

Automatic Radiation Station

Radiation Monitoring



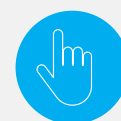
**Modular and scalable
platform**



**Multimode data
communication**

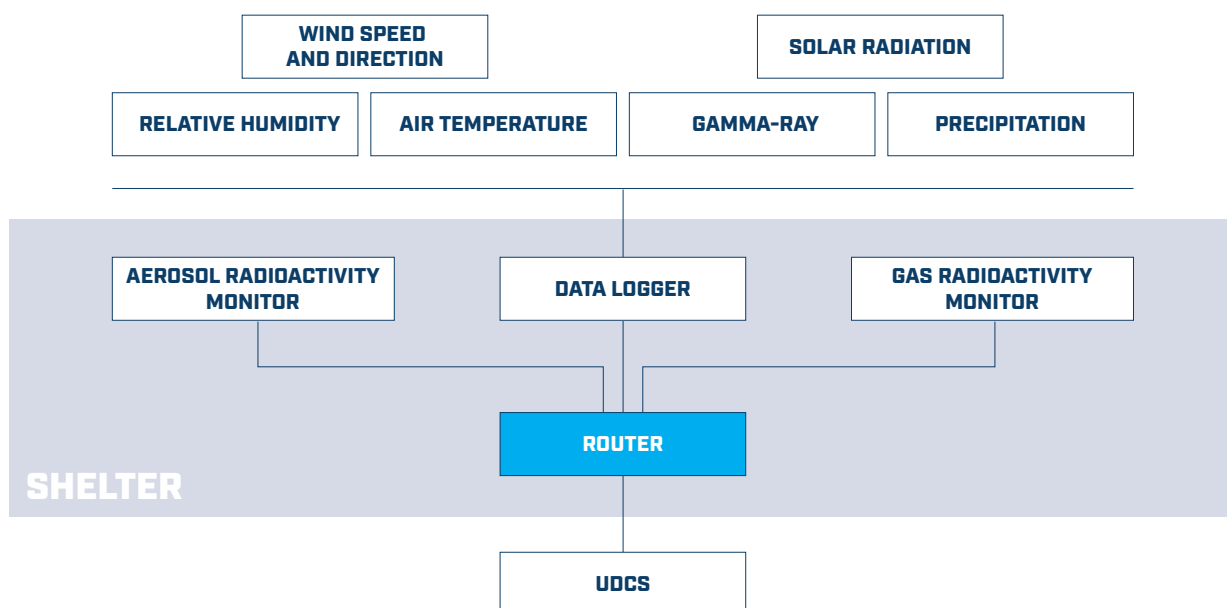
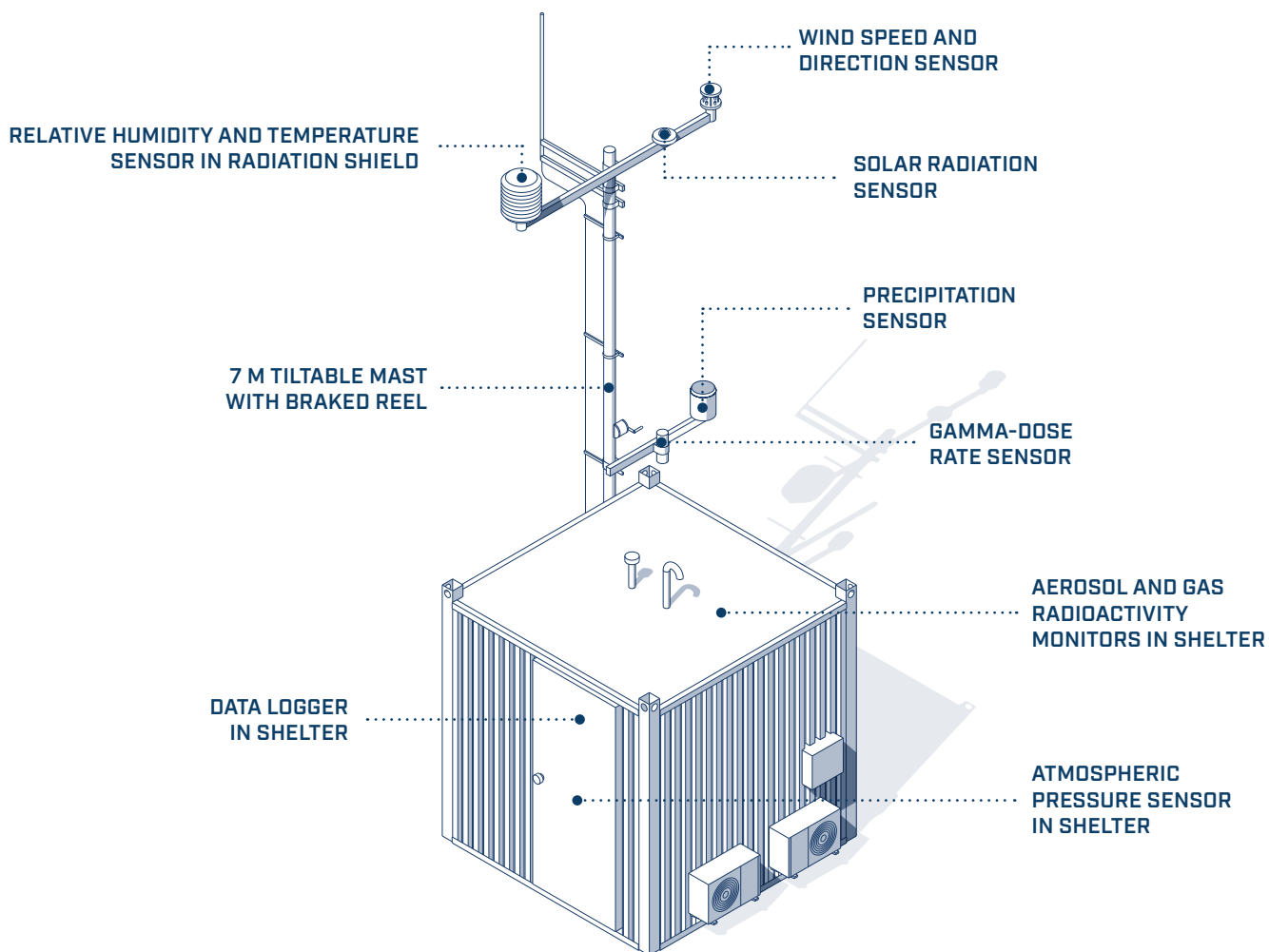


**Statistics, alerts and
notifications**

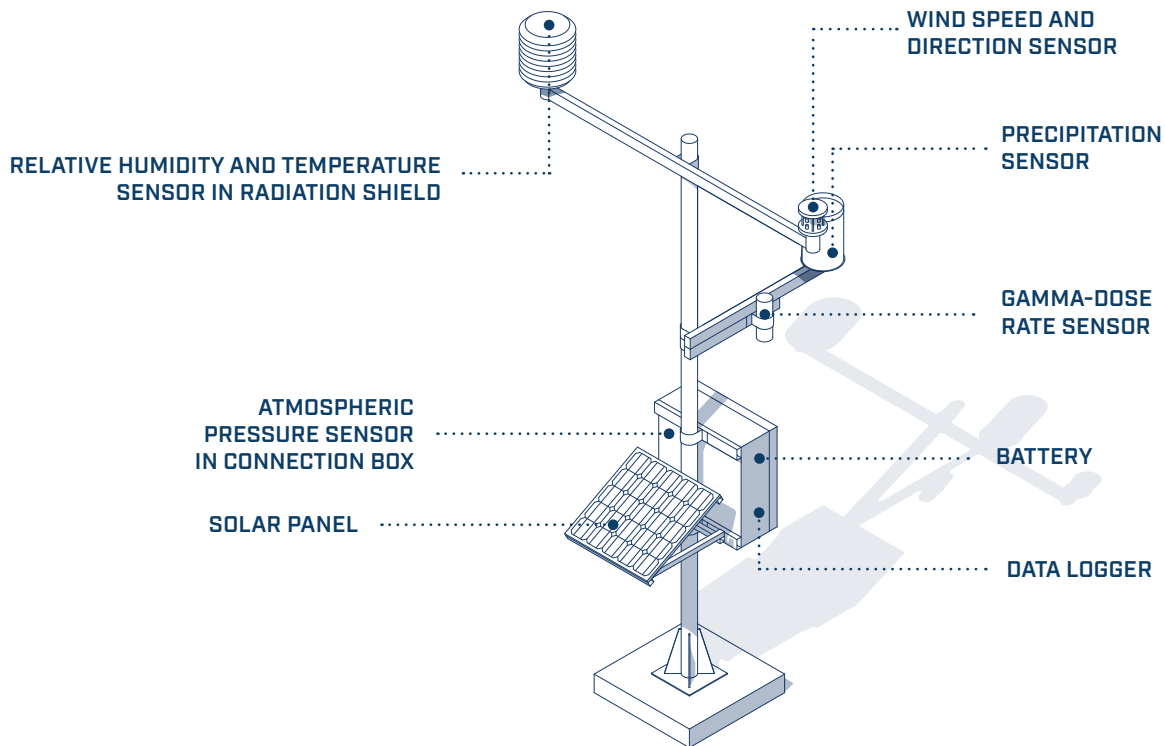


**Customizable web
interface**

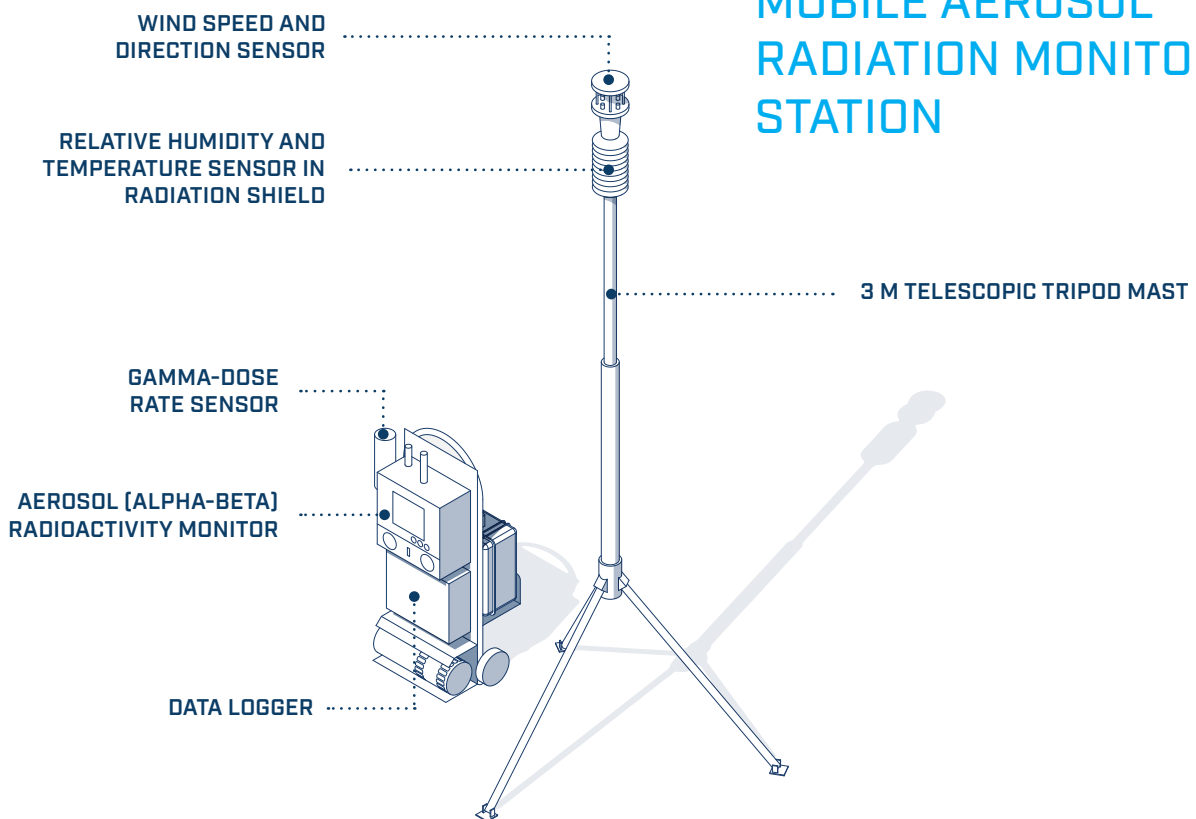
AEROSOL RADIATION MONITORING STATION



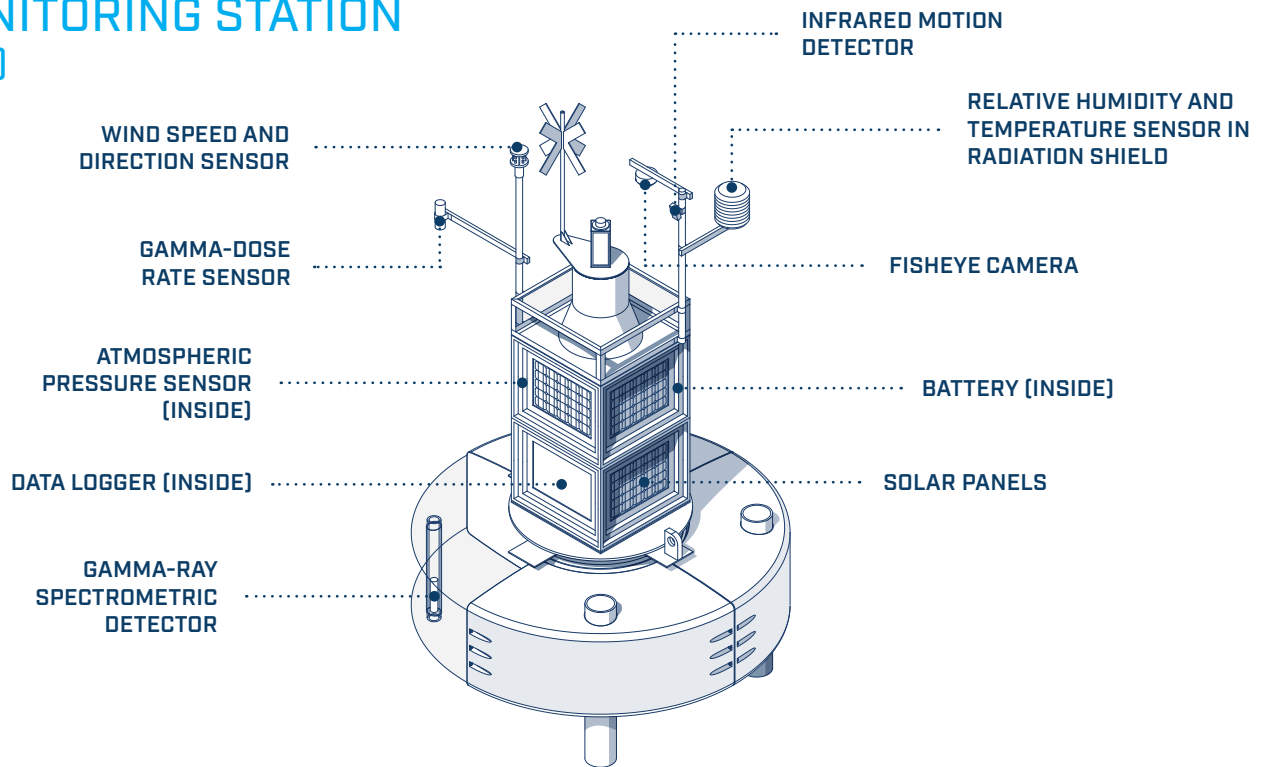
GAMMA RADIATION MONITORING STATION



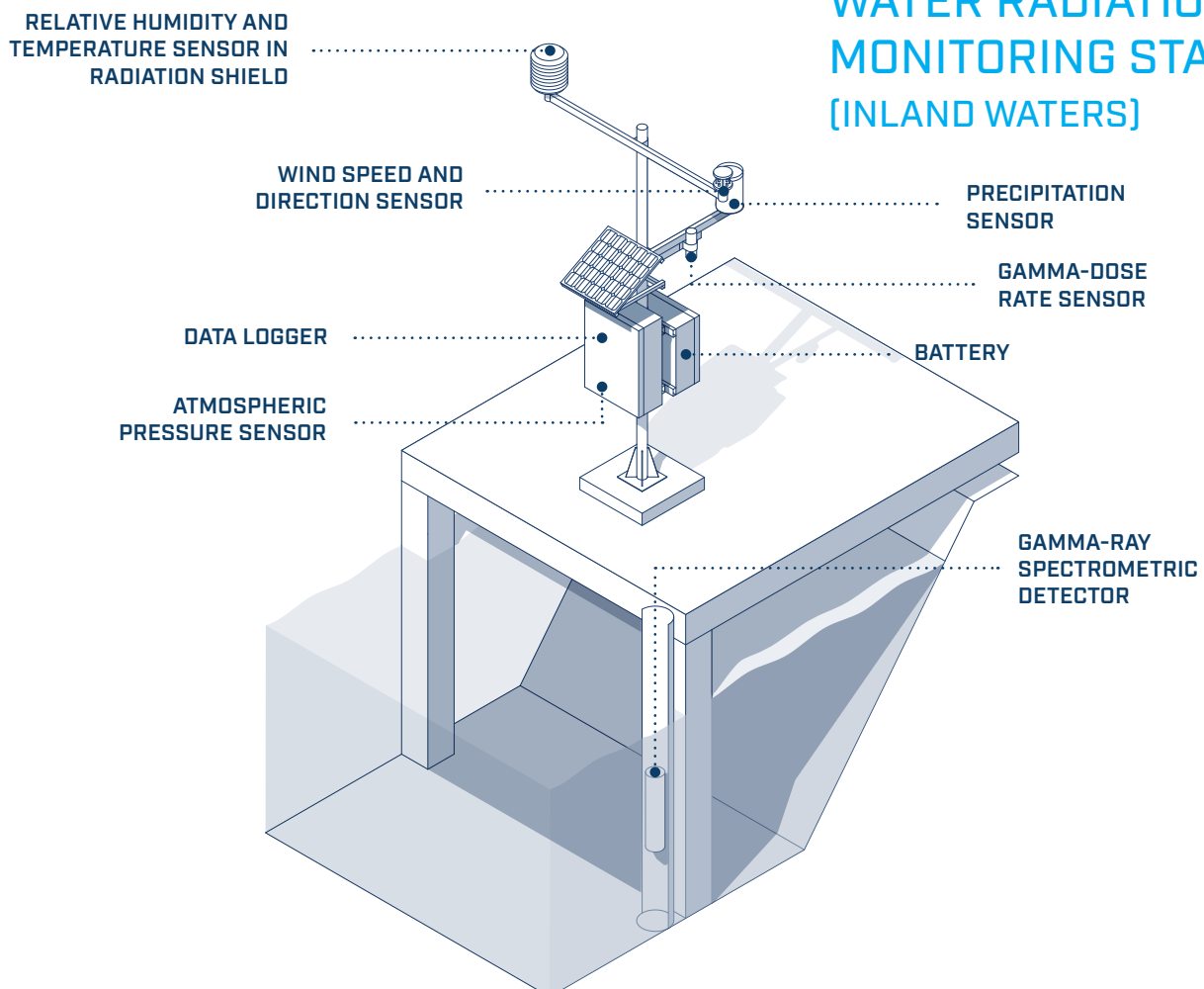
MOBILE AEROSOL RADIATION MONITORING STATION



WATER RADIATION MONITORING STATION [SEA]



WATER RADIATION MONITORING STATION [INLAND WATERS]



Radiation monitoring station variables

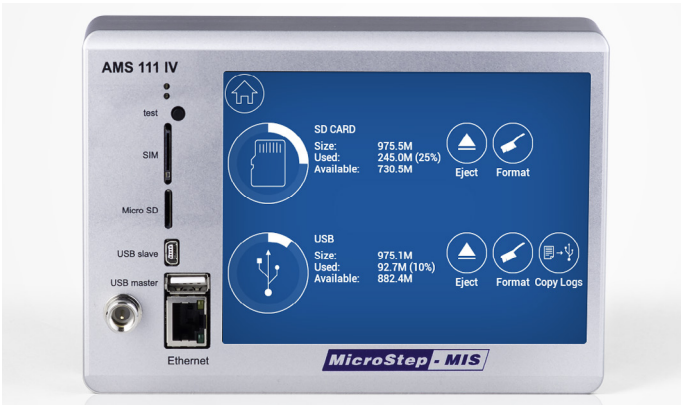
	Aerosol Radiation Monitoring Station	Gamma Radiation Monitoring Station	Water Radiation Monitoring Station (inland waters)	Water Radiation Monitoring Station (sea buoy)	Mobile Aerosol Radiation Monitoring Station
Radiological data	Gamma dose rate	✓	✓	✓	✓
	Concentration of gamma-rays emitting radioactive isotopes in air / water (aerosol section - gamma) E.g.: ¹³⁴ Cs, ¹³⁷ Cs, ¹³² Te, ¹⁴¹ Ce, ¹⁴³ Ce, ²⁴¹ Am, etc.	✓	✗	✓	✗
	Activity of gamma-rays emitting radioactive isotopes sampled on filter (aerosol section - gamma)	✓	✗	✗	✗
	Concentration of alpha and/or beta particles emitting radioactive isotopes in air (aerosol section - alpha/beta) E.g.: ²²² Rn (Radon), ²²⁰ Rn (Thoron), artificial alpha, cumulative beta	✓	✗	✗	✓
	Activity of alpha and/or beta particles radioactive isotopes sampled on filter (aerosol section - alpha/beta)	✓	✗	✗	✓
	Concentration of gamma-rays emitting radioactive isotopes in air (gas section - gamma) E.g.: ¹³¹ I ₂	✓	✗	✗	✗
	Activity of gamma-rays emitting radioactive isotopes sampled on cartridge (gas section - gamma)	✓	✗	✗	✗
	Activity of gamma-rays emitting radioactive isotopes sampled in water	✗	✗	✓	✗
Meteorological data	Air temperature	✓	✓	✓	✓
	Atmospheric pressure	✓	✓	✓	✓
	Dry bulb temperature	✓	✓	✓	✓
	Precipitation	✓	✓	✓	✓
	Relative humidity	✓	✓	✓	✓
	Solar radiation	✓	optional	optional	optional
	Wind speed and direction	✓	✓	✓	✓
State of Health data	Buoy status data	✗	✗	✓	✗
	Gamma dose rate probe	✓	✓	✓	✓
	Intelligent charger	✗	✓	✓	✗
	Monitor of radioactive aerosol	✓	✗	✗	✓
	Monitor of radioactive gas	✓	✗	✗	✗
	Shelter status	✓	✗	✗	✗
	Station status	✗	✗	✗	✓
	Underwater gamma spectrometer	✗	✗	✓	✗

Technical specifications

Data Logger AMS 111 IV

Memory and RTC

Internal 128 MB Flash memory
Internal 128 MB DRAM memory
Secure digital card up to 64 GB
External USB mass storage up to 256 GB
Real time clock (backup with Lithium battery)



Communication I/O ports

3x RS-232 port (baud rate: 300 to 115200), 1x UART
2x RS-485 port
Interface for GSM / Wifi / Radio module
Ethernet 10/100 Mbit
USB master, USB slave
2x SDI-12

Supported Protocols

FTP server, FTP client, HTTP server, telnet, SMTP, SMTPS, MODBUS RS-485, MODBUS, NTP Ethernet

P4-4G modem**Data rates**

- LTE-FDD Max 100 Mbps (DL) Max 50 Mbps (UL)
- LTE-TDD Max 61 Mbps (DL) Max 18 Mbps (UL)
- DC-HSPA+ Max 42 Mbps (DL) Max 5.76 Mbps (UL)
- UMTS Max 384 Kbps (DL) Max 384 Kbps (UL)
- TD-SCDMA Max 4.2 Mbps (DL) Max 2.2 Mbps (UL)
- CDMA Max 5.4 Mbps (DL) Max 14.7 Mbps (UL)
- EDGE Max 236.8 Kbps (DL) Max 236.8 Kbps (UL)
- GPRS Max 85.6 Kbps (DL) Max 85.6 Kbps (UL)

Operating temperature range

–40 °C to +85 °C

Environmental conditions

Operating temperature range: –40 °C to +70 °C
 Operating humidity range: 0 to 100 %

P4-GSM modem**Specification**

- Quad Band GSM/GPRS/3G modem E-GSM 850/900/1800/1900
- Class 4 (2 W at 900 MHz)
- Class 1 (1W at 1800 MHz)
- Data, SMS
- Fax and data transmission without extra hardware

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Environmental conditions

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 Operating humidity range: 0 to 100 %

Aerosol radioactivity monitor**Specifications**

- Automatic filter change, 45 filters loader, 90 days autonomy
- Silicon detector for alpha/beta, 20 - 25 % efficiency
- Real time discrimination of Radon/Thoron progenies
- Real time Gamma background compensation with dedicated detector
- MCA (Gamma) 4096 channels, with full solid state MCA set-up and controls and operation by resident firmware
- Remote data transfer and control
- Full integrated spectra storage and transmission to central system for further complete spectrometric analysis
- Automatic self-diagnostic
- Built In Test functions locally and remotely fully accessible

Alpha/Beta spectrometry

2048 channels

Gamma detector

1.5" x 1.5" SrI₂ (Eu) crystal (typ. res. 3 % ± 5 % FWHM @ ¹³⁷Cs), automatic gain / offset stabilization; HV Bias supply adjustable from MCA

Alpha range10⁻² to 10⁵ Bq/m³**Beta range**10⁻¹ to 10⁵ Bq/m³**Gamma range**10⁻¹ to 10⁵ Bq/m³**Constant air flow regulation**

+/- 2%

Air temperature sensor**Measuring range**

–65 °C to +75 °C

Accuracy

±0.2 (–40 to +60) °C

Atmospheric pressure sensor**Pressure range**

500 to 1100 hPa (or custom)

Measurement principle

piezoresistive transducer

Accuracy

±0.3* hPa (–40 °C to +60°C)

Long-term stability	±0.2 hPa / year
	<i>*custom range or accuracy available upon request</i>

Gamma-dose rate sensor

Detector	two H*(10) GM tubes with energy compensating filter
Measuring range	10 nSv/h to 10 Sv/h

Gamma-ray spectrometric detector

Detector	1,5" x 1,5" SrI ₂ (Eu) crystal detector, resolution ≤3.5% @ ¹³⁷ Cs
Output	Spectrum, automatic reporting of 10 radioisotopes from the library
Measurement cycle	10 min / 1h / 24h / ..., user configurable
Energy range	30 keV to 3 MeV – 1024/2048/4096 channels

Gas radioactivity monitor

Specifications	• Cartridge control and changing • Flow-rate control and measurement • Live spectrum acquisition • On-line Spectra analysis and readout • Pb-214 peak automatic compensation • Evaluation of Iodine concentration in air • System parameters set-up • Programmable thresholds (alert and alarm) for radiological events • Intrinsic automatic control of system operation, machine failure alarm messages in case of equipment operational failure (i.e. mechanics or pneumatics failures) • Built in test procedures • Digital outputs • Data communication
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Precipitation sensor

Catch area	200 cm ²
Output	pulses - switching contact
Resolution	0.1 mm 0.2 mm 0.5 mm
Measuring range	0 to 600 mm/h 0 to 900 mm/h 0 to 2500 mm/h
Measurement error for different rainfall	intensity < 20 mm/h -> measurement error < 1 % intensity 20 to 600 mm/h -> measurement error < 2 %

Relative humidity sensor

Measurement range	0 to 100 %RH
Accuracy (@ 25 °C)	±1 %RH
Short term hysteresis	< 0.6 %RH
Accuracy over temperature range	1 + t - 25 * (0.008 + 0.00052 * RH)
Typical long-term stability	±1.0* % per year
Sensor type	thin film capacitive
	<i>* dependent on operating environment</i>

Solar radiation sensor

Classification to ISO 9060: 1990	Secondary Standard
Sensitivity	7 to 14 μV/W/m ²
Maximum operational irradiance	4000 W/m ²
Detector type	Thermopile

Spectral range (20 % points)	270 to 3000 nm
Non-stability (change/year)	< 0,5 %
Non-linearity (100 to 1000 W/m2)	< 0,2 %

Wind sensor

Wind speed

Range	0 to 60 m/s (116 knots)
Accuracy	±2 % @ 12 m/s
Resolution	0.01 m/s (0.02 knots)
Response time	0.25 seconds
Threshold	0.01 m/s

Wind direction

Range	0 to 359° (no dead band)
Accuracy	±2° @ 12 m/s
Resolution	1°
Response time	0.25 seconds

Telescopic tripod mast

Material	stainless steel
Color	white, red/white, red RAL3000/white RAL9016
Load	• 36 m/s (130 km/h) without guy ropes • 75 m/s (270 km/h) • 100 m/s (360 km/h)

Tiltable meteorological mast with braked reel

Length	7 m
Color	white RAL9016
Material	stainless steel