

BITT Technology

ERAC

Electrostatic Radioactive Aerosol Collector



To assess a radiation contamination of the environment the easiest instrument is the evaluation of the external gamma radiation. The next important assessment of the environment is the aerosol activity which finally in the air of the ground-level atmosphere is inhaled by people for this is all above the alpha- and beta activity the criterion.

The use of aerosol measuring instruments, which are able to work under the same conditions as the gamma stations so far failed primarily on the price and the possibility of establishing such facilities outdoor.

The **ERAC** is a fully automatic continuously working measuring instrument for the measuring of the alpha and beta activity as well

as the gamma radiation which can be used both in radiation early warning systems and for the monitoring of radon concentration in buildings and outdoor.

Measurement principle:

With a commercial fan as used in PCs the air is sucked over an ionization distance while a large part of the aerosols respectively dust particles are deposited on commercial aluminium foil. The aluminium foil is gradually forwarded.

For the gamma activity a proportional counting tube is designed below the foil.

Above the aluminium foil a semi-conductor diode strip is ordered which measures both the alpha spectrum as well as the beta-radiation.

The measurement in 2 steps (every 10 minutes an evaluation is made):

1. Step: The fan and the ionization section are switched on and at the same time the gamma radiation is measured.
2. step: The fan and the ionization section are switched off and the alpha-, beta- and as well the gamma measurement are made.

For the data evaluation in the control centre has been developed our software **BITT SCADA** (Supervisory Control And Data Acquisition). With BITT SCADA the collection, transfer, evaluation, visualization and storing of all data is easily possible as well as the control of all stations. Further details please look at our website www.bitt.at

The **ERAC** has been tested outdoor for two years, where the operational readiness in parallel with a conventional glass fibre filter aerosol measuring unit was compared.

The fluctuating concentration of ^{222}Rn at **ERAC** has shown the same course.

Application method:

Recording of the $\text{Rn } 222$ concentration in the environment, in-door, in waterworks and in thermals as well as in earthquake –dangerous areas for the earthquake warning.

The instrument is also ready for the measurement of artificial radio nuclides, especially plutonium 239

The detection limit for artificial nuclides will be evaluated and the LD (Limit of Detection) is also displayed graphically.

This figure is important because the natural radon levels in the environment can vary strongly.

Service and maintenance only required every 6 months.

The **ERAC** is applied for patent and will be available for an approximate price of € 25.000,00 with the housing (see picture) from autumn 2009.

Detailed information is currently being prepared and will shortly be available.

PRELIMINARY TECHNICAL DATA:

Für weitere Informationen

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V0.8



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With housing:	Dimensions:	770 x 550 x 1.600 mm (depth x width x height)
	Weight:	appr. 75 kg
Without housing:	Dimensions:	500 x 400 x 200 mm (depth x width x height)
	Weight:	appr. 25 kg
Power:		230V AC / 50Hz / 35VA also possible variant: 12 V operation (for example: solar module)
Operation conditions:		Temperature -20°C + 50°C Relative humidity 0 - 99 % Semiconductor 2000 mm ²
Detector		
Differentiation of Artificial and natural nuclide		yes
Measuring range:		
Artificial alpha, beta		1 – 10.000 Bq /m ³ If needed 100.000 Bq/m ³
Natural background measuring:		²²² Rn EEC
Range:		0.1 – 1000 Bq /m ³
Spectral Evaluation:		MCA 64 Ch. PIC8254
Datalogger:		AXIS, ETRAX Lx 100
Precipitate method:		Regulated electrostatics deposition ~6KV
Precipitate carrier:		commercial aluminum f oil
Foil transport:		4 mm /h
Flow rate:		ca. 7.5 m ³ /h
Operating time without maintenance:		6 months

SENSITIVITIES

The smallest detectable radioactivity was calculating the system, considering only realistic sampling and measurement situations. Values are given in Bq/m³ units for measurement cycle time of 600 sec.

	30 min	1 hour
Natural radon background < 20 Bq/m ³ EEC.		
Artificial α-LD (²³⁹ Pu)	1.2	0.9
Artificial β-LD ⁹⁰ Sr [Bq/m ³]	1.5	1.2
Natural radon background < 5 Bq/m ³ EEC.		
Artificial α-LD (²³⁹ Pu)	1.0	0.3
Artificial β-LD ⁹⁰ Sr [Bq/m ³]	1.2	0.5

