SPECIFICATIONS

English

Rays detected :	X, Gamma rays and beta particles (X, β and γ)
Measurement cycle :	30/38 seconds
Measurement display time :	3 seconds
Unit displayed :	Micro Rem per hour (µRem/h)
Sensor :	Tube Geiger-Müller
Display :	3 digits by LED + 1 service LED
Range of measure :	0 à 999 µRem/h
Energy of X and γ rays detected :	100 keV to 1,2 MeV
Energy of β particles detected :	350 keV to 1,2 MeV
Measurement uncertainty of X and Gamma rays :	25 %*
Measurement uncertainty of beta :	Indicative due to low propagation
Power source :	9 Volts, 6LR 61 type battery
Temperatures range:	- 49°F to + 131°F
Factory calibration :	Cesium 137
Saturation indication :	**t t t** on display
Indication of each Gamma or beta quantum :	≡ on service LED and beep

CE

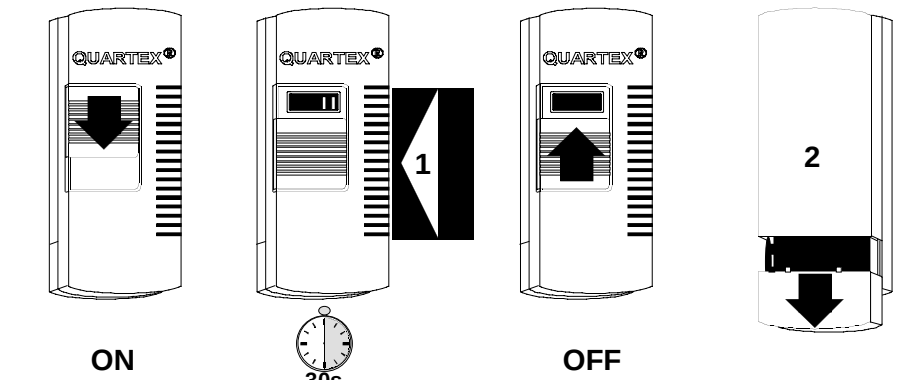
* : For energies under 300 keV, the radiometer is more sensitive (up to 125%) nevertheless spectrum density of radioactive objects in the range of low energies is small.

GUARANTEE

This radiometer is guaranteed against defect due to faulty design , materials or workmanship in the following limits :
This guarantee is strictly limited, after examination and control, to repair of defective parts in our factories (or at our discretion, to replacement). This guarantee excludes indemnity of any kind.
The guarantee period is one year.
The guarantee comes into force from the date of purchase indicated on the proof of purchase. The guarantee is effective if the radiometer has been used in accordance with the documentation and the state of the art.
This guarantee does not apply to damage or accident caused by neglect, modification or attempt to modification of any kind.
The guarantee is not applicable in case of force majeure, act of God or any case not under the responsibility of the builder or due to abnormal use.
The guarantee stops if the purchaser has unsealed or attempted to unseal the body of the radiometer.
The guarantee is valid for radiometers that are returned to the retailer with a proof of purchase.
The radiometer should be returned at the purchaser's risk and expenses.
The replacement or repair under this guarantee does not extend the duration of the latter.

This guarantee is in addition to and does not in any way affect any statutory or other rights of consumer purchasers.

Before returning the radiometer in the frame of the guarantee, verify the battery contacts : it is a usual case of miss-functioning.



1)

Detection axis

2)

Battery change

Geiger Counter Quartex

INTRODUCTION TO THE RADIOMETER QUARTEX

English

The Geiger Quartex counter RD 8901 is used to detect the beta radiations and X and Gamma rays (call ionizing radiations) with a high sensitivity. It count beta particles and the ionizations created by the X and Gamma rays over a period of 30 seconds in order to indicate the quantity of energy transmetted into the matter (Dose equivalent).
Units displayed are the micro Rem/hour (µRem/h) witch corresponds to the Dose equivalent received by the human body in one hour.

PRECAUTIONS FOR USE

Check the condition of the battery regularly. If the display shows nothing, or indicates a value less than 3 µRem/h, the battery you must change the battery. Remove the battery if the counter will not be in use for some time.
Do not open instrument casing, thedetector tube is supplied with high voltage.
The accuracy of the instrument reflects it's intended domestic usage. in case of really abnormal detection, call an official agency.

USE OF THE INSTRUMENT

To switch on, slide down the rugged window. A long tone will indicate thestart of the count cycle. Atone is emitted and the display indicates the symbol ≡ at the detection of each ionization. After about 30 seconds, the measurement is displayed (with _) and a 2 tone bip is heard (3 sec.) then a long bip and the average of the last 3 measurements (with ≡). A count cycle will re-starts.
According to the statistical phenomena of the radiation, an average of at least 5 measures in the same condition is necessary to be significant, especially at very low level. Background radiation is subject to natural fluctuations from a measurement period to an other.
The initial measurement is the level of ambient radiation that makes up the "ground noise":
The actual target may now be tested. To do this, approach the target that is to be emitting β or γ rays with the openwork side of the counter.
If the measurement is greater than the "ground noise", the object is radioactive and the QUARTEX will anable you to evaluate the dose rate.
If the measurement is equal to the "ground noise", the target may be considered non radioactive (β and γ).

It is however possible that the target does contain elements emitting β or γ rays but at a strength too weak to be detected above the "ground noise". These elements are generally radiotoxic if ingested.

When used in search mode, audible tones will help to localise a radioactive source.

It is possible to discriminate the β from the γ in using a filter. The measurement without filter includes β + γ. With a filter like an aluminium film, the measurement is only γ. therefore, the differences are the β.

Note : Display of t t t symbol indicated a very high level of radioactivity.

A REMINDER ABOUT RADIOACTIVITY

Matter is composed of atoms, each atom has a core composed of protons and neutrons. the core is surrounded by electrons witch circle around like satellites. Radioactive materials spontaneously emit X or Gamma rays and/or beta or sometime Alpha particles.

Beta particles are electrons. Because of their charge, they react strongly with matter. They travel from several centimetres to several metres in air. Aluminium foil will stop them .

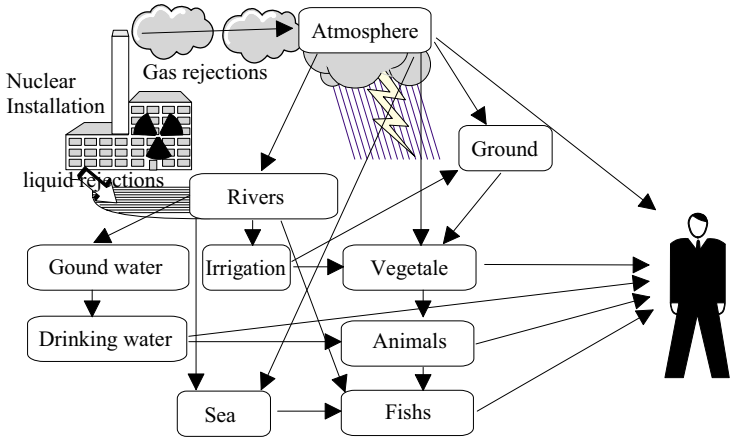
Alpha particles are helium atoms (2 protons et 2 neutrons), They travel some centimetres in air. A sheet of paper will stop them.

Gamma rays are electromagnetic rays generated during physical phenomenas occurring at the level of the core of the atom. Gamma rays are capable of producing ions (atoms or molecules electrically charged)directly or indirectly during their passage through matter. They can travel ten's of metres in air and theirpenetration can be very significant. A very thick layer of lead or concrete will greatly attenuate gamma rays.

X rays are similar to Gamma rays but generated during physical phenomenas occurring outside the core of the atom. They are used in medicine but are rarely found in nature.

CONTAMINATION AND CONCENTRATION

This sketch below shows a simplified detail of radioactive propagation, and in which areas of the environment they can be found.
Note : game, like migratory birds and foxes can be contaminated and numerous and the majority will come from highly-contaminated areas of the former USSR.



EFFECTS OF THE RADIOACTIVITY

Ionisation of atoms of molecules of the human body can cause problems capable of generating cancerous tumours and genetic mutations themselves able to create heredity defects.
Parts of the body susceptible to radiation (in descending order) :

1) Sexual organs (both sexes, heredity defects)
2) Breast (cancer)
3) Red marrow of bones (leukaemia)
4) Lungs
5) Thyroid
6) Bones
7) Tissues
8) Skin

IRRADIATION

NATURAL

Sub-soil :	4 µRem/h average (depending of States and places)
Granite soil :	20 time more than the Sub-soil (radioactivity of 8000 Bq/Kg)
Radon gas :	This gas comes from the underground Uranium disintegration and can accumulate inside buildings. It gives off alpha particles and some Gamma rays
Cosmic radiations* :	3,4 µRem/h at the sea level (10,3 at 10000 Ft)
The human body :	2,3 to 17,7 µRem/h (linked to swallowing and breathing)
Water and food :	5,7 µRem/h (non-contaminated products)

ARTIFICIAL

Medicine :	11,4 µRem/h average in a year (X-rays and radio therapy...)
TV screen :	0,11 µRem/h
Worldly nuclear test fallout :	51,3 µRem in 50 years (average diluted atmospheric discharge)

Etc .....

* Cosmic radiation is attenuated by the atmosphere, It's effect is greater at altitude, and can reach up to 300 µRem/h in a plane at 33000 Ft.

THE LEVELS OF RADIATION NOT TO OVERPASS

There is no innocuousness threshold for the radioactivity. All doses, even low, generate a pathological risk. Higher the dose is, More the risk of cancer and genetic mutations' growths. The ratio between risk and dose can be considered as linear. Therefore the International Commission for Nuclear Protection (ICNP) has suggest in 1990 that the maximal dose equivalent be , for the public not more that 1 milliSievert par year (corresponding to an average of 11,4 µRem/h) This Standard is for doses received in addition of medical X rays and natural radioactivity. The old Standards was 5 milliSievert per year but all the radiations was included.
The ICNP estimates that for every milliSievert, 60 cancers (including 50 fatal) and 13 additional genetic mutations per million of people can be estimated.

CALCULATION OF THE AVERAGE DOSES

You should measure the levels corresponding to the places you use to be, and take into account the time you spend in, to establish an average.
Example : habitation 20 µRem/h, 12 hours per day; workplace 30 µRem/h, 8 hours per day; other 10 µRem/h, 4 hours per day. Average dose = (20X12) + (30X8) + (10X4) = 520 µRem for 24h, therefore 520 ÷ 24 = 21,6 µRem/h

THE UNITS

UNITS	EQUIVALENT	DEFINITION
Curie (Ci) or **Becquerel (Bq)**	**1 Curie = 37 billion of Becquerels** **1 Becquerel = 27 picocuries**	The number of splits per second (**ACTIVITY**)
Rœntgen (R)	**1 Rœntgen =2,58.10^{-4}C/Kg**	Measure of energy in air (**DOSE**)
Rad (Rœntgen absorbed dose) or **Gray (Gy)**	**1 Gray = 100 Rad (1 joule / Kg)** **1 Rad = 0,01 Gy**	Energy received per unit mass (**ABSORBED DOSE**)
Rem (Rad Equivalent Man) or **Sievert (Sv)**	**1 Rem = 10 milli Sievert (mSv)** **1 Sv = 100 Rem ≈ 100 R**	Effect of radiations on the human body (**DOSE EQUIVALENT RATE**)

WHO TO CONTACT IN CASE OF ABNORMAL DETECTION ?

In the UK
Directorate of Pollution and Wastes, Radioactive Substances Division, tel : 0171 276 8086
In the USA
EPA (Environmental Protection Agency) tel : 202 382 20 90
NCRP (National Council on Radiation Protection and Measurements), tel : 301 657 26 52
In Ireland
Ministry of Environment, tel : 353 01 793 77
Earthwatch (NG), tel : 353 27 50968

In New Zealand
Ministry of Environment, tel : 64 4 473 4090
In Canada
Environment Canada, tel : 1 403 468 80 12
In Australia
Environment Protection Authority, tel : 61 3 6285111 or 61 9 2227000
State Pollution Control Commission, tel : 61 2 7930260
In Sweden
Staten strälskyddsinstitut, tel : 08-729 71 00