

GAMMA DOSE RATE MONITORING SYSTEM FOR REAL-TIME RADIATION MONITOR

GAMON-D

APPLICATIONS AND SCENARIOS

The **GAMON-D** is a versatile gamma dose rate monitoring system designed for early environmental warning and emergency response.

GAMON-D integrates a low power consumption CPU, to guarantee autonomous operations, including the activation of backup communication interfaces for data transfer in any environmental condition.

The **GAMON-D** is intended for a wide range of applications thanks to its high detection efficiency and its extended measurement range. Its design allows an easy integration in different systems ranging from on-field monitoring stations to mobile survey vehicles. The **GAMON-D** can be mounted on a tripod to be easily relocated for typical security or emergency response scenarios, and the embedded GPS provides the current location.

The **GAMON-D** can be deployed in

- ring monitor systems around nuclear facilities as nuclear power plants, nuclear fuel processing and spent fuel storage facilities;
- nationwide environmental monitoring networks;
- area monitor system in nuclear research laboratories;
- portable, mobile measurement stations for emergency response and public security purposes.

DESCRIPTION

The **GAMON-D** is a gamma dose rate monitoring system series, designed for outdoor online radiation monitoring, for early environmental warning and emergency response. The **GAMON-D** can be deployed in a wide range of scenarios, as in permanent ring monitoring as well as in moving monitoring stations. It can be mounted on a tripod to be easily relocated for typical security or emergency response scenarios, and the GPS monitors the current location.

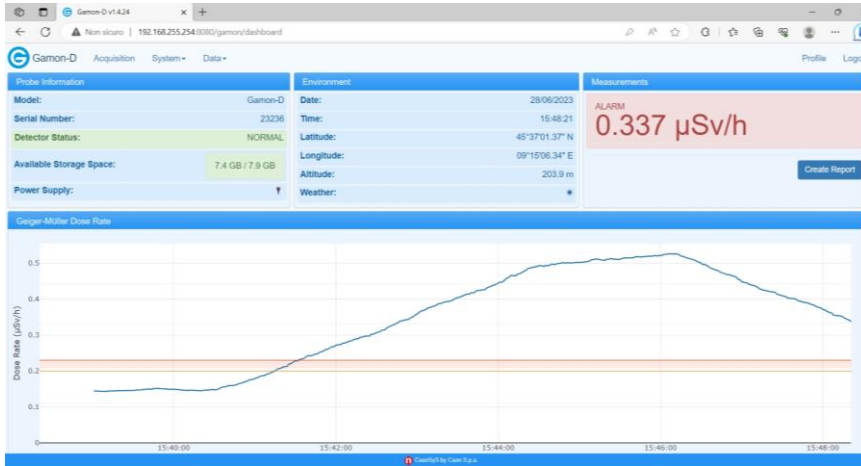
The **GAMON-D** embeds two energy compensated Geiger–Mueller (GM) detectors to provide a wide detection range for ambient equivalent dose rate $H^*(10)$ from 10 nSv/h to 10 Sv/h. The high-volume GM is used for low dose rate measurement and can detect small changes of the natural background also in short acquisition cycles. The control of the two detectors is performed by internal electronics, which continuously monitors the count rate.



It can operate in a wide temperature range from -40 to 60 °C and in harsh weather conditions thanks to its IP68 double enclosure with thermal insulation, including the power and the communication interface connectors.

The **GAMON-D** dose rate monitor system has low power consumption and can be powered by common AC-DC converters, additional battery packages or external solar panels.

The **GAMON-D** is provided with wired connections, RJ45 Ethernet and USB 2.0 port, or can be provided with additional wireless interfaces as Wi-Fi and GPRS/LTE. The operator can select the preferred communication interface.



The **GAMON-D** embedded ARM based CPU stores the data in an internal non-volatile memory of 8 GB which guarantees up to 1 year storage with 15-minute reports. The CPU runs a web interface to allow the user to easily configure the data acquisition. Security level of the web interface can be configured by the user to avoid unauthorized setting changes.

The web interface enables the access to multiple **GAMON-D** systems located in a multi-point measurement network and to visualize the status on a map. Network or sub-network status summary can be monitored from the graphical interface.



MAIN FEATURES

- Gamma dose rate monitoring system embedding two energy compensated Geiger–Mueller (GM) detectors
- Onboard web interface for easy configuration
- Wide measurement range from 10 nSv/h to 10 Sv/h
- Automatic switching between GM tubes based on the acquired count level
- Moving average algorithm for instantaneous dose rate measurement
- Big onboard data storage for long autonomous data taking
- Designed for operating outdoor in extreme weather conditions from -40 to +60 °C
- Robust case, designed to guarantee IP68, including the power and the communication connectors
- Design for easy wall and pole mounting
- Wired and Wireless communication interfaces: USB 2.0, Ethernet, Wi-Fi and 3G/4G LTE
- Quick and easy to install and to operate thanks to onboard web graphical interface
- Easy integration into the CAEN Gamon Monitoring Center (GMC) Software
- Reachback functionality through CAEN GMC

OPTIONS

The **GAMON-D** gamma dose rate monitoring system is provided with wired communication interfaces or can be provided with enhanced connectivity through the integration of WiFi and 3G/4G LTE wireless interfaces. The monitoring system has IP68 connectors for USB 2.0 and RJ45 Ethernet ports.

Standard Gamma Dose Rate System:

- USB, Ethernet interfaces;
- 12 VDC power plug.

Wireless Gamma Dose Rate System:

- USB, Ethernet interfaces;
- 12 VDC power plug;
- 3G/4G LTE and Wi-Fi, optional weather station, optional backup battery.

The **GAMON-D** can be also integrated in monitoring stations for tailored solutions.

Gamma Dose Rate Monitoring Station:

- Pole or wall mounted with main power supply;
- Various kinds of supports available (pole, tripod, stainless steel stand);
- Backup battery;
- Optional solar panel power supply.



The **GAMON-D** dose rate monitor can integrate an external configurable weather station for correlating possible dose rate variations due to isotopes deposited by the rain. It integrates an internal temperature sensor for compensating the background and the measured dose rate.



TECHNICAL SPECIFICATIONS

Geiger-Mueller

- Two energy compensated Geiger-Mueller tubes
- Energy range: 50 keV ÷ 2 MeV
- Dose rate range (GM): 10 nSv/h ÷ 10 Sv/h
- Dose rate accuracy: < 10%
- Linearity: < 10% from 100 nSv/h to 1 Sv/h

Sensors

- GPS
- Temperature internal sensor

Communication interfaces

- Ethernet RJ45
- USB 2.0 port
- Communication protocol TCP/IP
- Connector protection level IP68

Options (available on request)

- Rain sensor
- Weather station (configurable)
- Wi-Fi
- 3G/4G LTE
- Standing support (configurable)
- Battery-powered cabinet for stand-alone use
- Solar power supply
- Transport rugged case

Software

- Integrated web interface
- Local database and data repository
- Periodic, hourly and daily report generation
- Periodic integration time: 1, 5, 10, 15, 30 min
- Alarms based on instantaneous and averaged H*(10) rate rage
- Storage: 1 year with 15 min reports

Power supply

- Power consumption: < 3.5 W
- Voltage: 5 ÷ 12 VDC
- Power connector protection IP68

Physical dimensions and weight

- Length: 60.3 cm
- Diameter: 10.0 ÷ 17.2 cm
- Weight: up to 4 kg

Environmental

- Temperature range -40 ÷ 60 °C
- Protection level IP68 outdoor extreme weather conditions
- Relative humidity: 100% (waterproof)



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