

# Analog Output Module (AOM)

Fully Qualified Safety-Related Digital Platform

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## About

Curtiss-Wright Nuclear has partnered with Radics, LLC to supply integrated FPGA-based instrumentation and control (I&C) systems for nuclear power plants and research reactors. RadICS is a digital I&C platform that is robust, flexible, and scalable. It provides state-of-the-art functions, services, and safeguards for 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 Analog Output Module (AOM) serves as a high-density output conditioning module providing 32 independent, highly reliable, and galvanically isolated analog outputs. The Logic Module uses the AOM to drive field devices, indicators, and other functions. The AOM also performs robust and continuous self-diagnostics to ensure the safety and integrity of each output and module function. In the event of critical failures, the AOM deenergizes to a plant defined safe-state.

## Analog Output Module (AOM)

- High density 32 channel analog outputs designed to generate conditioned output signals that exceed accuracy and response time diagnostic tolerances.
- Independent FPGA for analog output processing, self-diagnostics, and fail-safe functional behavior.
- IEC 61508 SIL 3 certification in single and multiple channel configurations.
- Robust self-diagnostics ensure higher reliability and early fault detection with safety-focused fault management.
- Segregation of output processing, self-diagnostics, and watchdog functions assures safety-critical functionality.
- Galvanic isolation on signal outputs 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 cyber security and resilience to obsolescence.



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## Analog Output Module Technical Specifications

Function	Specifications
Output Range	0 to +5 V / 4 to 20 milliamp / $\pm 10$ V / 0 to 5 milliamps
D/A Conversion Resolution	16 bits
Output Signal Value Accuracy	0.04% of full scale (at 25 °C)
Maximum Output Load	up to 350 ohm (k $\Omega$ ) for current output Minimum of 1 k $\Omega$ for voltage output
Internal Power Supply On Each Output Channel	$\pm 15$ V / $\pm 35$ milliamp
Output Analog Channel Isolation	all output channels are galvanic-isolated up to 250 V <sub>RMS</sub> AC or 250 VDC field-to-Chassis and channel-to-channel
Overvoltage Protection	$\pm 60$ VAC/VDC continuous (using external protection elements installed in Chassis)
Output Signal Update 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: 1.42A ( $\pm 0.15$ A) (32 outputs in 4-20mA mode used; 20mA at each output)
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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