

GFK-0123

2 Channel Analog Output (0 to +10 V or 4 to 20 mA) IC655ALG566

This Series Five 2 Channel Analog Output module provides two output channels, each capable of converting 12 bits of binary (digital) data to an analog output for use as required by your application. This module provides both voltage and current outputs. Connections for field wiring are made to the 20 screws on the removable terminal block. These outputs can be voltage (0 to +10 V), or current (4 to 20 mA). Resolution of the converted signal is 12 bits binary (1 part in 4096). Twelve LEDs on the faceplate provide a 12-bit binary display which can indicate resolution of the output as a percent of full scale.

The module can drive either single ended or differential voltage devices or current devices. User devices to be driven are optically isolated from the base unit power supply by opto-isolators on the module. An Analog output module consumes 32 consecutive Output points, beginning with the first output reference assigned to the slot in which the module is installed.

In addition to the 12 LEDs described above, there are three other LEDs viewable on the faceplate. The GEN LED is on when the module address is mapped into either the O1+ or O2+ status table; the DIAG LED when on, indicates that an internal failure has been detected by the module. The ADR LED, when on, indicates that the 8 LEDs in the two columns to the right have been instructed by the CPU to display the starting address for the module in BCD format.

Table 38. Specifications for 2 Channel Analog Output

Output Ranges	0 to +10 V and 4 to 20 mA
Channels	2 (independent)
Resolution	12 Bit Binary (1 part in 4096)
Output Impedance	0.5 ohms maximum, voltage output
Output Current	20 mA maximum, voltage output
Load Impedance	550 ohms (max.), 5 ohms (min.), current output
Linearity	±0.05%, maximum
Accuracy vs. Temperature	±50 ppm (parts per million) per 1°C
Total Accuracy	±0.4% maximum at 25°C
Conversion Timing	Begins as soon as new data is loaded into the module from the CPU.
Conversion Time	0.1 milliseconds
Visual Display	12 LEDs for each channel. This 12 bit binary display indicates output voltage or current. Can be used to estimate output as a percent of full scale.
Isolation	Optical coupling
Internal Power Consumption	+5 VDC, 150 mA maximum (supplied by base unit power supply)
External Power Requirement	24 VDC ±10%, 200 mA maximum (supplied by user)
Output Points Required	32 consecutive points for each module
Diagnostic LED (DIAG)	ON for: no external power, or if terminal strip is disconnected.

User Items

The following figure is an illustration of the Analog Output module showing the user features on the faceplate. There are no jumpers or switches on this module requiring configuration.

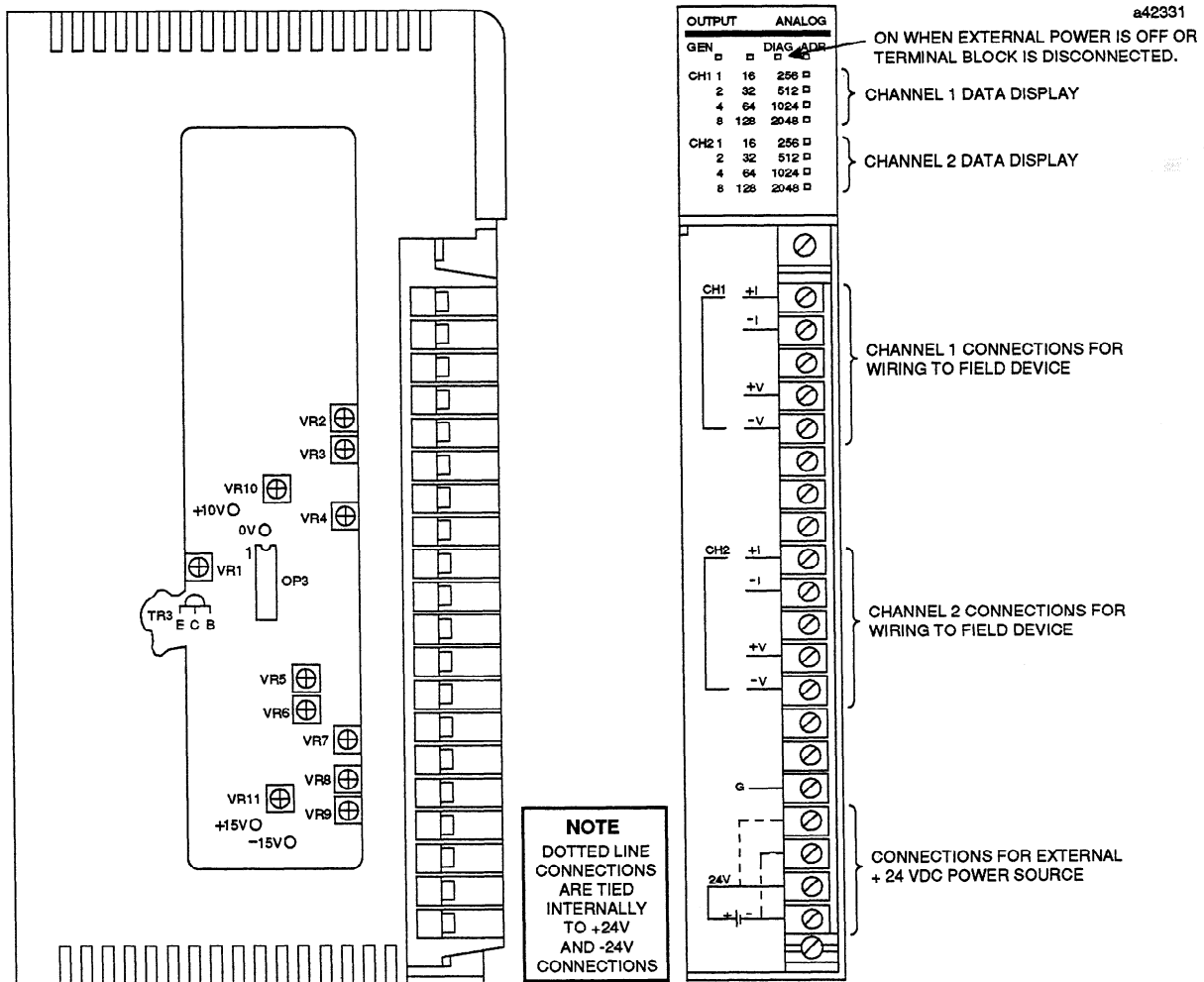


Figure 60. Analog Output Module (0 to +10V or 4 to 20 mA) User Items

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Analog Output Module Circuitry

The Analog Output module is capable of driving devices requiring either single ended or differential voltage or current inputs. The following figure is an illustration of the logic diagram for one of the Analog Input module channels. The following group of notes is applicable to this module and should be followed when connecting user devices.

NOTE

Maximum loading is 20 mA for full voltage output; this does not apply to the 4 to 20 mA current output. Both outputs on this module are single ended and are referenced internally to the same user side common which is isolated from the Series Five PLC chassis ground. All 0V (user side common) points are connected together internally in this module. If multiple destinations are connected to the same output module, their reference points (0V) must be connected together and be at the same voltage. Twisted-pair cable should be used when possible; twisted-pair with shield is preferred.

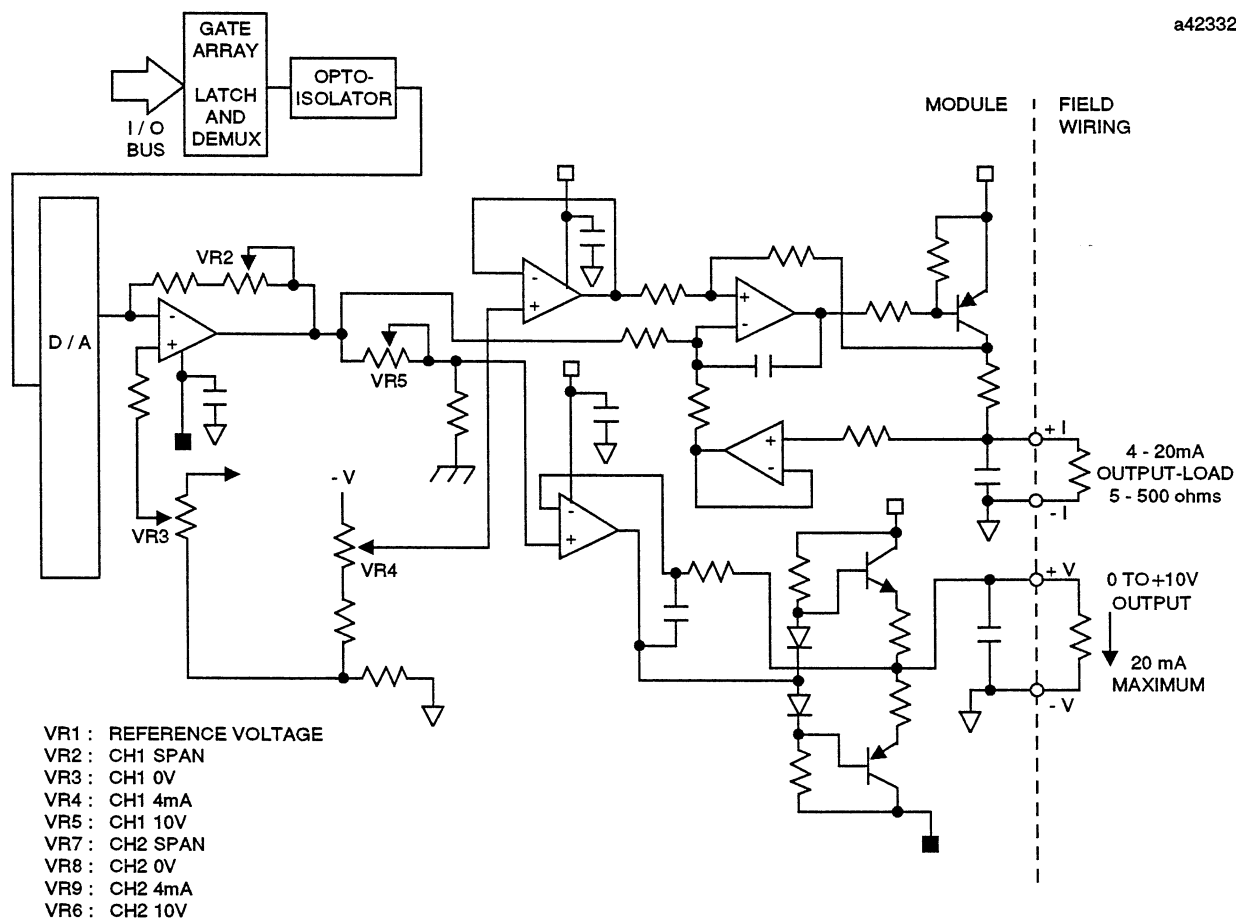


Figure 61. Logic Diagram for Analog Output Module - IC655ALG566

Recommended Connection for External Power Source

A 24 VDC power source must be supplied by the user for connection to the module. This 24 VDC voltage source is converted to various DC voltages in the module for internal circuit power requirements.

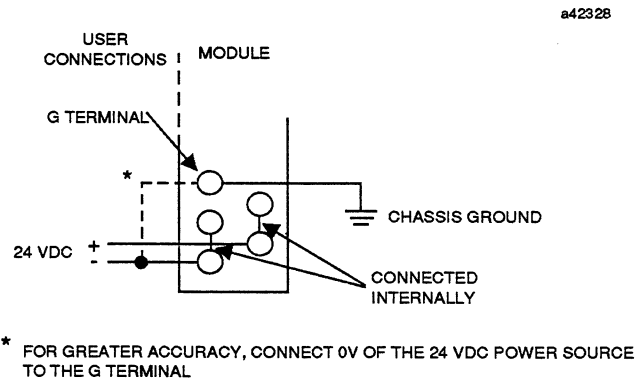


Figure 62. Recommended Connections for +24 VDC Power Source

Data Format

This Analog Output module consumes 32 consecutive output points beginning with the first output point assigned to the slot in which the module is installed. Each of the two channels uses 12 of the 32 bits for data. The following table shows the data format for each channel relative to the Output points.

Table 39. Analog Output Data Format

Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 1 Data Bit	Output Reference Number	CH 2 Data Bit	Output Reference Number	CH 2 Data Bit
1	1	9	9	17	1	25	9
2	2	10	10	18	2	26	10
3	3	11	11	19	3	27	11
4	4	12	12	20	4	28	12
5	5	13	(1)	21	5	29	*
6	6	14	(1)	22	6	30	*
7	7	15	(1)	23	7	31	*
8	8	16	(1)	24	8	32	*

* not used

1. Data bit 12 (MSB) to 16 indicates the sign of the data input when the -10 to +10 V range is selected. Bit ON; sign is -, bit OFF; sign is +.

NOTE

In a Series Five program, the results of output value calculations (scaling) must not become negative. Negative 2's complement numbers correspond to binary values beyond 32767, i.e. a transition from 0 to -1 generates an output value change to maximum current (or voltage).

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Analog Output Module Calibration

The Analog Output module is calibrated at the factory; calibration in the field is normally not required. If an Analog Output module requires calibration, refer to the procedures listed below. Also, refer to the following figure as a guide to the location of the potentiometers referenced in the calibration procedures.

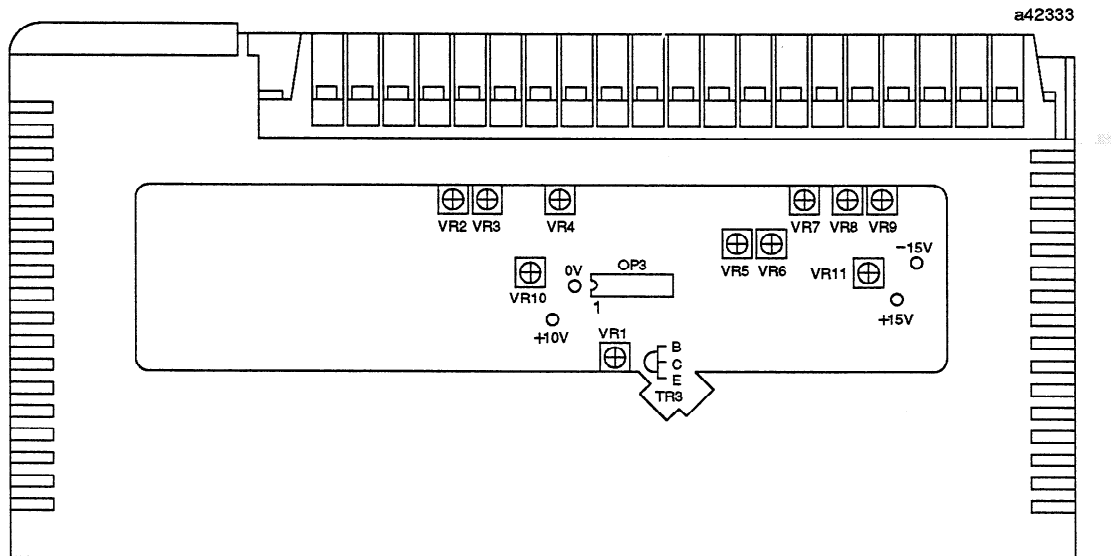


Figure 63. Location of User Items for Module Calibration

Calibration Procedures

1. Check voltage between the listed points.
 - A. Between pin 0V and pin +15V: voltage must be 17.3 VDC to 18.7 VDC.
 - B. Between pin 0V and pin -15V: voltage must be -15 VDC \pm 1.5 VDC.
2. If these voltages are not as listed, check the 24 VDC power supply connected to the module.
3. Adjust VR1 so that the voltage between pin 0V and pin +10V is 10.000 Volts dc.
4. Adjust VR3 so that the voltage output of Channel 1 is \pm 0.00 millivolts with all data 0 (zero).
5. Adjust VR8 so that the voltage output of Channel 2 is \pm 0.00 millivolts with all data 0 (zero).
6. Adjust VR4 so that the current output of Channel 1 is 4.000 milliamps with all data 0 (zero).
7. Adjust VR9 so that the current output of Channel 2 is 4.000 milliamps with all data 0 (zero).
8. Adjust VR2 so that the current output of Channel 2 is 20.000 milliamps with all data "1".
9. Adjust VR7 so that the current output of Channel 1 is 20.000 milliamps with all data "1".
10. Adjust VR5 so that the voltage output of Channel 1 is 10.000 Volts dc with all data "1".
11. Adjust VR6 so that the voltage output of Channel 2 is 10.000 Volts dc with all data "1".
12. Repeat steps 3 through 10 until all voltage and current readings are correct.

NOTE

When setting the range to 0 V and/or 4 mA, set the scale to 000H; when setting the range to full scale - set the scale to FFFH (from the user logic program).