A²M 4000

(α – β – γ) Area Activity Monitor
Toxic/Combustible Gas Sensor Option

The A²M4000 is the very first portable and battery powered instrument that combines various types of detectors and components for almost any measurement task in the field of radiation protection.

Definition of a local dose, detection of radioactive sources: The handy and robust NaJ(Tl) detector is connected to the unit via a 10m long cable, so that it can be positioned flexibly in relation to the source. Thanks to the big detector volume, even small sources can be detected.

Net activity of free definable nuclides in food and material probes: The NaJ(Tl) detector is also used to analyze food and material probes regarding specific nuclides (e.g. Iodine, Caesium, Americium). By means of the gamma spectrum, the net activity of six user definable nuclides is automatically calculated. A lead shield against the environmental radiation is an optional accessory.

Measurement of radioactive aerosols in inhaled air (Alpha/Beta CAM): The aerosol sampling head with its spectroscopy filter and its silicon detector samples continuously and detects even small quantities of aerosol carried radioactivity. Both alpha and beta radiation are measured. The spectrometric analysis allows e.g. detecting Plutonium aerosols which cannot be detected by measuring gamma radiation.

Mop tests, surface contamination (clothes), electrochemical probes: Optionally, the A²M4000 can be connected to a portable vacuum chamber, to allow on-site analysis of mop tests and other samples under circumstances similar to those prevailing in a laboratory. The employed vacuum pumps can be connected to a 12V source (car battery).

Toxic and explosive gases: Optionally, sensors to detect toxic and combustible gases (e.g. CO, CO2, CH4) can be integrated.

All detectors can be operated simultaneously. The concept of the system allows an easy handling and a standardized data basis. The device offers predefined measurement procedures that can be easily modified by the user. Additional measurement programs can be created without any problem.

The A²M4000 disposes of a big touch-screen, showing the measured values. All measured data are stored in a 2GB memory card and are available from your PC or laptop through a USB interface. Data transmission and device control can be done by GPRS or GSM modems,

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as well as via Net Monitors ZigBee wireless adapter, if the device is operated in inaccessible or contaminated areas.

A²M 4000 - Technical Data

Aerosol sampler (CAM)	**Fix mounted at the AM4000 front panel**
Detector	400mm² ion-implanted silicon detector
Filter	Membrane filter, d=27mm, 1µm pore size Active filter monitoring against perforation, exhaustion No tool for filter replacement required
Pump	Rotary vane type 3 l/min, processor controlled
Analysis/results	Exposure and dose for both, alpha and beta aerosols (LLRD) Compensation of natural Radon daughters background Radon/Thoron EEC/PAEC are calculated separately Storage of time distribution (results as well as spectra)
Detection limits LLRD	at typical Radon outdoor concentration of 5 Bq/m³
1 min sampling interval	< 100 Bq/m³
10 min sampling interval	< 0.1 Bq/m³
Gamma probe	**Connection via cable at the AM4000 front panel**
Detector	Sodium-Iodide (NaJ(Tl)) with integrated PMT und Bias Scintillation crystal 2“ x 2“ Energy range for spectroscopy 10keV - 3MeV Spectral resolution 8% (Cs-137)
Results / Analysis	Count rate, dose rate (energy compensated), Net-activity of six user defined nuclides Storage of record related spectra and time distribution
Probe dimensions	Diameter 60mm, length 260mm Cable 5m (optional 10m)
Sensitivity	1000 cps/(µSv/h) related to Cs-137
Vacuum chamber (Option)	**Connection via cable at the AM4000 front panel**
Detector	Ion-implanted Silicon detector 400mm² (optionally up to 2000mm²) Alpha 0-10MeV, Beta from approx. 180keV (400mm²)
Connection	Cable for detector and vacuum control, 1m each Pump connector 4mm Quick-Lock tube connector
Sample holder	Plate for 1 and 2 inch samples, max. distance between sample and detector 40mm Reverse bias voltage included
Chamber	Aluminium anodized, easy to disassemble for cleaning purposes Vacuum control by pressure sensor und 3-path valve
Dimension	243mm x 195mm x 150mm
Results / Analysis	Alpha spectrum
Additional sensors	
Standard	Flow rate 0 … 4 l/min, uncertainty ± 5%
Air analytics (option)	CO, CO2, CH4, combustible gases, several ranges

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Water analytics (option)	pH value, Redox potential, conductivity etc.
Process (option)	Pressure, differential pressure, flow, velocity etc.
Meteorological (option)	Wind direction, wind speed etc.
Common	
Sampling	Simultaneous measurement with all detectors/sensors with respect to the selected sampling cycle
Sampling cycles	Storage of up to 16 different sampling cycles with up to 32 steps (pre-defined or infinite repetition) Interval 1 Second to several weeks
Data memory	SD Card, 2 GByte
Controlling	Touch-Screen 6 x 9cm Interface: USB, RS232, Net Monitors ZigBee wireless optionally
Power supply	Internal 12V rechargeable battery, mains power adapter Optionally additional connector for 12V car battery or solar power supply
Dimensions/weight	235mm x 140mm x 255mm / 6kg
Software	dVISION: Control and data transfer (also via TCP/IP, GPRS, GSM, ZigBee), visualization, data management dCONFIG: system configuration, creating/changing cycles (also via TCP/IP, GPRS, GSM, ZigBee) dLIBRARY: Library/Calibration for NaI gamma probe compatible with TOMAS (Tracking Online Monitoring und Alarm System) and IDEA-ILC
Extensions	Available at internal connectors: 8 analogous inputs, 3 counter inputs, 2 status inputs, 6 switch outputs, clock switch, PID regulator/analogous output
GPS	GPS coordinates are recorded and stored together with the measurement results. GIS compatible *.kml files can be exported (can be opened by Google-Earth). Antenna connected by cable.

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