

Noble Gas Monitor Station

CMS Gas Activity Monitor



The Lab Impex Systems CMS gas activity monitor continually measures the level of airborne concentration of radioactive (Beta-emitting) Noble Gases.

Suitable for process, stack and health physics applications, the CMS Gas Activity Monitor is installed at many nuclear facilities around the world.

Highlights

- Stable and sensitive: unique detection technology and advanced algorithms
- Proven and tested system: designed to meet the requirements of IEC60761-3 and 10CFR820
- Reduced false alarms: low background sensor with low sensitivity to external sources of gamma radiation
- Ease of operation: modular system, simple maintenance routines, many training packages available
- Flexible: designed for process, stack emissions and radiation protection applications

Operational Benefits

The CMS Gas Activity Monitor is designed to offer real operational benefits to the user. All aspects of system performance and system maintenance have been evaluated and optimised with a view to providing the user with simple, trouble-free operation at all times.

The CMS Gas Activity Monitor offers users the very best in sampling efficiency, detector technology, processor electronics and data analysis.

The Noble Gas Sensor

The detector used by the CMS Gas Activity Monitor is a recently developed PG-10. Offering unparalleled sensitivity to Noble Gases, the PG-10 uses a 750ml measurement chamber and specially designed plastic scintillation sensor to give a stable, accurate measurement of airborne concentration.

In operation, gas is sampled through the PG-10 by a vacuum pump located downstream. In addition, an inline flow sensor continually monitors flow through the circuit in order to generate alarms in the event of pump fail or blockage.

Many options exist for mounting and shielding the PG-10. As standard a 50mm shielding assembly that may be skid mounted or floor standing is available, although other solutions, to suit the performance and installation requirements of the client, may be catered for.



The PG-10 provides a measurement range of $<10 \text{ kBq/m}^3$ to $10 \times 10^9 \text{ Bq/m}^3$ ($2.7 \times 10^{-7} \mu\text{Ci/ml}$ to $2.7 \times 10^{-2} \mu\text{Ci/ml}$) for Kr-85.

A relatively unique feature of the PG-10 is that it offers a direct measurement of Noble Gas Beta rather than Gamma decays.

The Result:

1. A higher sensitivity than conventional systems for those Noble Gases where the Gamma yield is low i.e. Kr-85.
2. A lower sensitivity to external sources of Gamma that traditionally can lead to false alarm conditions on conventional systems.



The CMS

A CMS Continuous Monitoring Station, located either locally or remote from the PG-10 acts as the processor and display for the system.

At the core of the Lab Impex Systems range, the CMS is a respected, proven, monitoring station. The CMS will display the current noble gas concentration result, generate activity /status alarms, enable the user to access parameters and compile a database of result data.



The CMS Gas Activity Monitor is also available in transportable cart configuration.

Stack/Duct Monitoring

The CMS Gas Activity Monitor will also accept stack or duct flow data and will report the stack/duct gap concentration. An option to provide total activity discharged is also available and may be reported as daily, weekly, monthly or annually.

Features of the CMS include:

- High levels of environmental protection
- Ability to add other sensors (Gamma dose rate, particulate, Iodine etc)
- Unique calculation algorithm
- Fast alarm generation
- Modular construction
- Stainless steel housing
- High intensity audio-visual alarm
- Multiple parameter sets

Performance Specification

Noble Gas Monitoring Station

Detectors	<ul style="list-style-type: none"> Scintillation Detector comprising plastic scintillator with light guide, photomultiplier and dynode chain Typical Detector Characteristics Diameter: 65mm Length: 110mm Temperature range: -10 to +50°C Weight: Approx 2Kg 	Visual Display	<ul style="list-style-type: none"> Alpha-numeric display: 2 rows x 20 characters, 8.5mm (.3") character height Large clear 20 x 142mm (1" x 5.5") digital display with 4 colour function key indicators High intensity alarm - An additional alarm Red xenon strobe module warning
Measuring Chamber	<ul style="list-style-type: none"> Type: 0.75 litre stainless steel Air Connections: 2 x 10mm O.D. pipe Diameter: Approx 100mm Height: 110mm 	Keypad	<ul style="list-style-type: none"> 24 soft keys keypad with tactile feedback
Performance	<ul style="list-style-type: none"> Efficiency Krypton-85: 10% Typical background: 6ps 	Data Buffer (Optional)	<ul style="list-style-type: none"> Cyclic FIFO (first in first out) buffer which retains historical data. Provides 1 week data retention with historical review on LCD display Results stored every 10 minutes in Normal (LED green) mode and every 2 minutes in Alert (LED yellow) and Alarm (LED red) modes Contents of the data buffer are retained without mains power providing the internal battery is in place

CMS Controller for Noble Gas Monitor

Physical Characteristics	<ul style="list-style-type: none"> Stainless steel enclosure 	Operating Environment	<ul style="list-style-type: none"> Indoor use (or suitably enclosed) Operating temperature range -10 to 50°C (-4°F to -122°F) Maximum relative humidity 95% (up to 30°C)
Dimensions (HxWxD) & Weight	<ul style="list-style-type: none"> Height: 458mm (18") including LED beacon and cable connectors Depth: 150mm (5.5") including sounder projection Width: 200mm (8") Weight: Approx 7kg (15.5lbs) 	Power Details	<ul style="list-style-type: none"> Mains AC single phase connection (85-260V AC) Battery: Internal 1hour back-up rechargeable battery (facilitates full operation for 1 hour) Frequency: 47 to 60Hz Max.Current: 500 mA Internal 1 A anti surge fuse
Environmental Protection	<ul style="list-style-type: none"> P54 (IP65 option available) 	Outputs	<ul style="list-style-type: none"> Fail-safe relay contacts for fault and alarms Four relay outputs (Alarm 1, Alarm 2, Alarm 3 and Fault) RS-232/RS-48 2 x analogue outputs configurable 0.5V, 4-20mA, 0-20mA Ethernet 10base T (Lab Impex Systems protocols, HTTP, FTP)
Display	<ul style="list-style-type: none"> Large LCD graphic display (114mm x 64mm (4.5" x 2.5") with backlight) Fully sealed membrane keypad Both digital and analogue display Key switch Two layer status light column (Totem Pole, Red + Green LED) 	Alarm Facilities	<ul style="list-style-type: none"> Fast, accurate warning of high activity or faults Tower light configuration: Visual alarm (12V LED Totem Pole) Audible alarm sounder: 2 tones alternating at 1.2Hz > 100dB (other tones optional) Alarm clearly visible from 9m (33ft) Three activity alarm thresholds and other parameters can be set by the user and pass-code protected.
Data Storage	<ul style="list-style-type: none"> Non-volatile data capability for 7 days count history at minimum 5 minute data log intervals with historical review on LCD display Non-volatile data capability for event history (last 100 events) Non-volatile data storage for operating parameters 		

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