

Analog Output Module, 12-Bit, 4 Channels

October 2008

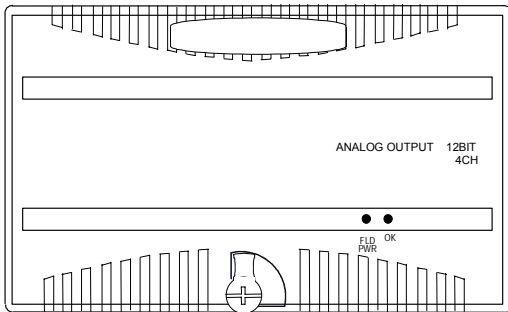
GFK-2527

Product Description

Analog output modules IC200ALG320 and BXIOAO4200 provide four 4mA to 20mA analog current-sourcing outputs. Including a modest amount of overrange current, approximately 20.38mA of output current per channel is available to drive output loads.

Analog output modules IC200ALG321 and BXIOAO4205 provide four analog voltage outputs. The output range is 0 to +10VDC

Analog output modules IC200ALG322 and BXIOAO4210 provide four analog voltage outputs. The output range is -10 to +10VDC



An external power supply is required for the outputs.

Intelligent processing for this module is performed by the CPU or Network Interface Unit. The module receives 4 words of analog output data.

LED Indicators

The green FLD PWR LED indicates the presence of user-side power for the analog field-side circuits.

The green OK LED is on when backplane power is present to the module.

Diagnostics

The module reports a Loss of User Side Power fault for field-side circuits.

Configuration Parameters

The module is easily set up with a jumper for the outputs to either hold their last states or default if backplane power or communications are interrupted or the PLC is stopped. External user power must remain uninterrupted.

Outputs remain in their default or last state until the module receives different output data from the backplane, or until field power is removed.

Preinstallation Check

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system

Module Characteristics

Channels	4 single-ended, one group
Module ID	IC200ALG320 / BXIOAO4200: FFFF9440 IC200ALG321 / BXIOAO4205: FFFF9040 IC200ALG322 / BXIOAO4210: FFFF9040
Isolation:	
User input to logic (optical) and to frame ground	250VAC continuous; 1500VAC for 1 minute
Group to group	Not applicable
Channel to channel	None
LED indicators	FLD PWR LED indicates field power is present OK LED indicates backplane power is present
Backplane current consumption	5V output: 50mA max.
Thermal derating	IC200ALG320 / BXIOAO4200: see diagram IC200ALG321 / BXIOAO4205: none IC200ALG322 / BXIOAO4210: none
Configuration parameters	Output default
Diagnostics	Loss of User Side Power
External Power Supply	
Recommended range	+18 to +30VDC (including ripple)
Current consumption at recommended range	160mA max. (including load current)
12V operation range	9.6 to 15VDC, 12VDC nominal (including ripple)
Current consumption at 12V range (including load current)	IC200ALG320 / BXIOAO4200: 240mA max IC200ALG321 / BXIOAO4205: 210mA max. IC200ALG322 / BXIOAO4210: 210mA max.
Output Characteristics	
Output voltage or current	IC200ALG320 / BXIOAO4200: 4 to 20mA IC200ALG321 / BXIOAO4205: 0 to 10.24VDC IC200ALG322 / BXIOAO4210: ±10.24VDC
Load characteristics:	IC200ALG320 / BXIOAO4200: Resistive: 0 to 1250 Ohms maximum* Capacitive: 0.1µF maximum Inductive: 0.5H maximum
	IC200ALG321 / BXIOAO4205: IC200ALG322 / BXIOAO4210: Resistive: 5000 Ohms minimum Capacitive: 1.0 µF maximum
Accuracy: +25 deg C** 0 to +60 degrees C	+/- 0.3% of full scale (typical), +/- 0.5% of full scale (max) +/-1% of full scale (max)
Resolution	IC200ALG320 / BXIOAO4200: 4µA = 8 counts IC200ALG321 / BXIOAO4205: 2.5mV = 8 counts IC200ALG322 / BXIOAO4210: 5mV = 16 counts
Update rate per module	0.3ms maximum
Channel-to-channel crosstalk rejection	70dB minimum
Output default	IC200ALG320 / BXIOAO4200: Hold Last State (default), 4mA (configurable) IC200ALG321 / BXIOAO4205: IC200ALG322 / BXIOAO4210: Hold Last State (default), 0 (configurable)

$$* R_{L(MAX)} = (V_{EXTERNAL PS} - 4V) / 20.38mA$$

** In the presence of severe RF interference, (IEC 1000-4-3, 10V/m), accuracy may be degraded an additional +/-1%.

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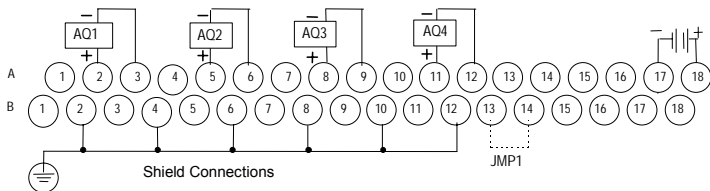
Field Wiring Terminals

Terminal assignments for the module are shown below.

Number	Connection	Number	Connection
A1	No connection	B1	No connection
A2	OUT AQ1	B2	Shield Termination Point
A3	RET 1	B3	No connection
A4	No connection	B4	Shield Termination Point
A5	OUT AQ2	B5	No connection
A6	RET 2	B6	Shield Termination Point
A7	No connection	B7	No connection
A8	OUT AQ3	B8	Shield Termination Point
A9	RET 3	B9	No connection
A10	No connection	B10	Shield Termination Point
A11	OUT AQ4	B11	No connection
A12	RET 4	B12	Shield Termination Point
A13	No connection	B13	JMP 1A
A14	No connection	B14	JMP 1B
A15	No connection	B15	No connection
A16	No connection	B16	No connection
A17	DC-	B17	No connection
A18	DC+	B18	No connection

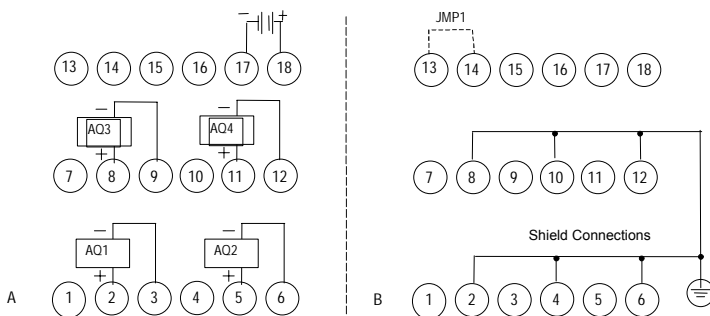
Wiring Connections for Carriers with Two Rows of Terminals

The diagram below shows wiring connections for this module when installed on a carrier with two rows of terminals.



Wiring Connections for Carriers with Three Rows of Terminals

The next diagram shows wiring connections for this module when installed on a carrier with three rows of terminals.



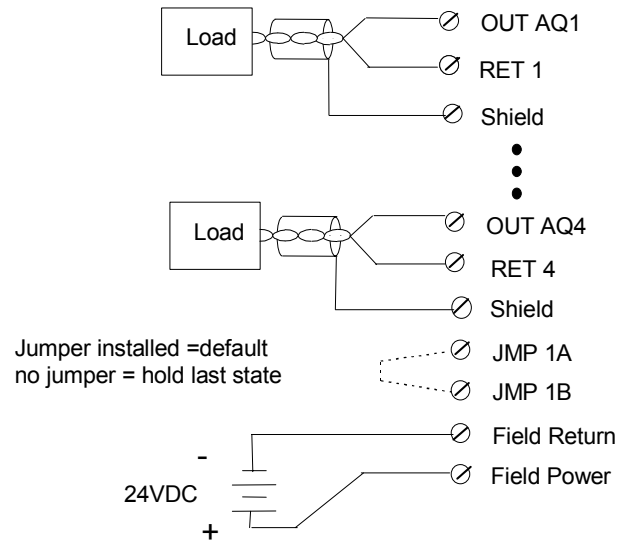
Jumper Selection

If no jumper is installed outputs hold their last state (the last commanded value from the backplane) if backplane power or communications are interrupted or the PLC is stopped. With a jumper installed, if such conditions occur outputs default as indicated in the table below.

The jumper setting should only be changed with field power and backplane power removed.

Jumper	Default for IC200ALG320 BXIOAO4200	Default for IC200ALG321/ 322 BXIOAO4205 / 4210
None	Hold Last State	Hold Last State
JMP 1	4mA	0

Wiring Example



Cable Shield Connections

Shielded twisted pair cable is recommended for all of the analog channel connections.

If the module is installed on a Terminal-style I/O Carrier (IC200CHS001, 002, or 005) or a Compact Terminal-style I/O Carrier (IC200CHS022, 025), the cable shield can be connected directly to the carrier per the Field Wiring Table. An Auxiliary I/O Terminal Strip (IC200TBM001, 002, or 005) can also be added to the Terminal-style I/O Carriers to aid in grounding shields. Be sure to ground the Auxiliary I/O Terminal Strip as well if you plan to use it for this purpose.

If the module is installed on a Connector-style I/O Carrier (IC200CHS003), the cable shield can be connected directly to an Interposing Terminal (IC200CHS011, 012, 015). Be sure to ground the Interposing Terminal. It is recommended to use a shielded interposing cable as well between the Interposing Terminal and the Connector Base. A custom shielded cable can be made using the Connector kit (IC200ACC304). In addition, a custom shield braid can be wrapped around standard Interposing Cables (IC200CBL105, 110, 120, 230). If this approach is used be sure to ground the braid.

All cable shield connections should be connected to earth ground and be kept as short as practical. The power cable does not need to be shielded.

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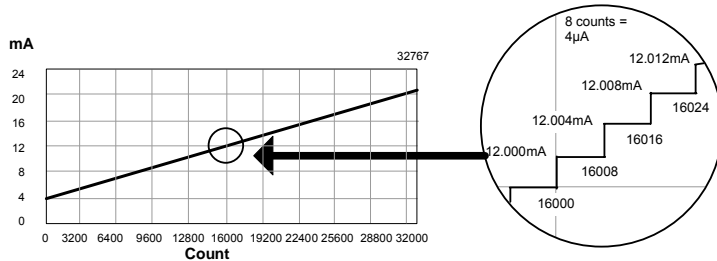
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Scaling

The graphs below show the relationship between the output data that is provided to the module from the backplane, and the data that is output by the module.

Count vs Output Current for Modules IC200ALG320 and BXIOAO4200:



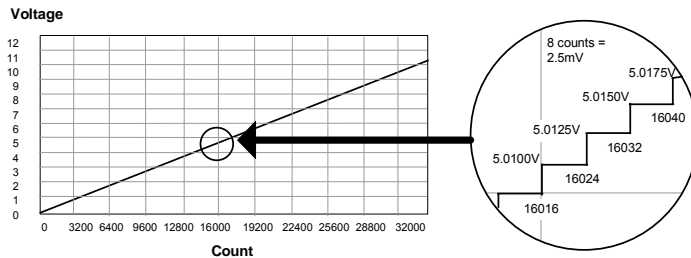
The following equation can be used to calculate specific output currents:

$$I_{out} = 4\text{mA} + (\text{count}/32760) \times 16.38\text{mA}$$

The count value must be a multiple of 8. If the module receives a count value that is not a multiple of 8, it rounds the value down to the closest multiple of 8. For example:

Count	mA
16000	12.000
16007	12.000
16008	12.004

Count vs Output Voltage for Modules IC200ALG321 and BXIOAL4205



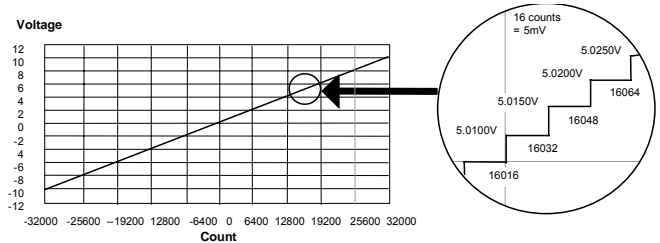
Voltage can be calculated using the following equation:

$$V_{out} = ((\text{analog counts} \times 10.25) / 32768)$$

The count value must be a multiple of 8. If the module receives a count value that is not a multiple of 8, it rounds the value down to the closest multiple of 8. For example:

Count	Voltage
16024	5.0125V
16030	5.0125V
16032	5.0150V

Count vs Output Voltage for Modules IC200ALG322 and BXIOAO4210



Voltage can be calculated using the following equation:

$$V_{out} = ((\text{analog counts} \times 20.5) / 65535)$$

The count value must be a multiple of 16. If the module receives a count value that is not a multiple of 16, it rounds the value down to the closest multiple of 16. For example:

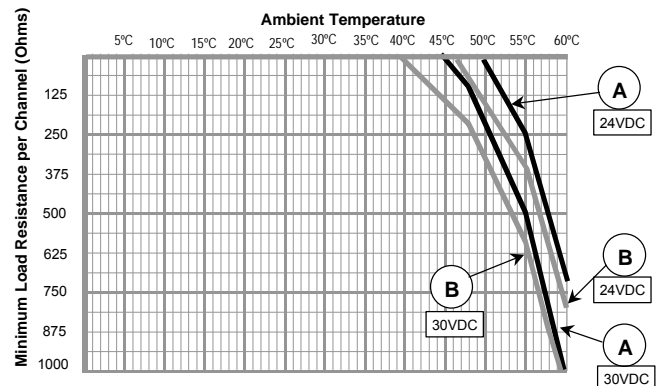
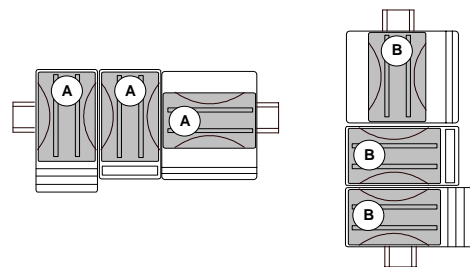
Count	Voltage
16032	5.0150V
16040	5.0150V
16048	5.0200V

Thermal Derating: IC200ALG320, BXIOAO4200

Modules IC200ALG321, IC200ALG322, BXIOAO4205 and BXIOAO4210 have no thermal derating.

For modules IC200ALG320 and BXIOAO4200, the minimum recommended load resistance per channel depends on the ambient temperature, the external voltage, and the orientation of the module and DIN rail. All module orientations shown below have the same derating.

The total load requirement includes the impedance of the transducer being driven. At higher ambient temperatures, it may be necessary to add resistance in series with the load to reach the minimum load requirement.



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Compatibility

- This module is compatible with the initial release of VersaMax CPUs and NIUs.
- Modules installed in expansion racks must be revision C or later.

Product Version Information

Rev	Date	Description
IC200ALG320F BXIOAO4200F IC200ALG321F BXIOAO4205F IC200ALG322F BXIOAO4210F	October 2008	Updated Power Supply OK signal circuitry.
IC200ALG320E BXIOAO4200E IC200ALG321E BXIOAO4205E IC200ALG322E BXIOAO4210E	July 2005	Improvement to latching mechanism.
IC200ALG320D IC200ALG321D IC200ALG322D	April 2004	Changed to V0 plastic for module housing.
IC200ALG320C IC200ALG321C IC200ALG322C	January 2004	ATEX approval for Group 2 Category 3 applications.
BXIOAO4200D BXIOAO4205D BXIOAO4210D	January 2004	ATEX approval for Group 2 Category 3 applications. Changed to V0 plastic for module housing.
IC200ALG320B BXIOAO4200B IC200ALG321B BXIOAO4205B IC200ALG322B BXIOAO4210B	November 1999	Minimum version required for use in expansion racks.
IC200ALG320A BXIOAO4200A IC200ALG321A BXIOAO4205A IC200ALG322A BXIOAO4210A	September 1998	Initial product release

Operating Note

If hot insertion of a module is done improperly, the operation of other modules on the same backplane may be disrupted. See *Installing a Module on a Carrier* in the *VersaMax Modules Manual*, GFK-1504.

Installation in Hazardous Locations

- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.