MIRION
TECHNOLOGIES

Radiation Monitoring Solutions

Safely Harnessing the Energy of Radiation

Radiation Monitoring Solutions

Mirion's radiation monitoring systems enable the safe utilization of nuclear power as a transformative energy source.

Control and Reactor Protection

- ✓ In-core & out-of-core Control (neutron flux channels)
- ✓ Boron meters

Barrier Monitoring

- ✓ Primary circuit/water monitoring
- ✓ Spectrum analysis monitors
- ✓ Steam generator tube rupture monitoring

Effluent Release Monitoring

- ✓ Alpha and Beta particulates monitors
- ✓ Iodine monitors
- ✓ Noble Gas monitors
- ✓ Tritium monitors
- ✓ Stacks monitors
- ✓ Liquids monitors

Area Monitoring

- ✓ Dose rate measurement
- ✓ Post-accident contamination monitoring

Operational Measurement

- ✓ Irradiation monitoring in pipes, sleeves and drums

Learn more: mirion.com

MIRION TECHNOLOGIES

Effluent Release Monitoring

iCAM™

Alpha Beta Air Monitor

The iCAM monitor measures airborne alpha and beta particulate activity with dynamic radon/thoron alpha and beta background compensation.

FEATURES

- Environmental monitoring or stack/duct discharge
- Alpha and beta particulate monitoring in one instrument
- Alpha measurement range: 1E-3 to 9E3 Bq/m3 (1 hour averaging)
- Beta measuring range: 1 to 3.6E5 Bq/m3 (1 hour averaging)
- Lowest false alarm rates due to unique radon compensation algorithms
- Dynamic gamma compensation
- Rapid response to accidental releases – typical 5 DAC-hr alpha alarm in five minutes
- Rugged and reliable
- Comprehensive I/O facilities (RS-232 and RS-485, 4–20 mA, 4 x relays, etc.)
- Card mounted changeable filter for ease of handling or filter roll with automatic filter advance for long term unattended operation (up to six months)
- Mobile/portable/wall mount systems available

AVAILABLE CONFIGURATIONS

iCAM MF (Moving Filter) monitor

Standard iCAM monitor on trolley

Standard iCAM monitor on bench

Standard iCAM monitor on wall mount

Effluent Release Monitoring

iCAM/MF

Moving Filter Head for iCAM Monitor

The iCAM monitor measures airborne alpha and beta particulate activity with dynamic radon/thoron alpha and beta background compensation.

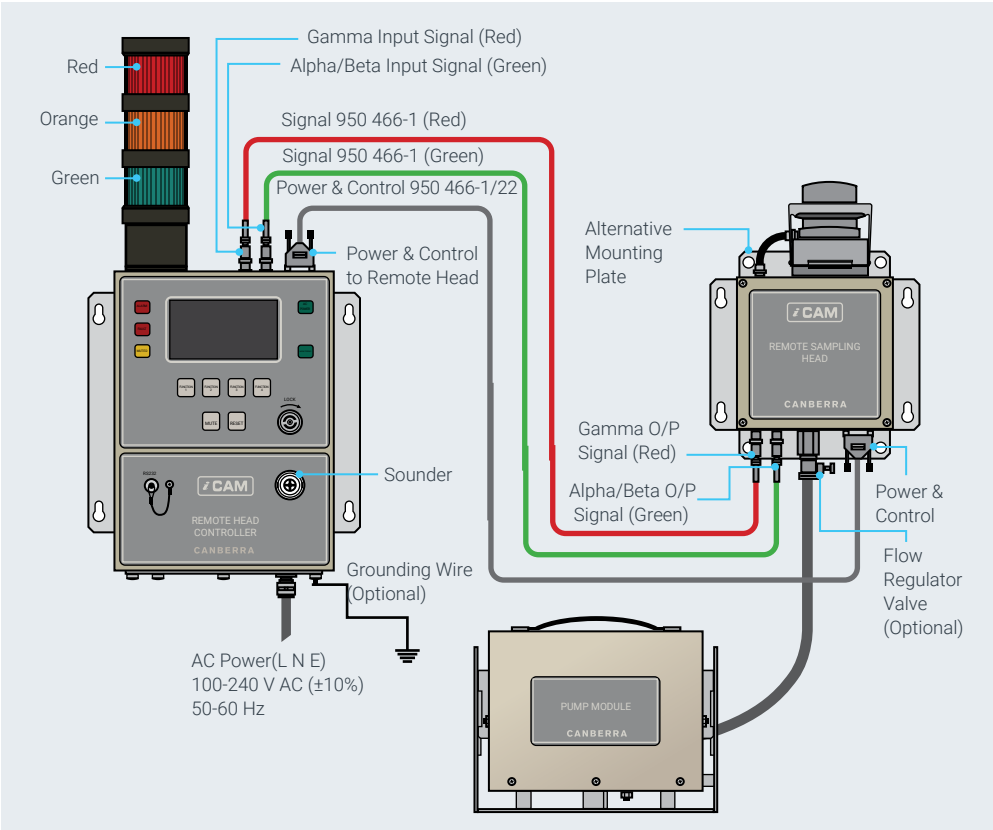
FEATURES

- ✓ Automatic filter change mechanism
- ✓ Up to six months autonomous operation
- ✓ Retrofittable to existing iCAM monitors
- ✓ Automatically detected and configured

CAM RH™

Remote Head

The iCAM RH enables separating the sampling head and pump from the control and display unit – by up to 100 m (330 ft) for optimized display positioning and access, and alarm audibility.



ABPM 203M™

Mobile Alpha Beta Particulate Monitor

FEATURES

- Static and dynamic compensation of the radon and thoron solid progenies
- Dynamic gamma background compensation
- Perfectly adapted for alpha and beta measurement of particulates in environment with high rate of radon
- Optimized alpha measurement for high energies (PU238, PU239)
- Real time alpha spectrometry
- Up to 6 months filter cassette autonomy with moving filter or fixed filter card option

Effluent Release Monitoring

ABPM 201S™

Seismic Alpha Beta Particulate Monitor

The ABPM 201S monitor samples air extracted from ventilation ducts or stacks. A double silicon detector performs the gamma compensation and a radial fin grid limits the scattering of the alpha particles (static compensation) which facilitates the compensation of the radon and thoron solid progenies by the processing algorithms (dynamic compensation). Operating costs are minimized by autonomous operation through automatic filter advance management.

FEATURES

- Static and dynamic compensation of the radon and thoron solid progenies
- Dynamic gamma background compensation
- Online spectrometry
- Up to 6 months' filter cassette autonomy
- 1E qualification and embedded safety related software
- Available under 10 CFR 50 App.B, ASME NQA-1 and IEC61226 programs for safety related application

IM 201S™ and IM 201M™ Iodine Monitors

IM 201S and 201M Iodine Monitors continuously measure the gamma volumetric activity of radioactive iodine sample, in both molecular and organic forms (methyl iodine), contained in air drawn from stacks, ventilation ducts or working areas. An NaI scintillation detector faces the activated charcoal cartridge in which radioactive iodine is trapped. The proximity of the detector and the cartridge, enclose within a 4 π/5 cm (4 π/2 in.) lead shielding, serves to optimize detection efficiency. IM 201S can withstand seismic conditions.

FEATURES

- Embedded^{241} Am source for energy spectrum stabilization against temperature changes and aging
- 1024-channel spectrum analysis
- Effluent trapping of iodine - molecular and organic forms
- Can be a temporary bypass for IM 201S or IM 201L to maintain full monitoring capability during maintenance

IM 201S Iodine Monitor

IM 201M Iodine Monitor

Effluent Release Monitoring

NGM 203S™

Seismic High Range Noble Gas Monitor

The NGM 203S monitor samples air in discharge stacks, ventilation ducts or working areas.

FEATURES

- Durable detector without electronic or radiation degraded components
- 1E qualification and embedded safety related software
- RG 1.97 and IEC60951 compliant
- Available under 10 CFR 50 App. B, ASME NQA-1 and IEC61226 programs for safety related applications
- Flow-through ionization chamber

NGM 209M™

Mobile Low Range Noble Gas Monitor

The NGM 209M system monitors air in working areas, discharge stacks or ventilation ducts. The dual silicon diode detector integrated in a 4 π/3 cm (4 π/1.18 in.) lead shielded sample volume guarantees measurement reliability. The first silicon diode detects the beta/ gamma radiation from sample volume and the gamma ambient radiation (background). The second diode detects gamma radiation from the sample volume and the gamma ambient radiation. This allows noble gas beta measurement with dynamic gamma compensation by the processing algorithms.

FEATURES

- ✓ Dynamic gamma radiation compensation with shielded gas detection sensor
- ✓ Operates as a stand-alone monitor or can be integrated in a RAMSYS network using a wireless network or a RS485 serial link

Effluent Release Monitoring

PING 206S™

Particulate Iodine and Noble Gas Monitor

The PING 206S monitor continuously measures particulate, iodine and noble gas volumetric activities in stacks, ventilation ducts or working areas.

FEATURES

- ✓ Particulate monitoring with static and dynamic compensation of the radon and thoron solid progenies
- ✓ Iodine monitoring for both molecular and organic forms
- ✓ Noble gas monitoring with dynamic gamma and pressure compensations
- ✓ Local Display Unit (LDU) displays the measurements and status of each channel
- ✓ Compact skid
- ✓ 1E qualification and embedded safety related software
- ✓ Available under 10 CFR 50 App.B, ASME NQA-1 and IEC 61226 programs for safety related applications

LM 212S™

Off-line Gamma Liquid Monitor

FEATURES

- Energy spectrum and temperature changes compensation
- Available with or without display or local signaling
- Seismically qualified
- The hinge mounted cover of the lead shielding makes maintenance easier on the detector
- Available under 10 CFR 50 App.B, ASME NQA-1 and IEC61226 programs for safety related applications

SAM 202K™

Spectrum Analysis Monitor

FEATURES

- Wide measurement range
- Can be used for various types of application
- Minimal periodic maintenance
- 1E qualification and embedded safety related software
- Available under 10 CFR 50 App. B, ASME NQA-1 and IEC61226 programs for safety related applications

Tritium Monitors

β ionix™

Portable Tritium Monitor

The portable β ionix system monitors real-time Tritium activity and other βeta emitters in ambient air.

FEATURES

- Continuous measurement and response time under 60 seconds
- Tritium detection from 12.5 kBq/m3 (0.33 µCi/m3)
- Easy commissioning and maintenance
- User-friendly interface
- Precise, stable and reliable
- Performance validated by the CTHIR laboratory
  Mobile/portable/wall mount systems available

M ionix™

Mobile Tritium Detector

The M ionix detector monitors tritium levels and other ambient beta gases in real time. It ensures radioprotection for personnel during decommissioning or as a temporary replacement for a fixed monitor.

FEATURES

- Self-checking
- Response time in under 3 minutes
- Integrated light and sound alarms
- Capacity for automatic γ compensation
- Detection of tritium from 10 kBq/m3 (0.27 µCi/m3)
- User-friendly interface
- Easily movable on various surfaces

C ionix™

Installed Tritium Monitors

C ionix tritium monitors measure continuous activity of tritium and other β emitters in gases for workplace monitoring, decommissioning, stack release or other applications. C ionix monitors available include C ionix - BXX, C ionix - GN, C ionix - EXX, and C ionix – HTO.

FEATURES

- ✓ Self-checking
- ✓ Continuous measurement
- ✓ Automatic γ compensation (GN, HTO)
- ✓ Integrated light and sound alarms
- ✓ Response time:
  - 75 seconds (BXX)
  - 90 seconds (GN, HTO)
  - 3 minutes (EXX)
- ✓ Detection of tritium from:
  - 20 kBq/m3 (0.54 µCi/m3) (HTO)
  - 10 kBq/m3 (0.27 µCi/m3) (EXX, BXX)

Tritium Monitors

HT ionix™ Tritium Bubblers

Alpha Beta Air Sampler

The range of HT ionix bubblers has trappers for monitoring concentration levels of atmospheric tritium in HTO (vapor) and HT (gas) forms.

These bubblers are used for radioprotection, environmental monitoring, discharge measurement, and laboratory applications.

FEATURES

- ✔ High trapping efficiency: HT & HTO → > 95%
- ✔ Limited liquid loss
- ✔ Real-time leak detection
- ✔ No condensation
- ✔ Easy decontamination
- ✔ Only one annual maintenance required

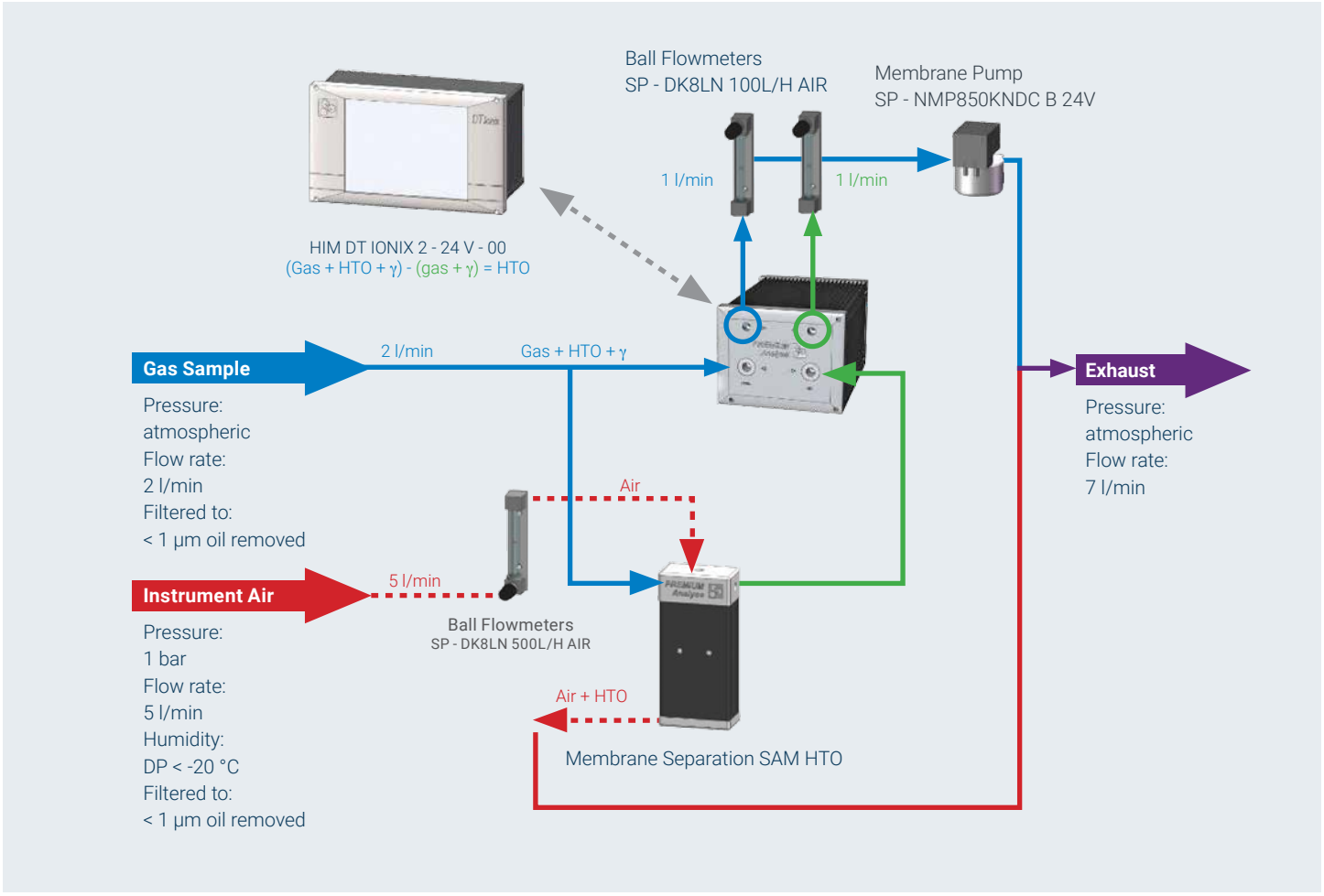
C ionix™ - HTO

Installed Tritium Monitor

The C ionix monitor – HTO continuously measures the level of tritium oxide (HTO) activity in the presence of other β emitting gases, including noble gases, for workplace monitoring, decommissioning, stack release and more.

FEATURES

- Self-checking
- Automatic γ compensation
- Integrated light and sound alarms
- Response time from 90 seconds
- Detection of tritium from 20 kBq/m³ (0.54 µCi/m³)
- Quick change components
- Simple γ source verification of system



Tritium Monitors

Monitors for Process Control

SENSITIVES

- Tritium LOD: 5 kBq/m³
- Volume: 4/8 l
- Applications:
  - Exhausts
  - Measurement, Environmental Protection

WIDE RANGE

- Tritium LOD: 15/50 kBq/m³
- Volume: 660/180 cc
- Applications:
  - Radioprotection
  - Nuclear Power

HIGH ACTIVITY

- Tritium LOD: 50 kBq/m³
- Volume: 10/500 cc
- Applications:
  - Nuclear Power
  - Process control

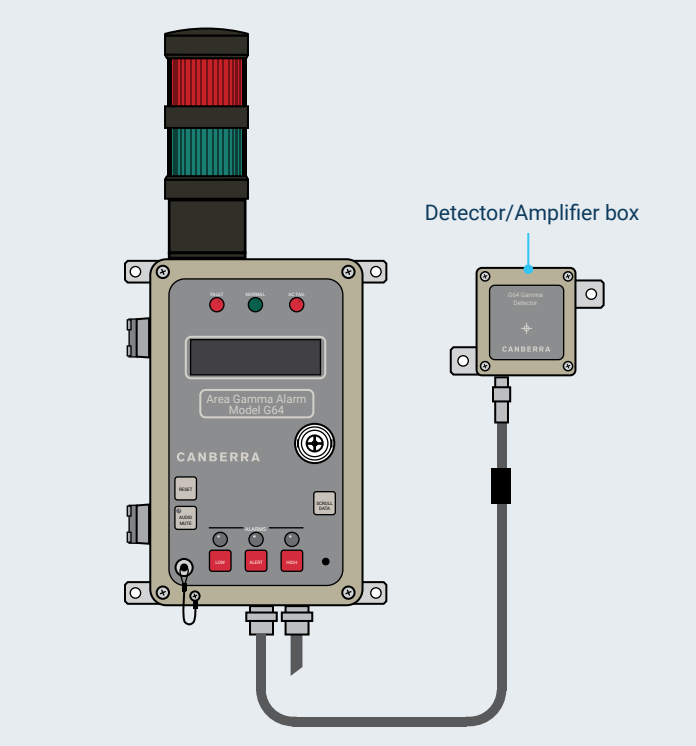
Area Monitoring

G64™

Area Gamma Monitor

FEATURES

- Wide range area gamma monitor 0.1 µ Sv/h to 100 m Sv/h (10 µR/h –10 R/h)
- Options for remote detector, high range ion chamber detector to 100 Sv/h (10K R/h), NaI scintillator and ionization chamber
- Interlock operation built in
- Compact, rugged industrial construction
- High reliability
- Comprehensive I/O facilities (RS-232 and RS-485, 4–20 mA, relays, etc.)



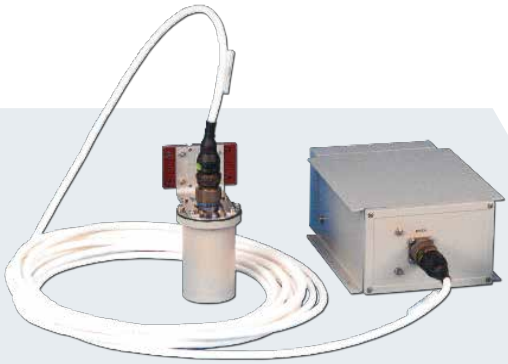
GIM 204K™

Very Wide Range Gamma Area Monitor

The GIM 204K system monitors dose rate or equivalent dose rate in nuclear facilities for personnel exposure and process monitoring.

FEATURES

- Wide measurement range
- Compact and reliable
- Available with or without display and local signaling
- 1E qualification and embedded safety related software
- Available under 10 CFR 50 App.B, ASME NQA-1 and IEC61226 programs for safety related applications



GIM 201K™

Low Range Gamma Area Monitor

The GIM 201K system monitors absorbed equivalent dose rate in nuclear facilities or laboratories for personnel exposure. The ionization chamber measures short duration pulsed radiation fields when halogenated and/or material activation is an issue.

FEATURES

- Wide measurement range
- High detector TID
- Up to 150 meters (492 ft) between detector and processing unit
- Available with or without display and local signaling
- Suitable for continuous and pulsed radiation fields
- Compact and reliable

NIM 201K™

Neutron Irradiation Dose Rate Monitor

The NIM 201K system monitors the neutron equivalent dose rate in real time in nuclear reactors, subcritical stacks, neutron generators, irradiators and accelerator facilities. The helium-3 proportional counter (cylindrical tube) detects thermal and fast neutrons. Its large energy range makes it efficient, reliable and highly sensitive.

FEATURES

- Detector for indoor and outdoor applications
- H*(10) measurement
- Available with or without display and local signaling
- Wide and high neutron energy range (2.5 10-8 to 16 MeV)
- Compact and reliable

Operational Measurement

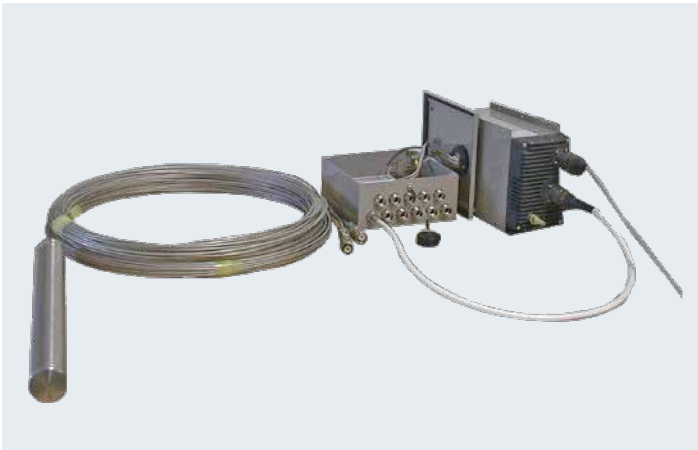
GIM 206K™

High Range Gamma Area Monitor

The GIM 206K system continuously monitors dose rate under harsh or post-accident environmental conditions. This monitor meets the requirements set forth by the IEC60951 standard and by the USA RG 1.97.

FEATURES

- Wide measurement range
- Compact and reliable
- Seismic qualification
- Available with or without display and local signaling
- 1E qualification and embedded safety related software
- Available under 10 CFR 50 App.B, ASME NQA-1 and IEC61226 programs for safety related applications
- LOCA proof detector and cable
- High TID



Operational Measurement

GIM 203K™

Wide Range Gamma Area Monitor

The GIM 203K system continuously monitors gamma dose rate under harsh or post-accident environmental conditions. It monitors the dose rate inside containment and in the reactor building during and after mild or severe accidents and under harsh operating conditions.

FEATURES

- Wide measurement range
- Compact and reliable
- Seismic qualification
- Available with or without display and local signaling
- 1E qualification and embedded safety related software
- Available under 10 CFR 50 App.B, ASME NQA-1 and IEC61226 programs for safety related applications
- LOCA proof detector and cable
- High TID

Control and Reactor Protection

BM 501™

Boron Meter

FEATURES

- Non-intrusive on-line measurement, directly placed around process pipe
- Can be adapted to pipe diameter
- Category B software according to IEC62138
- Seismic qualification
- Temperature compensated measurement
- Detection sub-assembly featuring a moderator/shield (for neutron thermalisation and radiation protection)
- Standard version with two detectors, temperature sensors and signal processing units for redundancy of measurement (also available with single detector)

proTK™

Neutron Flux Monitoring System

The neutron flux monitoring system proTK combines long term experience in design and manufacturing of both detectors and signal processing electronics. These products are strictly oriented to the highest level of safety relevance and reliability and are qualified by several type tests and proven by an excellent operational experience.

The system proTK covers the requirements for measuring equipment used for the reactor protection system according to IEC61226 Cat A.

FEATURES

- Modular construction
- Versatile applications
- Robust and reliable in operation
- Type tested
- Proven by operational experience

Barrier Monitoring

SGLM 510™

Steam Generator Leakage Monitor

FEATURES

- Gross gamma dose rate monitoring of the main steam line (incl. N-16) for primary circuit leakages
- Wide measuring range (1E-7 to 1E+2 Gy/h)
- Local HMI for display of measurement values, monitoring performance and setting parameters (key locked)
- Up to eight types of safety relay outputs for alarm and fault signals and local alarm indication
- proTK™ signal processing units are modular in hardware and software, highly customizable
- Extensive self-supervision and integrated test functions
- Designed and qualified to fulfill Cat. A functions according to the IEC 61226 and for Class 1E functions

SGLM 504

Steam Generator Leakage Monitor

FEATURES

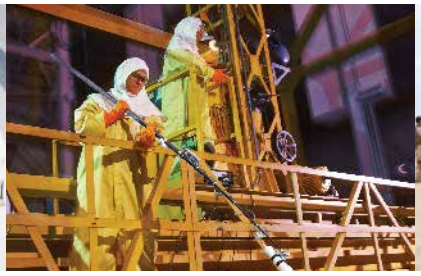
- Measure gamma radiation e.g., from decaying N-16 or noble gases in the main steam line of a PWR
- Provide isolated analog outputs (0/4 to 20 mA) for the measured count rate (log. scale)
- Provide isolated relay outputs for high alarm, system fault and test mode active
- Adjustable pulse-height discrimination threshold (optionally with discrimination window)
- Qualified to perform Cat. A safety functions acc. to the IEC 61226 and is qualified acc. IEC 60780 and IEEE 323, and IEC 60880 for SW.
- Seismic qualification acc. IEEE 344 and IEC 60980
- High level of safety due to continuous status monitoring (e.g. operating voltages or SW code integrity)
- Built in test signal generators for periodic testing of signal processing (remote activation possible)

Vital Protection. Transformative Potential.™

MIRION IS A GLOBAL LEADER IN RADIATION SAFETY, SCIENCE AND MEDICINE.

We offer a diverse portfolio of products and services that protects people and the planet from the harmful effects of ionizing radiation and accelerates innovation across a diversity of end markets.

The Mirion Technologies group provides proven radiation safety technologies that operate with the highest levels of precision – from R&D labs, to critical nuclear facilities, and on the front lines. In collaboration with our customers, Mirion empowers innovations that deliver vital protection and harness the transformative potential of ionizing radiation to shape our future world.

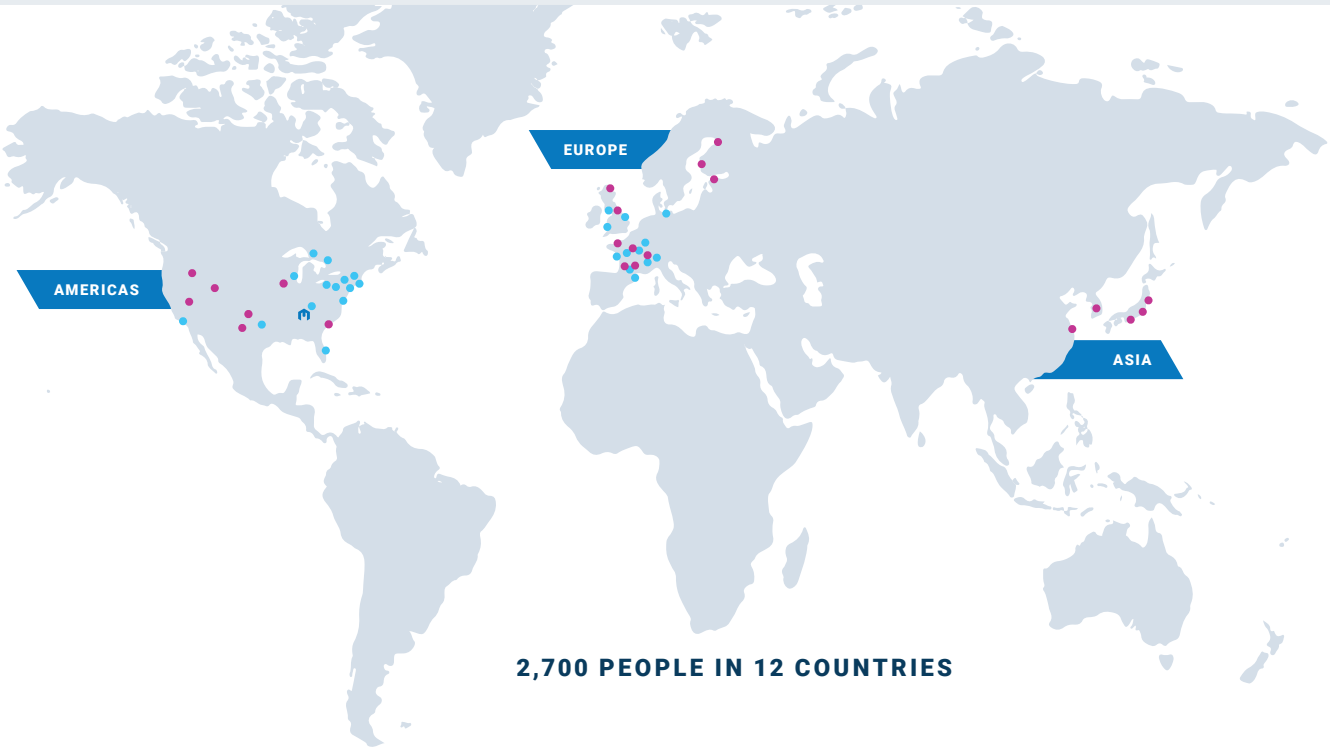
MIRION

Empowering Progress Across Continents

Mirion Technologies combines innovative radiation safety technologies with unrivaled expertise, cultivated over decades of collaboration with reactor manufacturers and operators, nuclear fuel facilities, regulators, national labs (such as the U.S. DOE), nuclear institutes, universities, and national military/ security organizations worldwide.

Trust us to provide the solutions and support you need to safeguard your valuable assets and ensure a secure and sustainable future.

CORPORATE HQ (ATLANTA, GA) MANUFACTURING SITES SERVICE & SALES CENTERS



2,700 PEOPLE IN 12 COUNTRIES

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Protect What's Next™

MIRION
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