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IC670ALG320

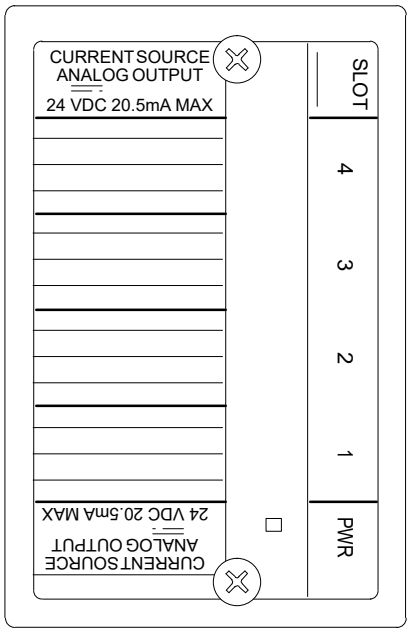
Analog Output Current/Voltage 4Pt. Grouped

Provides the wiring diagrams and installation guidelines for this GE Field Control module.

GFK-0892H
June 1997

Current/Voltage Source Analog Output Module

The Analog Output Module (IC670ALG320) provides a group of four current/voltageanalog outputs. Each output channel provides a span of 4–20mA and 0–10V, which can be changed to 0–20mA and 0–12.5 volts by adding jumper on the I/O Terminal Block. Default scaling is 0 to 20,000. Scaling can be changed in configuration to match the output used or to engineering units.



Power Sources

The same 24 volt power supply used for the Bus Interface Unit can provide loop power to the outputs in most cases. If module to module (or Bus Interface Unit) isolation is required, separate power supply(s) must be used.

The most common application would have the loop supply local at the module, driving multiple isolated transducers, isolated analog inputs, or differential analog inputs.

LED

An LED, visible through the transparent portion of the module top, indicates whether field and backplane power are present.

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Host Interface

The Current Source Analog Output Module has 4 words (8 bytes) of analog output data. A Bus Interface Unit is required to provide this output data to the host and/or local processor.

The module converts analog values from the host or local processor into output current. Scaling for the module is performed by the Bus Interface Unit. Software Range Selection of 0 to 20mA and 4 to 20mA is available on a per-channel basis. Using the 0 to 20 mA range requires the installation of an external wire jumper between JMP and RET.

The default scaling for this module is:

Eng Lo	=	0
Eng Hi	=	20,000
Int Lo	=	0
Int Hi	=	20,000

The default range is 0 to 20mA. The module is shipped with no wire jumper present. The jumper must be installed to correspond to the module's default range and scaling.

The 4–20mA range provides a fixed 4 milliamp offset (0mA = 4mA signal), with a 16mA signal span. The 4mA offset remains as long as analog loop power is applied, even if the logic power is off. Note that default outputs for loss of host communications require both backplane power and analog field power.

A second output on each channel provides an uncalibrated voltage output. The 4 to 20mA range corresponds to 0 to 10 volts. The 0 to 20 mA range corresponds to 0 to 12.5 volts. A wire jumper is required for the 0 to 20mA range. Both voltage ranges have restricted load current drive capability above 10 volts. Voltage can be used alone, or simultaneously with current to drive meters or voltage input devices.

An OPEN WIRE diagnostic available per channel operates only on the current outputs. If you are using only the voltage output of a channel, you should either disable the fault or connect a dummy load of 250 to 800 ohms across the current terminals of the channel. An OPEN WIRE fault will not affect the operation of the voltage output.

Output register values outside the capability of the module will drive the output to the appropriate minimum or maximum level but will not generate a diagnostic fault.

Keying Locations

Optional keying locations for the Current Source Analog Output Module are:

KeyingLocations									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
✓		✓						✓	✓

Scaling

The "Int" units on the HHM configuration screen correspond to actual desired output current values, in microamps, provided the base terminal jumper corresponds to the module range configuration. The Int unit values set in the configuration must be within the limits of the range used. The module will operate with a range–jumper mismatch, but Int units scaling will be invalid. The "Eng" units are the values supplied by the host.

Field Recalibration Using Scaling

Field recalibration can be accomplished by forcing the outputs to the "Eng Hi" and/or "Eng Lo" calibration point values in the module configuration, reading the actual output produced, and updating the configured values to the actual values. Usually, recalibrating the high point only is sufficient. If the low point is done, it should be changed from the default value of 0 volts or 4000 microAmps to get better accuracy. The following example shows a two-point calibration for 0 to 10 volts:

1. Set the analog output scaling for 0 to 10 volts output:

Eng lo	100	(mV)
Eng hi	10,000	(mV)
Internal lo	4,160	(corresponds to 100 mV)
Internal hi	20,000	(corresponds to 100 mV)

2. Force the output to the low point value: 100 (= 0.100 volt)

3. Read the output using an accurate meter on the output. For example, you might get a value of 0.107 volts, instead of 100.

4. Force the output to the high point value: 10000 (=10.000 volts)

5. Read the output using an accurate meter on the output. For example, you might get a value of 9.985 volts, instead of 10.000 volts.

6. Change the scaling to the new calibrated values:

Eng lo	107	(reading in mv from step 3)
Eng hi	9985	(reading in mv from step 5)
Internal lo	4160	(microamps to yield voltage in step 2)
Internal hi	20000	(microamps to yield voltage in step 4)

7. The voltage output is now calibrated to your meter, within the approximately 3-millivolt resolution of the output.

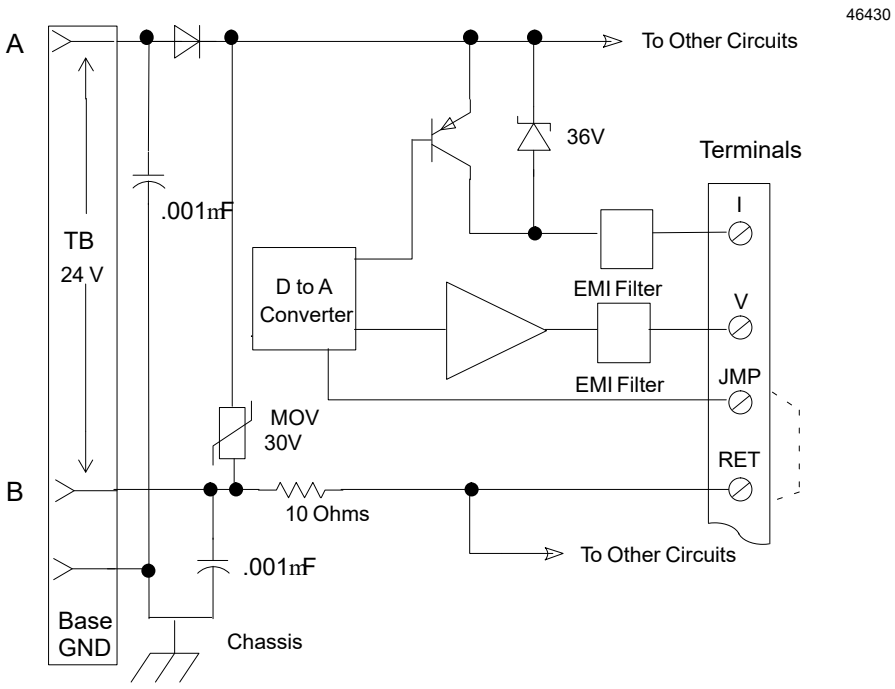
Use the new Eng Hi and Eng Lo values as calibration points when repeating, or go back to step 1 and begin again. The scaling affects both the voltage and current forms of the output point, so only one can be recalibrated.

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Current/Voltage Source Analog Output Module

Module Operation

Four D/A converters provide simultaneous current and voltage outputs from each output channel. Current output spans are 0–20 or 4–20 mA; voltage spans are 0–10 or 0–12.5 volts. All outputs are isolated from ground and logic, but are grouped on a common power supply. Outputs can be isolated as a group from the rest of the system if a separate isolated loop supply is used.



Each circuit provides simultaneous voltage and current outputs from the digital to analog converter. All circuits share a common loop supply and return.

The current driver is a sourcing type. The low side of a load can be connected to RET, the negative side of a 24 V loop supply, or a more negative point that can be up to 36 volts negative with respect to the module 24 volt supply positive terminal.

Voltage output is relative to RET terminal, which is common to all circuits. The module's 10 ohm resistor helps reduce ground loop circulating currents.

The operating range for an output can be changed to 0–20 mA, 0–12.5 volt by connecting the JMP terminal to the RET terminal for that output, as illustrated above and on page NO TAG of this datasheet.

The module contains MOV transient voltage suppressors, and RF bypass capacitors to the module chassis. The chassis point is connected to the module case and the chassis ground terminal on the module base. This should be grounded for best noise immunity.

Outputs default to minimum value upon initial powerup or loss of backplane power.

Current/Voltage Source Analog Output Module

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Module Specifications

Module Characteristics	
Linearity, all ranges & outputs	1 LSB resolution value
Power supply range	20 to 29 volts, DC. 5% maximum ripple
24V Power input current Standby (no output) Operating	 80 mA typical 180 mA (including loop current), maximum
Module power dissipation	1.5 Watts, minimum, 4.3 Watts maximum
Temperature coefficient	+/–.002% of value per degree C, typical, +/–.005% of value per degree C, maximum
Isolation to ground and logic	1500 VAC for 1 minute, 250 VAC continuous
Input or channel to channel common mode	None; single ended grouped out
Current Drawn from BIU Power Supply	51 mA maximum
Output Characteristics	
Digital Resolution	12 bits, typical
Current Analog Resolution, LSB current 4 – 20 range 0 – 20 range Output current range JMP open JMP to RET Current load impedance Open wire (current only) Over–range Output error, current (note 5)	 4.0 microAmps, typical 5.0 microAmps, typical 4 mA, minimum, 20mA maximum .05 mA minimum, 20mA maximum (note 1) 0 Ohms minimum, 600 Ohms maximum (note 2) 800 load Ohms minimum (note 3) 20.000 mA minimum, 20.500 mA maximum Ç 20µA Ç 0.1% of value, maximum
Voltage Analog Resolution, LSB voltage 0–10 0–12.5 Output voltage range JMP open JMP to RET Voltage load impedance Output error, voltage (note 5)	 2.5 mV typical 3.125mV typical .02 Volts minimum, 10 Volts maximum (note 1) .02 Volts minimum, 12.5 Volts maximum 2K Ohms minimum for 10V output, 5 K for 12.5V output Ç 10mVÇ 0.25% of value, maximum

note 1: May limit or become non–linear below minimum values given, due to saturation of output drivers.

note 2: Minimum load should be 250 ohms if ambient exceeds 50 C. Valid over rated 18– 30 supply voltage. Maximum load can be increased to 800 ohms if min. supply voltage is greater than 23.0 volts, including ripple.

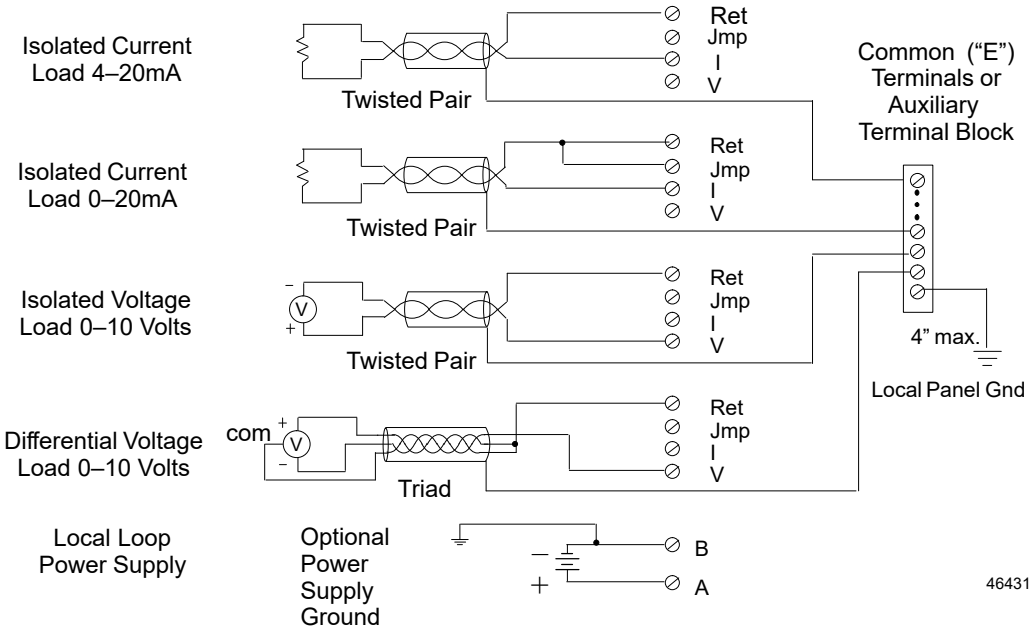
note 3: Open wire occurs when there is insufficient compliance voltage to drive output to commanded value. Therefore occurrence of open wire depends on combination of output load and current. The open wire warning may occur continuously on a disconnected output, such as not used, or voltage used instead.

note 4: In the presence of severe RF interference (IEC 801–3, 10V/m), accuracy may be degraded to 1mA or 0.5V.

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Field Wiring

The following illustration shows typical connections for this module.



Instrumentation grade shielded twisted pair or 3 wire twisted (triad) wire should be used for best noise immunity. The shield should be terminated at a local panel ground near the module.

The module local loop supply may be either floating or grounded, and may be shared with other similar functions. All loads have a common return bus (RET) available at the module for the negative side of the loads. This is internally connected through a 10-Ohm buffer resistor to the supply negative side B terminal. Normally, only ungrounded loads are recommended.

If a grounded load must be driven, a circulating ground loop current may be set up between the load and ungrounded module supply. (This may reduce accuracy). The internal resistance lessens the effect for small ground voltage differences.

CAUTION

The module may be damaged if high ground voltage differences occur due to miswiring or high power surges.

Ordinarily no additional wiring to the RET bus is needed. However, if a low-impedance ground is required to all devices, the proper way is to jumper any RET terminal to the power B terminal at the module and ground the Loop supply externally.

Current/Voltage Source Analog Output Module

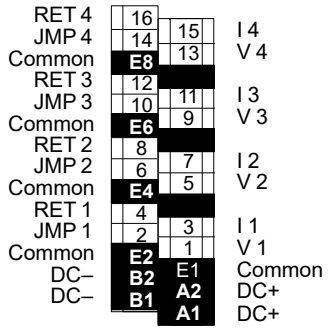
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If the module is installed on an I/O Terminal Block with Box Terminals or Barrier Terminals, an Auxiliary Terminal Block may be used to provide additional wiring terminals. For the I/O Terminal Block with Wire to Board Connectors, external connection points are usually preferred, although an Auxiliary Terminal Block can be used.

Auxiliary Terminal Blocks have all terminals connected together internally. The Auxiliary Terminal Block with box terminals has 13 terminals, each of which accommodates one AWG # 14 (avg 2.1mm^2 cross section) to AWG #22 (avg 0.36mm^2 cross section) wire, or two wires up to AWG #18 (avg. 0.86mm^2 cross section). The Auxiliary Terminal Block with barrier terminals has nine terminals, each of which can accommodate one or two wires up to AWG #14 (avg 2.1mm^2 cross section).

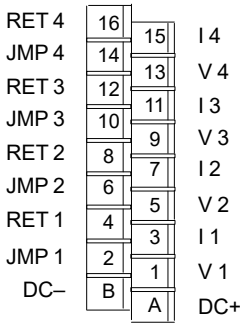
The Panel Ground Shield from the Auxiliary Terminal Block to the panel should be AWG #14 wire, not longer than 4 inches (10cm).

I/O Terminal Block with Box Terminals (IC670CHS002 or 102)

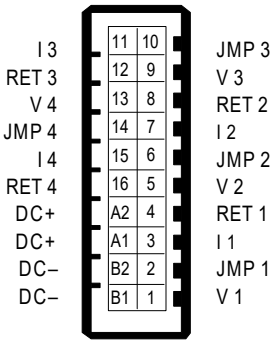


Terminals E1, E2, E4, E6, and E8 are electrically connected togethe, A1 and A2 are electrically connected together, B1 and B2 are electrically connected together.

I/O Terminal Block with Barrier Terminals (IC670CHS001 or 101)



I/O Terminal Block with Wire to Board Connectors (IC670CHS003 or 103)



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