GAI-TRONICS®
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Model 12584-002 I/O Control Module

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General Information

The Model 12584-002 I/O Control Module is designed to monitor contact closure devices connected to its input, and to turn devices on or off that are connected to its output. It operates as a slave device reporting to a system master controller via a serial data line connection. The master controller is programmed to recognize the I/O Control Module and process the data information received from it.

Typically, the system master controller is a computer or a GAI-Tronics Model 10959 Series Audio Messenger Interface (AMI). In special applications, the system master controller can be another I/O Control Module that is reprogrammed with custom software.

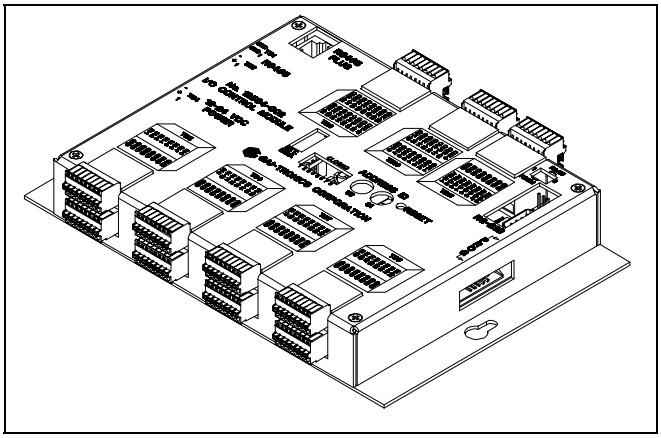

Figure 1. Model 12584-002 I/O Control Module

In general, the Model 12584-002 I/O Control Module provides the following features:

Digital Input Monitoring

The I/O Control Module can monitor up to 32 voltage-free contact inputs. The contacts can be normally open or closed. Additionally, they can be momentary or maintained type activation. The programming of the system master controller defines how each input is activated. Each input is individually programmed for the type of activation switch and the resulting event.

Analog Input Monitoring

The I/O Control Module monitors up to eight analog voltage inputs from 0 to +5 V dc. Each input is individually programmed to activate on a pre-programmed voltage threshold level.

NOTE: This feature is <u>not</u> available when an AMI is acting as the master controller device.

Output Control

The module provides up to 32 open collector control outputs for activating devices such as relays, indicators, or other on/off devices. The outputs can be active high (off) or active low (on). Additionally, they can be momentary (pulsed) or maintained type activation. The programming of the system master controller defines how the outputs are activated. Each output is individually programmed to activate during a certain system event.

Accessory Device to the GAI-Tronics AMI

There are two ways the device can be used with the AMI:

- **Input/output extension module** - This application provides 32 additional switch inputs to the AMI that can be programmed for alarm activation, alarm reset, muting, or telephone interface control switches.
- **Serial data alarm control** - This application allows the system master controller to activate and reset alarms on the AMI from a remote location without using contact closure inputs wired directly to the AMI.

Each allocation requires a unique data connection to the AMI. Refer to the Installation section for wiring diagrams.

Data Line Selection and Settings

The Model 12584-002 I/O Control Module supports both RS485 and RS232 data connections. The RJ232 connection is accessed from a male DB-9 connector. There are two different RS485 data connections. RS485 #1 is accessed from terminal block TB1 and TB2, and RS485 #2 is accessed on an RJ45 receptacle.

- Data connection to system master controller must be made using either the RS485 #1 data connection OR the RS232 data connection. Both cannot be used simultaneously.

  A 3-position jumper (J6) selects either RS232 or RS485 #1 data communication.
  - Short pins 1 and 2 to select RS485 data on TB2.
  - Short pins 2 and 3 to select RS232 data on DB9 connector.

  RS485 #1 data connection is made to terminal blocks TB1 and TB2. Refer to Table 7 and Table 8 in the Installation section of this manual for data line connection details.

  RS232 data connection is made to the male DB-9 connector. A null-modem cable should be used for connection to the master controlling device.

- The RJ45 receptacle connection is used exclusively for serial data control of the AMI as mentioned above. Refer to Table 9 in the Installation section of this manual for data line connection details. Do not use this data connection for the system master controller.

After selecting the data line type, there are several other switches on the I/O Control Module that must be set to the proper data format to communicate with the controlling device. Each switch is labeled on the module case. The following sections describe each switch in detail.

Address Switches S1 and S2

S1 an S2 are hexadecimal switches that are used to set the I/O Controller's address. If the system contains more than one I/O Controller, each device must be set with a different address. The device's addressing should be set in sequential order starting with address 01. Switch S2 sets the first digit and switch S1 sets the second digit.

Example:
Address 01: S2 = 0, S1 = 1
Address 02: S2 = 0, S1 = 2
Address 03: S2 = 0, S1 = 3

NOTE: After changing the board address, the RESET button must be momentarily depressed for the new address to take effect.

DIP Switch S4

An 8-position DIP switch S4 sets various data parameters and operation parameters of the I/O controller. The following tables indicate each switch position and the corresponding settings/functions.

DIP switch S4 positions 1-3 set the serial data line baud rate as follows:

Table 1. DIP Switch S4 Positions 1–3: Baud Rate

Switch S4-1	Switch S4-2	Switch S4-3	Baud Rate
Closed	Closed	Closed	2400
Open	Closed	Closed	4800
Closed	Open	Closed	9600
Open	Open	Closed	19200
Closed	Closed	Open	38400
Open	Closed	Open	57600
Closed	Open	Open	115200
Open	Open	Open	115200

The DIP switch S4 positions 4-8 set the operating parameters as follows:

Table 2. DIP Switch S4 Positions 4–8: Operating Parameters

DIP Switch Position	Function	Settings
S4-4	None - not used	N/A
S4-5	None - not used	N/A
S4-6	Automatic input response	**Closed** - will wait for a poll request from master controlling device before sending an input activation data message. **Open** - will automatically send a data message when an active input is detected. The controller will NOT wait for poll request from the master controlling device.
S4-7	Address return	**Closed** - will NOT return the controller's address (set by hex switch S1 and S2) when sending a data message to the master controlling device. **Open** - will return the controller's address (set by hex switch S1 and S2) when sending a data message to the master controlling device.
S4-8	Data fault indication	**Closed** - if data communication is lost with the master controlling device, all outputs will remain in their current state until data communication is restored. **Open** - if data communication is lost with the master controlling device, all outputs will flash on/off.

Switch Settings for AMI Extender Application

Table 3. Hex Switch Settings

Hex Switch No.	Function	Settings
S1 and S2	Board address	S1 = 1 S2 = 1

Table 4. DIP Switch S4 Settings

DIP Switch S4	Function	Settings
S4-1	Baud rate =19.2K	Open
S4-2		Open
S4-3		Closed
S4-4	N/A	
S4-5	N/A	N/A
S4-6	Wait for poll request from master	Closed
S4-7	Return address to master controller	Open
S4-8	Do not signal data fault with master	Closed

Switch Settings for Remote I/O Applications

When the I/O Control Module is being used for remote input/output control or for alarm activation and reset from a master control device, the switches must be set as follows:

Table 5. Hex Switch Settings for Serial Data Control

Hex Switch No.	Function	Settings
S1 and S2	Address - TBD by system master controller	A unique address must be set for each I/O control module in the system. As determined by the system master control device. Device addressing should be set in sequential order starting with address 01.

Table 6. DIP S4 Switch Settings: Serial Data Control

DIP Switch S4	Function	Settings
S4-1	Baud rate to be determined by system master controller's baud rate. See Table 1.	Baud rate must be set to match the master controller.
S4-2		
S4-3		
S4-4	N/A	N/A
S4-5	N/A	N/A
S4-6	Wait for poll request from master	Closed
S4-7	Return address to master controller	Open
S4-8	Do not signal data fault with master	Closed

Reset Switch

A small push-button switch is provided to restart the I/O controller's microprocessor. Momentarily press the button to initiate the reset sequence.

Installation

Wiring

WARNING Do not apply power until all the connections have been wired.

Warning: Observe precautions for handling electrostatic sensitive devices.

WARNING Connect only to a UL-listed Class 2 power source.

Table 7. TB1 Terminal Block Assignments

Terminal	Labeled	Function
TB1-1	**GND**	RS485 #1 data ground
TB1-2	**GND**	RS485 #1 data ground

Table 8. TB2 Terminal Block Assignments

Terminal	Labeled	Function
TB2-1	**+**	RS485 #1 data (+)
TB2-2	**-**	RS485 #1 data (-)

Table 9. RJ45 Connector Pin Assignments

Pin No.	Function
1	No connection
2	No connection
3	RS485 #2 data ground
4	RS485 #2 data (+)
5	RS485 #2 data (-)
6	RS485 #2 data ground
7	No connection
8	No connection

TB10 and TB9 - Digital Output Connections

The TB10 and TB9 connectors each provide 16 digital (common ground) output connections designed to drive externally-mounted relays or other indicating circuits. Each output can sink up to 100 mA of current. External circuitry (relays, indicators, etc.) must be powered from an external power supply of the same voltage used to power the I/O Control Module (12 to 24 V dc). The ground (or dc common) terminals of the external power supply must be tied to TB4 (-).

Table 10. TB9 and TB10 Digital Output Connections

Terminal	Labeled	Function	Specifications
TB10-1 to TB10-16	**OUT-1 TO 16**	Digital outputs 1-16	• Active Low State - sinks 100 mA (max) to GND. • Active High State - output floats high to source voltage.
TB9-1 to TB9-16	**OUT-17 TO 32**	Digital outputs 17-32	

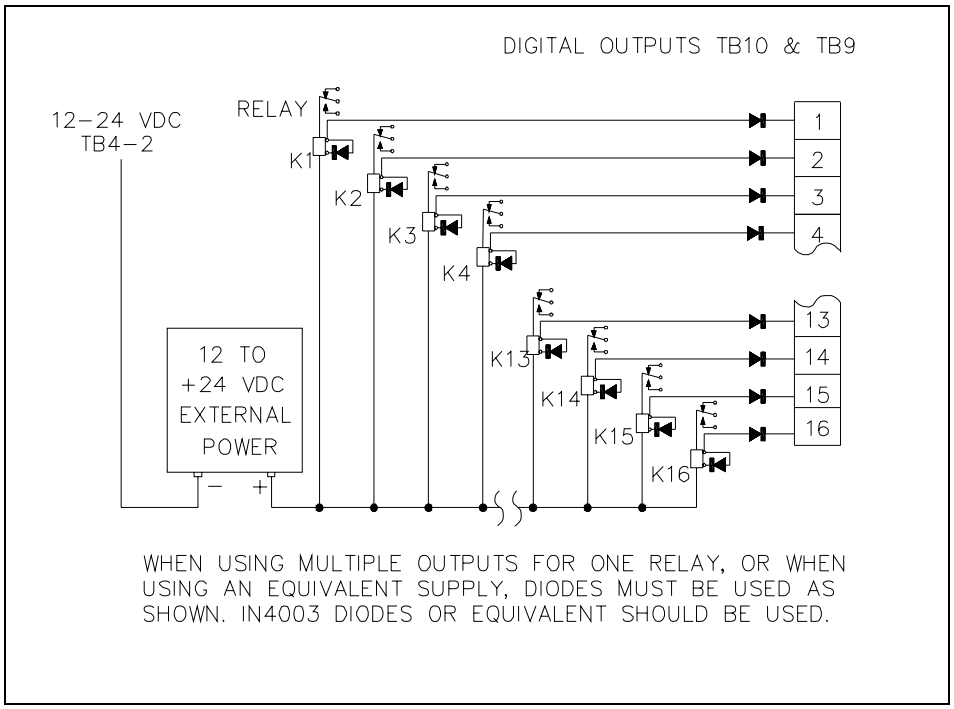

Figure 2. Typical digital output relay wiring

TB5, TB6, TB7, and TB8 - Digital Input Connections

The TB5, TB6, TB7 and TB8 connectors each provide connections for eight contact closure inputs. Switches or relay contact closures are used to activate the inputs. The input contacts may be any combination of momentary (pulsed) switches and maintained (latched) switches. They can be either N.O. or N.C. dry contacts rated at 5 mA minimum.

NOTE: For the inputs to operate reliably, the cable loop resistance connecting the relay/switch contact closures cannot exceed 200 ohms. For example, using No. 24 AWG cable, the maximum cable length for connection of the relay/switch contact closures cannot exceed 1,500 feet. Refer to the terminal block assignment charts and Figure 3 below.

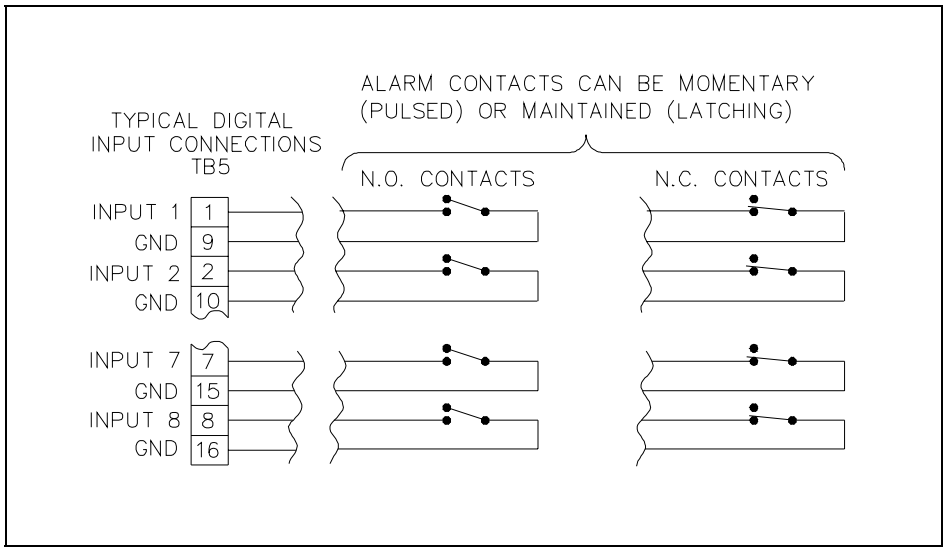

Figure 3. Typical input switch wiring

TB11 - Analog Input Connections

TB11 is used for monitor sensors or dc voltage. An industry standard for sensors is to produce a 4 to 20 milliamp (mA) output to represent a range from no signal to full scale signal, with 0 mA being an indication of an error condition. A 250-ohm resistor will produce a 1 to 5 V dc signal when 4 to 20 mA flows through it resulting in a signal that can be connected directly to the input, assuming it is not greater than 5 V dc. For voltages greater than 5 V, a resistor voltage divider network must be installed to reduce the voltage level present on the input.

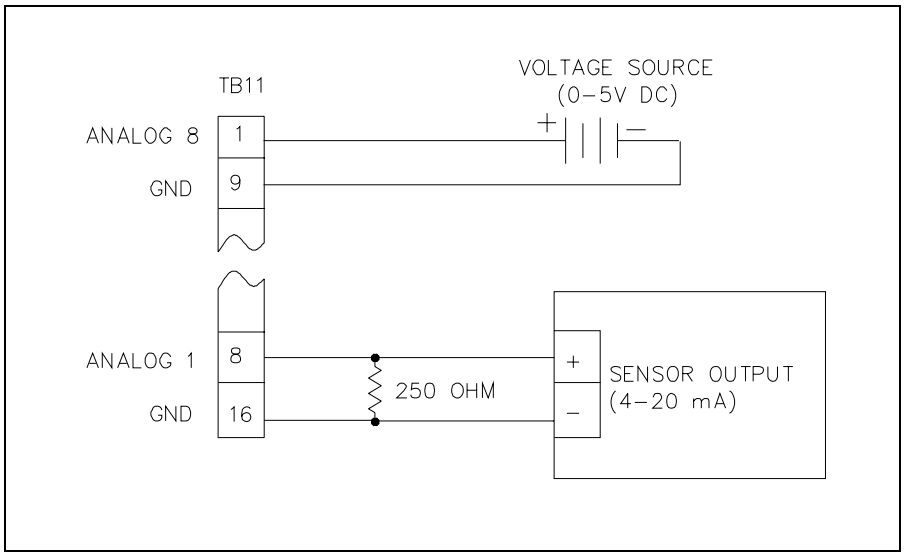

Figure 4. Typical Analog Input Wiring Diagram

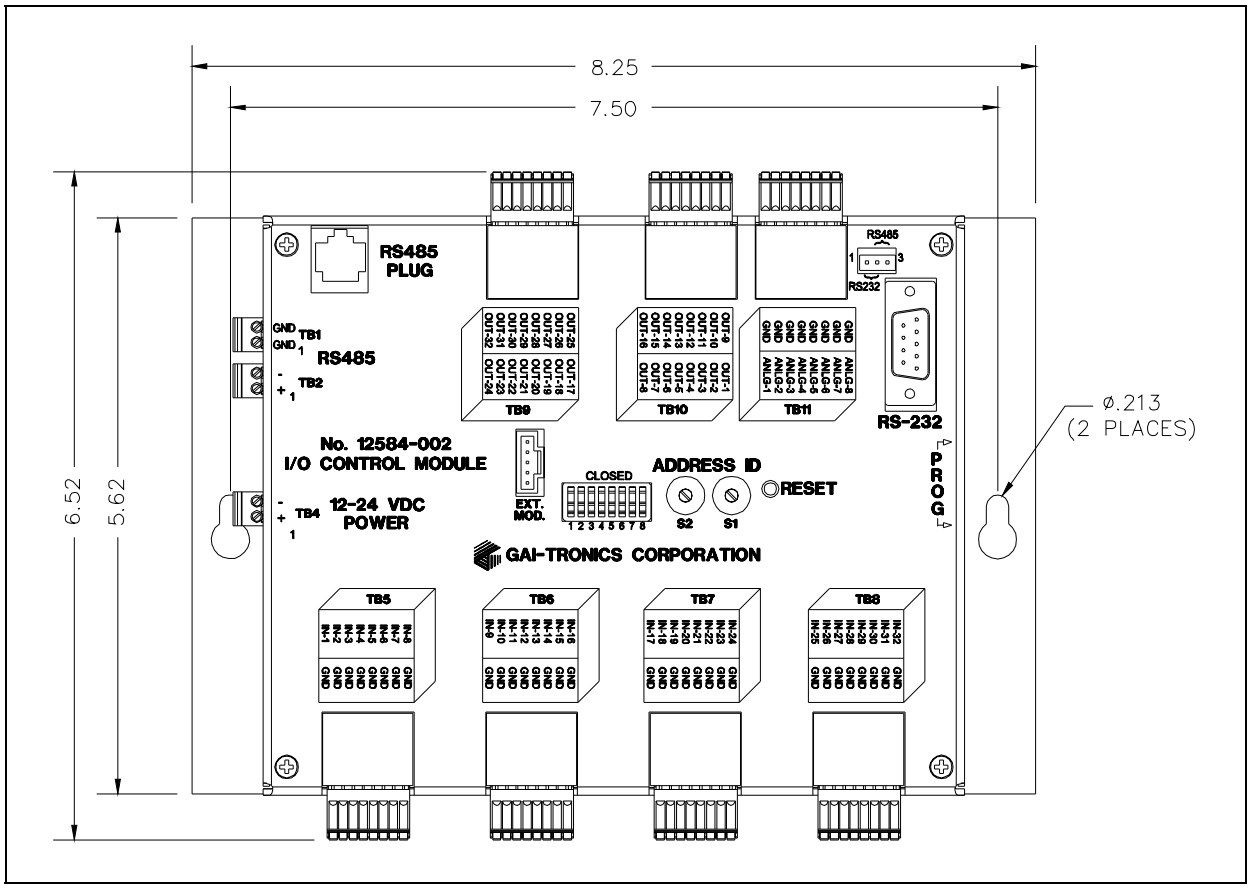

Figure 5. Terminal Block Locations

Table 11. TB5 Terminal Block Assignments

Terminal	Labeled	Function	Specifications
TB5-1	**IN-1**	Activates input #1	• Short input terminal to GND if using a Normally Open activation switch. • Remove input terminal from GND if using a Normally Closed activation switch.
TB5-2	**IN-2**	Activates input #2	
TB5-3	**IN-3**	Activates input #3	
TB5-4	**IN-4**	Activates input #4	
TB5-5	**IN-5**	Activates input #5	
TB5-6	**IN-6**	Activates input #6	
TB5-7	**IN-7**	Activates input #7	
TB5-8	**IN-8**	Activates input #8	
TB5-9 through TB5-16	**GND**	Ground	Ground reference for input 1-8 terminals

Table 12. TB6 Terminal Block Assignments

Terminal	Labeled	Function	Specification
TB6-1	**IN-9**	Activates input #9	• Short input terminal to GND if using a Normally Open activation switch. • Remove input terminal from GND if using a Normally Closed activation switch.
TB6-2	**IN-10**	Activates input #10	
TB6-3	**IN-11**	Activates input #11	
TB6-4	**IN-12**	Activates input #12	
TB6-5	**IN-13**	Activates input #13	
TB6-6	**IN-14**	Activates input #14	
TB6-7	**IN-15**	Activates input #15	
TB6-8	**IN-16**	Activates input #16	
TB6-9 through TB6-16	**GND**	Ground	Ground reference for input 9-16 terminals

Table 13. TB7 Terminal Block Assignments

Terminal	Labeled	Function	Specification
TB7-1	**IN-17**	Activates input #17	• Short input terminal to GND if using a Normally Open activation switch. • Remove input terminal from GND if using a Normally Closed activation switch.
TB7-2	**IN-18**	Activates input #18	
TB7-3	**IN-19**	Activates input #19	
TB7-4	**IN-20**	Activates input #20	
TB7-5	**IN-21**	Activates input #21	
TB7-6	**IN-22**	Activates input #22	
TB7-7	**IN-23**	Activates input #23	
TB7-8	**IN-24**	Activates input #24	
TB7-9 through TB7-16	**GND**	Ground	Ground reference for input 17-24 terminals

Table 14. TB8 Terminal Block Assignments

Terminal	Labeled	Function	Specification
TB8-1	**IN-25**	Input 25	• Short input terminal to GND if using a Normally Open activation switch. • Remove input terminal from GND if using a Normally Closed activation switch.
TB8-2	**IN-26**	Input 26	
TB8-3	**IN-27**	Input 27	
TB8-4	**IN-28**	Input 28	
TB8-5	**IN-29**	Input 29	
TB8-6	**IN-30**	Input 30	
TB8-7	**IN-31**	Input 31	
TB8-8	**IN-32**	Input 32	
TB8-9 through TB8-16	**GND**	Ground	Ground reference for input 25-32 terminals

TB4- Power Connections

The I/O Control Module requires a dc power supply. The dc power supply voltage must be between 12 and 24 V dc. TB4 is used for power connections. Please refer to the TB4 terminal block assignment chart and Figure 6 below.

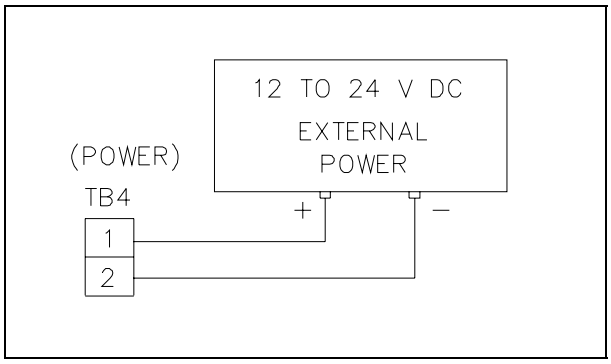

Figure 6. Power connections at TB4

Table 15. TB4 Terminal Block Assignments

Terminal	Labeled	Function
TB4-1	**+**	Power (+) 12 to 24 V dc power supply positive terminal
TB4-2	**-**	Power (-) 12 to 24 V dc power supply negative terminal

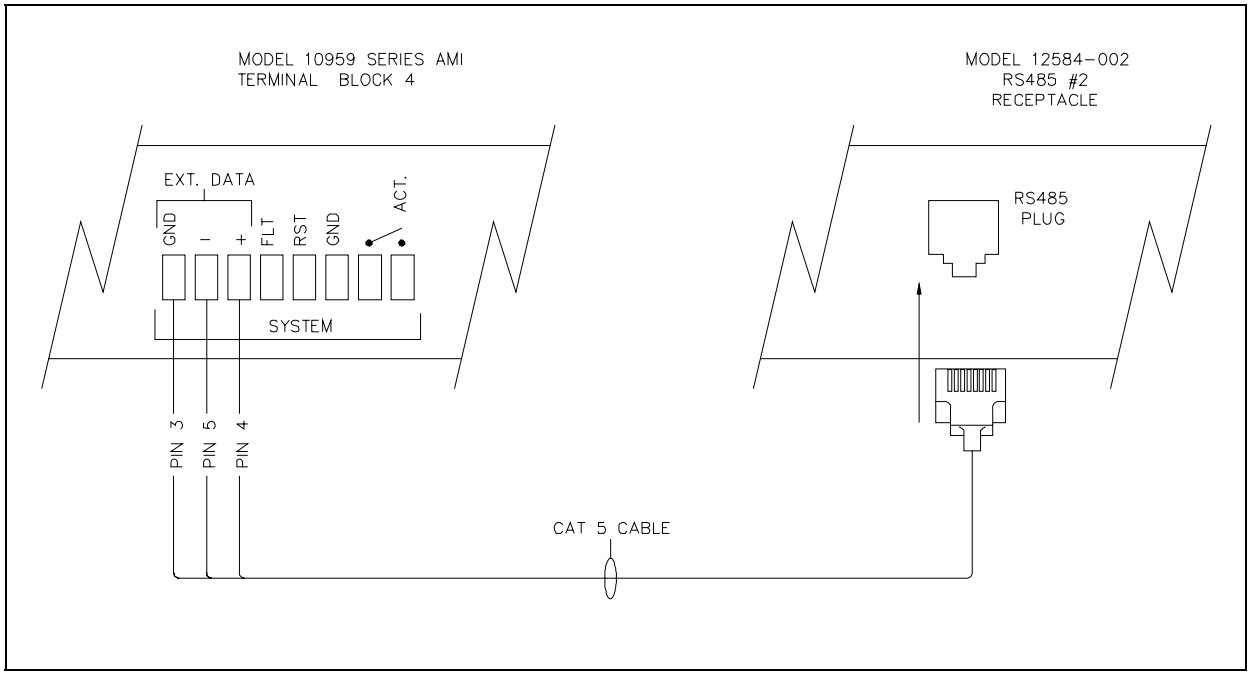

Figure 7. Data Connection for AMI Alarm Control

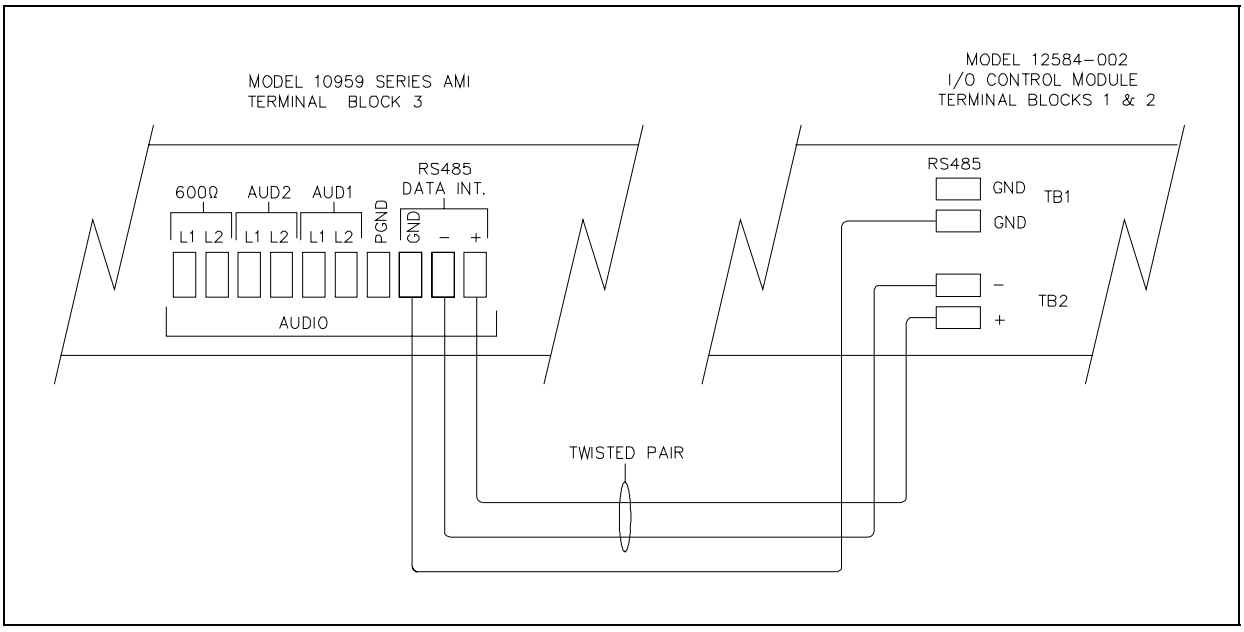

Figure 8. Data Connection for AMI I/O Extension

Specifications

Power Supply Requirements

Connection to a 12 to24 V dc (UL listed) class 2 power source ..... 3.2 A maximum*
Power consumed @ 12 V dc ..... 38.4 watts maximum*
Power consumed @ 24 V dc ..... 76.8 watts maximum
Auxiliary outputs ..... Sink 100 mA maximum, per output to circuit common and pulled up to the power input voltage

*Calculations are only accurate if a single power supply is used to power the I/O PCBA and associated output control lines. The current draw is based on all outputs being active simultaneously and sinking 100 mA each.

Mechanical

Enclosure ..... Steel body and cover; black fine-textured paint finish
Mounting ..... Wall or shelf
Dimensions ..... 7.50 W× 5.625 D × 1.20 H inches (191 × 143 × 31 mm)
Weight ..... 2 lbs. (0.902 kg)

Environmental

Temperature range ..... +32º F to +122º F (0º C to +50º C)

Replacement Parts

Part Number	Description
69434-001	PCBA, I/O Controller

Warranty

Equipment. GAI-Tronics warrants for a period of one (1) year from the date of shipment, that any GAI-Tronics equipment supplied hereunder shall be free of defects in material and workmanship, shall comply with the then-current product specifications and product literature, and if applicable, shall be fit for the purpose specified in the agreed-upon quotation or proposal document. If (a) Seller's goods prove to be defective in workmanship and/or material under normal and proper usage, or unfit for the purpose specified and agreed upon, and (b) Buyer's claim is made within the warranty period set forth above, Buyer may return such goods to GAI-Tronics' nearest depot repair facility, freight prepaid, at which time they will be repaired or replaced, at Seller's option, without charge to Buyer. Repair or replacement shall be Buyer's sole and exclusive remedy. The warranty period on any repaired or replacement equipment shall be the greater of the ninety (90) day repair warranty or one (1) year from the date the original equipment was shipped. In no event shall GAI-Tronics warranty obligations with respect to equipment exceed 100% of the total cost of the equipment supplied hereunder. Buyer may also be entitled to the manufacturer's warranty on any third-party goods supplied by GAI-Tronics hereunder. The applicability of any such third-party warranty will be determined by GAI-Tronics.

Services. Any services GAI-Tronics provides hereunder, whether directly or through subcontractors, shall be performed in accordance with the standard of care with which such services are normally provided in the industry. If the services fail to meet the applicable industry standard, GAI-Tronics will re-perform such services at no cost to buyer to correct said deficiency to Company's satisfaction provided any and all issues are identified prior to the demobilization of the Contractor's personnel from the work site. Re-performance of services shall be Buyer's sole and exclusive remedy, and in no event shall GAI-Tronics warranty obligations with respect to services exceed 100% of the total cost of the services provided hereunder.

Warranty Periods. Every claim by Buyer alleging a defect in the goods and/or services provided hereunder shall be deemed waived unless such claim is made in writing within the applicable warranty periods as set forth above. Provided, however, that if the defect complained of is latent and not discoverable within the above warranty periods, every claim arising on account of such latent defect shall be deemed waived unless it is made in writing within a reasonable time after such latent defect is or should have been discovered by Buyer.

Limitations / Exclusions. The warranties herein shall not apply to, and GAI-Tronics shall not be responsible for, any damage to the goods or failure of the services supplied hereunder, to the extent caused by Buyer's neglect, failure to follow operational and maintenance procedures provided with the equipment, or the use of technicians not specifically authorized by GAI-Tronics to maintain or service the equipment. THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES AND REMEDIES, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Return Policy

If the equipment requires service, contact your Regional Service Center for a return authorization number (RA#). Equipment should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the equipment is under warranty, repairs or a replacement will be made in accordance with the warranty policy set forth above. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts.

Call 800-492-1212 (inside the USA) or 610-777-1374 (outside the USA) for help identifying the Regional Service Center closest to you.