GFK-0388G
August 1997

High Level Analog Output System - Voltage/Current Module

Features

- High Level Analog voltage and current outputs on one module

- Output module has four outputs individually configurable for voltage or current

- Provides unipolar or bipolar Analog voltage outputs up to Ç 10 volts full scale

- Provides 0 to 22.5 milliamp current loop signals

- Individual user scaling on each output channel

- Fast update rate

- No jumpers or DIP switches for user to configure

- Calibrated at factory with factory calibration data stored in non-volatile EEPROM memory

Easy configuration using the configuration function of the MS-DOS® or Windows®programming software running on Windows® 95 or Windows NT® over Ethernet TCP/IP or through the SNP port. The Programming Software configuration function is installed on the programming device. The programming device can be an IBM® XT, AT,PS/2® or compatible Personal Computer.

Functions

The high level Analog Output system for the Programmable Logic Controller (PLC) accepts digital data from the CPU or other controllers accessing the PLC backplane. This output data is converted by a Digital to Analog (D/A) converter to analog outputs of up to 10 volts full scale, or 0 to 22.5 milliamp current loop signals.

The basic converter is 16 bits resolution (1 part in 65536) with 14-bit monotonicity. Outputs are isolated from the backplane and are protected against transient and steady-state overvoltage conditions.

Analog outputs use %AQ references in the PLC. A maximum of 8K words of %AQ memory is available in the PLC. Each output channel uses one word (16 bits) of %AQ memory.
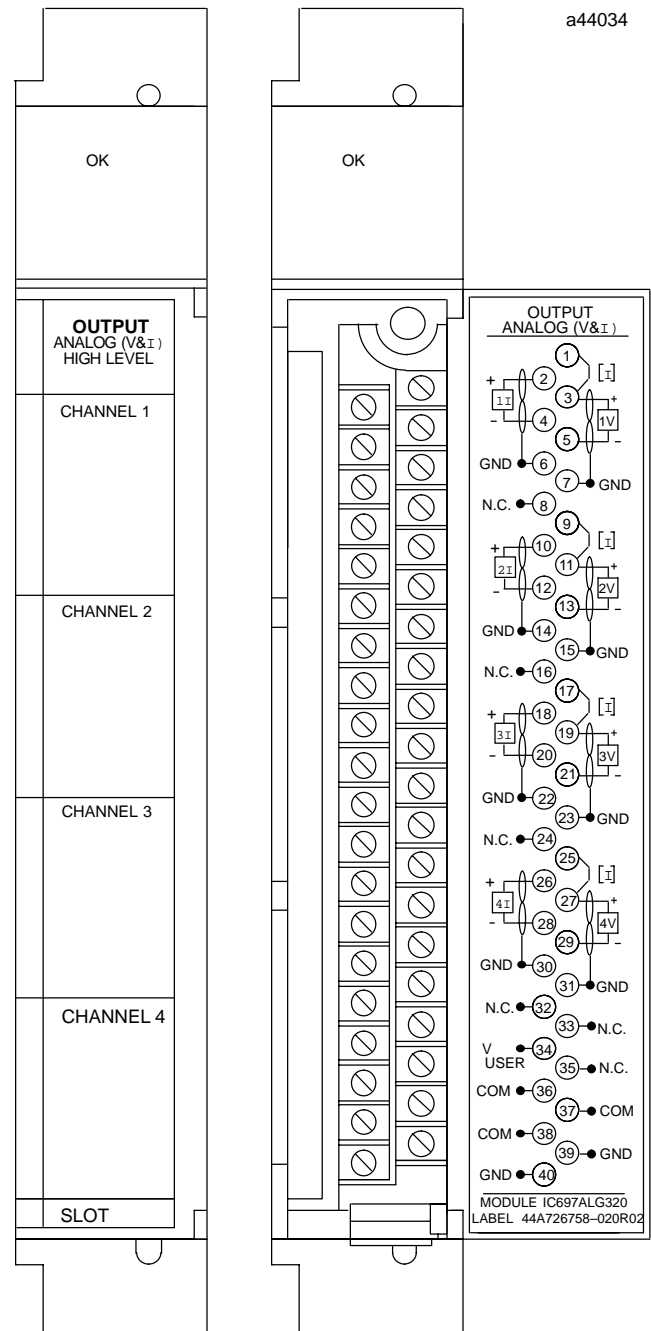

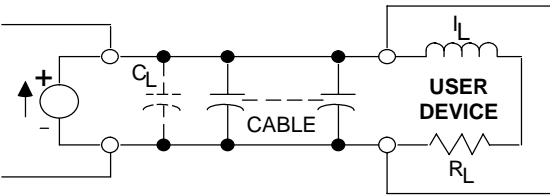**Figure 1. High Level Analog Output Module**

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® MS-DOS, Windows, Windows 95, and Windows NT are registered trademarks of Microsoft Corporation.

High Level Analog Output System - Voltage/Current Module

Table 4. Analog Output Specifications †

Output Ranges:	Voltage: –10 volts to +10 volts (default) Current: 0.0 mA to 22.5 mA (4 to 20 mA default)

Resolution:	16 bit with 14 bit monotonicity
	    312.5 microvolts per LSB step on voltage
	    0.5 microamps per LSB step on 4 to 20 mA
	No missing codes over 16 bits on voltage.
	No missing codes over 15 bits on current.
	
	NOTE: User scaling may introduce degraded granularity in output voltage depending upon the scaling factors used.

Accuracy: **Calibration**	Voltage: Factory set at full scale = 10 volts Ç2.5 millivolts. Current: Factory set at 4.0 mA Ç5 μA and 20 mA Ç 5 μA. Full Scale, with 24.0 VDC field side voltage.
Field calibration not possible	Calibrated at factory with calibration data stored in EEPROM memory.
Maximum Errors	at 25°C (77°F)
Linearity	Ç 0.02% of full scale over entire negative to positive range.
Temperature Coefficient	Voltage: Ç 25 PPM per °C typical Current: Ç 50 PPM per °C typical
Output Loading: *Voltage:*	R: minimum = 2000 ohms C: maximum = 1000 picofarads
Current ‡:	R: up to 800 ohms C: maximum = 1.0 microfarad L: maximum = 250 millihenrys
	‡ The current output should be monitored for stability with step changes using inductive loads. There will be combinations of R, L, and C that will not be stable and will require additional capacitance on the current output terminals to maintain output stability with inductive loads (as shown in the following figure).
Short Circuit:	Voltage and current outputs will handle a continuous short circuit without harm and will return to the proper output (output when short occurred) when the short is removed.
Conversion Rate:	All outputs are updated sequentially approximately every 2.0 milliseconds (maximum) for all 4 channels.

Table 4. Analog Output Specifications (continued) †

Response Time:
Settling times, to the specified accuracies, for a zero to full scale step output at maximum rated load capacities are:
    Voltage:
 	
    Current:
	
	5.0% 0.5 milliseconds
	0.1% 2.0 milliseconds
	
	5.0% 1.0 milliseconds
	0.1% 5.0 milliseconds

Output Protection: **Impulse:**	Outputs isolated from VME backplane - but not between output channels. They are designed to have a Ç 0.5 VDC compliance circuit-to-circuit and operate within specifications. The outputs are protected from overvoltage to the levels listed below. Outputs normally are not affected by common mode damped ring-wave of up to 1000 volts peak. Common or transverse mode peaks up to 2500 volts cause no damage, but may cause occasional bad data if they occur coincident with conversion of the affected channel. The noise level is a direct function of the grade of cable used for connections.

Power Requirements:
    Rack Backplane
    Field Side
	+5 VDC at 1.66A (8.3 watts) maximum
	150 mA of DC user power must be supplied by the user for the current outputs. The recommended operating voltage is 24 VDC. A range from 10 VDC to 30 VDC (user load impedance dependent, see Figure 3) can be used with some loss in output accuracy.
	Field side power to the Analog Output module should be connected to the module with a good quality shielded cable in environments where noise could be coupled into the field side power wiring.

† Refer to GFK-0867B, or later for product standards and general specifications. For installations requiring compliance to more stringent requirements (for example, FCC or European Union Directives), refer to *Installation Requirements for Conformance to Standards.*

Table 5. Ordering Information

Description	**Catalog Number**
High Level Analog Output Module	IC697ALG320

Note: For Conformal Coat option, or Low Temperature Testing option please consult the factory for price and availability.