Reuter-Stokes
a Baker Hughes business

Reuter-Stokes MIC neutron detectors for pressurized water reactors

Designed for peak performance and reliability

Reuter-Stokes, with more than 35 years of experience, is one of the world's leaders in miniaturized fission chambers. The Reuter-Stokes MIC (movable in-core) sensor, used in pressurized water reactors (PWR), maps the thermal neutron flux in the water gap between adjacent fuel bundles and is compatible with existing installed systems. The precisely matched, machined, and bonded components of the Reuter-Stokes MIC increases reliability by minimizing the possibility of detector failure resulting from installation and removal. This means exact radiation readings when you need them, every time. Reuter-Stokes MIC detectors are compatible with all equipment with all equipment vendors and can perform as direct replacements for current movable in-core probes.

Accurate output signal

The unique uranium coated miniature fission chamber and mineral insulated cable technology of the MIC enables detection of the core thermal neutron radiation levels by traversing the active fuel region and producing a direct current that is proportional to the neutron flux in the water gap.

The accurate signal of the MIC, enabled by the ceramic to metal seal that isolates the detector and cable assembly, eliminates variation at temperature from gas expansion and provides a signal that is precise and repeatable over hundreds of flux scans. This allows greater confidence in the neutron monitoring system operation.

Functional flexibility over a long detector lifetime

Superior insulation resistance at temperature in the Reuter-Stokes MIC probes aids in exact flux measurement by minimizing leakage currents. This proven design permits usage of the detector over a wide range of temperatures, decreasing the need for frequent replacements. The long detector lifetime contributes to increased operation efficiency and decreased maintenance costs.

Customer-focused solutions

Reuter-Stokes is dedicated to continuous improvement in the performance of our products. By utilizing Six Sigma quality development and efficient, short cycle production, we are able to meet customer needs quickly and to provide MIC probes in an industry leading order to delivery time.

Reuter-Stokes has also invested in plant and equipment to remain at the forefront of technology. Enhanced uranium plating, state of the art clean room assembly and testing processes employed in the manufacture of the Reuter-Stokes MIC probes ensures the high level of quality our customers have come to expect.

Vast global installed base

Reuter-Stokes is committed to our customer around the globe, with experts available to meet deadlines when you need them and on your schedule. Reuter-Stokes MIC probes are installed in more than 25 PWR plants worldwide.

Performance benefits

- Reliable, trouble free detector operation
- Responsive technical support
- Extensive miniaturized fission chamber manufacturing experience for over 35 years

Available options

- MIC probes are available in right handed or left handed models and in custom lengths.

Specifications

- Part Number RS-C6-0201-231 (L or R for left handed or right handed drive cable pitch).

Moveable In-Core (MIC) neutron detector

Optional characteristics	
Thermal neutron flux range	1 E11 nv to 2 E14 nv
DC neutron sensitivity	
In pwr at 0 nvt with 100 v applied	8.5 E-18 A/nv ±20%
In test reactor with 100 v applied	1.5 E-17 A/nv ±20%
Sensor gamma sensitivity	
In co-60 field with 100 v applied	2 E-14 A/R/h max.
Sensor design lifetime	
(Corresponds to 10% sensitivity decrease)	3 E20 nvt
Inter-electrode operating voltage	100 VDC
Insulation resistance (integral cable only)	
Whole cable at 24°c	1 E12 Ohms min.
4.5 M of cable at 375°c, remainder at 24°c	1 E8 Ohms min.
Capacitance	110 pf/ft.

Physical characteristics	
Sensor element	
Outer diameter	0.188 in. max.
Sensitive length	1.00 in.
Detector length	2.17 in. max.
Nominal fissile coating	0.4 mg U-235
Fill gas	76 cm argon
Anode and cathode material	304 or 304L SS
Insulator material	Alumina
Drive cable	
Outer diameter (helical wrap, lh, or rh)	0.191 in. max.
Length	175 ft. (standard)
Material	Carbon steel
Single cable	
Sheath diameter	0.041 in. max.
Center conductor material	Inconel 600
Cable sheath	Inconel 600
Insulation	Alumina
Connector	
Type	Amphenol #27-7 (standard)

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