



RAMSYS™

# SGLM 202K™

## Steam Generator Leak Rate Monitor



Monitoring steam generator leak rate in PWR nuclear power plants by measuring  $^{16}\text{N}$  activity

### DESCRIPTION

The SGLM 202K monitor forms part of the RAMSYS product line. It has been designed to detect and quantify leaks between the primary and the secondary circuits of a steam generator in a nuclear power plant. It operates on the principle that radioactive nitrogen ( $^{16}\text{N}$ ) produced in the reactor core during operation crosses into the secondary circuit through a steam generator tube crack (or hole). The  $^{16}\text{N}$  is carried away by the steam and is detected in the main steam line (MSL) outside containment.

For the SGLM 202K version: the NaI(Tl) detector is enclosed inside a  $2 \pi / 5 \text{ cm}$  (2") thick lead shielding to ensure protection against the ambient gamma background noise. This detector has no thermal insulation.

### FEATURES

- ✓  $^{16}\text{N}$  monitoring when reactor power exceeds 25%
- ✓ Gross gamma energy monitoring when reactor power < 25%
- ✓ Spectrum stabilization against temperature and aging drifts
- ✓ 16 selectable windows over the range covered
- ✓ 1024-channel analysis
- ✓ Available with or without display and local signaling
- ✓ Seismically qualified
- ✓ More than 800 SGLM channels in operation worldwide
- ✓ Designed for 1E mild environment conditions

# SGLM 202K™ STEAM GENERATOR LEAK RATE MONITOR

## PHYSICAL CHARACTERISTICS

- Radiation detected: gamma
- Detector: 3"x2" NaI(Tl) scintillator + PMT (SG/NAI 111)
- Energy range:
  - <sup>16</sup>N window: 4.5 MeV to 7 MeV
  - Gamma window: 0.2 MeV to 2.2 MeV
- Measurement range:
  - Leak rate: 0.1 to 5 000 l/h (0.64 to 31 700 GPD); Bq/m<sup>3</sup> (μCi/cc) unit also possible; based on user requirements
  - Gamma: 0.5 to 100 000 cps
- Spectrum analysis: 1024 channels
- Lead shield: 2 π / 5 cm (2 π / 2 in)

## ENVIRONMENTAL CHARACTERISTICS

- Normal temperature: +5 °C to +40 °C (+41 °F to +104 °F)
- Temperature limit: -5 °C to +55 °C (+23 °F to +131 °F)
- MTBF (LPDU): > 50 000 hours
- TID: 100 Gy (10<sup>4</sup> rad)
- Protection index: IP65 and IK07

## MECHANICAL CHARACTERISTICS

- Dimensions:
  - Processing unit: 390 mm x 196 mm x 187 mm (15.3 in x 7.7 in x 7.3 in)
  - Detector: Ø 402 mm x 429 mm (Ø 15.8 in x 16.9 in)
- Weight:
  - Processing unit: 8 kg (17.6 lb)
  - Detector: 226 kg (498 lb)
- Color: gray RAL 7030 (decontaminable paint)

## ELECTRICAL CHARACTERISTICS

- Power supply: 230 Vac – 50 Hz or 120 Vac – 60 Hz
- Data link outputs: one RS232 (LPDU only) and two isolated RS485
- Alarm relays: three SPDT relays
- I/O: two isolated analog outputs and one isolated analog input (0/4-20 mA)

## SIGNALING (APPLICABLE TO LPDU ONLY)

- Alphanumeric display: measurement, status...
- Sound alarm: buzzer 90 dBA at 1 meter
- Visual alarm: three lights (red, yellow, green)

## REFERENCE STANDARDS

- Environmental: IEC/IEEE 60780-323
- Seismic: IEEE344 and IEC60980
- EMC: 2014/30/EU and 2014/35/EU, EPRI 102323, RG 1.180, IEC61000-6-2 and IEC61000-6-4

## VERSIONS

- 230 Vac or 120 Vac
- Local processing and display unit (LPDU) or local processing unit (LPU)
- With or without RS485 junction box
- Detector cable length: from 20 m (65.6 ft) to 100 m (328 ft)
- Junction box cable length: 2 m (6.56 ft), 5 m (16.4 ft) or 10 m (32.8 ft)

## ACCESSORIES

- Calibration tools
- Software: MASS2™, RAMVISION™, SIMS2™ applications...
- Ethernet (LPDU version only)
- USB converters
- Seismic qualified wall mounting bracket for LP(D)U
- Seismic qualified detector support

## NOTE

The <sup>16</sup>N monitor can measure the <sup>16</sup>N count rate in the MSL with a relatively high precision and can convert the count rate into leak rate if the power nuclear level is provided by the manufacturer by means of an 0/4-20 mA current loop.

Converting the count rate to volumetric activity requires detailed Monte Carlo analysis. Mirion Technologies can provide such analysis.

Correlating leak rate (in units of l/h or GPD) to <sup>16</sup>N activity requires a detailed thermo hydraulic analysis and knowledge pertaining to the leak location.

The steam generator manufacturer typically provides the thermo-hydraulic data required for establishing leak rate correlations.

Mirion Technologies can provide the overall analysis for establishing the leak rate correlations if the thermo-hydraulic data is available.



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