

NGM-2000 Noble Gas Monitor



The NGM-2000 is a state-of-the-art device designed for quasi-continuous nuclide specific activity monitoring of noble gases which are discharged from ventilation stacks and pipelines. Thanks to its unique design the NGM-2000 offers very low detection limits.

Purpose

The NGM-2000 is a state-of-the-art device designed for quasi-continuous nuclide specific activity monitoring of noble gases which are discharged from ventilation stacks and pipelines in nuclear power plants, nuclear fuel processing plants and scientific institutions with experimental reactors.

Due to low level detection limits, this monitor is suitable for the standard operating conditions.

Description

The NGM-2000 noble gas monitor is a compact and a fully automated device. After connection of the monitor to the sampling line it directly processes and displays the measured data and the status of operating parameters on the local display. The device has the facility to transfer this information to a host system.

The control of the device and setting of parameters can be done either locally or from a host system.

The monitor is produced in two standard options. The NGM-2000-1 basic model monitor uses one sampling line. The NGM-2000-2 model has the facility to be switched by the user between two sampling lines.

Basic monitor set includes

- Sampling line input with filters and drier
- Compressor unit
- HPGe semiconductor detector with electrical cooling
- Unit for control of the air-sampling system
- Local display unit and control unit
- Uninterruptible power supply for safe monitor standby operation

In the basic quasi-continuous mode the monitor samples the air at regular intervals from the sampling pipeline. The sampled air passes through a set of filters (aerosol and iodine) prior to being compressed into the Marinelli pressure beaker and is then measured within the energy range 50 to 3000 keV.

Main Advantages

- Nuclide specific measurements
- Fully evidential observance of limits which are set in European Directive 96/29/EURATOM (this EU directive stipulates the basic safety standards for health protection of workers and individuals against ionizing radiation hazards).
- Current spectra and 24-hour summed spectra can be viewed
- Ideal geometry, very low detection limits

Specification

Detector type	Cooled HPGe detector
Measuring vessel volume	about 12 litres
Nominal pressure	900 kPa (6750 mmHg)
Optional pressure	1200 kPa (9000 mmHg)
Effective measuring range (average) over 24 hour summary measurements:	

- ^{133}Xe 5E2 ~ 1E9 Bq/m³
- ^{85}Kr Nominal 5E4 ~ 1E9 Bq/m³
- ^{85}Kr Optional* 5E3 ~ 1E9 Bq/m³

Energy range	50 keV ~ 3 MeV
Standard time of measuring period	12 min
Shielding	Cu 1 mm, Sn 1 mm, Pb 50 mm
Power supply	230 VAC
Dimensions (H x W x D)	about 1830 x 1000 x 580 mm (72 x 39.4 x 22.9 in)
Weight	about 800 kg (1764 lb)

* valid with optional vessel pressure 1200 kPa

Description

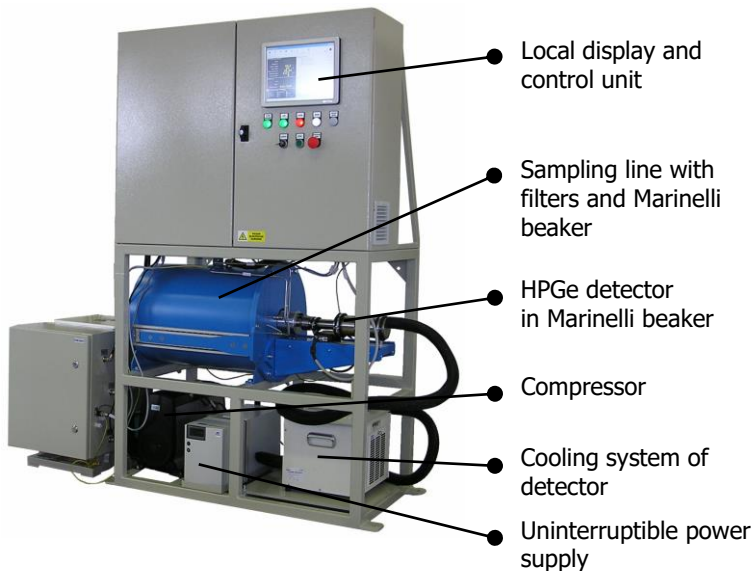
Every hour and at each 2, 4, 8, 12 and 24-hour interval, the spectra are summed and evaluated. Output values in the system are:

- Current activities of noble gases from the last measurement cycle;
- Noble gas activity calculated from one-hour spectra;
- Noble gas activity calculated from spectra in 2, 4, 8, 12 and 24-hour intervals.

The volume activity is determined for the air volume under standard conditions, i.e., at temperature of 273.16 K and pressure of 101.325 kPa.

If the upper limit of the activity value should be exceeded and the device is unable to determine a correct value, the monitor switches automatically to atmospheric mode. In this mode, the pressurizing system does not operate, and the air sample is measured under the current atmospheric pressure. The evaluation of measured spectra is identical with that of the quasi-continuous mode.

NGM-2000 / main components and functions



- Local display and control unit
- Sampling line with filters and Marinelli beaker
- HPGe detector in Marinelli beaker
- Compressor
- Cooling system of detector
- Uninterruptible power supply

Optional SW

- NGM DAS server, system database for any number of monitors;
- NGM WebClient, web user interface for analysis and display of database of measured values from any number of monitors;
- NGM RemoteControlSW, remote administration software for monitor control unit

Standards and Certifications

The NGM-2000 noble gas monitor is a type approved monitor (cert. no. **TCM 441/09-4668**, issued by Czech Metrological Institute) and meets and complies with the requirements of the following standards:

▪ Facilities for continuous radioactivity monitoring of gaseous discharges

Monitors of radioactive rare gases, ČSN IEC 60761 standard, type-approved by the Czech Metrological Institute (ČMI).

▪ Nuclear instrumentation - Measurement of gamma-ray emission rates of radionuclides - Calibration and use of germanium spectrometers

Spectrometric parameters, ČSN IEC 1452, type-approved by the Czech Metrological Institute (ČMI).

▪ Seismic resistance classification

The regulations developed according to the NTD ASI Section III code approved by the State Office for Nuclear Safety in Czech Republic for the strength assessment in nuclear facilities were applied to assess the strength and seismic resistance of the device. The seismic resistance was assessed as seismic category 2.

▪ Electromagnetic compatibility (EMC)

ČSN EN 61000-4-2 to 6 (IEC 1000-4-2 to 6)
ČSN EN 61000-4-11 (IEC 1000-4-11)

Models and Accessories

Type/Model	Device description
K1061	NGM-2000 basic option, single sampling line input. Operational vessel pressure 900 kPa.
K0807-01	NGM-2000-1 basic option, single sampling line input. Operational vessel pressure 1200 kPa.
K0807-02	NGM-2000-2 basic option, dual sampling line input. Operational vessel pressure 1200 kPa.



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