

Noble gas monitor station

CMS gas activity monitor



Key features

- Unique detection technology and advanced algorithms
- Meets the requirements of IEC60761-3
- Low background sensor with low sensitivity to external sources of gamma radiation
- Process, stack emissions and radiation protection applications

Overview

Ultra Energy's CMS gas activity monitor continually measures the level of airborne concentration of radioactive (Beta emitting) Noble Gases. It offers users the very best in sampling efficiency, detector technology, processor electronics and data analysis, with system performance and maintenance evaluated and optimized to provide users with simple, trouble-free operation at all times. Suitable for process, stack and health physics applications, the CMS Gas Activity Monitor is installed at many nuclear facilities around the world.

Technical specifications

Noble gas sensor

The detector used by the CMS Gas Activity Monitor is a recently developed PG-1. Offering unparalleled sensitivity to Noble Gases, the PG-1 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-1 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-1. 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 can be catered for.

The PG-1 provides a measurement range of $<10 \text{ kBq/m}^3$ to $1 \times 10^9 \text{ Bq/m}^3$ ($2.7 \times 10^{-7} \mu\text{Ci/ml}$ to $2.7 \times 10^{-2} \mu\text{Ci/ml}$) for Kr-85 (5 minute averaging time).

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

The result is a higher sensitivity than conventional systems for those Noble Gases where the Gamma yield is low i.e. Kr-85. It also has a lower sensitivity to external sources of Gamma that traditionally can lead to false alarm conditions on conventional systems.

Continuous Monitoring Station (CMS)

A CMS located locally to the PG-1 acts as the processor and display for the system. At the core of the 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.

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

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

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



Performance specifications

CMS gas activity monitor performance specifications	
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: <ul style="list-style-type: none"> ◦ Diameter: 65mm ◦ Length: 110mm ◦ Temperature range: -10 to +50°C ◦ Weight: ~ 2Kg
Measuring chamber	<ul style="list-style-type: none"> • Type 0.75 liter stainless steel • Air connections 2 x 10mm O.D. pipe • Diameter ~100mm • Height 110mm
Performance	<ul style="list-style-type: none"> • Efficiency Krypton-85 ~5% • Typical background 1.5cps
Dimensions and weight	<ul style="list-style-type: none"> • Width 530 mm • Depth 565 mm • Height 1560 mm • Mass 200 kg
System power	<ul style="list-style-type: none"> • Mains AC single phase connection (85-260VAC) • Battery internal 1hour back-up rechargeable battery (facilitates full operation for 1 hour)
Rated	<ul style="list-style-type: none"> • Frequency 50/60Hz • Current 5A/7A (500 mA^{**})

Performance specifications

CMS gas activity monitor performance specifications	
CMS controller for noble gas monitor	
Physical characteristics	<ul style="list-style-type: none"> Stainless steel enclosure
Dimensions and 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: ~ 7kg (15.5lbs)
Environmental protection	<ul style="list-style-type: none"> IP54
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 Digital and analogue display Key switch Two layer status light column (Totem Pole, Red + Green LED)
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)
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)
Transportable dimensions and weight	<ul style="list-style-type: none"> Width 1200 mm Depth 640 mm Height 1525 mm Mass 262 kg

Performance specifications

CMS gas activity monitor performance specifications	
CMS controller for noble gas monitor	
Outputs	<ul style="list-style-type: none"> • Fail-safe relay contacts for fault and alarms • Three relay outputs (alarm, alert and fault) • RS-232/RS-485 • Two analogue outputs configurable 0-5V, 4-20mA, 0-20mA • Ethernet 10base T (Lab Impex Systems protocols, HTTP, FTP)
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: two tones alternating at 1.2Hz>80dB@1m (other tones optional) • Alarm clearly visible from 9m (33ft) • Three activity alarm thresholds and other parameters can be set by the user and passcode protected
Product numbers	<ul style="list-style-type: none"> • Fixed: 0455/190* • Transportable: 0455/510** • (* = 230 Vac. ** = Air Ejector Pump)

About Ultra Energy

Organizations working with nuclear and industrial technologies have a responsibility to safeguard people, the environment and infrastructure. We provide solutions that give our customers complete, long-term protection and control of safety critical systems, while helping them increase the net value derived from investments over their total lifespan.

Part of Ultra Group, Ultra Energy has worked with nuclear and industrial customers for over 60 years. We're embedded in strategic national infrastructure and helping organizations develop future applications. We support continuous operation of industrial sites with protection and control solutions that monitor and manage factors such as radiation, neutrons, temperature and pressure within safety critical systems.

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