



VF NUCLEAR



NUCLEAR
POWER PLANTS



RESEARCH
CENTRES

GEMS-413, GEMS-414

GASSEOUS EFFLUENT MONITORING AND SAMPLING SYSTEM



MAIN ADVANTAGES

- System for measurement of radioactive noble gases and sampling of particulates and iodine
- Seismic-resistant design
- Operation after the LOCA accident, with a sample cooler also after severe accidents
- Classified as category C according to EN 61226
- Measurement of the dose rate from the particulates and iodine filters
- Safe transport and evaluation of the filters
- Local and remote control and display

PURPOSE

The GEMS-400 series monitors are designed for measurement of noble gases and sampling of particulates and iodine after the LOCA accidents. The air sample is taken from the ventilation stack or the containment of nuclear facilities. Two basic models are available: GEMS-413 (with NGD-13 detector) and GEMS-414 (with NGD-14 detector).

The main components of the monitor are:

- heated stainless steel routes with valves to distribute the measured air,
- two parallel shielded chambers for sampling particulates and iodine (each chamber is equipped with a particulate filter and an iodine cartridge), including dose rate detectors,
- the NGD-13 or NGD-14 detector for measuring the volume activity of radioactive noble gases,
- redundant pumps,
- a purge system with a separate pump or with a connection to a pressurized air distribution system,
- a processing display unit with 10 "touch screen,
- a steel frame, ensuring seismic resistance of the system.

Optionally, a trolley for transporting particulate and iodine filters removed from the sample chambers as well as a filter manipulator can be ordered with the system.

The system frame can be dismantled to facilitate transport and installation of the equipment.

GD-04 dose rate detectors, in the sample chambers, ensure that the maximum deposited activity on the filter does not exceed $1.1\text{E}12$ Bq. They allow safe handling of filters.

The monitor is equipped with a system of self-diagnostics of important parts. GD-04 self-diagnostics is performed by ^{137}Cs radionuclide control sources. Self-diagnostics of the NGD detector is provided by a control LED.

The monitor communicates with the host system via the RS-422/485 interface, Ethernet, or analogue loops. It can communicate simultaneously with the classified host system and separately send data to a non-classified system.



Display of the processing unit

GASSEOUS EFFLUENT MONITORING AND SAMPLING SYSTEM

SPECIFICATIONS

Detector	
NGD-13	Semiconductor CdTe (5x5x5 mm)
NGD-14	scintillation crystal YAP(Ce) (2x2) mm
Sample temperature	
NGD-13	max. 55°C (short term 66°C)
NGD-14	max. 95°C, non condensing
NGD detectors lead shielding thickness	10 cm
Temperature of sampling line heating	max. 110°C
Sample Pressure	max.150 kPa
Max. deposited activity on the filter	up to 1 TBq
Classification according to EN 61226:2011	C
Ingress Protection	IP 40
Dimensions (w × h × d)	2500 × 2000 × 800 mm
Weight	1500 kg
Power supply	100 – 240 V AC / 47 - 53 Hz
Communication interface	RS-422, RS-485, Ethernet, analogue (I/U) loops

MEASURING PARAMETERS

	NGD-13	NGD-14	SDG-04
Measuring range	from 2,9E08 to 5,1E15 Bq/m ³	from 3,2E08 to 4,8E16 Bq/m ³	from 1,0E-07 to 2,0E00 Gy/h
Reference radionuclide	¹³³ Xe	¹³³ Xe	¹³⁷ Cs

OPTIONAL FEATURES

Passive sample cooler for severe accidents for sample temperatures up to 95°C and condensing humidity

Ports for air grab sampling and / or calibration with radioactive gases

Galvanically isolated analogue inputs and outputs, digital outputs, RS-232, isolated connections to qualified and non-qualified host systems

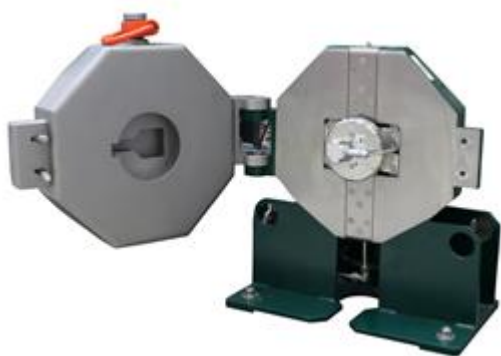
Qualification of the monitor according to IEC 61226 and IEC/IEEE 60780-323, seismically resistant skid according to IEC/IEEE 60980-344

OPTIONAL ACCESSORIES

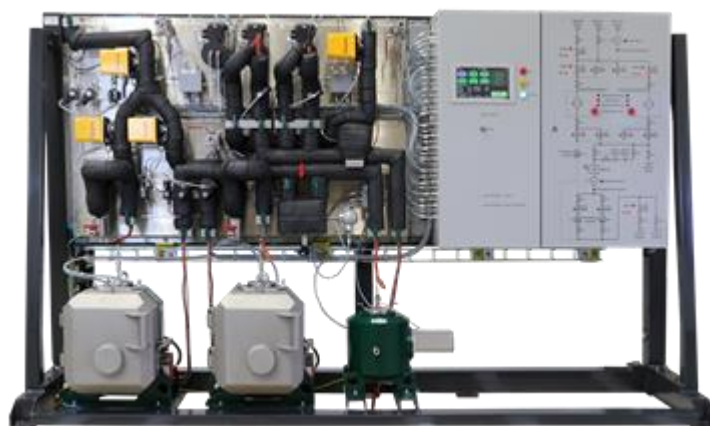
Manual manipulator and shielded trolley for contaminated P/I filters.

RELATED PRODUCTS

GEMS-700	Gaseous Effluent Monitoring and Sampling System for routine and post-accident operation
GEMS-300	Gaseous Effluent Monitoring and Sampling System for routine operation



NGD-13 detector with open shielding



GEMS-414 monitor with the NGD-14 detector