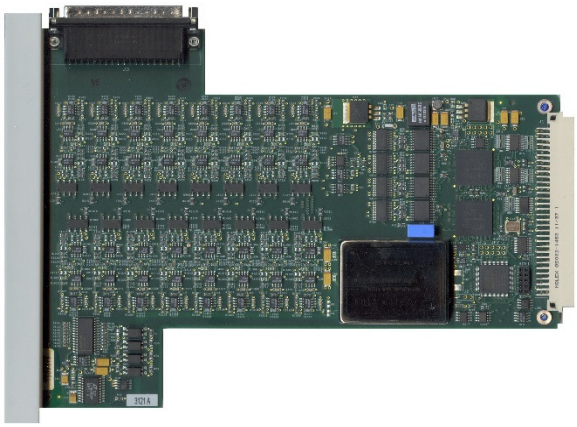
SIL-3 16-Channel Analog Output Card

3121 Current/ 3122 Voltage

PRODUCT HIGHLIGHTS

- **SIL-3 Approved**
- **Safety and Critical Control Applications**
- **Current Output Option - ±20 mA, 0-20 mA, 4-20 mA**
- **Voltage Output Option - ±10V, 0-10V**
- **Configurable Redundancy - Single, Dual, or Triple**
- **16-bit Digital to Analog Conversion**
- **Channel Readback Validation**



3121 16-Channel Analog Output Card

Product Overview

The 16-Channel Analog Output card has been designed to provide high resolution, precision analog output signals. The 16-Channel Analog Output card can be installed into any RTP 3000 TAS and N+ family chassis to control actuators, valves, solenoids, or other suitable analog devices.

Built-in advanced diagnostics test each output signal to verify proper operation. Readback of outputs verifies output levels. To test for stuck output values, the card will periodically change the commanded value of the analog output by a small amount (< 1%) for one scan cycle. The output is verified to have changed via the analog channel readback circuitry. Additional diagnostics are performed extensively on all backplane communications to ensure the validity of commands, slot addressing, card ID and data. If an error is detected, an error bit is set and the outputs are not transferred. Watchdog timers allow the output to de-energize to a zero state in case of loss of communication to the cad.

Configurable redundancy reduces costs as the redundant outputs are configured to your availability, integrity and system cost requirements. The flexible architecture allows redundant output cards to be in the same chassis or in different chassis.

Redundant current outputs use a current sharing scheme. Each card that is active drives current into the load. In a triple redundant configuration Card A drives 1/3 of the output current while Card B and C each drive 1/3 of the output current.

In a dual redundant configuration Card A drives ½ of the output current while Card B drives ½ of the output current. This approach guarantees that you will always know the status and functionality of the redundant cards before a switchover takes place.

Dual or triple redundant voltage output cards use a hot standby scheme where two or three voltage cards are connected in parallel. Only one card drives the output. The one of other cards will automatically drive the load if a failure occurs. This increases availability.

RTP is the Best Technology for Your Investment,
Here's why:
The 3000 TAS is a multi-processor architecture that delivers exceptional Performance and Comprehensive Diagnostics. The results speak for themselves: A reaction time of 12 msec, true 1 msec SOE (Analog and Digital), an MBTF of greater than 50,000 years an MTTFS of greater than 60,000 years, and a PFDavg of $5x10^{-5}$. ***Compare these numbers to any other system.***
Built-in proof test diagnostics means it will never be necessary to shut down at the proof test interval. Unlimited online downloads of logic and configuration changes do not require a periodic shut down like other systems. ***Compare this functionality to any other system.***
NetSuite Software: One-time price includes unlimited use of Logic Development, Alarm Manager, Data Archive and Historian and HMI without hardware or software keys. ***Compare this functionality and price to all other systems.***
Finally, a Safety Instrumented System (SIS) should always take the process it protects to a safe state when it is required to do so, and it should never interfere with the operation of the process at the time. ***The 3000 TAS does this better than any other system.***

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In a redundant configuration, you may degrade to a single output card and maintain the SIL 3 rating indefinitely.

Redundant configurations provide ease of replacement. There is never a need to stop the process. Card replacement can be completed using NetArrays. Simply disable the card, remove the cable and card, install the replacement card, attach the cable, and re-enabling the card in NetArrays. There is no field calibration required.

Enhancements to the card PLD can be accomplished quickly and easily in the field with a simple file download and restart of the card.

If adding a new channel or new card, make the configuration change in NetArrays and download the new file online. This allows existing logic and I/O to continue processing undisturbed while the new logic and I/O is initialized.

Specifications

3121 – 16 Channel Current Analog Output Card

Safety Integrity Level	SIL 3
Number of Channels	16 channels
Output Signals	Sourcing: ±20 mA, 4 – 20 mA, or 0 – 20 mA
Full Scale Value	20 mA
Analog output error (maximum error at 25 ºC)	±0.050% of full scale value (±0.010 mA)
Analog output error (temperature coefficient)	+/-0.010% of full scale value/ºC (±0.002 mA/ºC)
Maximum error over temperature range	+/-0.350% of full scale value (±0.070 mA)
Digital resolution	16 bits
Settling time to within maximum error for full-range change	Less than 1ms
Slew Rate	0.2 mA/µsec (typical);
Type of protection	Digital isolators (magnetic)
Isolation	Channel to RTP ground and external power supply 500 VDC max No channel to channel isolation
Backplane Power	5 VDC @ 300 mA 24 VDC @ 675 mA
Voltage Compliance Range For Current Output	+11.6 Volts
Common points between channels	All channels share an isolated common ground.
Load resistance range	100 Ω minimum, 600 Ω maximum
Crosstalk between channels at DC, AC 50 Hz and AC 60 Hz	DC -71 dB AC 50 Hz -71 dB AC 60 Hz -71 dB
Non-linearity	±0.050% of full scale value (±0.010 mA)
Output Protection	Outputs may be shorted to 0 V indefinitely.
Hardware Watchdog timer	0.31 to 0.650 seconds
Programmable Watchdog timer	150 msec

3122 – 16 Channel Voltage Analog Output Card

Safety Integrity Level	SIL 3
Number of Channels	16 channels
Output Signals	0-10 VDC or ±10 VDC
Full Scale Value	10 V
Output Impedance	< 1.15 Ohms (output on) > 10 Mega Ohms (output off)
Analog output error (maximum error at 25 ºC)	±0.065% of full scale value (±6.5 mV)
Analog output error (temperature coefficient)	±0.003% of full scale value/ºC (±0.3 mV/ºC)
Maximum error (0 ºC to 55 ºC)	±0.153% of full scale value (±15.3 mV)
Digital resolution	16 bits
Settling time to within maximum error for full-range change	Less than 130 µS
Slew Rate	0.1 V/µsec (typical, resistive load);
Type of protection	Digital isolators (magnetic)
Isolation	Channel to RTP ground 500 VDC max No channel to channel isolation
Backplane Power	5 VDC @ 300 mA 24 VDC @ 500 mA

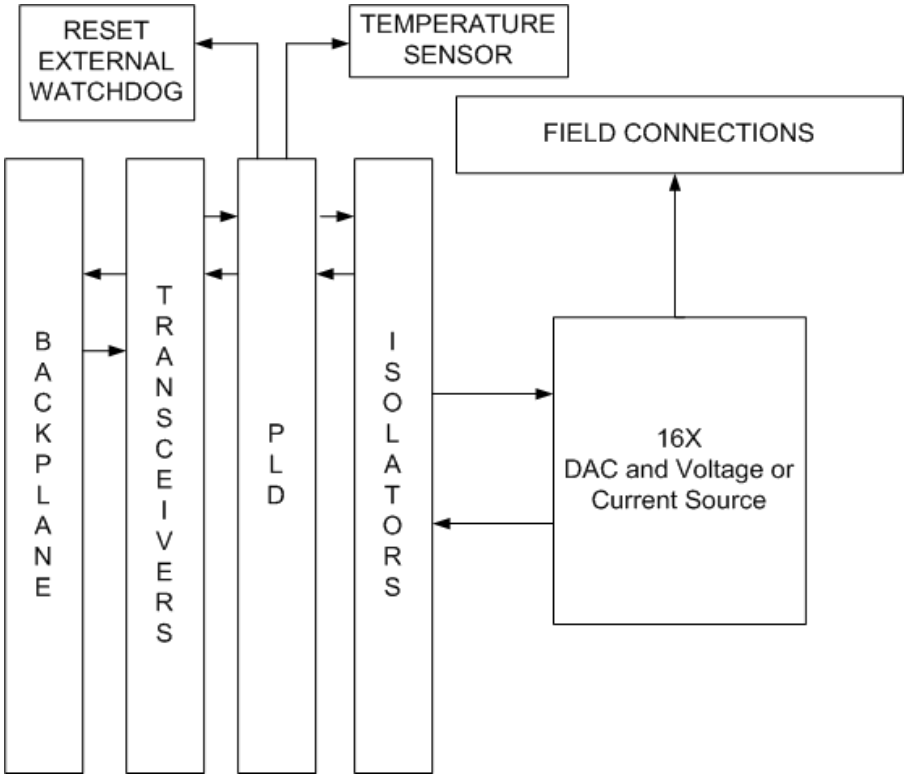
Common points between channels	All channels share an isolated common ground.
Load resistance range	2 kΩ minimum reference to Signal Return
Crosstalk between channels at DC, AC 50 Hz and AC 60 Hz	DC -72 dB AC 50 Hz -72 dB AC 60 Hz -72 dB
Non-linearity	±0.065% of full scale value (±6.5 mV)
Output Protection	Outputs may be shorted to 0 V indefinitely
Hardware Watchdog timer	0.31 to 0.65 seconds
Programmable Watchdog timer	150 msec

Environmental Specification

Operating Temperature Range	–20 ºC to +60 ºC
Storage Temperature Range	–25 ºC to +85 ºC
Relative Humidity Range	10% to 95%, non-condensing

Termination Module

3099/22-000	Triple Redundant Termination Module – 16 Ch AO
3099/22-100	Single Termination Module – 16 Ch AO



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