# radICS

Radics delivers a digital I&C platform that is robust, flexible, and scalable. It provides state-of-the-art functions, services, and safeguards for both safety and safety-related applications in the nuclear industry. The RadICS product line consists of a Logic Module, basic input/output modules, and specialty modules all housed in a seismically qualified chassis.

The RTD Inputs Module (RIM) will serve as a highdensity analog RTD sensor acquisition module. It will provide 8 independent, highly reliable, and galvanically isolated inputs with built-in filtering and calibration for use by the Logic Module. The RIM will also perform robust and continuous self-diagnostics to ensure the safety and integrity of each input and module function.



# Resistance Temperature Detector Inputs Module (RIM)

➤ High density 8 channel analog inputs with built-in hardware redundancy and self-diagnostics for highly reliable operation, filtering, calibration, and random hardware failure detection.

➤ Independent FPGA for analog input processing, self-diagnostics, and fail-safe functional behavior.

➤ Robust self-diagnostics ensure higher reliability and early fault detection with safety-focused fault management.

➤ Segregation of input processing, self-diagnostics, and watchdog functions assure safety-critical functionality.

➤ Galvanic isolation for signal inputs with robust and dedicated communication links to Logic Module for secure data transfer.

➤ Inherent on-board diversity features eliminate common cause failure vulnerabilities.

➤ FPGA technology ensures resilience to I&C obsolescence.

*20 Years of Proven Innovation for the Global Nuclear Industry*

# Resistance Temperature Detector Inputs Module Technical Specifications

| | |
|---|---|
| **Input Analog Signal Range** | 5-1500 Ohms (0-1600 Ohms over-range monitoring capabilities)<br>4 signal sub-ranges:<br>5-198 Ohms; 5-398 Ohms; 5-795 Ohms; 5-1500 Ohms. |
| **Supported Sensor Types** | 1. 2-, 3- and 4-wire connection schemes support.<br>2. Raw resistance (Ohms) measurement<br>  (to support any specific sensor type with external conversion into temperature performed in Logic Module).<br>3. 5 pre-defined RTD sensor types support with adjustable R0 (up to 350 Ohms) and R -> t conversion performed internally by module.<br>Supported RTD types:<br>  - Platinum ($\alpha$=0.00385 per °C) – corresponds to IEC 751<br>  - Platinum ($\alpha$=0.00391 per °C)<br>  - Copper ($\alpha$=0.00428 per °C)<br>  - Copper ($\alpha$=0.00426 per °C)<br>  - Nickel ($\alpha$=0.00617 per °C) |
| **A/D Conversion Resolution** | 18 bits / 400 kilo samples per second (kSPS) |
| **Response Time** | 100 milliseconds |
| **Common Mode Rejection Ratio** | > 86 dB |
| **Overall Accuracy** | 0.1% of sub-range full scale (@ 25 °C) |
| **Input Channel Isolation** | all input channels are galvanic-isolated up to 500 $V_{RMS}$ AC or 500 VDC field-to-Chassis and channel-to-channel |
| **Overvoltage Protection** | ±60 VAC/VDC continuous (using external protection elements installed in Chassis) |
| **Information Package Exchange Cycle** | 5 milliseconds |
| **Diagnostic Package Exchange Cycle** | 5 milliseconds |
| **LVDS Line Speed** | 100 megabit/second |
| **LVDS Line Protocol** | proprietary protocol with integrity checking (CRC), galvanic-isolated Tx / Rx |
| **Self-Diagnostic Functions** | diverse watchdog unit, checksum analysis, active diagnostics with internal fault detection, hardware error detection, functionally diverse continuous self-diagnostic tests, power supply fault detection |
| **Power Supply / Consumption** | 2 independent inputs – 24 (18 – 36) VDC /<br>Maximum consumption: 0.29A(±0.15A) (8 inputs used; 1500 Ohms input value at each input) |
| **Indications** | 2 status LED indicators (RUN/FAULT)<br>4-character dot matrix symbol-indicator for providing current operational mode, service information, and error codes |
| **Operating Temperature** | 4.4 to 60 °C (40 to 140 °F) |
| **Operating Humidity** | 10 to 90% relative humidity, non-condensing |

*RadICS Platform is the only FPGA-based I&C platform with a SIL 3 certification in a single channel configuration. The Platform is reviewed and approved by U.S. NRC. Radics LLC provides engineering, testing and commercial grade dedication services for nuclear power clients on international markets to meet local nuclear regulatory requirements and ensure safety and reliability at nuclear power genera on sites.*