT PLUS.

After the batteries have been changed and replaced by new ones, the LED will light for about one second in orange.

Changing the batteries will force you to adjust the re-set internal real-time clock. A concerning message appears on the display of the RADON-SCOUT PLUS. Stored data remain in the memory and can be read out after changing of discharged batteries.

The selection of the right battery depends on the purpose and total duration of the measurement. For principals, NiCd- and NiMH-accumulators with a cell voltage of 1.2 V as well as alkaline-manganese or zinc-carbon batteries with 1.5 V can be used.

Important hint: Never use Lithium batteries - those cells provide a cell voltage of 3.0V or 3.6 V.

For long term measurements or frequent measurements with small periods of usage, the use of alkaline-manganese cells is recommended as those batteries provide a high energy density (up to 17000 mAh) and a low self-discharging.

Time-to-time measurements for short term are best supplied by rechargeable batteries, as they may be charged prior to usage. NiMH cells provide an energy density of up to 8000 mAh compared to NiCd-cells with a maximum of 5000 mAh. In addition, maintenance to avoid memory effects is not required for NiMH type but self-discharging is higher.

Because the capacity of any cell type is dependent on temperature, storage condition and age (especially rechargeable batteries), the following data are an approximation only:

Alkaline-manganese 17000mAh:	up to 4 month (RADON-SCOUT PLUS up to 3 month)
NiMH 8000mAh:	up to 2 month
NiCd 5000mAh:	up to 1 month

The uptake of power during stand-by is about 15 – 20 % of a measurement. Anyway: In case of storage of the instrument without usage, batteries should be removed.

Discharged batteries are indicated by the red LED, flashing each four seconds. In addition, the measurement will be stopped and the device enters into the stand-by mode.

Start of a measurement

Setting the toggle switch to the right starts the measurement of the Radon activity concentration in the ambient air. Older data will remain in the memory and can be transferred later together with the new one.

RADON-SCOUT only

In case that the switch is already set to the position "RUN" during replacement of discharged batteries, the measurement will be started immediately. Please set the real time clock and restart the measurement once again. The LED will flash in green for about half a second, then LED will flash one or three times each four seconds dependent on selected integration interval (one flash = three hours, flashing three times = 1 hour).

RADON-SCOUT-PLUS only

If the toggle switch is already in „RUN“ position after replacing the battery, the display will show a request to set the real time clock of the instrument by the PC software.

To start the acquisition, the switch has to be set firstly to "STOP" and then to "RUN" position. The green LED lights for a short time and blinks each 4 Seconds during acquisition.

After starting, the remaining time to finish the first integration interval (until the first value can be calculated) is displayed.

As soon as the results of the first integration interval are available, the display switches over automatically between two display pages (each Minute). The first page contains the actual value for Radon with statistical 1-Sigma error as well as the sensor readings (T, rH, p), battery voltage and time stamp. The second page shows the Radon average since the last start of an acquisition, the time of the start, the time period from start (used for averaging) and the number acquired records.

All results are stated in the physical units as selected by software (SI or US style).

Interruption of a measurement

A recent measurement series may be interrupted by switching the toggle switch to the position "STOP", assumed that it is not locked by the software. The Radon-Scout will enter the "STOP" modus immediately without finishing the recent integration interval.

The RADON-SCOUT PLUS will show "Radon-Scout PLUS"

To perform a measurement

Preparation

Prior to each new measurement campaign, the status and type of the batteries should be checked to avoid a loss of data with respect to a interruption of the analysis. In case that the cells had been changed after you adjusted the real-time clock the last time – adjust the timer again to ensure a reliable time regime!

Selection of the right location for exposure

The Radon-Scout was designed for stationary monitoring. Strong vibration, movement or mechanical shocks will disturb the analysis. Those interferences will be detected and compensated by the instrument, therefore the sample is not affected. Disturbance during a longer periods of time needs to be avoided by selecting an appropriate place of exposure. Measurements during transport must not be carried out.

In case that the device had been moved during measurement, the corresponding integration interval will be marked to detect e.g. an unauthorised transportation or a movement with admission.

Selection of the right integration interval

Radon-Scout will store 672 (RADON-SCOUT-PLUS = 2047) measurement records. In case that this maximum of data will be exceeded, the oldest data in the history will be erased and overwritten by the last cycle result (circular memory). Set the interval long enough to avoid data lost in case of measurements over long time periods.

If the assumed or predicted Radon concentration is smaller than 200 Bq/m^3 , the integration interval should be set to three hours. Otherwise the statistical error of each single value below 200 Bq/m^3 will exceed 20%. The integration interval can be changed by software only. The RADON-SCOUT-PLUS allows integration intervals from 1 to 255 Minutes. From the physical point of view intervals less than 60 Minutes make no sense because of the response time.

Lock toggle switch

To avoid a sudden or unintended interruption of a measurement campaign by unauthorised staff, the toggle switch should be locked by software. Using this feature just one start of the measurement is possible.

If the switch is locked, the RADON-SCOUT PLUS display will not show any result.

Serial Interface (RS232)

The serial interface according RS232 standard is required to read out measurement data and to adjust the measurement parameter of the Radon-Scout. Please note that the power consumption of the instrument is about five times higher if connected to the PC by the data transfer cable. In case that the device is permanently connected to a PC, the battery life-time is reduced due to that.

Technical data

Measurement	Measurement chamber with HV collection and Si detector Gross alpha detection
Sampling	Diffusion
Sensitivity	2 cpm/kBq/m ³ (4.4 cph/pCi/L)
Measurement range	0 ... 2 MBq/m ³
Error	±5% within the whole range or smaller
Ambient conditions	-10 ... 40 °C, 0 ... 100 %rH not condensing
Temperature sensor	-20 ... + 80 °C
Humidity sensor	0 ... 100 %rH
Pressure Sensor	800 ... 1200 mbar
Tamper sensor	2G to detect movements or shocks
Memory	672 records (RADON-SCOUT-PLUS 2047)
Power supply	2 x battery type D (Mono) 1.5V/1.2V RADON-SCOUT-PLUS also by mains power (AC/DC adapter)
Autonomous operation	ca. 3 month for alkaline battery (17000mAh) at 20°C
Data transfer	Serial interface cable (RS232) or USB adapter
Operation	Start/Stop by toggle switch (may be locked via software) RADON-SCOUT-PLUS: display 3 x 16 characters
Dimension	ca. 175 x 135 x 55 mm
Weight	ca. 800 g incl. batteries