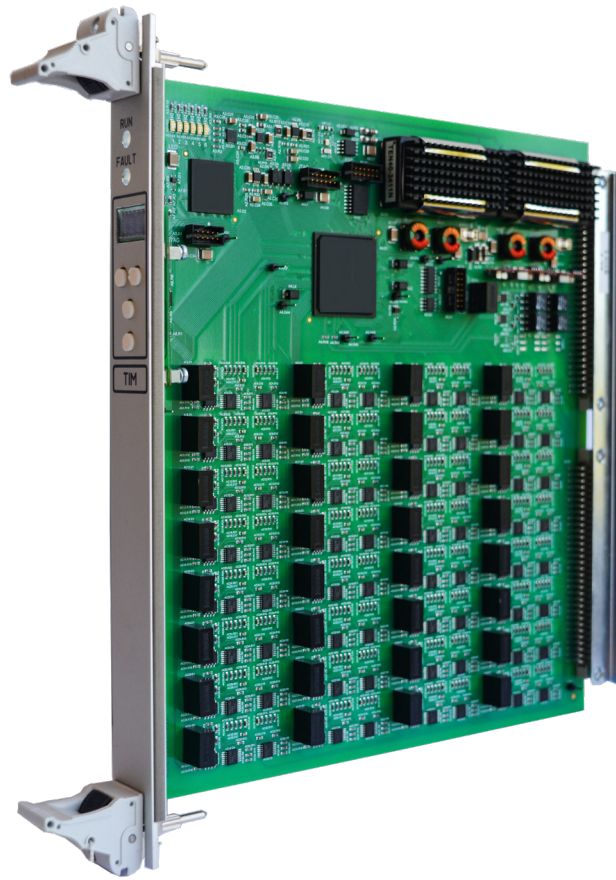




Radiy delivers a digital I&C platform that is robust, flexible, and scalable. It provides state-of-the-art functions, services, and safeguards for both safety and non-safety applications in the nuclear industry. The RadICS product line consists of a Logic Module, basic input/output modules, and specialty 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 250 V _{RMS} AC or 250 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

Research & Production
Corporation Radiy
29 Akademika Tamma Street,
Kropyvnytskyi 25009, Ukraine
inter.project@radiy.com
www.radiy.com

For more than 20 years Radiy has provided advanced instrumentation and control (I&C) solutions for nuclear power plant modernization and new build projects in the global market. Radiy's main I&C product, the RadICS I&C Platform, was developed specifically for use in nuclear power plants. It is the only FPGA-based I&C platform with a SIL 3 certification in a single channel configuration. Radics, a wholly owned LLC, provides delivery services for the RadICS I&C Platform for international markets to meet local regulatory requirements. Radiy also offers industrial control systems, electrical equipment, and reverse engineering services.