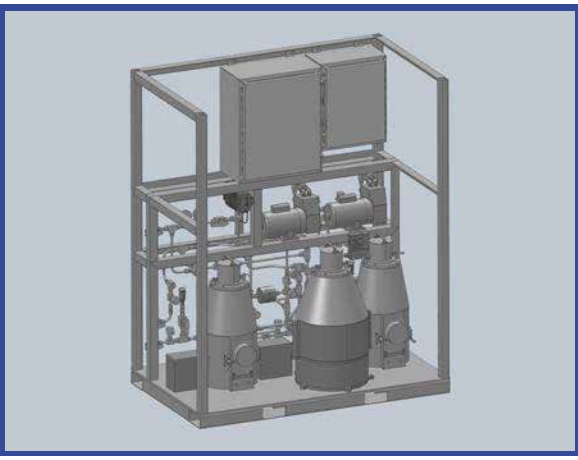
Particulate, Iodine and Noble Gas Monitor



Application

Tyne Engineering's low range, online radiation monitor is part of Tyne's radiation monitoring product line and was developed to continuously monitor radioactive particulate, iodine and noble gas volumetric activities in nuclear facility discharge stacks, ventilation systems and operational areas.

All systems rely upon the availability of Class IV 115VAC electrical power for operation. Critical systems can be provided with UPS battery back up at the customer's request.

Features

• Particulate, iodine and gas monitoring, beta and gamma monitoring as appropriate.

• Iodine monitoring, both elemental and organic forms, using gamma scintillation counters.

• Nobel gas monitoring, direct gamma and beta measurements to provide accurate emission monitoring of gamma emitters (Xe-133) and beta emitters (Kr-85).

• Compact, self contained skid only requiring a 115VAC supply and Ethernet connection.

• Expandable to include optional tritium and carbon-14 sampling capability.

The primary detector systems are scintillation counter based and use either single detectors or phoswich combined modality detectors depending upon the monitoring requirements. In the case of phoswich detectors, gamma and beta scintillation detectors are combined into a single assembly. The combined signals are deconvoluted using waveform separation techniques to provide singular measurements of gamma and beta radiation with minimum interference or cross-talk between the different radiation readings.

The detectors are installed within lead shielding assemblies in a 4π configuration.

Integrated total activities of particulate and iodine will be measured by accumulation of the measured sample on the filter media. Integration will be base lined at each filter change. Filter changes will be managed utilizing filter bypass valves to avoid shutting down the entire sampling system upon filter removal.

Noble gases will be measured directly using a Marinelli cell in near-real-time. The only delays will be the induction period in the sampling lines, the time to flush the Marinelli cell and the required counting time.

Sampling will be controlled using mass flow controllers and two positive displacement pumps (One backup) to draw the sample through the measurement chain. When the tritium and carbon 14 sampling option is selected, a lower flow rate pump is used to provide a controlled flow from the Marinelli cell exhaust to sample these gases.

The entire system will have a common human machine interface (HMI) that will interact with both the process control and the data flow from radiation detectors. The HMI will also act as the common communication hub for external communication of data from the detector skid to remote data collection and annunciation systems. Where the RMS is being used in a safety related functionality, a direct signal from the detector, prior to digitization and analysis will be conditioned to 4-20mA and forwarded to the associated safety related system.

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Specifications

Particulate Monitoring

Radiation Detected	Gamma and Beta
Detector Type	Gamma, NaI(Tl) Beta, PVT
PMT	High gain, low noise
Gamma Energy Range	80keV to 2.5 MeV
Beta Energy Range	80keV to 2.5 MeV
Typical Measurement Range, Gamma	
Typical Measurement Range, Beta	
Filter Type	Paper

Iodine Monitoring

Radiation Detected	Gamma
Detector Type	Gamma, NaI(Tl)
PMT	High gain, low noise
Gamma Energy Range	80keV to 2.5 MeV
Typical Measurement Range, Gamma	
Filter Type	1. TEDA doped charcoal 2. Silver impregnated zeolite available upon request.

Noble Gas Monitoring

Radiation Detected	Gamma and Beta
Detector Type	Gamma, NaI(Tl) Beta, PVT
PMT	High gain, low noise
Gamma Energy Range	80keV to 2.5 MeV
Beta Energy Range	80keV to 2.5 MeV
Typical Measurement Range, Gamma	
Typical Measurement Range, Beta	
Detector Configuration	Marinelli Cell

Other

Operating Temperature Range	+5 to +50 Centigrade
Operating Humidity	0 to 90% RN, non-condensing
Sample flow rate	50 liter/min (1.8cfm)
System Pressure Drop	<4 psi (<275mBar)

Power supply	115 VAC, class IV; Can be supplied by UPS if required
Approximate Dimensions	
Approximate Weight (With PI&G detectors installed)	
Mounting	Detectors are installed on a steel plate assembly with superstructure to support associated process equipment

Connectivity, Displays & Alarms

Alarms	Visual and audible
Data outputs	RS-232 & Ethernet Indus--trial wireless available
Local Display	LCD screen with user selectable outputs including: • Immediate measured values • Historical trends • Device Status
Analog I/O	Analog outputs provided from each detector assembly (4 to 20mA)

Standards

Nuclear	IEC 60761, IEC 61171, IEC 61172, IE C61578
Environmental	IEC 60780-323:2016, IEEE N323C
EMC	IEC 61000-6-2 and IEC 61000-6-4
Seismic / Class 1E (If required)	IEC 60980, IEEE 344
Class 1E (If required)	Additional Standards may apply

Accessories

These units can be provided with local and remote display units, with calibration tools and with data analysis software depending upon customer preferences and needs. USB convertor dongles can also be provided to convert the RS-232 I/0 to a number of industry standard formats. The Ethernet connection can be connected to commercial WiFi routers to provide wireless network connectivity if needed.

Agent Stamp / Business Card

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