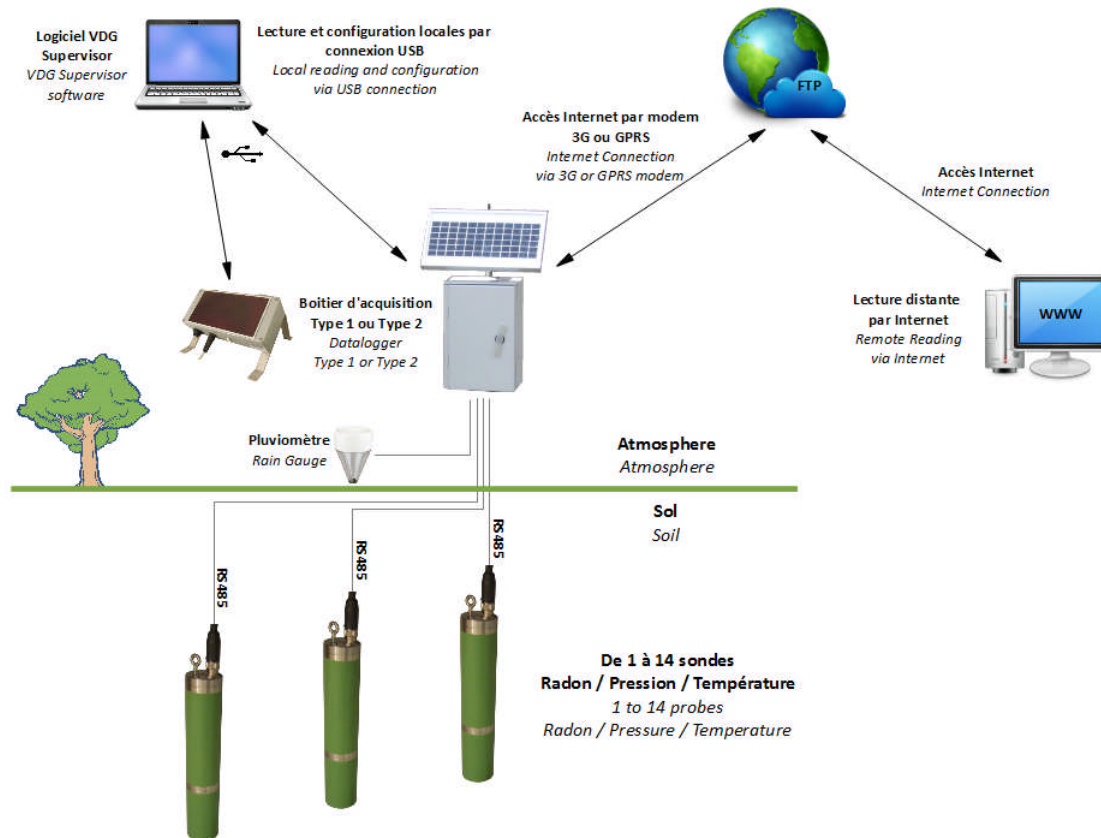


VDG RADON MONITORING NETWORK

○ CONSTITUTION OF A LOCAL NETWORK FOR GEOPHYSICAL MEASURES



Applications : gas geochemistry research, public and industrial safety, health impacts

- Continuous in situ monitoring (flux and velocity) of natural or anthropogenic soil degassing;
- Surface monitoring of underground gas storage sites, monitoring of diffuse degassing of former landfill sites;
- Monitoring of natural ground degassing before and after the setting up of industrial plants (Carbon dioxide sequestration, underground fuel gas storage, geothermal or hydrothermal facilities, etc.);
- Characterization and geochemical monitoring of seismically active faults;
- Distal monitoring of volcanic activity.
- Monitoring the efficiency of the covers of rehabilitated uranium bearing sites;

Specifications





- Modular setup,
- Complete set allowing the recording of measures from 1 to 14 buried probes,
- Each probe is equipped with sensors for radon, temperature and pressure.
- A monitoring housing placed above ground supplies power to the probes and records the measures: data is accessible without having to remove the probes from their positions.
- Probes can be connected in series or in parallel from the monitoring housing. The maximum distance allowed between the monitoring housing and the furthest probe is 120m.
- A rain gauge can be added to the setup.
- 3 power sources are available:
Battery + solar panel, batteries or mains power 110 / 230V with back up battery.
- Local data download with a laptop equipped with the proprietary software "VDG Supervisor"
- In option, two types of remote data transmission:
GPRS Modem to FTP server
3G Modem, accessible from a web page
- Operating temperature : -20°C to +50 °C.

1 – VDG Probe:

Specifications of radon probe VDG are described in the dedicated technical data sheet. (NT-XFAB545-203).

Quantities measured : ^{222}Rn , temperature, atmospheric pressure,
Measurement of radon :

The radon enters a detection volume through three cellulose filters which trap all the solid daughter products.

The sensor is an implanted silicon detector with a depleted depth of 100 μm and 400 mm^2 of sensitive area. It authorises the counting by spectrometry of atoms of ^{222}Rn and its daughter products created in the detection volume (window set at between 1.5 MeV and 6 MeV).

The calibration of the sensor enables the volumic activity of the ^{222}Rn to be calculated.



Sensitivity:	50 $\text{Bq}\cdot\text{m}^{-3}$ per $\text{imp}\cdot\text{h}^{-1}$ (typically) Range from 0 to 1 $\text{GBq}\cdot\text{m}^{-3}$
Temperature:	accuracy 0.05°C (relative) 0.1°C (absolute)
Atmospheric pressure:	0.1 hPa (relative) 1 hPa (absolute) from 500 to 1500 hPa
Shocks:	binary detection, the sensor is set for a sensitivity equivalent to that of the radon sensor (the silicon detector generating spurious pulses in the event of a shock)
Battery voltage:	0.1 V (resolution)

Casing:

Casing made of fibreglass and corrosion-resistant stainless steel.

245 mm height * 62 mm diameter / weight 2 kg

Lining: 5 μm of copper + 3 μm of nickel.

2 handling ties.

Protection index: IP 68.

Linking cable length: 120 m maximum .

2 – Monitoring housing :

2 types are available:



Type 1



Type 2

	Type 1	Type 2
Positioning	Ground	Mast
Number of probes monitored	1 to 3	1 to 14
Power supply	2 x5 alkaline batteries, Battery + solar panel	Battery + solar panel 230V AC 50Hz
Rain gauge	Yes	Yes
USB	Yes	Yes
GPRS	No	Yes
3G	No	3G Module with web server integrated into the monitoring housing, in association with a 3G modem.
Dimensions	360*160*90	300*200*170
Weight	5 kg	7 kg

Parameters measured:

- The monitoring housing measures the atmospheric pressure and the temperature.
- Impacts on the housing and power supply voltage are monitored.

Measuring cycle:

Adjustable parameters: 1 to 240 minutes

Memory capacity:

4 MByte Flash memory (saves the in the event of a power failure).

Storage capacity will depend on the length of the measuring cycles and the number of probes in service.

For a 15 min acquisition cycle:

Capacity of over 2 years for 2 probes

Capacity of over 5 months for 14 probes

Parameter setting and data collection:

Drivers and Software for PC with Windows XP, Vista, 7.

Environment:

Operating temperature: -20°C to +70°C

Relative humidity: 95%

Protection index: IP 54.

3 – Rain Gauge :



Tipping bucket rain gauge. The pulse created by the tipping action is transmitted via the interconnection box to the BARASOL MC probe, which then records it.

Sensitivity of measurement : 0.20 mm of water per tipping action

Length of cable (link to the box) : 6 m

Casing :

Plastic casing with metal base.

Holes for fixing it to the ground.

Dimensions:

Height : 350 mm

Weight:

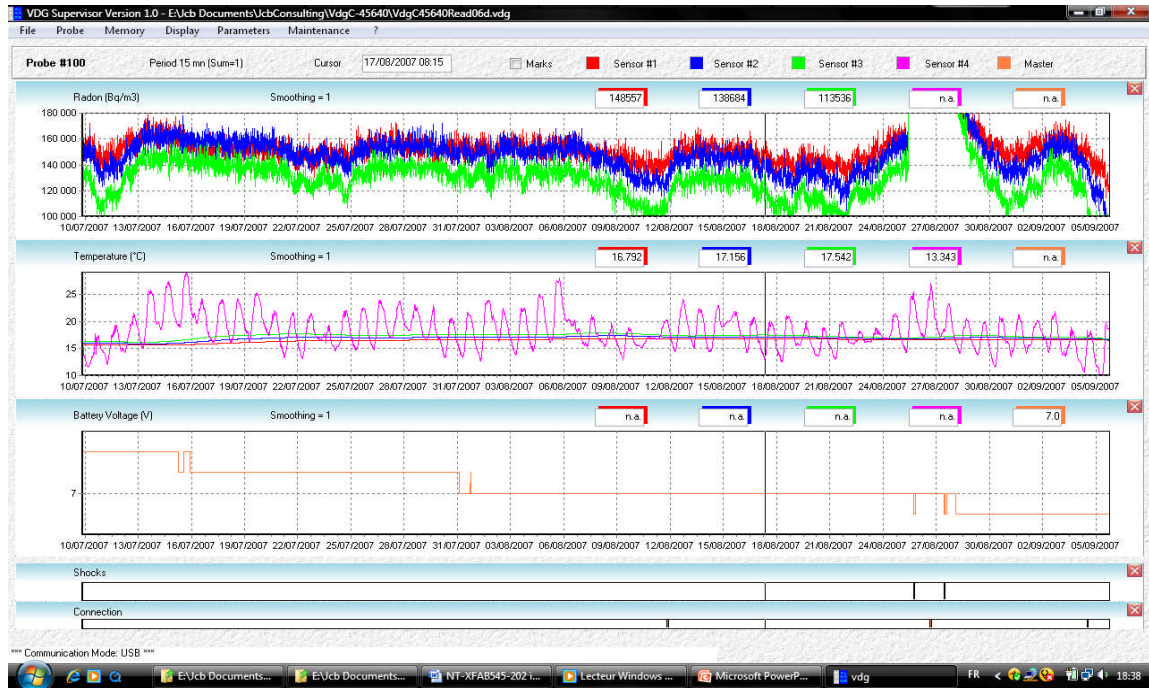
2.1 kg.

4 – Supervision software : VDG Supervisor

Operation:

- Software for PC with Windows 2000, XP, Vista, 7
- Parameter setting (selection of measuring interval...).
- Initialization of the sensors.
- Enables access and download of all data stored in memory
- Stopping recording for transport or temporary storage of the equipment.
- Export of data as Excel or text files, printing.

4 - Supervision software : VDG Supervisor (Continued) :



Display:

- 1 to 3 display windows available.
- Display of radon, temperature, pressure, battery voltage records with time.
- Display of 1 to 4 sensors per window (for example: radon for devices 1, 2, 3; pressure for devices 1 to 3 and data logger).
- Display of a window with instrument status (shocks and power failure).
- Change of time scale for all windows simultaneously.
- Change of ordinate scales separately.
- Display of data values by cursor, smoothing of curves by running average (1 to 10 points), summation, zoom.

Conversion:

- Conversion of the data in a tabulated text file for further exploitation in a spreadsheet or with an external processing software.

5 – References :

VDG is supplied with

- USB cable
- a certificate indicating the calibration coefficients of the radon sensors ,
- User manual on USB key

1-Hardware

				Type 1	Type 2
VDG Probe	P-545-101	Rain Gauge	P-542-108		x
VDG to housing cable	P-545-112	Battery housings	P-545-102	x	
<i>Length to be determined</i>		Mast	M-545-113		x
Monitoring housing type 1	P-545-116	Solar panel	M-545-107	x	x
Monitoring housing type 2	P-545-109	GPRS *	M-545-105		x
		3G *	P-545-117		x

2-Software

VDG Supervisor P-545-110

* SIM card, subscription and communication costs are extra, at the charge of client