



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 Thermocouple Inputs Module (TIM) will serve as a high-density analog thermocouple sensor acquisition module. It will provide 32 independent, highly reliable, and galvanically isolated inputs with built-in filtering and calibration for use by the Logic Module. The TIM will also perform robust and continuous self-diagnostics to ensure the safety and integrity of each input and module function.



Thermocouple Inputs Module (TIM)

- High density 32 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.



Thermocouple Inputs Module Technical Specifications

Supported Sensor Types	Type B, E, J, K, N, R, S, T with internal conversion $mV \rightarrow t \text{ } ^\circ\text{C}$. Also supports raw millivolts (mV) acquisition (to support any other sensor type with external conversion into temperature performed in Logic Module).
A/D Conversion Resolution	19 bits delta-sigma analog-to-digital conversion
Response Time	300 milliseconds
Common Mode Rejection Ratio	> 86 dB
Overall Accuracy	Type B: 0.15% of full scale (@ 25 °C) Type R, S, T: 0.1% of full scale (@ 25 °C) others - 0.04% of 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 / Maximum consumption: 0.4A(± 0.15 A) (32 inputs used in -35..+100mV mode; 100mV at each input)
Indications	2 status LED indicators (RUN/FAULT) 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

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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.