Corentium Pro Radon Monitor

Corentium Pro is a calibratable, battery-powered, continuous radon monitor specifically designed for professional users to measure indoor radon concentrations in workplaces and private homes where relative humidity does not exceed 85%. It is a user-friendly, small, lightweight and rugged instrument with a wide measuring range of 1 - 200 000 Bq/m³.

Radon concentrations are measured and recorded by the *Corentium Pro* at 1-hour integration intervals. It is additionally equipped with data loggers for temperature, relative humidity and air pressure, the measurement data of which are also recorded in 1-hour intervals.

Special attention in the design of the *Corentium Pro* was given to the aspect of making radon measurements reliable and preventing intentional or unintentional manipulation of the radon monitor and the measurement data by unauthorized persons.

The *Corentium Pro* does not have a direct display in order to prevent attempts to influence radon levels in the environment of the radon monitor when readings are high. However, the status of the instrument is indicated directly by different colored LED light signals as well as a buzzer.

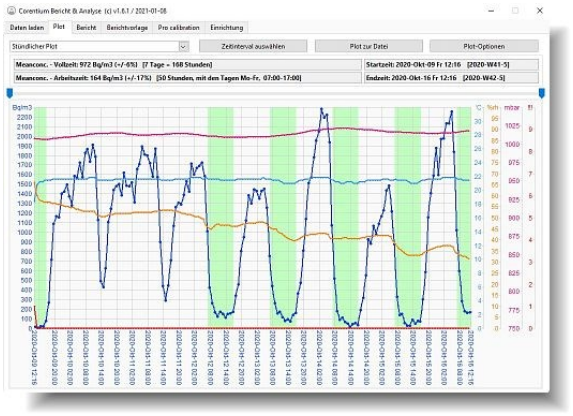
The *Corentium Pro* also does not have an on/off switch so that ongoing radon measurements cannot be interrupted by careless or malevolent behavior of unauthorized persons. The device constantly measures radon as soon as the batteries are inserted. Although actioning the pushbutton on the frontside of the radon monitor stops an ongoing measurement, this action also starts a new measurement at the same moment. In this way, no measurement data can be lost or measurement times missed. In addition, the pushbutton can be deactivated for defined periods via de "*CRA*" computer software.

The long battery life, which allows continuous measurement for more than one year with a single set of 3 type AA alkaline batteries, and the large memory, which can store up to 5 years of measurement data, further provide security against loss or missing of measurement data.

Other protective features on the hardware side include the secured battery compartment that can only be opened with a small "Torx 6" key and the ability to attach the Corentium Pro to a fixed object using a "Kensington" lock so that the equipment cannot be removed from the predetermined measurement location.

A built-in accelerometer registers every movement of the *Corentium Pro* as well as free fall or hard impacts on the device. With the "*CRA*" software, the user can see when these events occurred and assess whether or not the movements require a repeat radon measurement.
The measurements are not affected by moderate mechanical vibrations, since the *Corentium Pro* is insensitive to the effect of microphonics. It is insensitive also to electromagnetic interference from cell phones or other transmitters.

Protection against any manipulation of the measured data is ensured by the special file format (*.cor files) under which all measurement data are stored in the memory of the radon monitor. These files can only be accessed with the "*Corentium Report & Analysis*" PC software ("*CRA*" software), but the contents cannot be modified.



The *CRA* software allows the user to visualize and analyze all measurement data and export the data as spreadsheet files (*.csv) or image files to computers and other applications. In addition, specific periods per day, such as working hours, can be selected for which the radon measurement data are specifically taken into account and the respective mean values are calculated separately and automatically. The measurement data for these selected periods are also exported in a separate column of the spreadsheet.

With the *CRA* software it is further possible to control and operate the *Corentium Pro* and to generate widely customizable radon reports. The *CRA* software also automatically synchronizes the internal clock of the Radon monitors with the computer time, informs the user about basic instrument parameters, and is used to make certain settings on the *Corentium Pro*, such as setting the measurement delay and duration, synchronizing measurement starts with full hours, and disabling the instrument's menu button during scheduled measurement periods.
Communication between the *Corentium Pro* radon monitor and the computer is done via USB connection.

The measuring principle of the *Corentium Pro* radon monitor is based on the detection of alpha particles of radon and its decay products by means of open photodiodes. For this purpose, the *Corentium Pro* has 4 photodiodes, each with an area of 100 mm², located in four separate diffusion chambers. To increase detection efficiency, the radon decay products are deposited directly on the surface of the photodiodes by means of electric fields.

Corentium Pro Radon Monitor

The *Corentium Pro* is a spectroscopic radon monitor that produces a finely resolved energy spectrum so that only the signals from the alpha decays of Po-218 and Po-214 are selectively used to calculate radon concentration. Signals from cosmic rays (muons), from Po-210 and from isotopes from the thoron decay series, however, are discriminated.

For this reason, measurements with *Corentium Pro* radon monitors are not affected by the inevitable increase in contamination of the detection system with long-lived Po-210 over the course of operating time. Corrections of the measurement results with respect to background signals from Po-210 contamination and from cosmic rays during measurements at higher altitudes are therefore not necessary.

Based on the spectrometric measurement of alpha particles, the *CRA* software additionally offers visualization and export of measurement data in the so-called “standard mode” and in the “fast mode”. In the standard mode, the decays of Rn-222, Po-218 and the subsequent decays of Po-214 are used to calculate the radon concentrations, while in the fast mode, only the decays of Rn-222 and Po-218 are selected. By excluding the Po-214 isotope, which occurs in the radon decay chain with a significant delay to Po-218 decay, the fast mode provides a shorter response time for detecting variations in radon concentration, but at the cost of lower measurement sensitivity.

In accordance with the requirements of IEC 61577-2:2014, *Corentium Pro* radon monitors have a very low thoron cross interference of less than 2%.

In August 2022, the *Corentium Pro* received "type approval" from the Czech Metrological Institute (ČMI): - Type Approval Certificate N°: 0111-CS-A015-22
- Type Approval Mark: TCM 442/22 – 5879

(camera tripod not included in delivery)

TECHNICAL SPECIFICATIONS

SPECIFICATION	DESCRIPTION
Sampling Method	Passive radon diffusion chamber; Alpha spectrometry
Detection Method	Detection and energy measurement of α-particles with 4 silicon photodiodes in 4 distinct detection chambers
Sampling Rate	1 hour integration intervals
Measurement Range	1 – 200 000 Bq/m³
Radon Calculation Modes	Standard mode: Calculation of radon concentration via decays of Rn-222, Po-218 and Po-214 Fast mode: Calculation of radon concentration via decays of Rn-222 and Po-218
Sensitivity	~ 1cph at 10 Bq/m³ (standard mode)
Diffusion Time Constant	25 minutes
Thoron Cross Interference	< 2%
Measurement Uncertainty **After 24 hours** **After 7 days**	 σ ~ 7% ± 5 Bq/m³ (standard mode) σ ~ 5% ± 2 Bq/m³ (standard mode)
Detector power supply	3 alkaline batteries, type AA (LR06) for approx. 15 months continuous measurement
Operation Environment	Temperature: 4 to 40 °C Relative humidity: 5% RH to 85% RH (noncondensing) Barometric pressure: 50 kPa to 110 kPa
Temperature Sensor **Range** **Resolution** **Accuracy**	 4 to 40 °C 0,2 °C ± 0,5 °C (typical), ±1°C (max.)
Humidity Sensor **Range** **Resolution** **Accuracy**	 5% RH to 85% RH (noncondensing) 0,5% RH ± 4,5% (in range 20 – 85% RH)
Barometric Pressure Sensor **Range** **Resolution** **Accuracy**	 50,0 kPa to 110,0 kPa 0,06 kPa ± 1 kPa
Motion Sensor	Built-in accelerometer records movements of the device
Memory	The internal memory stores 5 years of hourly data points
Memory Capacity	- 1900 days of measurement - 5 datasets of one-year length - 177 datasets of one-week length
Memory Type	Non-volatile flash memory
Dimensions	140 x 140 x 30 mm
Weight	325 grams (including batteries)
Housing	ABS plastic
Other	- One push-button to start new measurements - Kensington security lock - ¼” thread to mount the device on camera tripod

Český metrologický institut

Type Approval Certificate

No. 0111-CS-A015-22

Czech Metrology in accordance with the Law of metrology No. 505/1990 Coll. as amended

approved

Continuous radon monitor
type Corentium Pro

under observation of technical data referred to in Annex of this Certificate.

Type approval mark: **TCM 442/22 - 5879**

Applicant: **GT-Analytic SARL**
30 rue Grande
13410 Lambesc
France

Manufacturer: **Airthings ASA**
Norway

Valid until: **18 August 2032**

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. Certificate has 3 pages.

Český metrologický institut -3-

Brno, 19 August 2022

Ing. František Staněk, PhD.
Deputy Director for Legal Metrology