

AVENTICS™

G3 Series DeviceNet™ Technical Manual



AVENTICS™ G3 Series DeviceNet™ Technical Manual

Conditions for use of this product

- (1) AVENTICS G3 Manifold ("the PRODUCT") shall be used in conditions;
- i) Where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident.
 - ii) Where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.
- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

ASCO L.P. shall have no responsibility or liability including but not limited to any and all responsibility or liability based on contract, warranty, tort, product liability for any injury or death to persons, loss or damage to property caused by the product that are operated or used in application not intended or excluded by instructions, precautions or warnings contained in AVENTICS Technical, User, Instruction, Safety manuals or bulletins.

Safety precautions

Before using this product, please read this manual and the relevant manuals carefully and pay attention to safety and product application. The following symbols are used in the manual to identify important safety, installation and application information.



CAUTION

Caution symbol indicates a possible hazard which may cause injury or equipment damage.



Note symbol indicates important information regarding equipment installation and setup.



CAUTION

Electrical installation and operational guidelines

- *To be connected to Class 2 power source only.*
- *All AVENTICS communication nodes should be grounded during the installation process. These grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.*
- *All AVENTICS G3 Electronics Products to be installed or wired in accordance with AVENTICS' published instructions and applicable electrical codes.*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection.*
- *Sources shall be Listed and rated suitable for parallel interconnection.*
- *CLASS 2 WIRING: All field wiring shall be suitable for Class 1, Electric Light and Power, or Class 2, 3 wirings are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) Limited energy circuit conductors from unlimited energy circuit conductors.*
- *Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.*
- *When using molded connector power cables, Do Not rely on wire colors for Pin-Out. Always use pin number references.*
- *Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection.*
- *Sources shall be Listed and rated suitable for parallel interconnection.*

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1. About DeviceNet™

1.1 Overview

DeviceNet™ is a serial communication protocol used to network industrial devices to eliminate labor intensive and expensive point to point wiring schemes. It is based on the CAN (Controller Area Network) protocol. Allen Bradley originally developed DeviceNet™, but it is now supported by a multitude of manufacturers.

The ODVA (Open DeviceNet™ Vendor Association) is an independent organization that governs the DeviceNet™ specification and oversees conformance testing for products, which will be used in a DeviceNet™ system.

DeviceNet™ uses a powered 4-wire (plus shield) network and can have up to 64 nodes. The protocol can transfer a maximum of 8 bytes of data per node cycle with three selectable communication (baud) rates of 125 Kbps, 250 Kbps, or 500 Kbps. Maximum distance is dependent upon baud rate and cable media type. Refer to the section below for details.

More information about DeviceNet™ and ODVA can be obtained from the ODVA web site www.odva.org.

1.2 G3 DeviceNet™ Features

<i>Features</i>	<i>Description</i>
DeviceNet™ Spec. Supported	Designed to DeviceNet™ Specification Revision 2.0
Bus Topology	Straight with restricted drops; trunkline-dropline configuration
Baud Rates Supported	125 Kbps, 250 Kbps and 500 Kbps and Autobaud
Duplicate address detection	If duplicate address detected on power up, duplicates will not progress to run mode
Error Correction	Yes, if error detected, sender is requested to repeat the message
Address Setting	Via graphic display, software, or optional Manual Configuration Module (MCM)
Termination Resistor (external)	A 121-ohms, 1%, ¼ Watt resistor is required at each end of the trunk line
ADR support	Auto-Device Replacement is supported when the MCM is not present
Connection Types Supported	Polled, Cyclic, Change of State (COS) or Combinations
Conformance Tested	Tested by ODVA for conformance

1.3 Cabling and Drop Line Lengths (as defined by DeviceNet™ specification)

Maximum Main Trunk Cable Length

<i>Baud Rate</i>	<i>Thick Trunk Cable</i>	<i>Thin Trunk Cable</i>	<i>Flat Trunk Cable</i>
125 Kbps	1640 ft (500 m)	328 ft (100 m)	1246 ft (380 m)
250 Kbps	820 ft (250 m)	328 ft (100 m)	656 ft (200 m)
500 Kbps	328 ft (100 m)	328 ft (100 m)	246 ft (75 m)

Maximum Drop Line Cable Length

<i>Baud Rate</i>	<i>Maximum Drop Length</i>	<i>Cumulative Drop Length</i>
125 Kbps	20 ft (6 m)	512 ft (156 m)
250 Kbps	20 ft (6 m)	256 ft (78 m)
500 Kbps	20 ft (6 m)	128 ft (39 m)

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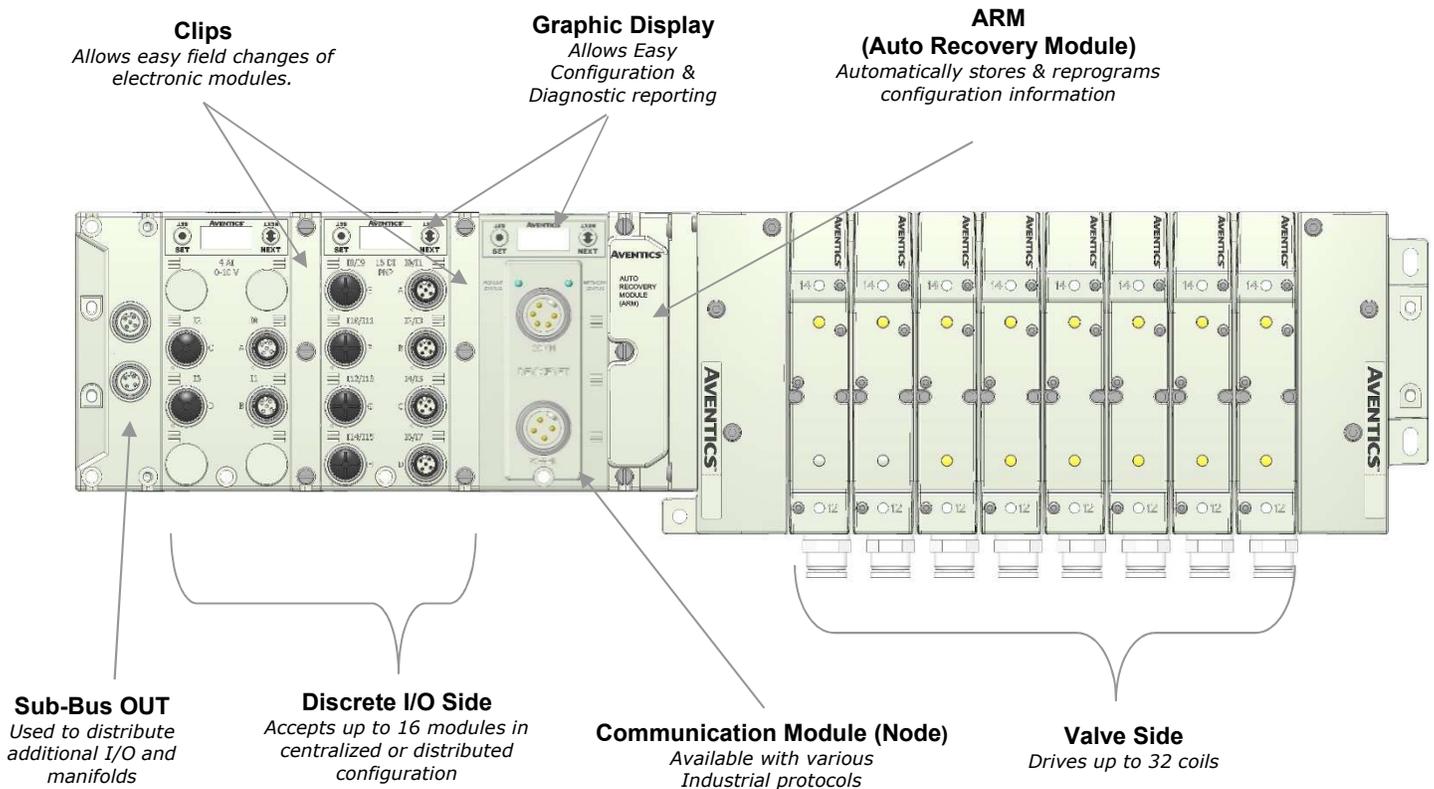
2. G3 Introduction

The G3 Series is an electronic product platform that features an integrated graphic display for simple commissioning and displaying of diagnostic information. In addition, it has an innovative distribution capability which allows the same I/O components that make up a centralized manifold configuration to be used as the distribution components as well, decreasing the need for duplicate components on centralized and distributed applications. The G3 platform interfaces to a variety of valve series and fieldbus interface protocols and is capable of addressing a total of 1200 I/O points (150 bytes). With proper assembly and termination, the G3 modules will have an IP65 / IP67 rating.

The manifold can be viewed as having two sections to it, the *Valve Side* and the *Discrete I/O Side*. The *Valve Side* supports a maximum of 32 solenoid coils and the *Discrete I/O Side* supports a maximum of 16 modules capable of addressing up to 1200 outputs, 1200 inputs or various combinations.

Various discrete modules with integrated graphic display are available. They include digital I/O, analog I/O, and specialty modules which cover various application needs. Pin-outs for all connectors are labeled on the side of the respective modules and are also detailed in the module section of this document.

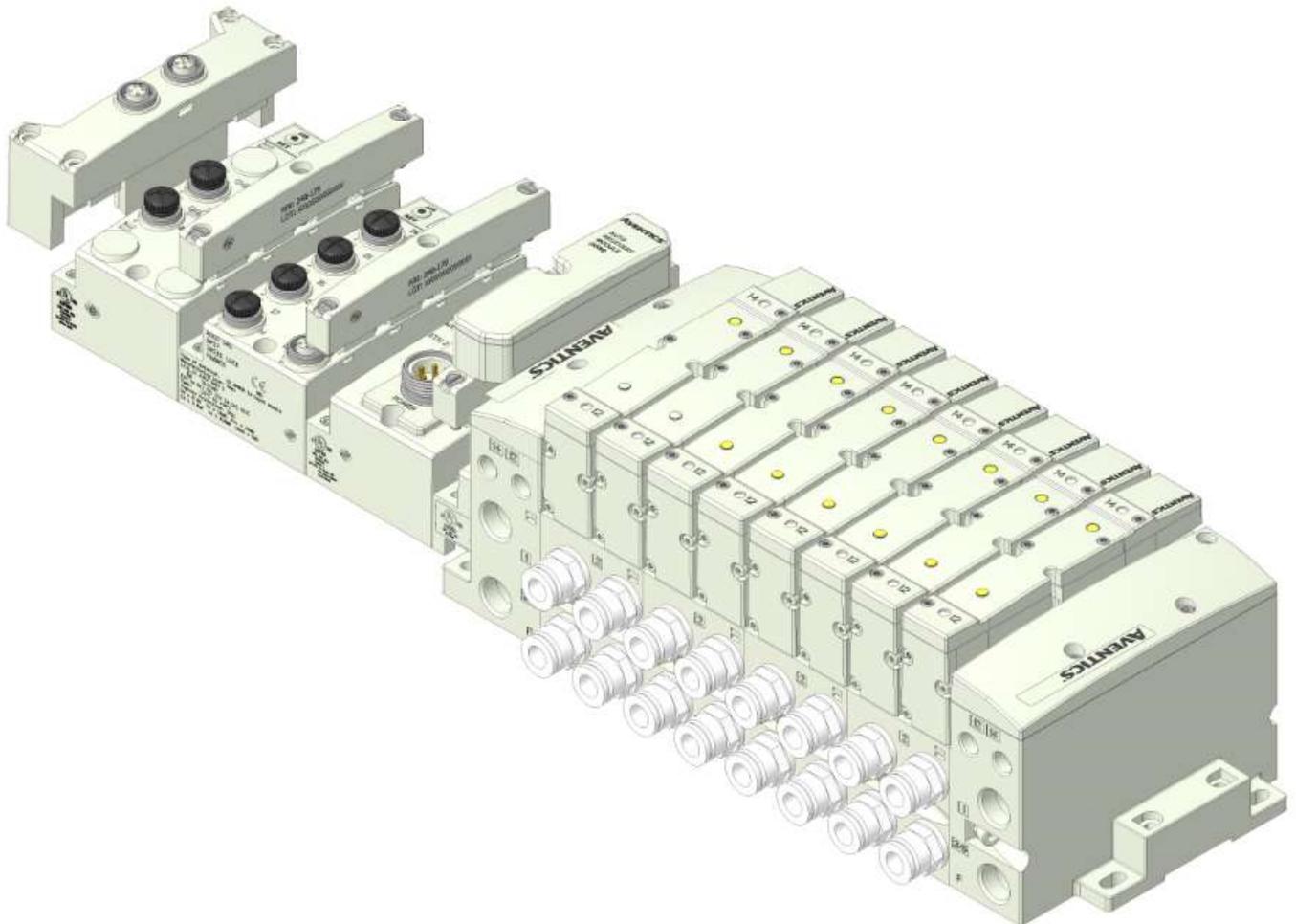
This manual details specific information for configuring and commissioning the AVENTICS G3 Series product line. For more information relating to pneumatic valves and valve manifold assemblies, please refer to the specific valve series catalogs at www.ASCO.com.



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2.1 G3 Electronics Modularity

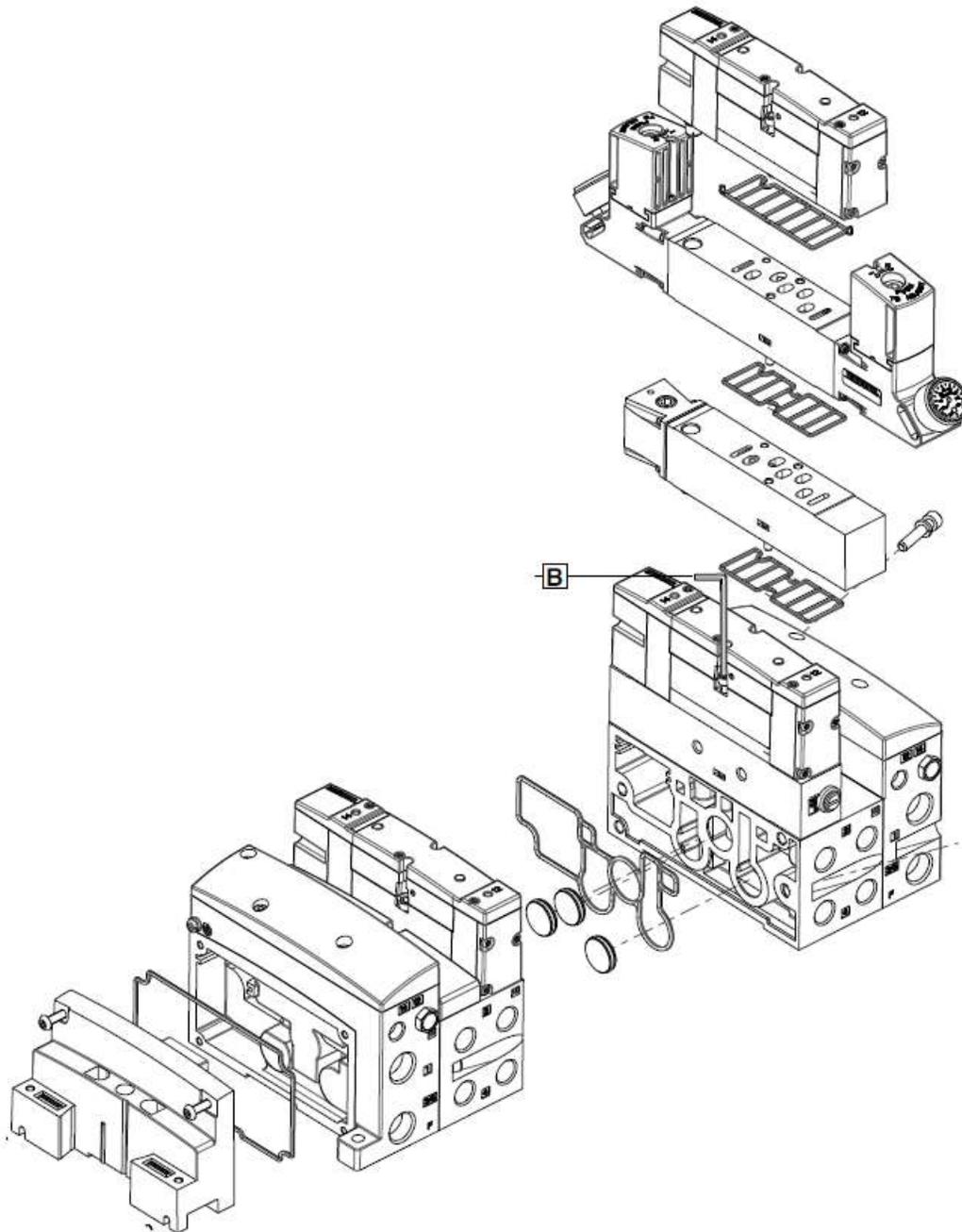
The G3 Series product line is a completely modular and scalable system. As shown below, all of the G3 electronic modules plug together via mechanical clips allowing for easy assembly and field changes.



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2.2 500 Series Pneumatic Valve Manifold

The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires. This allows easy assembly and field changes.



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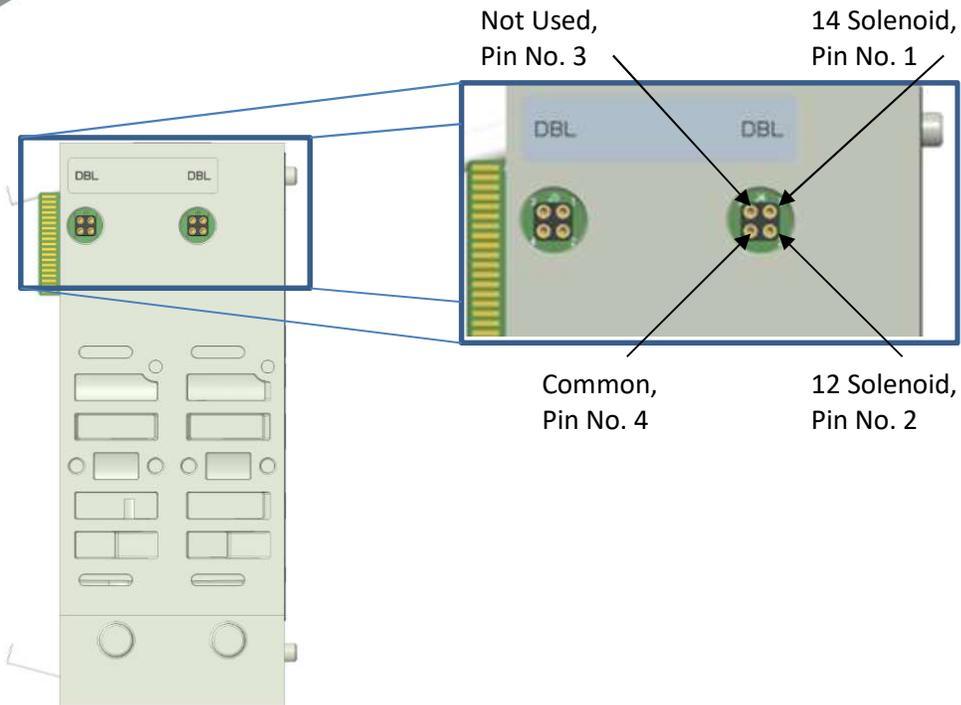
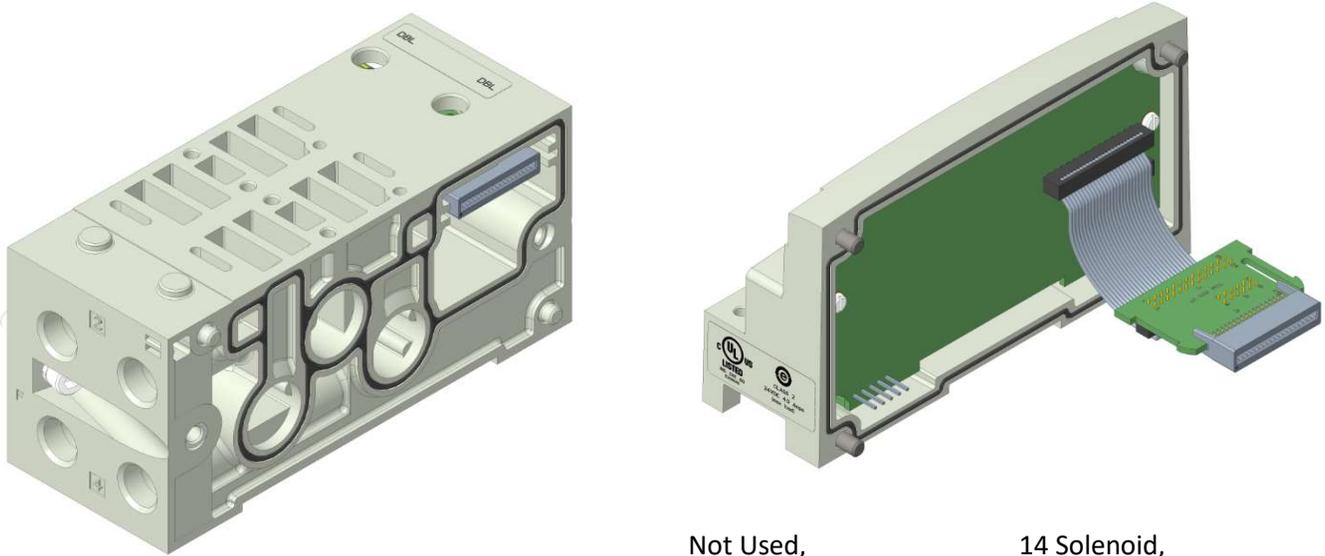


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2.3 500 Series Manifold Stations

Solenoid Coil Connections using Z-Board™ Technology for 50x valve series

Z-Board™ plug together technology connects all valve solenoids to the valve coil output driver board, located in the valve adapter. There is a maximum of 32 coil outputs available on the complete manifold assemblies. The 32 available outputs are accessed on the 501 series valves utilizing 3- and 4-station manifolds, and on the 502/503 series utilizing 2-station manifolds.



A single solenoid valve's coil designated as the "14"



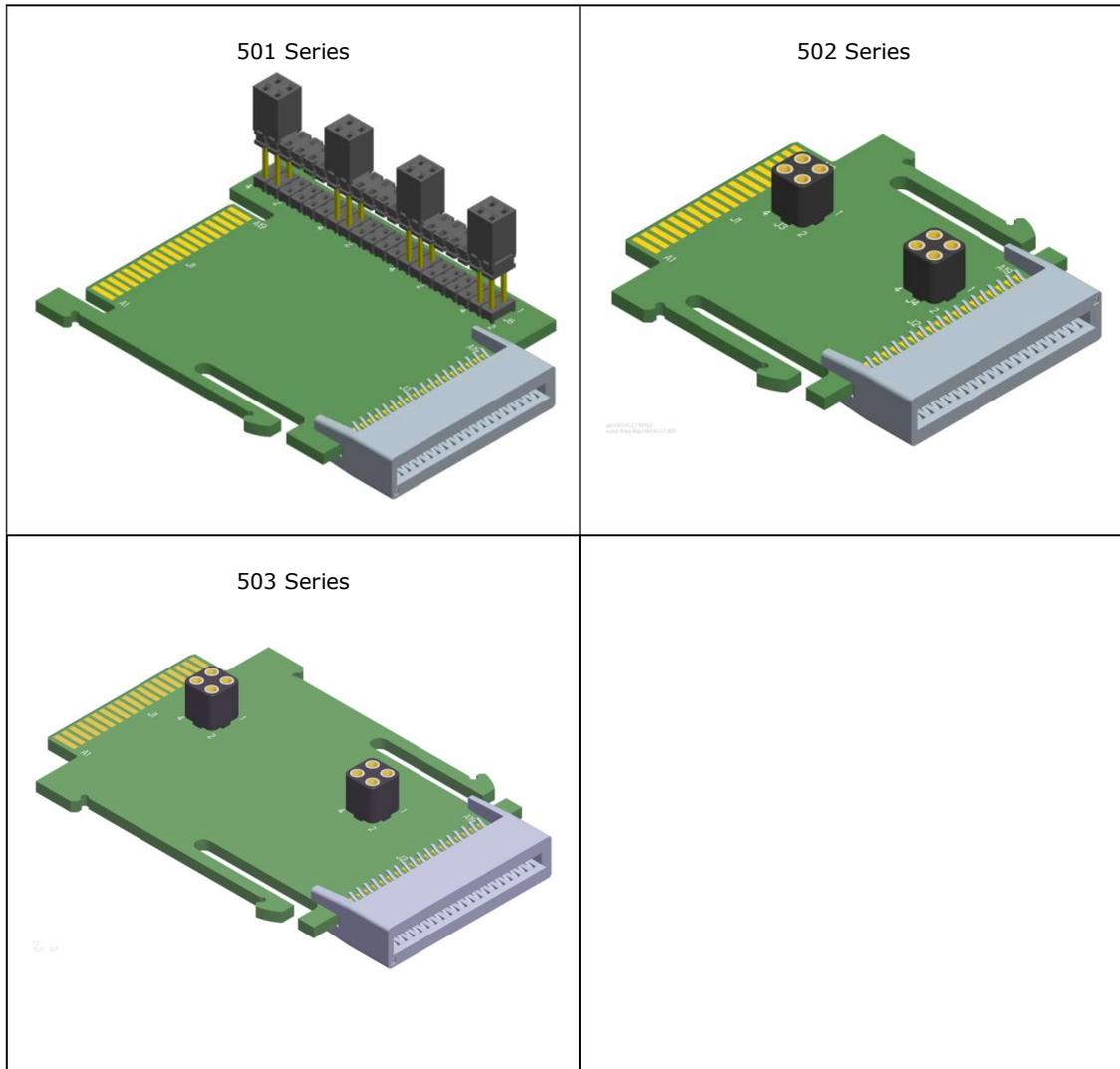
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2.4 500 Series Z-Board™ Connectors

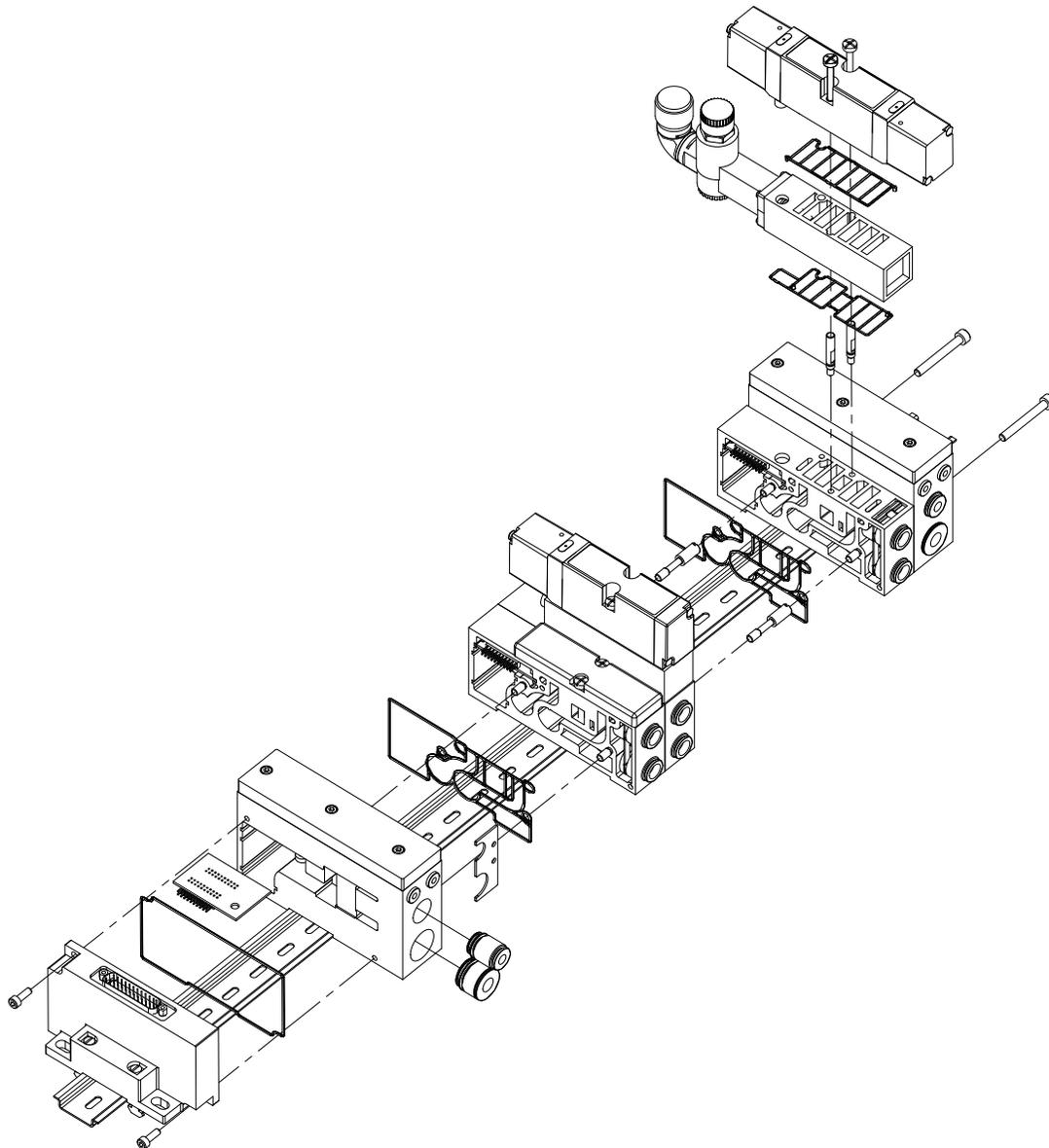
The 501, 502 and 503 valve series utilize 2 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 32 single, 16 double, or various combinations of valve coil output capabilities.



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2.5 2000 Series Pneumatic Valve Manifold

The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires. This allows easy assembly and field changes.



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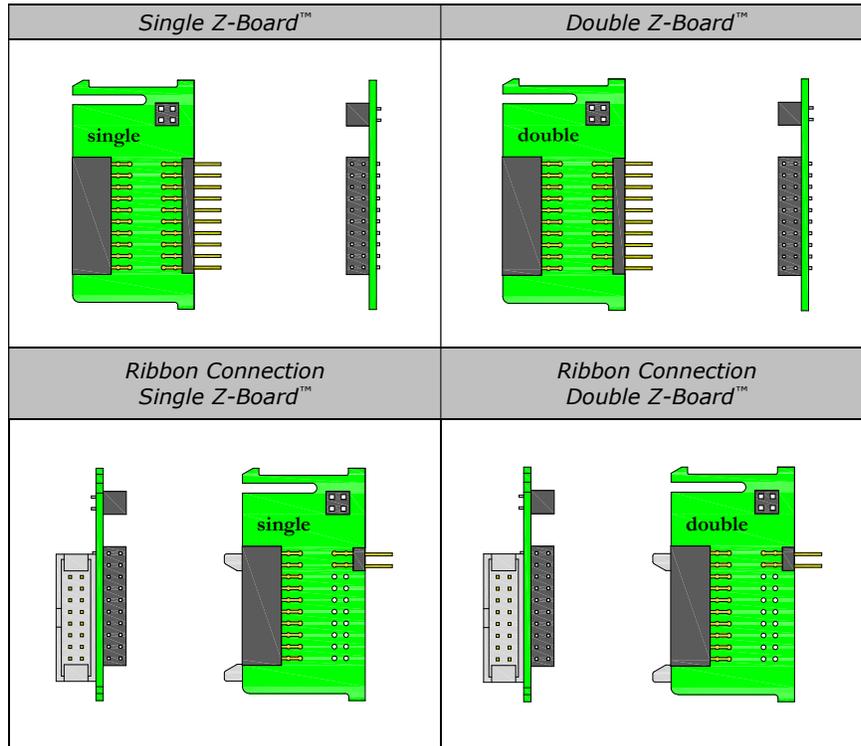


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2.6 2000 Series Z-Board™ Connectors

The 2005/2012/2035 valve series utilize 2 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 32 single, 16 double, or various combinations of valve coil output capabilities.



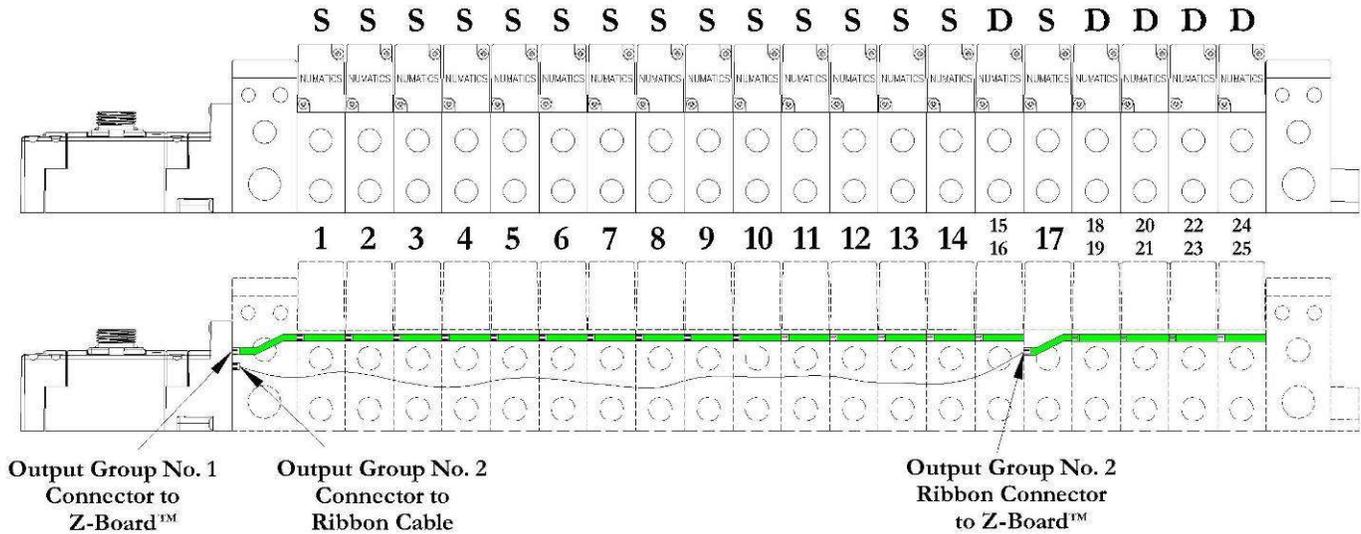
The 17th solenoid (output group No. 2's first bit) must be accessed via either the valve side Sub-D output module or a ribbon connector type Z-board.

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2.7 2000 Series Z-Board™ and Ribbon Cable Example

If fourteen (14) single solenoid and one (1) double solenoid valves are connected directly to the communication node via their Z-Boards™, and one (1) single solenoid and four (4) double solenoid valves are connected to the communication node via the ribbon cable, the following would be the valve side bit map:

S = Single Solenoid with Single Z-Board™
 D = Double Solenoid With Double Z-Board™



Output Word	0															1																				
Output Byte	0							1								2							3													
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	n/a										



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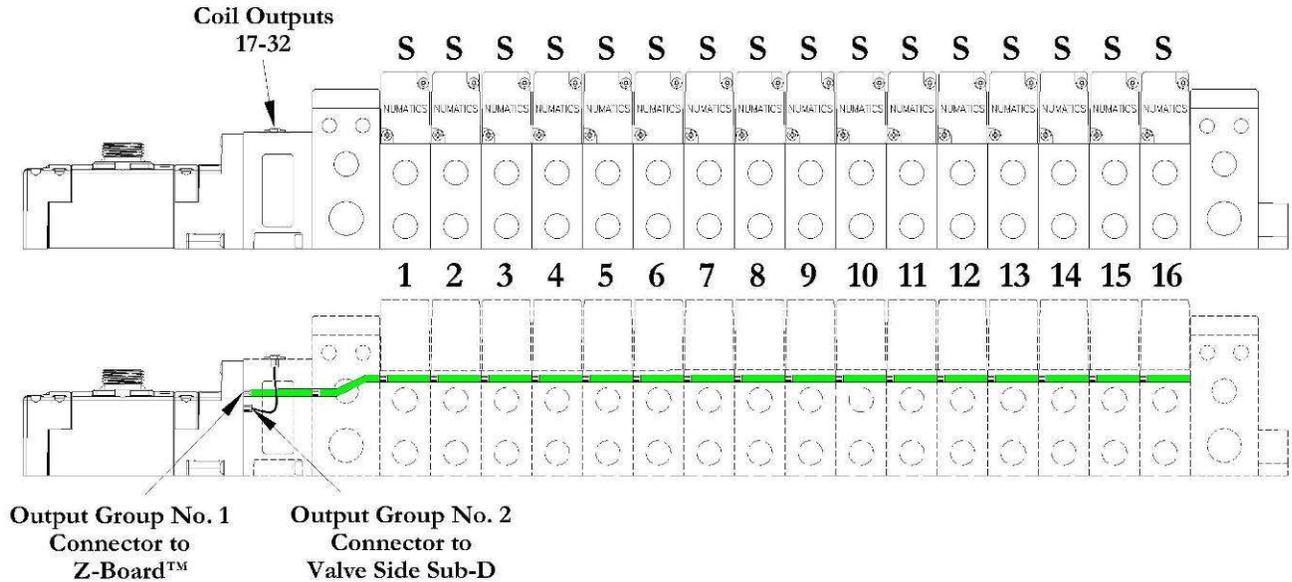
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2.8 2000 Series Z-Board™ with Valve Side Sub-D Example

If sixteen (16) single solenoid valves are connected directly to the communication node via Z-Boards™ and a valve side Sub-D connector is connected to the communication node via the output Group No. 2 connector then the following would be the valve side bit map:

S = Single Solenoid with Single Z-Board



Output Word	0								1																							
Output Byte	0				1				2				3																			
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

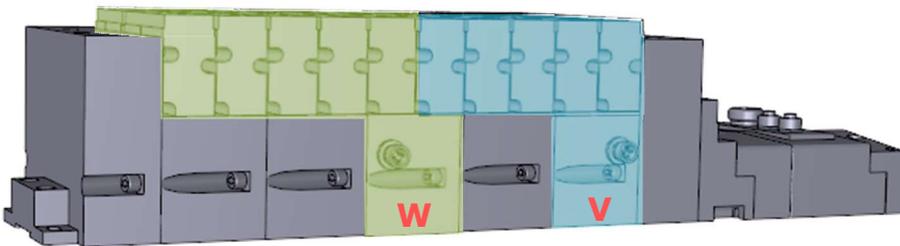


The ribbon cable and valve side Sub-D examples do not apply to 501, 502, or 503 series valves.

3. Zoned Power

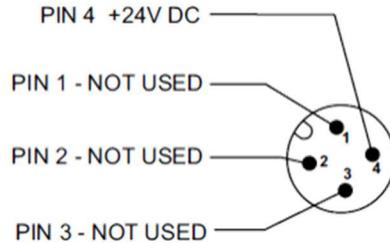
3.1 503 Series Zoned Power application

The Zoned Power Manifold blocks can be incorporated into a 503 Series manifold assembly to isolate Power to a number of valve stations, independent from the main power of the manifold. This is achieved by the integral 4-Pin M12 connector along with the modified manifold board. The total number of Zoned Power Manifold blocks is determined by the maximum solenoid outputs as defined by the type of interface (e.g. G3 Electronics, Terminal Strip, D-Sub). For user flexibility, the Zoned Power Manifold blocks are available in both "proprietary" and "ISO" versions and can be ordered with the M12 connector starting at the first or second station.



V Wiring Option

W & V Connector Pin Out



W Wiring Option

Technical Data

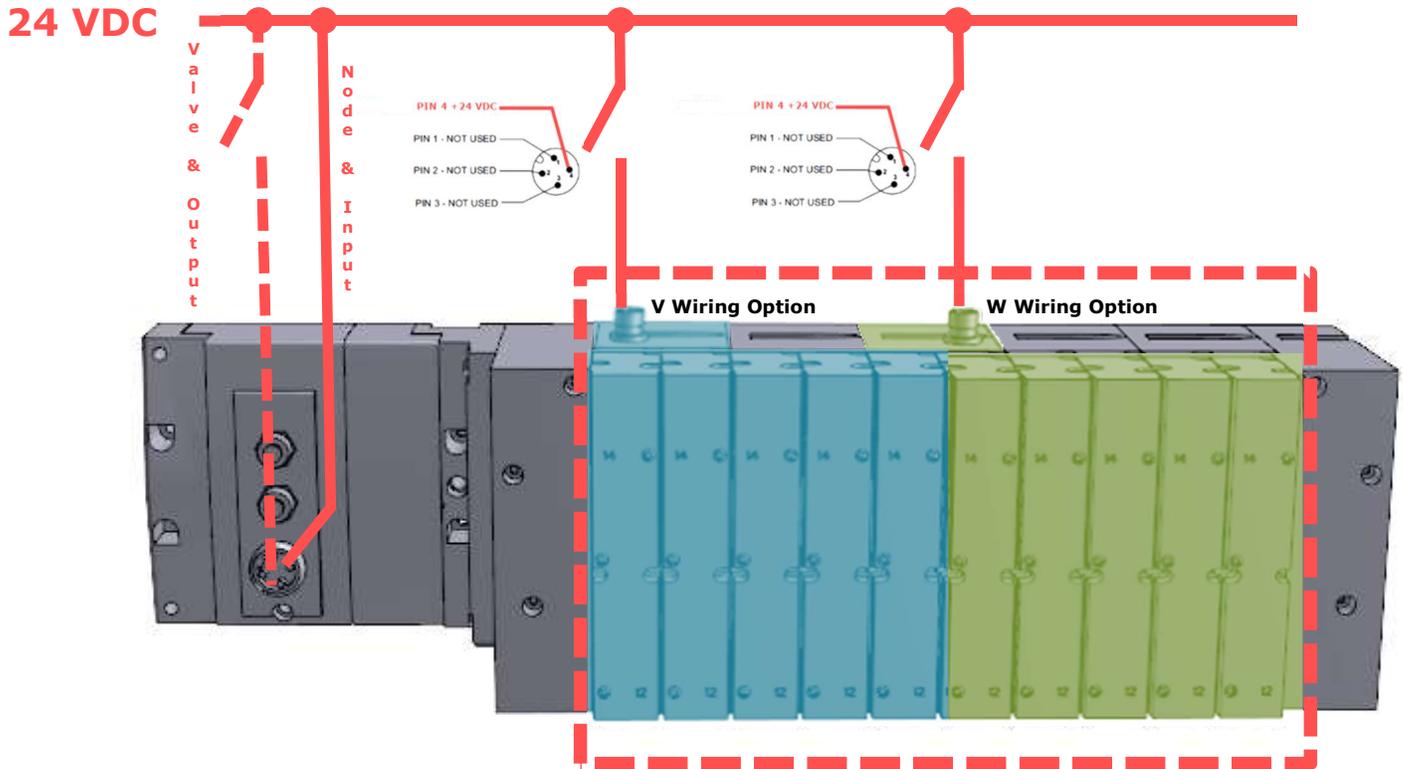
Electrical Data:

Voltage:	24 VDC (0 VDC must be common with main power)
Connection:	4-Pin M12 Single Key Male
Environmental:	IP65 (with proper connection)

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3.2 503 Series Zoned Power example

In the example shown below there are two Zoned Power Manifold blocks used. One is a "V" wiring option and the other is a "W" wiring option. The first (5) stations of the manifold assembly get their power from the M12 4-Pin connector at station one. The next (5) stations get their power from the M12 4-Pin connector at station six. Each of these "Zones" can be individually switched off if the machine or process requires. This example is considered a manifold with (2) Power Zones. The Main Power (7/8" MINI) cannot be considered or used as a Power Zone; Switched Power (Solenoid/Output Power) **MUST** be present for control to the solenoids.



The 0 VDC reference for the +24 VDC applied to Pin 4 of the M12 connector **MUST** be the same as the one used on G3/580/Terminal Strip/25 or 37 Pin Sub-D/19 or 26 Pin Round Connector. If multiple 24 VDC power supplies are used the 0 VDC references of each supply **MUST** be common.



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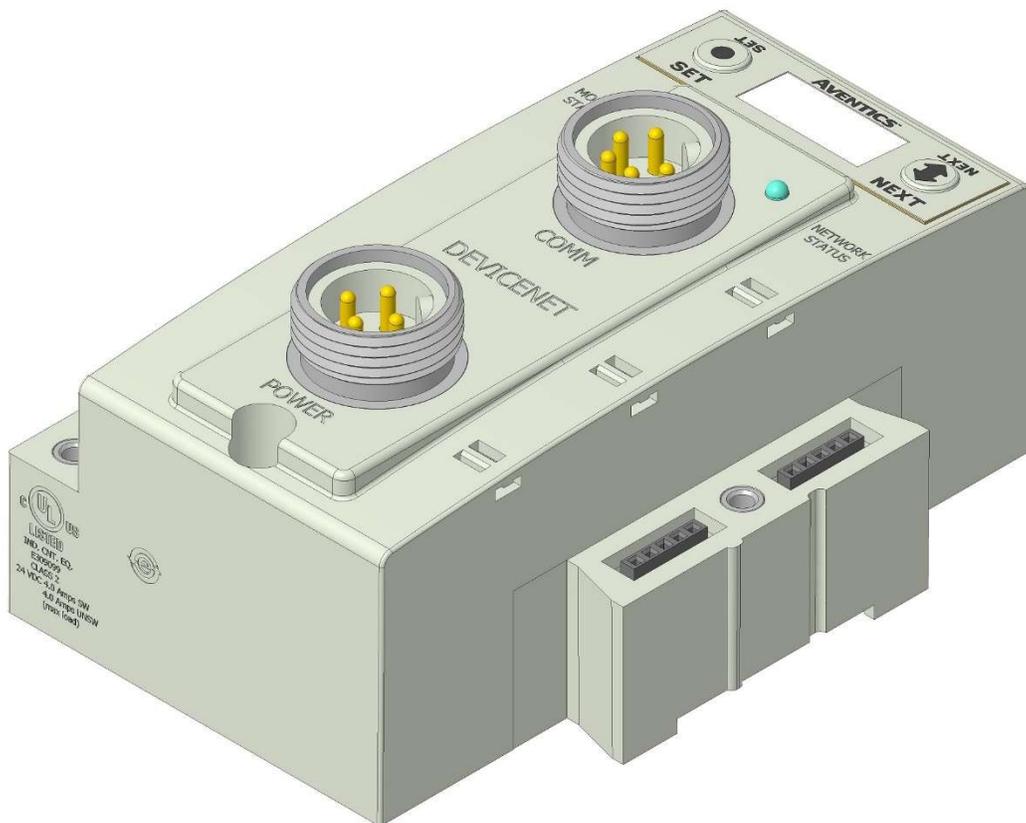
4. Communication Module

4.1 DeviceNet™ Communication Module (Node)

This module is the communication interface to the manifold. It contains communication electronics and internal short circuit protection for power. It can be configured via software, via the graphic display or manually via DIP switches through the optional Manual Configuration Module (MCM).

The AVENTICS G3 DeviceNet™ node is tested by the ODVA to ensure DeviceNet™ compatibility and interoperability. The G3 DeviceNet™ node supports Polled, Change of State (COS), Cyclic and Combination (i.e. Outputs can be set for Polled while Inputs can be set for COS for greater system response time) I/O Message types. DeviceNet™ Quick Connect functionality is also user selectable in this unit.

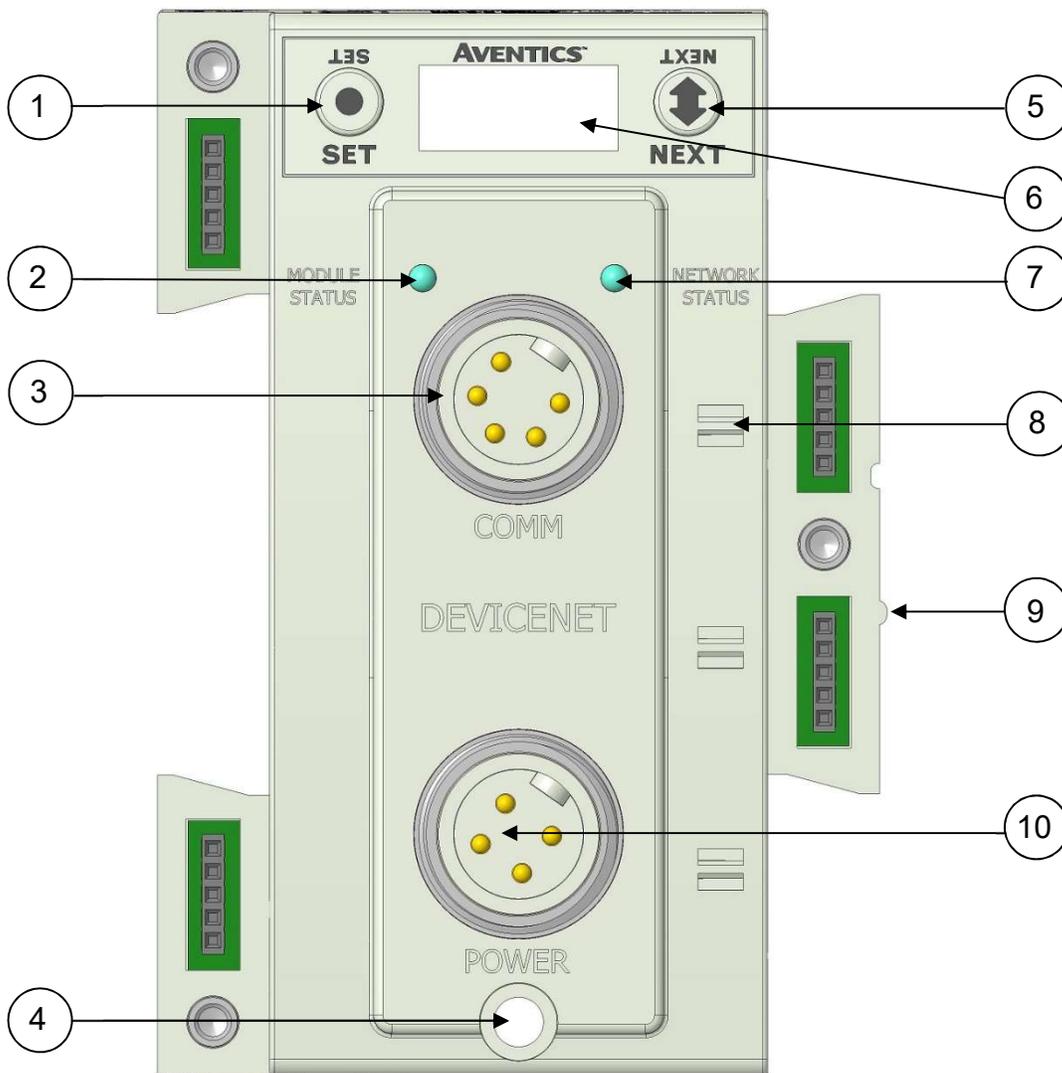
Communication Module	Part Number
DeviceNet™ Communication module	240-180



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4.2 Communication Module Description

Detail No.	Description
1	"Set" Button - used to navigate through user menus and to set parameters
2	Module Status LED
3	5 Pin MINI Male Communication Connector per ODVA specification
4	Mounting Hole
5	"Next" Button - used to navigate through user menus and to set parameters
6	Graphic Display - used to display parameter information
7	Network Status LED
8	Slot for text ID tags
9	Keying for preventing I/O module insertion
10	4 Pin MINI Male Power Connector



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4.3 Connector Pin-Outs

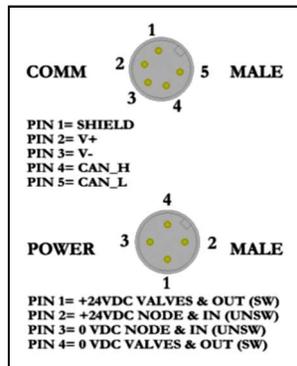
Industry standard 7/8" MINI connectors are used for communication and power.
 The DeviceNet™ communication connector is a single keyway 5 pin male connector.
 The Power connector is a single keyway 4 pin male connector.

DeviceNet™ Communication Connector Pin-Out

Pin No.	Function	Description
1	Shield	Cable shield
2	V+	Bus Power 11-25VDC
3	V-	Bus Power Common (0 VDC)
4	CAN_H	Controller Area Network High Communication Line
5	CAN_L	Controller Area Network Low Communication Line

Power Connector with CENELEC Style Pin-Out

CENELEC Pin No.	Function	Description
1	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW
2	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
3	0 VDC Common (Node and Inputs)	0 VDC (-V) Voltage used to power discrete inputs and node electronics UNSW
4	0 VDC Common (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW



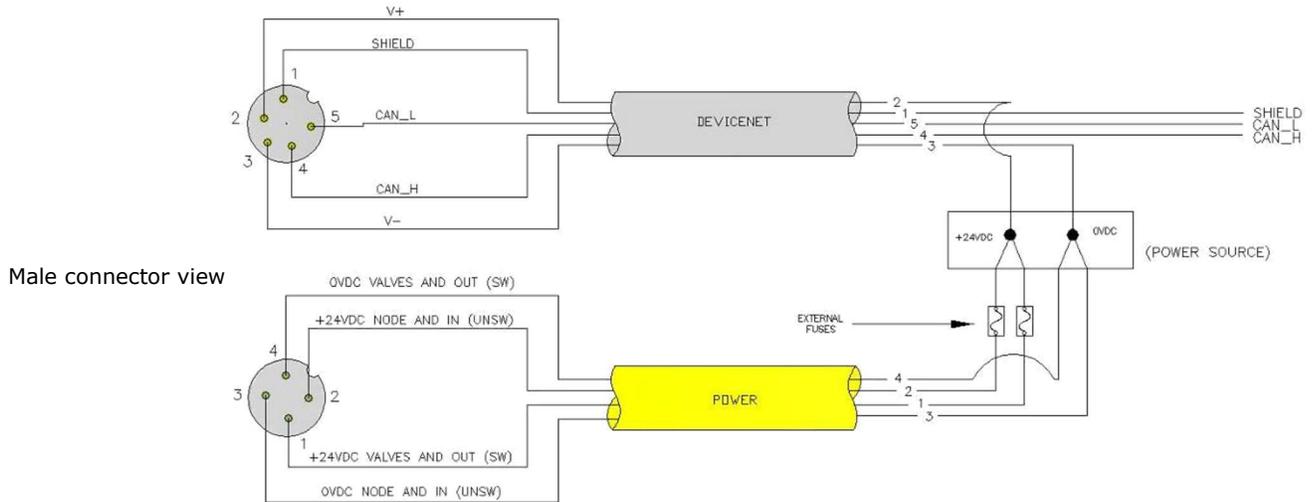
- Power common (0 VDC) pins 3 and 4 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.
- The draw of the +24VDC Valves and Outputs and +24VDC Node and Inputs pins cannot exceed 8 Amps, at any given moment in time.
- The Node and Inputs pins supplies power to the node electronics. These pins must be powered at all times for communication node to be functional.
- "To be connected to Class 2 power source only".

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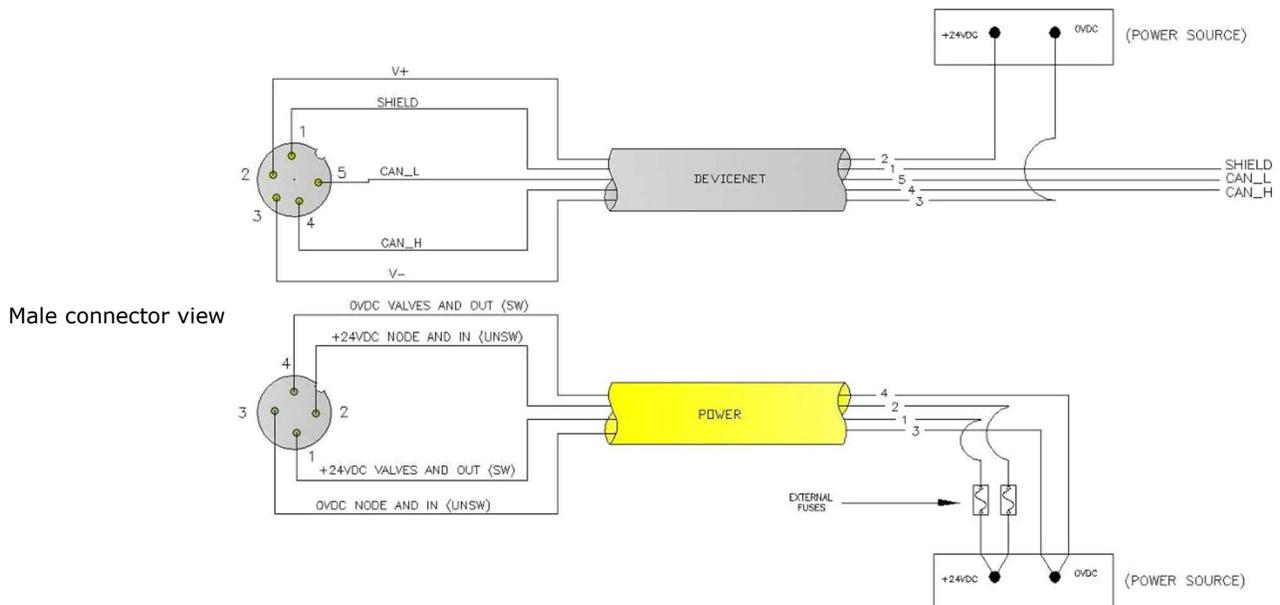
4.4 Electrical Connections

Standard Power Connector Wiring Diagram Examples

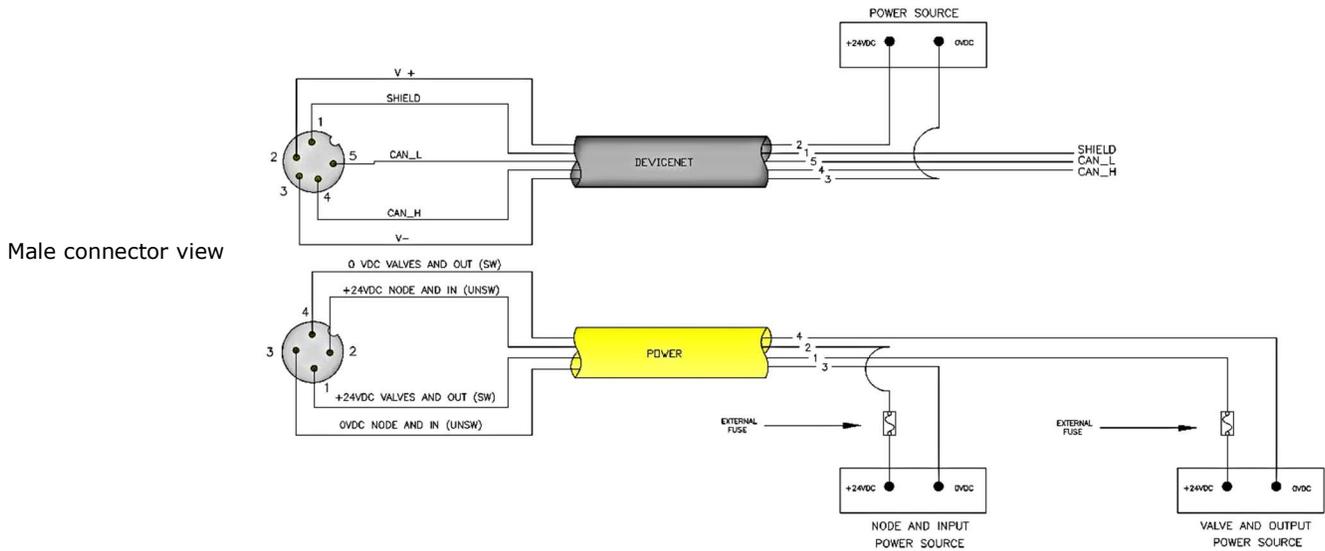
Single Power Supply Example (Non-isolated commons)



Separate Power Supply Example (Non-isolated commons)



Separate Power Supply Example (Isolated commons)

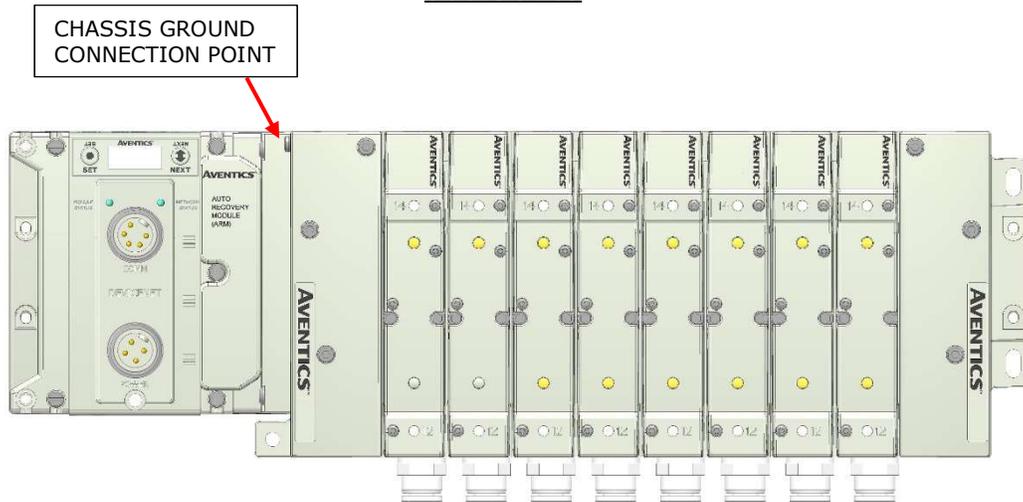


- Please see page 3-23 for external fuse sizing guide.
- When using molded connector power cables, Do Not rely on wire colors for Pin-Out. Always use pin number references.
- "Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring."
- "Wire connections shall be rated suitable for the wire size (lead and building wiring) employed."
- "CLASS 2 WIRING; All filed wiring shall be suitable for class 1, Electric Light and Power, or Class 2, Class 3 wiring are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) limited energy circuit conductors from unlimited energy circuit conductors."
- "MULTIPLE CLASS 2 POWER SOURCES: when interconnects, Class 2 sources shall be listed and rated suitable for parallel interconnection."

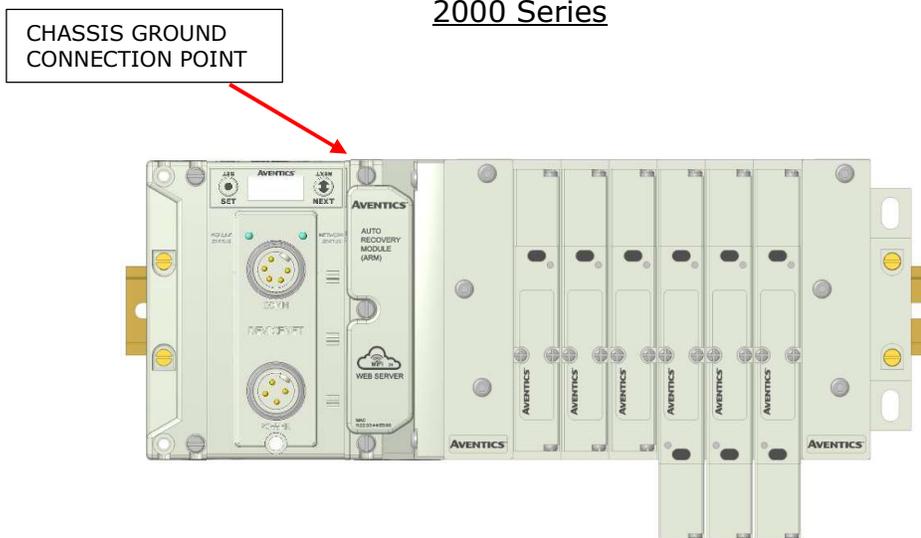
4.5 Ground Wiring

All AVENTICS communication nodes should be grounded during the installation process. These grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.

500 Series



2000 Series



- Proper grounding will prevent many intermittent problems with network communication.
- When grounding to a machine frame, please ensure that the machine frame itself is already properly grounded.
- Better grounding can be achieved when larger diameter (lower gauge) wire is used.

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4.6 Power Consumption

Power Connection

CENELEC Pin No.	Function	Description
1	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW
2	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
3	0 VDC Common (Node and Inputs)	0 VDC (-V) Voltage used to power discrete inputs and node electronics UNSW
4	0 VDC Common (Valves and Outputs)	0 VDC (-V) Voltage used to power outputs (valve coils and discrete outputs) SW

Power Rating

- For maximum supply current capability please refer to page **Error! Bookmark not defined..**
- Loads should not draw more than 0.5 Amps of current from any one individual discrete output point (Contact factory for higher current capability requirements).

Component	Voltage	Tolerance	+24VDC (Valves and Outputs) Pins 1 and 4		+24VDC (Node and Inputs) Pins 2 and 3	
			Current	Power	Current	Power
Solenoid Valve Coil 501 (Each)	24 VDC	+10%/-15%	0.03 A	0.80 W	0 A	0 W
Solenoid Valve Coil 502 (Each)	24 VDC	+10%/-15%	0.054 A	1.30 W	0 A	0 W
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 A	1.70 W	0 A	0 W
Solenoid Valve Coil 2002 (Each)	24 VDC	+10%/-15%	0.02 A	0.48 W	0 A	0 W
Solenoid Valve Coil 2005 (Each)	24 VDC	+10%/-15%	0.06 A	1.44 W	0 A	0 W
Solenoid Valve Coil 2012 (Each)	24 VDC	+10%/-15%	0.11 A	2.64 W	0 A	0 W
Solenoid Valve Coil 2035 (Each)	24 VDC	+10%/-15%	0.11 A	2.64 W	0 A	0 W
Solenoid Valve Coil ISO 5599/2- SPA	24 VDC	+10%/-15%	0.17 A	4.08 W	0 A	0 W
Valve Adapter (Driver) 2000 series	24 VDC	+/- 10%	0.03A	0.72 W	0.02 A	0.48 W
Valve Adapter (Driver) 500 series	24 VDC	+/- 10%	0.03A	0.72 W	0.02 A	0.48 W
Digital Module (M12/terminal strip)	24 VDC	+/- 10%	0.04 A	0.96 W	0.05 A*	1.20 W*
Digital Module (M8)	24 VDC	+/- 10%	0 A	0 W	0.19 A	4.56 W
Analog Module	24 VDC	+/- 10%	0.01 A	0.24 W	0.08 A*	1.92 W*
Sub-Bus Hub	24 VDC	+/- 10%	0 A	0 W	0.06 A*	1.44 W*
RTD Module	24 VDC	+/- 10%	0.01 A	0.24 W	0.06 A*	1.44 W*
Communication Module (Node)	24 VDC	+/- 10%	0.01 A	0.24 W	0.10 A*	2.40 W*
Sub-Bus Valve Module	24 VDC	+/- 10%	0.01 A	0.24 W	0.03 A*	0.72 W*
580 Sub-Bus Valve Module	24 VDC	+/- 10%	0.034 A	0.8 W	0.03 A*	0.72 W*
Auto Recovery Module (ARM)	24 VDC	+/- 10%	0 A	0 W	0.03 A	0.72 W
Manual Configuration Module (MCM)	24 VDC	+/- 10%	0 A	0 W	0.03 A	0.72 W

* Current depends on graphic display brightness setting. Max. value shown with high brightness. Values decrease by approx. 5% for Medium and 11% for Low brightness settings.



- Total power consumption for each Discrete I/O point is dependent on the specific current draw of input sensor devices and output loads.

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Recommended External Fuses

External fuses should be chosen based upon the physical manifold configuration. Please refer to the following table for the fuse sizing chart.

External Fuse Sizing Chart

<i>Power Consumption - Power Connector Pin for Valves and Outputs</i>	
<u>Description</u>	<u>Current</u>
Number of Solenoid Valve Coils Energized Simultaneously Number of coils ____ X ____ A = _____ Amps (Reference Chart 1 above for specific current draw based on valve series)	
	+
Total load current drawn by simultaneously energized Discrete Outputs = _____ Amps	
	+
Number of I/O modules installed ____ X 0.04 A = _____ Amps	
	+
Main Valve Driver = 0.03 Amps	
	+
Number of +32 Valve Drivers = 0.05 Amps	
	+
Communication Node Power Consumption = 0.01 Amps	
Total: _____ Amps	
Surge Compensation: X 1.25	
Suggested External +24 VDC (Valves and Outputs) Fuse Value: _____ Amps	
<i>Power Consumption - Power Connector Pin for Node and Inputs</i>	
<u>Description</u>	<u>Current</u>
Communication Node Power Consumption = 0.10 Amps	
	+
Total load current drawn by Sensor Devices from Discrete Inputs source = _____ Amps	
	+
Number of I/O modules installed ____ X 0.08 A = _____ Amps	
	+
Total: _____ Amps	
Surge Compensation: X 1.25	
Suggested External Pin +24 VDC (Node and Inputs) Fuse Value: _____ Amps	

*Factory Default Settings

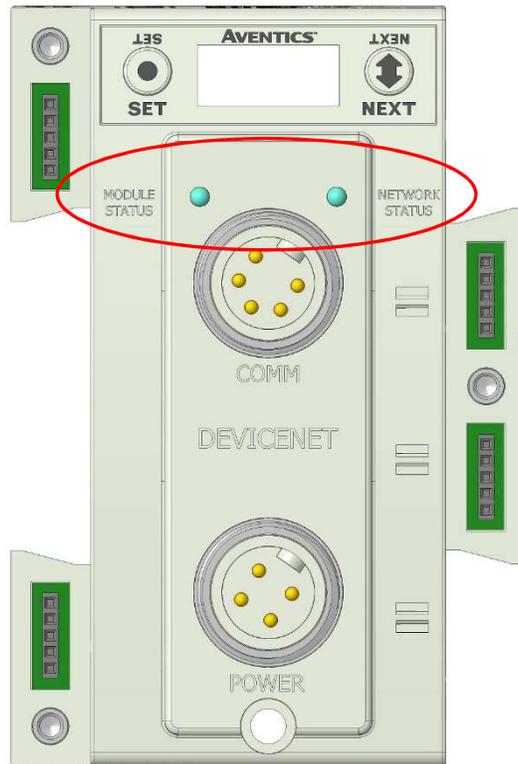


- The Node and Inputs Aux Power pins supply power to the node electronics. These pins must be powered at all times for communication node and Inputs to be functional.
- The internal electronic fuses exist to protect against damage due to catastrophic failure of internal components. External fuses are always recommended for protection against power supply failure, over-current conditions, etc.

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4.7 Diagnostics - Communication Module LED Functions

Upon power up, the Module and Network Status LEDs indicate the state of the unit. There are two LEDs on the G3 DeviceNet™ node. The LEDs functions are described in the table below.



LED Name	Color	Status	Description
NETWORK STATUS	Off	OFF	Device is not on-line; Bus power not applied if Module Status also flashing green; Physical problem with network; Improper baud rate.
	Green	ON	Normal operation. Device is on-line and has established a connection.
		FLASHING	Device is on-line but has no established connections.
	Red	ON	The device has detected a bus error that has rendered it incapable of communicating on the network; Duplicate MAC ID; "Bus Off" condition; Physical problem with network.
		FLASHING	Communication failure – one or more I/O connections have timed out.
MODULE STATUS	Off	OFF	Critical hardware fault. Microprocessor is not running.
	Green	ON	Normal operation. The device is operating properly.
		FLASHING	Network power is absent.
	Green	Red	FLASHING

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4.8 Output / Short Circuit Protection Diagnostic Status Bits

Diagnostic Status Bit Action during Fault Condition:

<i>Output Type</i>	<i>Output State</i>	<i>Fault Condition</i>	<i>Status Bit</i>
Valve Solenoid Coil Driver	ON	No Fault	0
		Fault - Short Circuit, Over Temp/Over Current	1
Valve Solenoid Coil Driver	OFF	No Fault	0
		Fault - Open Load	1
Discrete Outputs	ON	No Fault	0
		Fault - Short Circuit, Over Temp/Over Current	1



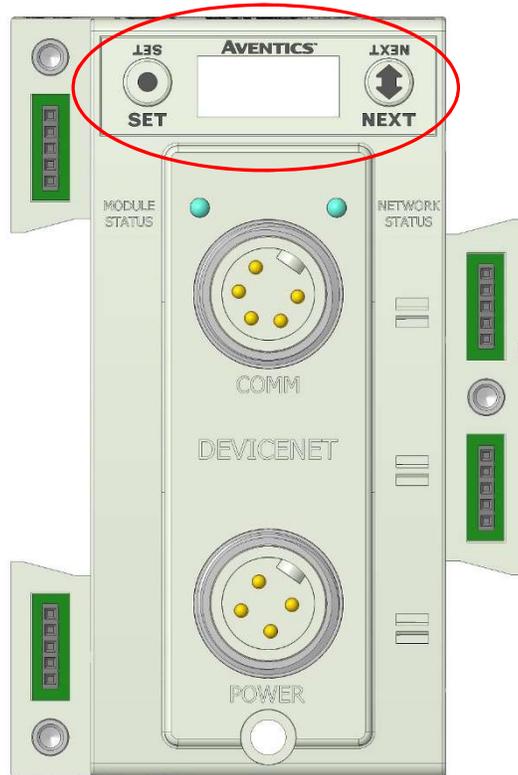
TDG3DNTM1-7EN 05/20
Subject to change without notice

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5. G3 Node Graphic Display

The G3 Communication and I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as showing diagnostic information.



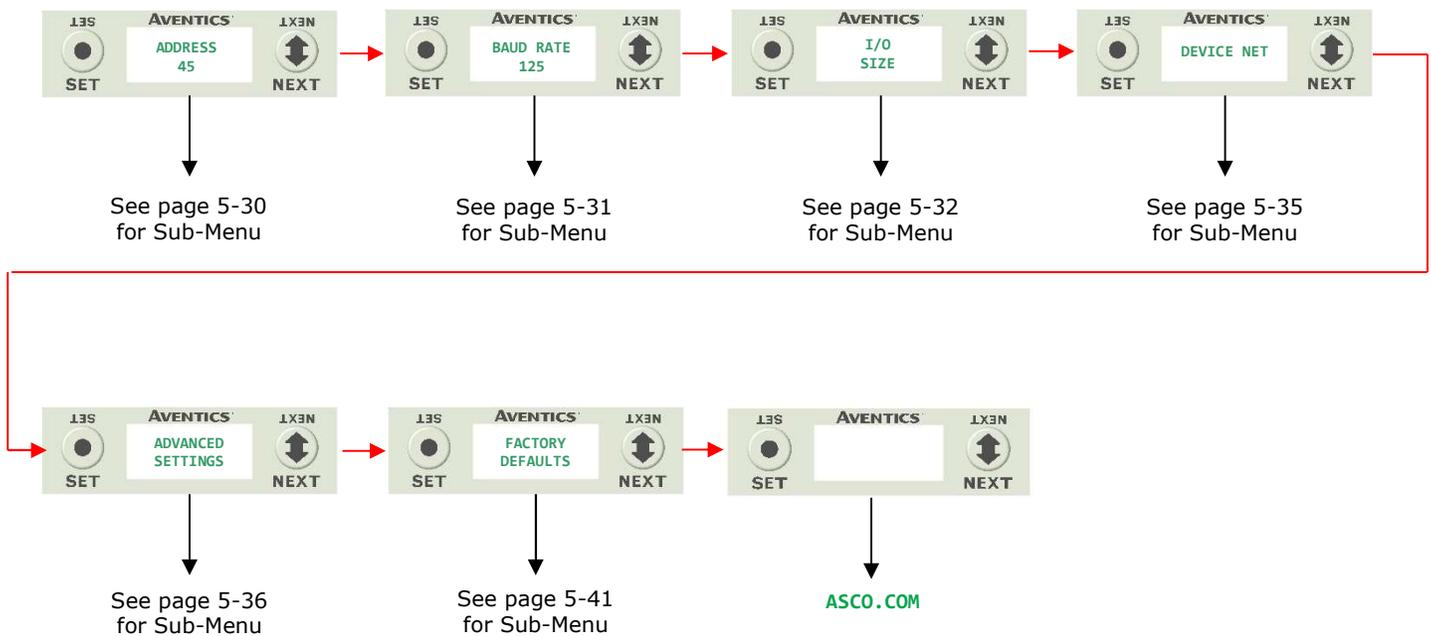
The following graphic displays represent the main menu selections of the DeviceNet™ communication module (node). Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus. Note that many of these settings can also be adjusted via software with EDS file parameters. **NOTE: WHEN A NETWORK I/O CONNECTION IS ESTABLISHED MANUAL CHANGES TO NODE PARAMETERS ARE NOT ALLOWED!**

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5.1 Main Menu Structure

Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus.

NOTE: When a network I/O connection is established manual changes to node parameters are not allowed!



- When a network I/O connection is established manual changes to node parameters are not allowed!

5.2 Network Address Sub-Menu

Steps to Set Address



1. Press the SET button to enter the ADDRESS sub-menu.



2. Press the NEXT button to scroll through the choices for the tens digit of the node address. Press the SET button to select the tens digit and move into the ones digit selection.



3. Press the NEXT button to scroll through the choices for the ones digit of the node address. Press the SET button to select the ones digit.



4. Press the NEXT button to select Yes or No to accept the address shown on the display,
 - a. Selecting No will bring you back to the main Address menu.
 - b. Selecting Yes will take you to the following SAVE SETTINGS menu.

Press the SET button to confirm your choice.



5. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new Address to be saved in temporary memory and allow you to make additional parameter changes before the node is reset. However, you must ACCEPT the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



- Only addresses 0-63 are valid.
- Address 0 is typically reserved for the master (i.e. PLC, IPC, etc.)
- Address 62 is typically reserved for network programming devices (i.e. Rockwell 1770-KFD, 1784-U2DN).
- Address 63 is reserved for new replacement devices.
- Address 63 is the Factory Default node address.

5.3 Baud Rate Sub-Menu

Steps to Set Baud Rate



1. Press the SET button to enter the BAUD RATE sub-menu.



2. Press the NEXT button to scroll through the choices for the baud rate of the node:



- a. 125K
- b. 250K
- c. 500K
- d. AUTOBAUD (Factory Default)
- e. RETURN (this will return you to the top of BAUD RATE menu)



Press the SET button to confirm your choice.



3. Press the NEXT button to select Yes or No to accept the baud rate shown on the display.
 - a. Selecting No will bring you back to the main Baud Rate menu.
 - b. Selecting Yes will take you to the following SAVE SETTINGS menu.

Press the SET button to confirm your choice

Saved Setting Steps



4. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new Baud Rate to be saved in temporary memory and allow you to make additional parameter changes before the node is reset. However, you must ACCEPT the saved changes before your next power cycle otherwise they will be lost.

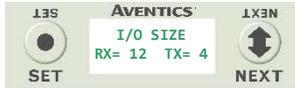
Press the SET button to confirm your choice.



- Node must be set to the same baud rate as the network master (i.e. PLC scanner, controller's communication module, etc.)
- More than one device (slave) on the network is required for AUTOBAUD to function.

5.4 I/O Size - Coils Sub-Menu

I/O Size Steps



1. Press the SET button to enter the I/O SIZE sub-menu.



2. Press the SET button to enter the I/O ALLOC COILS menu.



3. Press the NEXT button to scroll through the choices for the number of allocated valve coils:



- a. 0 COILS
- b. 8 COILS
- c. 16 COILS
- d. 24 COILS
- e. 32 COILS (Factory Default)
- f. RETURN (this will return you to the I/O ALLOC menu)



Press the SET button to confirm your choice.



4. Press the NEXT button to select Yes or No to accept the number of allocated coils shown.

- a. Selecting No will bring you back to the main I/O ALLOC menu.
- b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.



Save Setting Steps



5. Press the NEXT button to select either NOW or LATER.

- a. Selecting NOW will cause the node to reset and apply the new setting.
- b. Selecting LATER will cause the new Coil Allocation to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



- Choose the appropriate number of valve coils to optimize the number of I/O bytes allocated for the manifold.
- Optimizing number of coils may cause extra coil output not to be allocated for future expansion. Thus, adding valves in the future would require this parameter to be adjusted.

5.5 I/O Size - Allocation Menu

I/O Allocation Steps



1. Press the SET button to enter the I/O SIZE sub-menu.
2. Press the NEXT button to scroll to the SET I/O ALLOC TOTAL OUT menu.
3. Press the SET button to enter the I/O ALLOC TOTAL OUT menu.
4. Press the NEXT button to scroll through the choices for the tens digit of the total output size. Press the SET button to confirm the tens digit and move into the ones digit selection.
5. Press the NEXT button to scroll through the choices for the ones digit of the total output size. Press the SET button to confirm the ones digit.
6. Press the NEXT button to select Yes or No to accept the number of outputs shown.
 - a. Selecting No will bring you back to the main I/O ALLOC menu.
 - b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.

Save Setting Steps



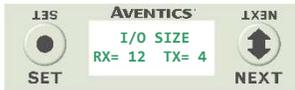
7. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new Total Output size to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



- Setting this value will turn off the default condition in the manifold of Auto Configuring its total I/O size based on installed modules.
- This value will allow you to set a preset I/O size for the manifold configuration regardless of modules installed as long the value is greater than the actual physical configuration.

I/O Size - Allocation Sub-Menu Cont.



I/O Allocation Steps

1. Press the SET button to enter the I/O SIZE sub-menu.
2. Press the SET button to enter the SET I/O ALLOC TOTAL IN menu.
3. Press the NEXT button to scroll through the choices for the tens digit of the total input size. Press the SET button to confirm the tens digit and move into the ones digit selection.
4. Press the NEXT button to scroll through the choices for the ones digit of the total input size. Press the SET button to confirm the ones digit.
5. Press the NEXT button to select Yes or No to accept the number of input bytes shown.
 - a. Selecting No will bring you back to the main I/O ALLOC menu.
 - b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.

Save Setting Steps

6. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new Total Input size to be saved in memory, you must accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.

5.6 DeviceNet™ with Quick Connect Sub-Menu



DeviceNet™ / Quick Connect Steps

1. Press the SET button to enter the DEVICENET™ Quick Connect feature sub-menu.



2. Press the NEXT button to scroll through to choose standard DeviceNet™ or DeviceNet™ with Quick Connect feature.
 - a. ENABLED
 - b. DISABLED (Factory Default)
 - c. RETURN (this will return you to the DEVICENET™ menu)

Press the SET button to confirm your choice.



3. Press the NEXT button to select Yes or No to accept the selection.
 - a. Selecting No will bring you back to the main DEVICENET™ protocol menu.
 - b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.



Save Setting Steps

4. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new Total Input size to be saved in memory, you must accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



- This setting allows the DeviceNet™ with QUICK CONNECT feature to be enabled or disabled.
- The QUICK CONNECT feature allows a node to quickly go into operation by shortening the time required to make the logical connection between the node and the DeviceNet™ scanner.
- This feature has benefits in many applications including those needing to make on the fly tool changes.
- The DeviceNet™ scanner must also support this feature.

5.7 Advanced Settings - I/O Diag. Menu

This menu allows the enabling / disabling of all the I/O status bits. The I/O status bits include valve coil, discrete outputs, input short circuit, and alarm status bits. The default condition is Enabled

I/O Status Steps



1. Press the SET button to enter the ADVANCED SETTINGS sub-menu.



2. Press the SET button to enter the ADVANCED MENU / DIAG. STATUS.



3. Press the SET button to enter the DIAG. STATUS I/O DIAG.



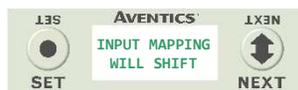
4. Press the NEXT button to scroll through the choices to enable/disable the Diagnostic status for I/O.



- a. ENABLED (Factory Default)
- b. DISABLED
- c. RETURN (this will return you to the DIAG. STATUS menu)



Press the SET button to confirm your choice.



5. Press NEXT to confirm the warning message.



6. Press the NEXT button to select Yes or No to accept the selection
 - a. Selecting No will bring you back to the main SET STATUS menu.
 - b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.



Save Settings Steps

7. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new I/O STATUS selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.

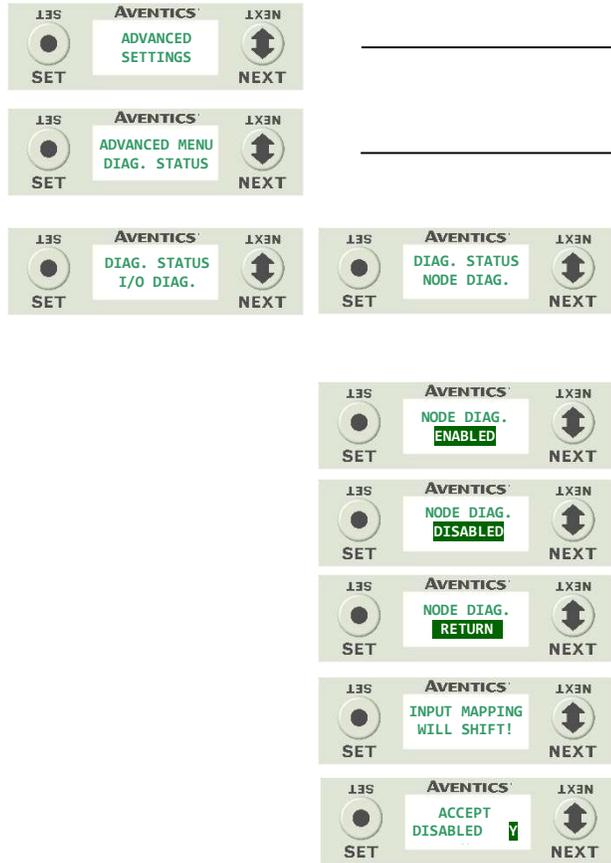


I/O Status Bits are diagnostic bits. They include the valve coil status bits, AUX Power status bits, and Short Circuit & Alarm status bits of various I/O modules.

5.9 Advanced Settings – Node Diagnostics (Diagnostic Word)

This menu allows the enabling / disabling of the diagnostic word status bits. The Diagnostic word bits include power status and sub-bus related status bits. Detailed information regarding these bits can be found on page 13-124. The diagnostic word comes enabled from the factory.

Diag. Word Status Settings

- 
1. Press the SET button to enter the ADVANCED SETTINGS menu.
 2. Press the SET button to enter the ADVANCED MENU / DIAG. STATUS.
 3. Press the NEXT button to scroll to the DIAG. STATUS / NODE DIAG. menu. Press the SET button to enter the DIAG. STATUS / NODE DIAG. menu.
 4. Press the NEXT button to scroll the choices to enable/disable the I/O status.
 - a. ENABLED (Factory Default)
 - b. DISABLED
 - c. RETURN (this will return you to the DIAG. STATUS menu)
 Press the SET button to confirm your choice.
 5. Press Next to confirm the warning message.
 6. Press the NEXT button to select Yes or No to accept the selection
 - a. Selecting No will bring you back to the main SET STATUS menu.
 - b. Selecting Yes will take you to the following saved settings menu.
 Press the SET button to confirm your choice.

Save Settings Steps

- 
7. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new NODE DIAG selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.
 Press the SET button to confirm your choice.

5.10 Advanced Settings - Fault Action

This menu allows the enabling / disabling of the fault action parameter. The fault action parameter determines the behavior of the outputs during a communication fault. Please see page 12-109 for more details.

Fault Action Settings



1. Press the SET button to enter the ADVANCED SETTINGS menu.



2. Press the NEXT button to scroll to the ADVANCED MENU / SET FAULT IDLE.
3. Press the SET button to enter the ADVANCED MENU / SET FAULT IDLE.



4. Press the SET button to enter the SET FAULT IDLE / FAULT ACTION menu.



5. Press the NEXT button to scroll the choices for the desired output action during a fault state.



- a. ALL OFF (Factory Default)
- b. HOLD LAST STATE
- c. RETURN (this will return you to the SET FAULT/IDLE menu)

Press the SET button to confirm your choice.



6. Press the NEXT button to select Yes or No to accept the selection
Press the SET button to confirm your choice
 - a. Selecting No will bring you back to the main SET FAULT/IDLE menu.
 - b. Selecting Yes will take you to the following saved settings menu.

Save Settings Steps



7. Press the NEXT button to select either NOW or LATER.
Press the SET button to confirm your choice.
 - a. Selecting NOW will cause the node to reset and apply the new setting
 - b. Selecting LATER will cause the new FAULT ACTION selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



- See page 12-109 for more details.
- Factory Default is "ALL OFF"

5.11 Advanced Settings - Idle Action

This menu allows the enabling / disabling of the fault action parameter. The fault action parameter determines the behavior of the outputs during a communication fault. Please see page 12-109 for more details.

Idle Action Settings



1. Press the SET button to enter the ADVANCED SETTINGS sub-menu.

2. Press the NEXT button to scroll to the ADVANCED MENU / SET FAULT IDLE. Press the SET button to enter the ADVANCED MENU / SET FAULT IDLE.

3. Press the NEXT button to scroll to the SET FAULT IDLE / IDLE ACTION. Press the SET button to enter the SET FAULT IDLE / IDLE ACTION menu.

4. Press the NEXT button to scroll the choices for the desired output action during an idle state.

- a. ALL OFF (Factory Default)
- b. HOLD LAST STATE
- c. RETURN (this will return you to the SET FAULT/IDLE menu)

Press the SET button to confirm your choice.

5. Press the NEXT button to select Yes or No to accept the selection.

- a. Selecting No will bring you back to the main SET FAULT/IDLE menu.
- b. Selecting Yes will take you to the following saved settings menu.

Press the SET button to confirm your choice.

Save Settings Steps

6. Press the NEXT button to select either NOW or LATER.

- a. Selecting NOW will cause the node to reset and apply the new setting.
- b. Selecting LATER will cause the new IDLE ACTION selection to be saved in memory, you must Accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.



• *Factory Default is ALL OFF.*

5.12 Advanced Settings - Brightness

Brightness Settings



1. Press the SET button to enter the ADVANCED SETTINGS menu.



2. Press the NEXT button to scroll to the ADVANCED / SET BRIGHTNESS. Press the SET button to enter the ADVANCED / SET BRIGHTNESS.



3. The current state of the parameter is shown.



4. Press the SET button to change this parameter. Press the NEXT button to scroll the choices for the desired brightness of the graphic display for all modules on the G3 system.



- a. LOW
- b. MEDIUM
- c. HIGH (Factory Default)



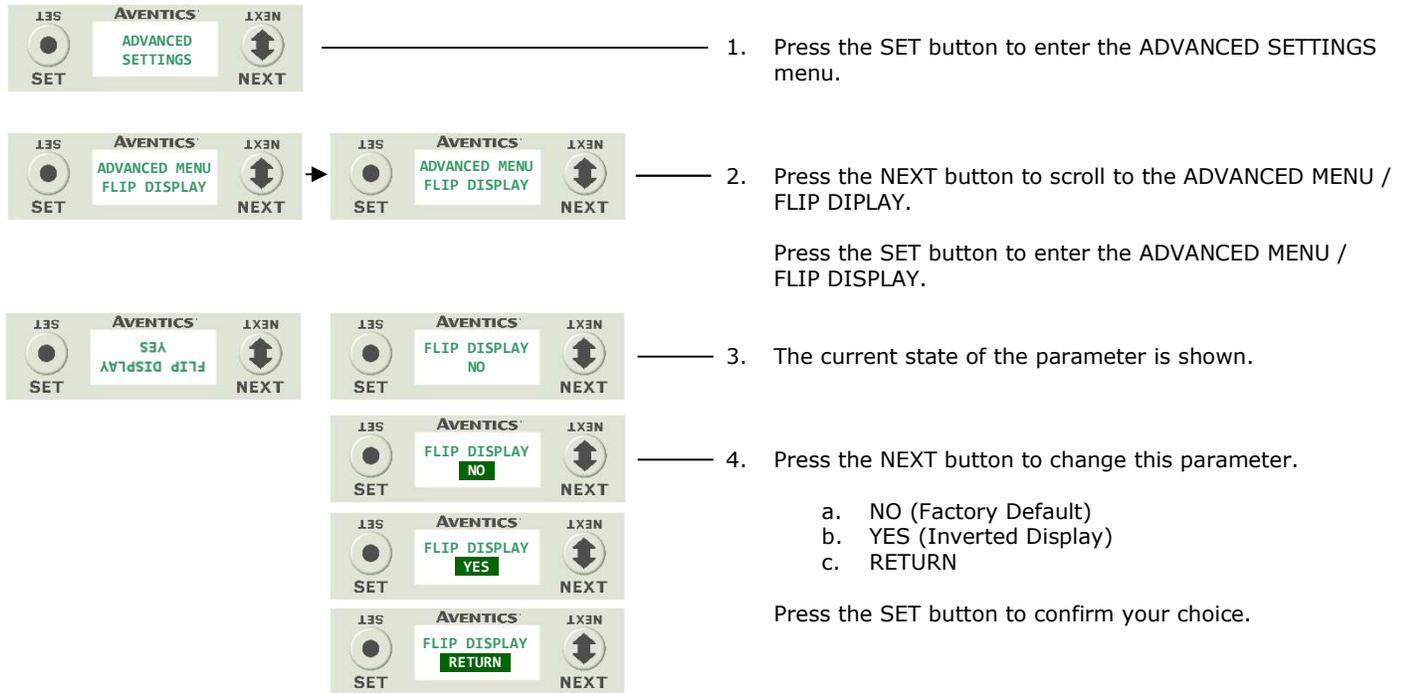
Press the SET button to confirm your choice. The changes will take effect immediately.



- This a global setting that affects all modules
- Each module, however, has its own setting if different settings are required.

5.13 Advanced Settings – Flip Display

Flip Display Settings



- This a global setting that affects all modules.
- Each module, however, has its own setting if different settings are required.

5.14 Advanced Settings – Parameters Lock

PARAMETER Steps



1. Press the SET button to enter the Parameters sub-menu.



2. Press the NEXT button to scroll through the choices to enable or disable the feature.



- a. UNLOCKED (Factory Default)
- b. LOCKED
- c. RETURN (this will return you to the main menu)

Press the SET button to confirm your choice.



By choosing LOCKED, all settable parameters will be read only via the graphic display. UNLOCKED, the factory default, will allow all parameters to be settable through the graphic display.

Please note that all parameters are read only, regardless of this setting, when an IO connection between the communication module and the controller (PLC) is present



3. Press the NEXT button to select Yes or No to accept the selection.

- a. Selecting No will bring you back to the main menu.
- b. Selecting Yes will take you to the following apply changes menu.

Press the SET button to confirm your choice.

Apply Changes Steps



4. Press the NEXT button to select either NOW or LATER.
 - a. Selecting NOW will cause the node to reset and apply the new setting.
 - b. Selecting LATER will cause the new setting to be saved in memory, you must accept the saved changes before your next power cycle otherwise they will be lost.

Press the SET button to confirm your choice.

5.15 Factory Defaults

Factory Default Settings



1. Press the SET button to enter the FACTORY DEFAULTS sub-menu.



2. Press the SET button to change this parameter.



3. Press the NEXT button to select Yes or No.
 - a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
 - b. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
 - c. Selecting RETUTN will bring you back to the main FACTORY DEFAULTS menu.

Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	Default
Node Address	63
Baud Rate	Auto-Baud enabled
Valve Side Output Bytes	4 Bytes (32 Allocated Valve Coil Outputs)
Rx/Tx Values	Self-Configuring
Diagnostic Word	Enabled
I/O Diagnostic Status	Enabled
DeviceNet™ Quick Connect	Disabled
Fault Action	Reset to All Off
Idle Action	Reset to All Off
Brightness	Medium
Parameters	Unlocked

5.16 Diagnostics - Self Test Mode

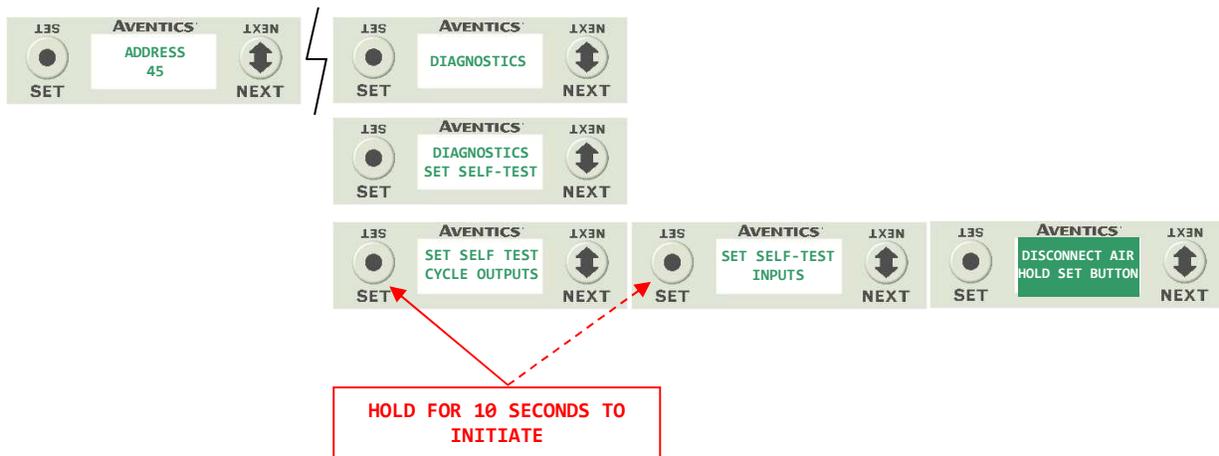
An internal diagnostic tool can be enabled on the communication module (node) using the graphic display. This tool allows the user to confirm that all of the inputs and outputs on the manifold and any of the distributed modules are fully functional without needing a network connection or controller. There are two test modes that the user can choose. The "CYCLE OUTPUTS" test mode tests all the outputs by sequentially turning them ON and OFF for approximately .5 seconds. The "INPUTS" test mode tests the inputs by causing all of the outputs to toggle between even and odd values when any input is made. The Self Test mode on the communication module (node) is a global setting and will test all devices connected on the main manifold as well as any distributed modules and/or manifolds.

Similar "local" Self Tests are available on all output modules types. This "local" Self Test function allows any output module to be tested without affecting any other output module.

NOTE: The number of Valve outputs that are tested are affected by the I/O size settings.

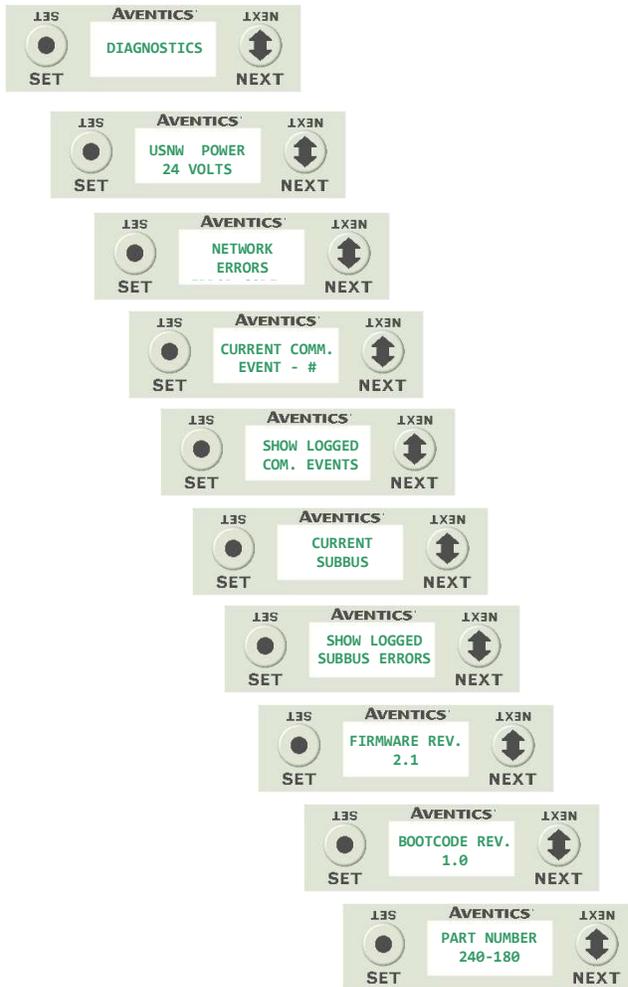
To use the Self Test Mode, the user must first set some initial conditions. Follow these steps to initiate the self-test mode.

- 1) **Disconnect Air and Communication from the manifold!**
- 2) Select the desired test mode using the graphic display. (See example below)
- 3) Starting at the Home Screen, navigate the menus by selecting the NEXT button until the DIAGNOSTICS menu is shown.
- 4) Select the SET button to access the DIAGNOSTICS menu and then again to access the SELF-TEST menu.
- 5) Push NEXT to navigate to the desired test mode: CYCLE OUTPUTS or INPUTS.
- 6) Push SET to select the desired test mode.
- 7) A message will appear: DISCONNECT AIR HOLD SET BUTTON.
- 8) Hold the SET button down for approximately 10 seconds to enable the test. The Display will flash the above message while the button is pushed.
- 9) When the display stops flashing, the Self Test Mode will run and the Module Status LED will flash Red/Green while the display shows SELF TEST RUNNING.
- 10) The global self-test mode can only be disabled by disconnecting the power to the manifold.



- Please be aware of the original position of detented valves so that they can be returned to the correct position after the self-test is disabled.

5.17 Diagnostics Cont.



1. All diagnostic information is read only
2. Press the SET button to enter DIAGNOSTICS sub-menu.
3. Press the NEXT button to scroll through the main diagnostic menu choices.
 - a. UNSW POWER
 - . - Displays voltage level of unswitched power (Node & Inputs)
 - b. NETWORK ERRORS - ERROR CODE
 - . - Displays fieldbus network errors
 - c. CURRENT COMM. EVENT NUMBER
 - . - Displays
 - d. SHOW LOGGED COMM. EVENTS
 - . - Displays log of network errors
 - e. CURRENT SUBBUS ERROR
 - . - Displays sub bus errors
 - f. SHOW LOGGED SUBBUS ERRORS
 - . - Displays log of sub bus errors
 - g. FIRMWARE REV.
 - . - For service personnel
 - h. BOOTCODE REV.
 - . -For service personnel
 - i. PART NUMBER
 - . - Displays replacement part number of module



- The UNSW POWER screen indicates the voltage level present on the UNSW (Node & Input) power pins (Pin No. 2 and 3) of the main power connector.
- A voltage level less than 19 volts will generate an error screen and an associated diagnostic bit (see 'Diagnostic' section for more details).

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5.18 Error Messages

The following are automatic error messages that are displayed when specific faults occur during operation:



Displayed when a short circuit condition is detected on the Sub-Bus power lines.



Displayed when a short circuit condition is detected on a valve coil.



Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration.

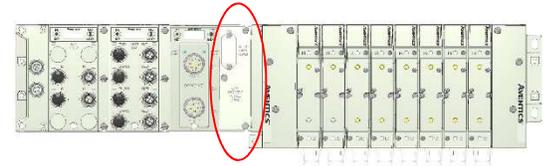


Displayed when +24 VDC on Pin No. 1 & 4 (Valves and Outputs) is not present or below 22 VDC.



Displayed when +24 VDC on Pin No. 2 & 3 (Node and Inputs) is below 19 VDC.

6. MCM – Manual Configuration Module (Optional)

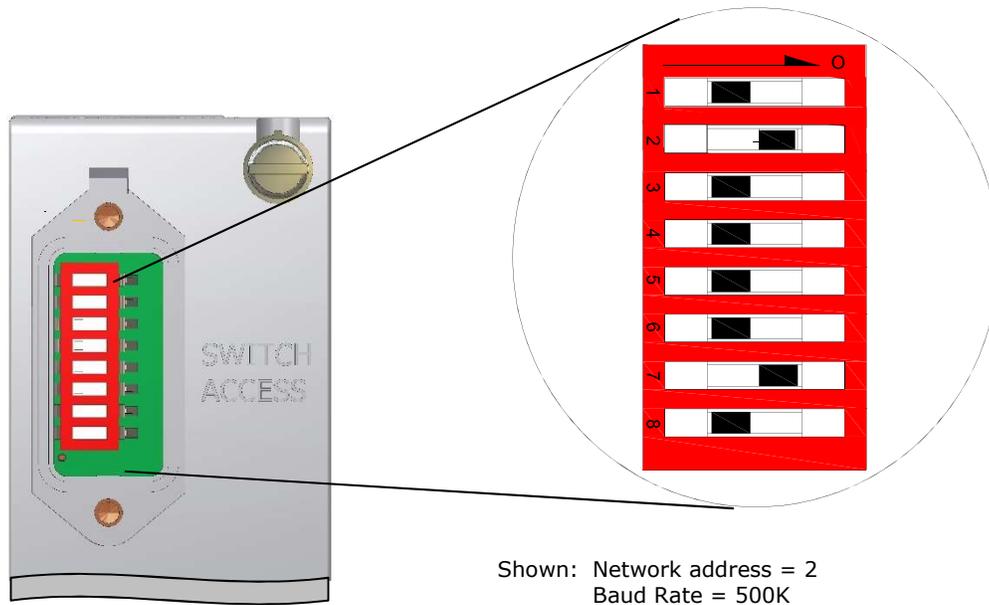


The MCM is an optional module that is installed between the node and the valve adapter module and allows the user to manually set, via DIP switches, the node address and baud rate without the need for software configuration or the use of the integrated graphic display in the node. If software configuration or configuration via the integrated graphic display in the node is preferred, this module is not necessary.

Description	Replacement Part Number
Complete Module	240-186

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6.1 DIP Switch Settings



Network Address:

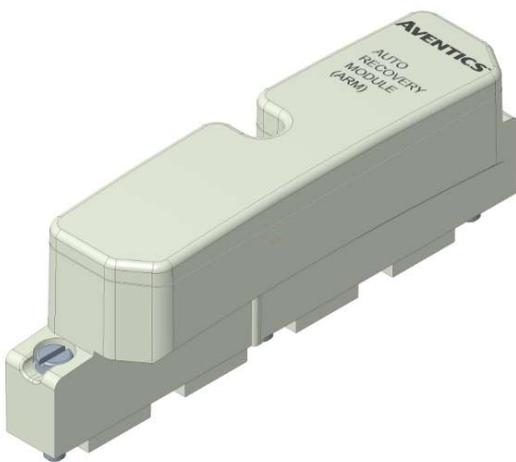
$2^5=32$ SW-6	$2^4=16$ SW-5	$2^3=8$ SW-4	$2^2=4$ SW-3	$2^1=2$ SW-2	$2^0=1$ SW-1	Address Value (Decimal)
OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
OFF	OFF	OFF	ON	OFF	OFF	4
⋮						
ON	ON	ON	OFF	OFF	OFF	56
⋮						
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OFF	62
ON	ON	ON	ON	ON	ON	63

Baud Rate:

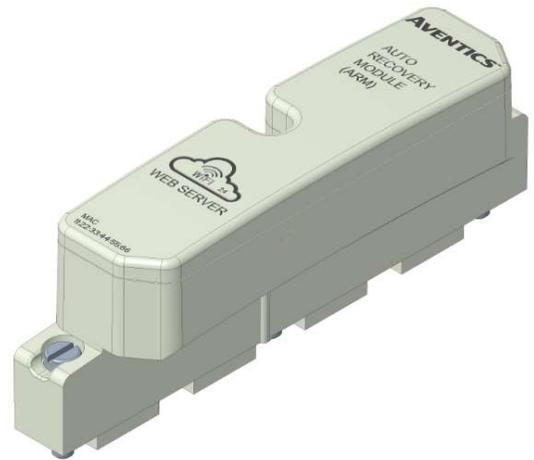
SW-7	SW-8	Baud Rate
Off	Off	125K
Off	On	250K
On	Off	500K
On	On	Auto-Baud

7. ARM – Auto Recovery Module (Optional)

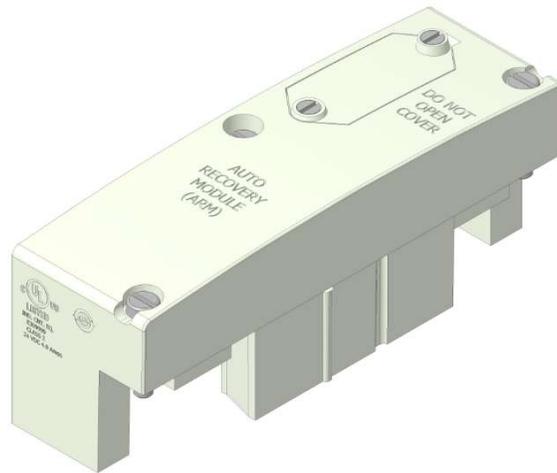
The Auto Recovery Module (ARM) is an optional memory module that is installed between the node and the valve adapter module and is used to back up the manifold system parameters even during catastrophic failure. During the power-up process the communication module reads the configuration of the manifold, including any user settable parameters of I/O modules, and stores the information in its non-volatile memory. Once the information is stored, it is disconnected from the power circuits while still mechanically attached to the manifold.



ARM-Clip Module



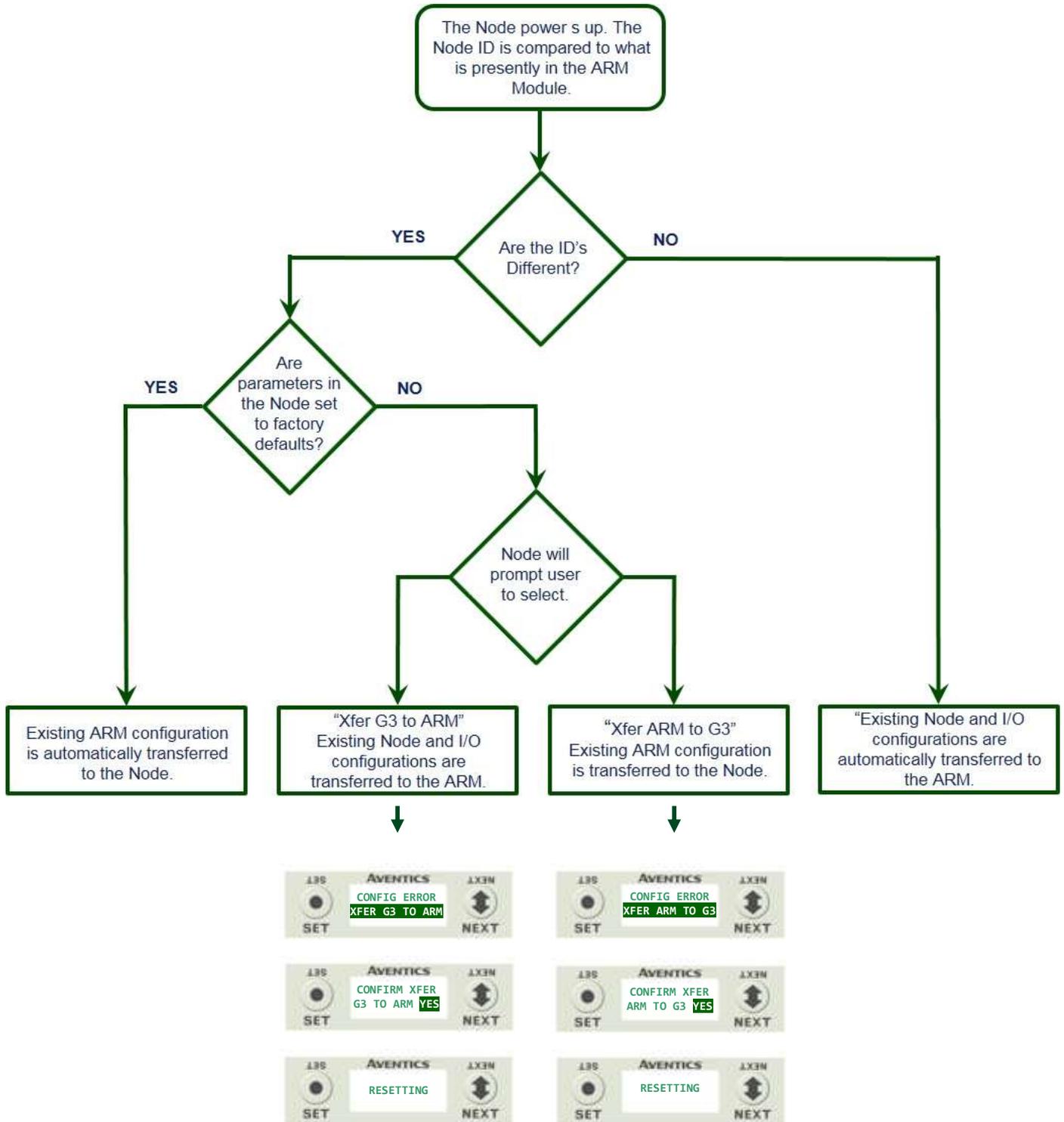
Wireless ARM-Clip Module



ARM Module (Legacy)

Description	Replacement Part Number
ARM Clip Module	240-383
Wireless ARM Clip Module	240-382
ARM Module (Legacy)	240-182

7.1 ARM process flowchart



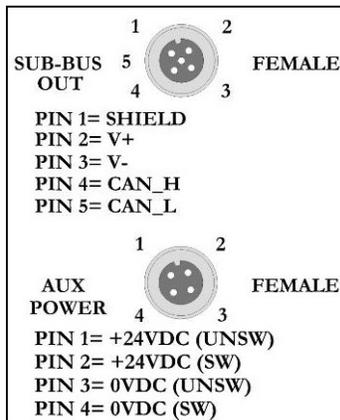
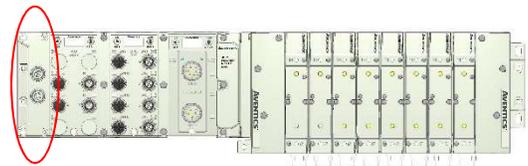
AVENTICS™ G3 Series DeviceNet™ Technical Manual

8.1 Sub-Bus Distribution Modules

Sub-Bus OUT Module

- Used only when distributing the Sub-Bus to another assembly is required.
- Sub-Bus OUT - 5 pin M12 female communication connector.
 - Used to distribute the Sub-Bus to the next Sub-Bus assembly.
 - Carries 24 VDC power for electronics of the next module.
- AUX. POWER OUT - 4 pin M12 female aux. power connector.
 - Optional connection.
 - Used as a convenient way to distribute the power connection to the next Sub-Bus assembly.

<i>Description</i>	<i>Replacement Part Number</i>
Sub-Bus OUT Module with Din Rail Mounting	240-244
Sub-Bus OUT module without Din Rail Mounting	240-183

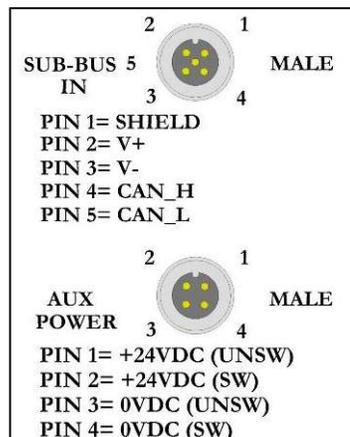
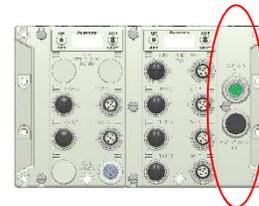
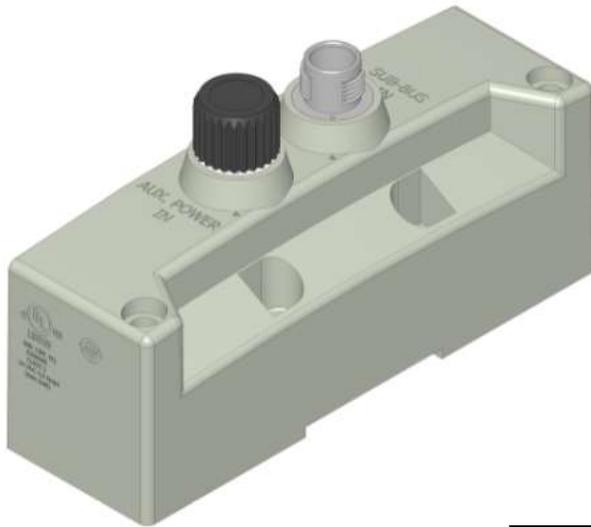


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Sub-Bus IN Modules

- Used to distribute I/O assemblies that do not have valves
 - Must be installed to the right of the I/O modules.
- SUB-BUS IN - 5 pin M12 male communication connector.
 - Must be connected to the Sub-Bus Out connector of the previous assembly
 - Carries 24 VDC power for electronics of module
- AUX. POWER IN - 4 pin M12 male connector.
 - Aux power is required for Output modules. This connection also allows Output power to be interrupted to all Output modules connected to this module.
 - Aux. Power is optional for Inputs. Power from the SUN-BUS IN connection is used to power sensors but can be augmented, if necessary, by adding additional power to this connector.

Description	Part Number
Sub-Bus IN module with Din Rail Mounting	240-246
Sub-Bus IN module without Din Rail Mounting	240-185

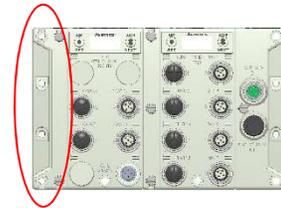
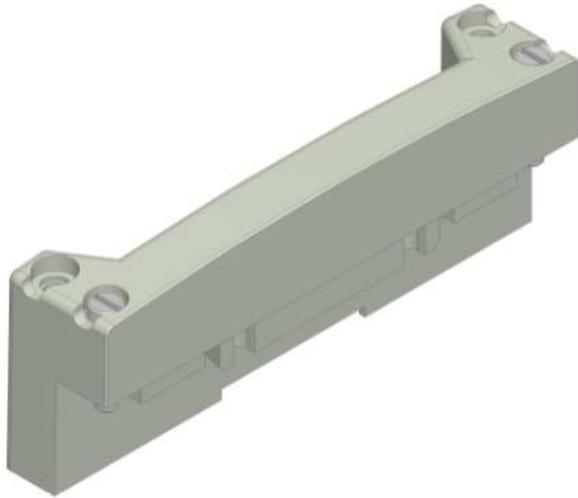


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Terminator Module

- Used to terminate SUB-BUS connections.
 - Must be installed on the left side of the last Sub-Bus module.

<i>Description</i>	<i>Part Number</i>
Terminator Module with Din Rail Mounting	240-245
Terminator Module without Din Rail Mounting	240-184



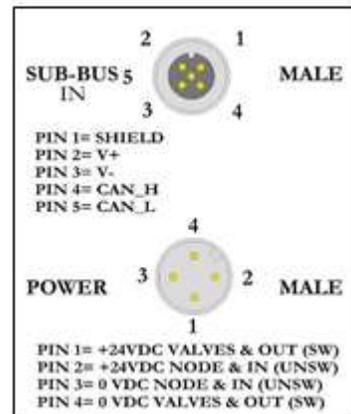
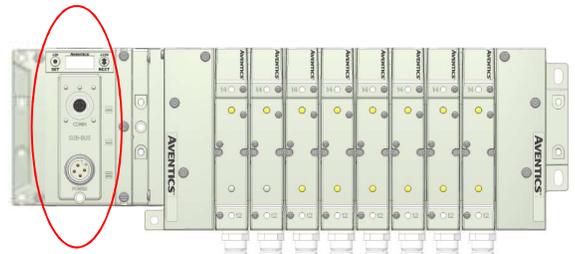
The terminator module is required to be installed in the G3 system for proper operation.

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G3 Sub-Bus Valve Module

- **COMM** - 5 pin M12 male Sub-Bus input communication connector.
 - Must be connected to the SUB-BUS OUT connector of the previous assembly
 - Carries 24 VDC power for electronics of module
- **POWER** - 4 pin MINI male power connector.
 - Power is required for Outputs
- **Used to distribute Valves on the Sub-Bus.**
 - Can accept discrete I/O module to allow a Sub-Bus Valve manifold with I/O

Description	Part Number
Sub-Bus Valve Module	240-241



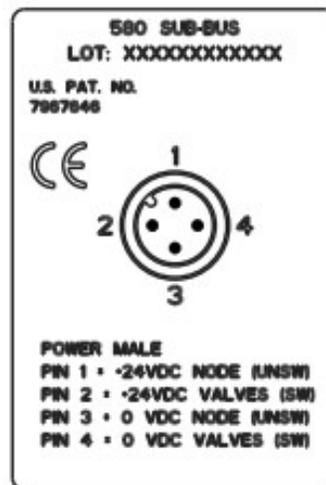
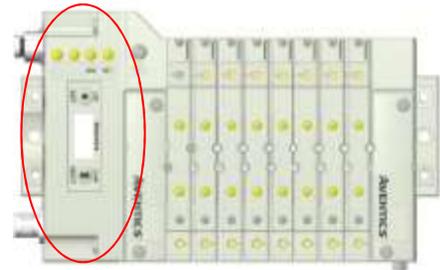
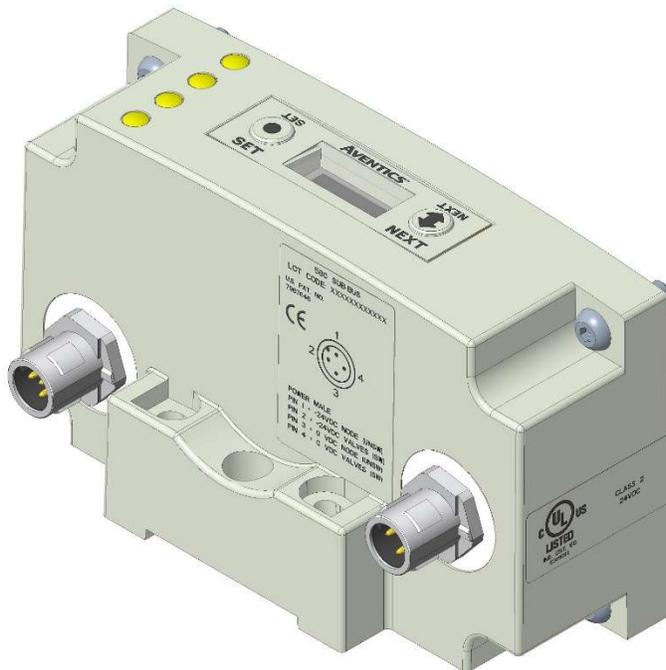
There is a 0.8 VDC drop in power across this module. Please consider this when distributing the Aux. Power after this module.

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580 Sub-Bus Valve Module

- COMM - 5 pin M12 male Sub-Bus communication connector.
 - Must be connected to the SUB-BUS OUT connector of the previous assembly
 - Carries 24 VDC power for electronics of module
- POWER - 4 pin M12 male power connector.
 - Power is required for Outputs
- Used to distribute Valves on the Sub-Bus.
 - Does not allow connection to G3 I/O modules.

Description	Part Number
Sub-Bus Valve Module without I/O	P580AEDS4010A00



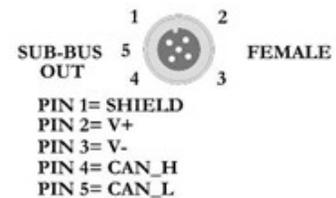
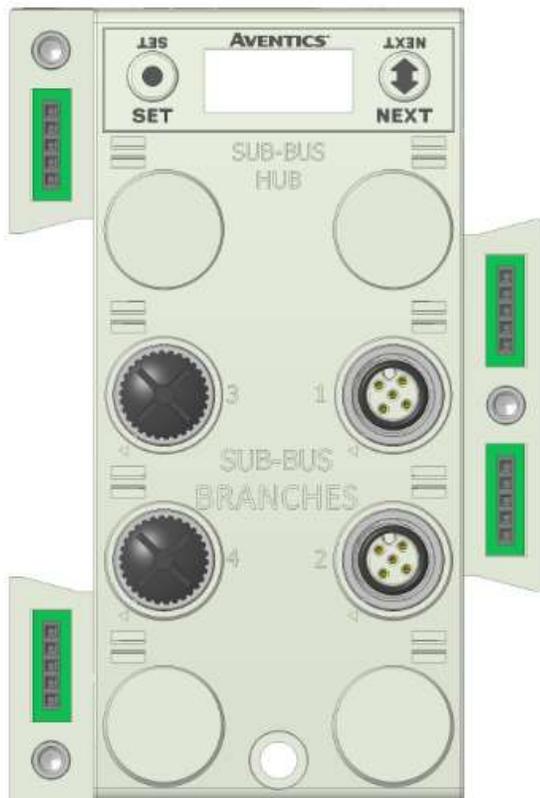
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Sub-Bus Hub Module

The G3 HUB module allows for branch distribution from the I/O side of the G3 System and can be integrated into the existing G3 Series Sub-Bus configuration. Auto Addressing allows for trouble free set up and configuration. Input, Output, as well as Valve manifolds can be attached to the available four Branches on a HUB module. Each G3 System can support up to two HUB modules, allowing for maximum flexibility. The HUB module is transparent to the I/O side of the G3 and does not reserve one of the potential sixteen positions.

- Used when distributing the Sub-Bus to another assembly.
- SUB-BUS OUT - 5 pin M12 female communication connector.
 - Used to distribute the Sub-Bus to the next Sub-Bus assembly.
 - Carries 24 VDC power (up to 3A) for electronics of the next module.
- Cannot connect a Hub to a branch of another Hub
- Each branch of the Hub can accommodate a sub-bus cable length of 30 meters.

Description	Part Number
Sub-Bus Hub Module	240-326



8.2 Sub-Bus Cables



M12 STRAIGHT 5 PIN MALE TO FEMALE SUB-BUS CABLE - SHIELDED

TA0501MGDTC0571P – 1 Meter
 TA0505MGDTC0571P – 5 Meter
 TA0510MGDTC0571P – 10 Meter



M12 STRAIGHT 5 PIN FEMALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TC05F200000071V – PG9



M12 STRAIGHT 5 PIN MALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TA05F2000000071V – PG9



M12 90° 5 PIN FEMALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TD05F2000000071V – PG9



M12 90° 5 PIN MALE FIELD WIREABLE CONNECTOR, SPRING CAGE

TB05F2000000071V – PG9



BULK SUB-BUS CABLE

*NOTE

000550MGD0005000 – 50 Meter Length
 0005A0MGD0005000 – 100 Meter Length

*** Note:**

Length of field wired cables should not exceed the maximum length of 30 meters for total sub-bus communications link. See appropriate technical manual for sub-bus length requirements. The cable assemblies and Bulk cable are the only approved cables for the G3 Sub-Bus link. See technical document TDG3SBWD1-0EN for proper installation and wiring of field wireable connectors.

Technical Data

TECHNICAL DATA	CABLE	CONNECTORS	BULK CABLE
Molded Body / Insert	TPU	Zinc - Nickel Plated	N/A
Coupling Nut	Zinc - Nickel Plated	Brass - Nickel Plated	N/A
Cable Jacket Material	PUR	N/A	Gray RAL 7001
Cable O.D.	6.70 mm	N/A	6.70 mm
Voltage Rating (Nominal)	60 Volts	60 Volts	60 Volts
Current Rating	4.0 Amps	4.0 Amps	4.0 Amps
Degree of Protection	IP65 (mated)	IP65 (mated)	IP65 (terminated)
Operating Temperature	-40° C - 80° C	-40° C - 80° C	-20° C - 75° C
Conductor Gauge	24 AWG Signal 22 AWG Power	26-20 AWG	24 AWG Signal 22 AWG Power
Bend Radius	67 mm	N/A	67 mm
No. of Bending Cycles	5 Million	N/A	5 Million

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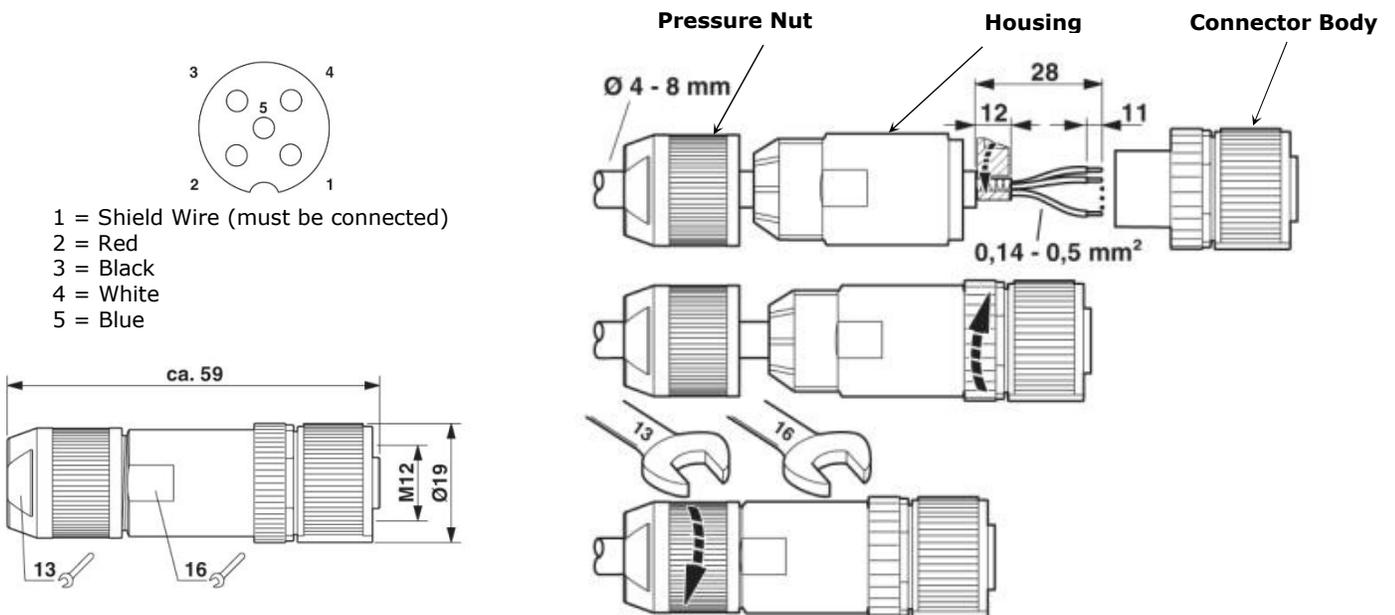
G3 Sub-Bus Field Wiring Directions

The purpose of this document is to instruct the end user of the proper wiring techniques required to make a G3 Sub-Bus cable from the available bulk cable and field wire ends. The effectiveness of the resultant assembly remains on the end user and may have bearing on the proper function of the G3 Sub-Bus operation; please follow the manufacturer's Cable Assembly Procedure properly.



Cable Assembly Procedure

- Step No.1 Cut cable to desired length.
- Step No.2 Run cable through Pressure Nut and Housing.
- Step No.3 Strip cable jacket back 28mm (1.10") for straight connectors and 35mm (1.38") for 90° connectors.
- Step No.4 Remove shielding from end of wires back approximately 16mm (.630").
- Step No.5 Apply shielding foil provided, around the shortened end of the shielding.
- Step No.6 Strip individual conductors back approximately 11mm (.433").
- Step No.7 Push stranded wires into appropriate colored terminal.
- Step No.8 Attach the connector body onto the housing and tighten.
- Step No.9 Attach the pressure nut on the back side and tighten.
- Step No.10 Confirm Continuity between all pins.

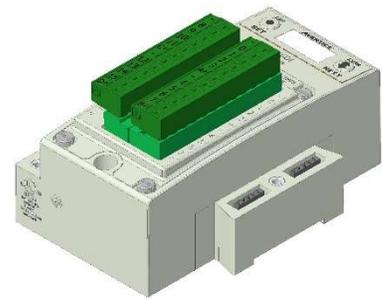


9. Digital I/O Modules

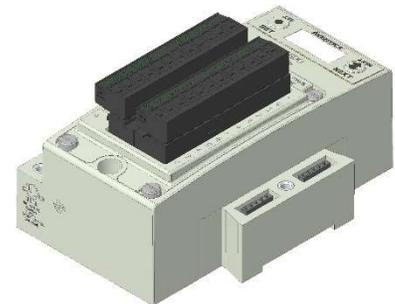
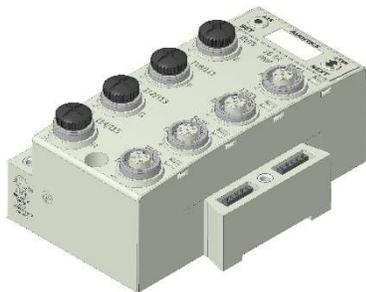
9.1 Digital I/O Module Rules

The maximum number of modules that can be used on the Discrete I/O side of the manifold is 16. These modules can be centralized on the main fieldbus manifold, distributed or a combination of both. Modules can be connected in any combination of inputs, outputs and specialty up to the physical limitation of 16 modules.

Input Module Types



Output Module Types



Input/Output Module Types



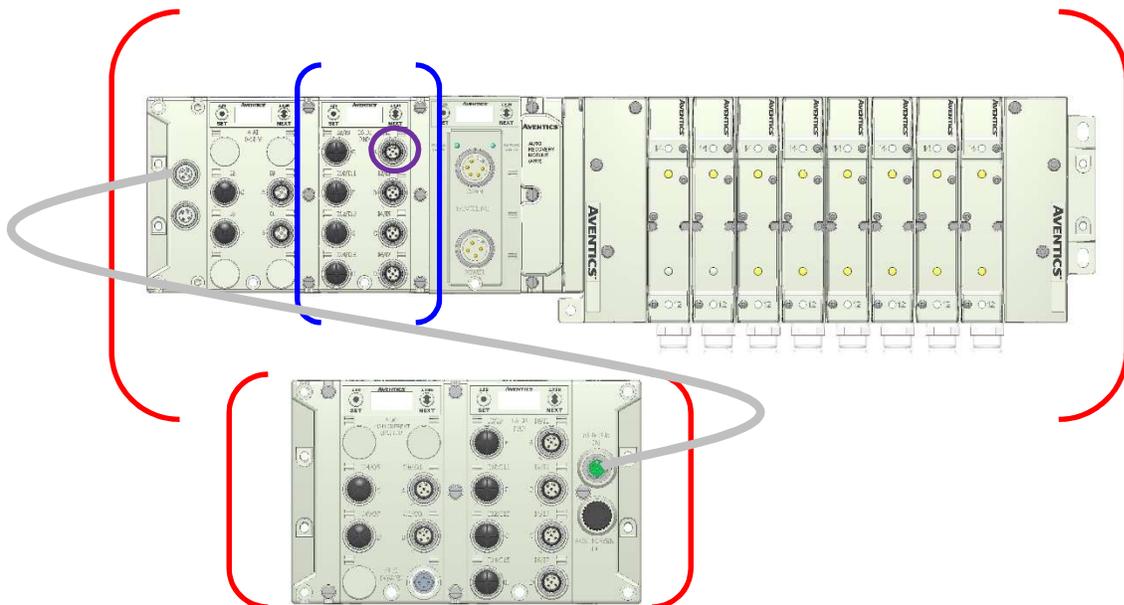
Valve Side Output Module Types



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9.2 I/O Module Technical Data

Module No.	Description	Connector Type	Current Limitation for Module	Current Limitation for connector	Current Limitation for manifold assy.
240-203	16 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	4A for +24 Valves and Outputs
240-204	16 NPN Inputs				
240-205	16 PNP Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-206	8 PNP Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-207	16 PNP Outputs	M12	1.2A	.50A (Pin 3 to Pin 2/4)	
240-208	8 PNP Outputs	M12	1.2A	.50A (Pin 3 to Pin 2/4)	
240-209	16 NPN Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-210	8 NPN Inputs	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-211	8 PNP Input and 8 PNP Outputs	M12	1.2A	.50A / output connector (Pin 3 to Pin 2/4) .15A / input connector (Pin 1 to Pin 3)	4A for +24 Node and Inputs
240-212 240-213 240-214 240-215	Analog IO modules	M12	1.2A	.15A (Pin 1 to Pin 3)	
240-300	8 High Current Outputs	M12	8A (From Aux. Power Conn.)	2.0A / output connector (1.0A Pin 3 to Pin 2) (1.0A Pin 3 to Pin 4)	N/A
240-307	2 Analog Inputs and 2 High Current Analog Outputs	M12	4A (From Aux. Power Conn.)	2.0A (Pin 3 to Pin 4)	N/A
240-311	RTD	M12	1.2A	N/A	4A for +24 Valves and Outputs
240-316	8 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	4A for +24 Node and Inputs
240-323	16 PNP Inputs	Terminal Strip	1.2A	.30A for each +24VDC terminal	
240-330	16 PNP Outputs	Terminal Strip	1.2A	.50A / output connector	
240-363	4 Analog Inputs and 4 High Current Analog Outputs	M12	8A (From Aux. Power Conn.)	2.0A (Pin 1 to Pin 3)	N/A
240-379	8 PNP Inputs	M8	1.2A	.15A (Pin 1 to Pin 3)	4A for +24 Node and Inputs

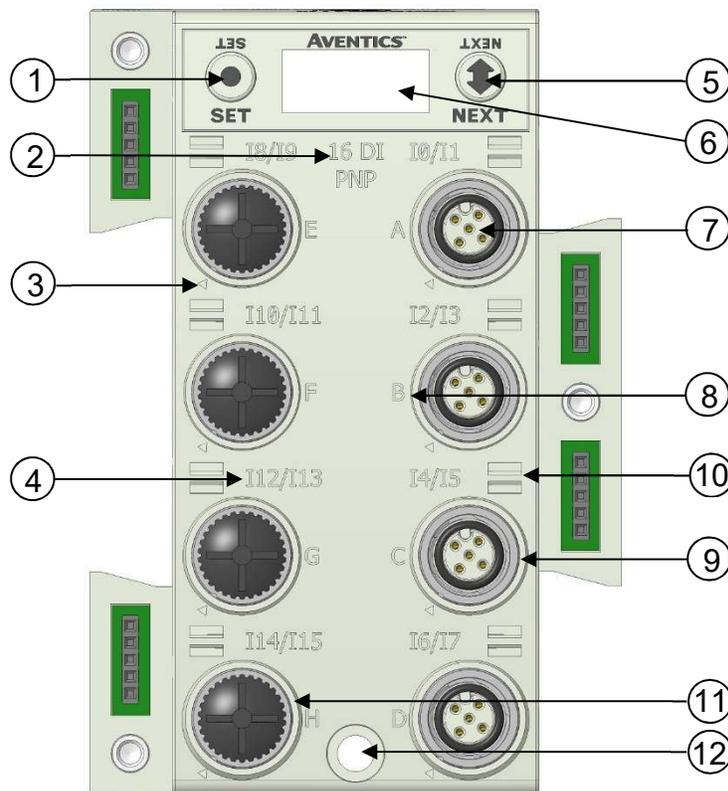


TDG3DNTM1-7EN 05/20
Subject to change without notice

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9.3 I/O Module Descriptions & Menus

Detail No.	Description
1	"Set" Button - used to navigate through user menus and set parameters
2	Module Function (I/O Type)
3	Alignment arrow for SPEEDCON connector
4	Bit Designation for I/O
5	"Next" Button - used to navigate through user menus and set parameters
6	Graphic Display
7	5 Pin M12 female I/O connector
8	Connector designation
9	Metal threads for SPEEDCON connector
10	Slot for text ID tags
11	Dust Cover
12	Mounting hole



NOTE All dust covers must be tightened to a torque of 4-6 in. lbs. to maintain the IP65 integrity.

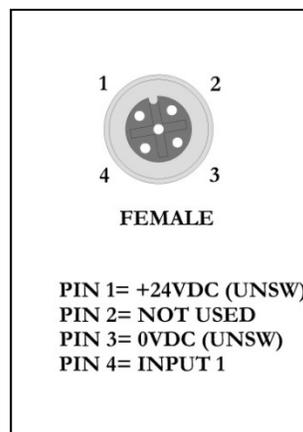
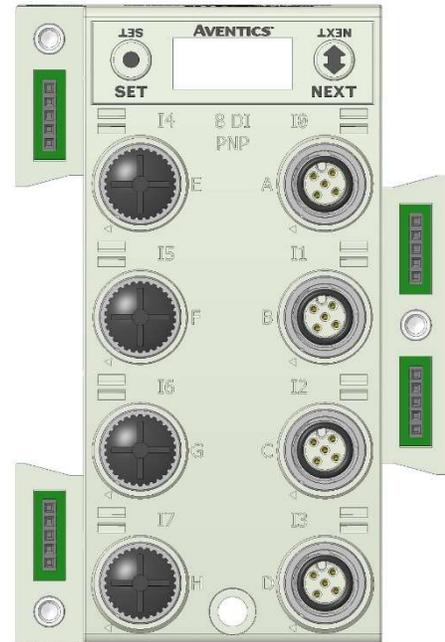
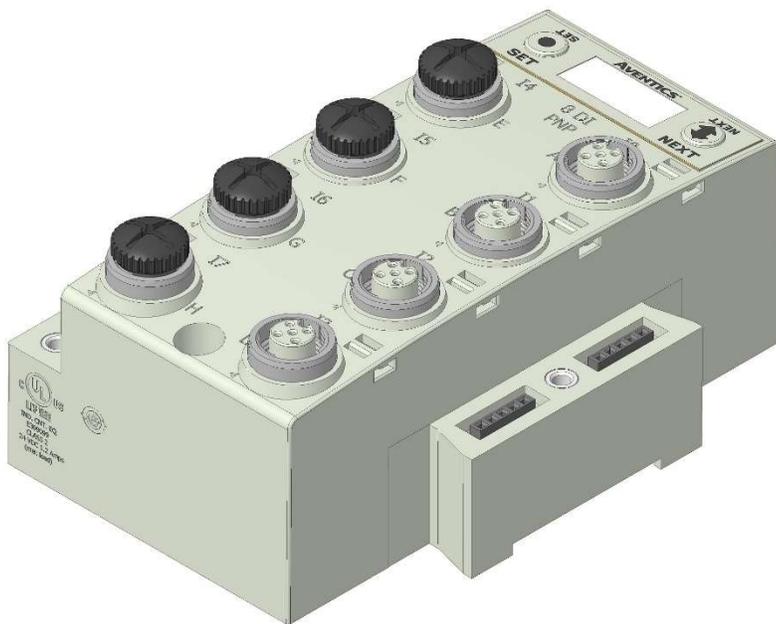
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9.4 Digital Input Modules

One Digital Input per Connector - M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-210	NPN (Sinking)	YES – Visual	YES – Optional	8
240-206	PNP (Sourcing)			

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1 (Selectable)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status

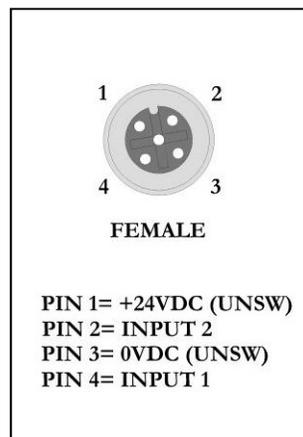
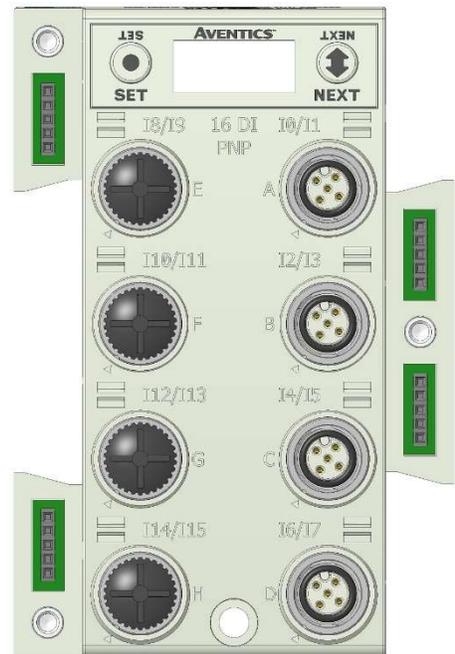
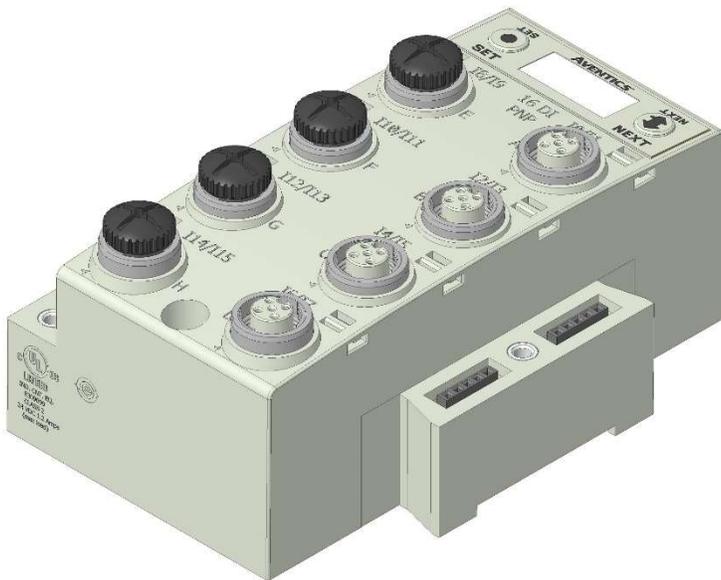


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Two Digital Inputs per Connector - M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-209	NPN (Sinking)	YES – Visual	YES – Optional	16
240-205	PNP (Sourcing)			

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X+2 (Selectable)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status



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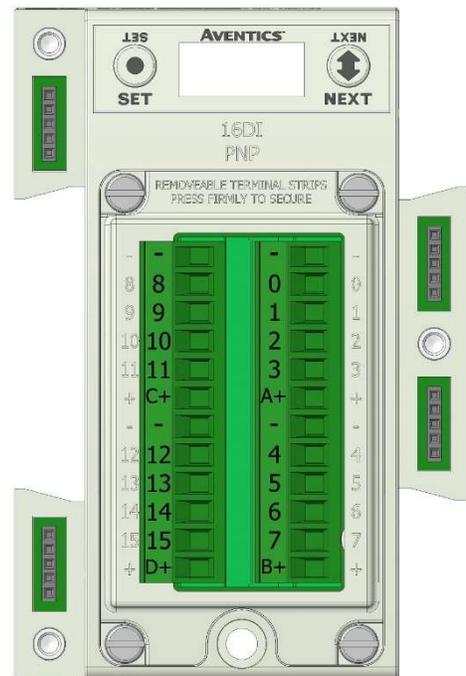
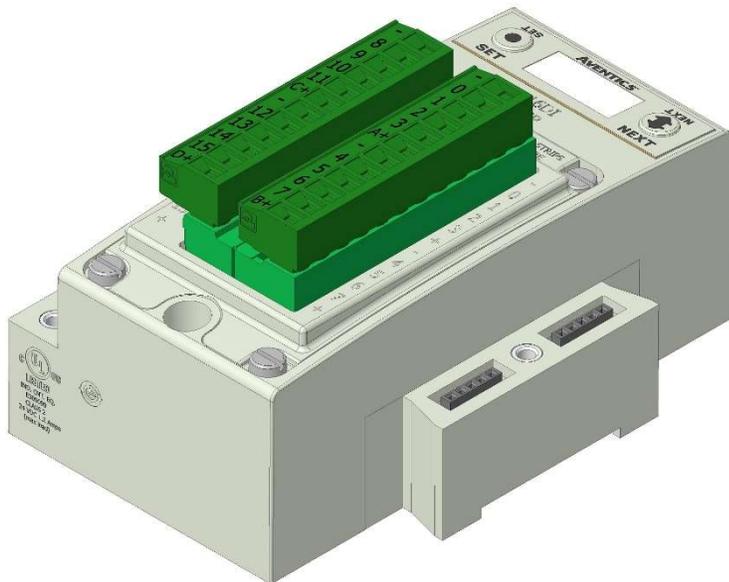
Sixteen Digital Inputs – Terminal Strip Modules

Specifications

- Wire Size Range: 12 to 24 AWG
- Strip Length: 7mm
- Terminal Tightening Torque: 0.5 Nm

Module Part No.	I/O Type	Short Circuit Protection (SCP)	Short Circuit Protection Status Bits	Input Points
240-203	PNP (Sourcing)	YES Visual and Logical Status Bits	4 user-enabled bits monitor Short Circuits on the four different + voltage connections of terminal strip	16
240-204	NPN (Sinking)			

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 2 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	SCP Status 1 = Fault D+	SCP Status 1 = Fault C+	SCP Status 1 = Fault B+	SCP Status 1 = Fault A+



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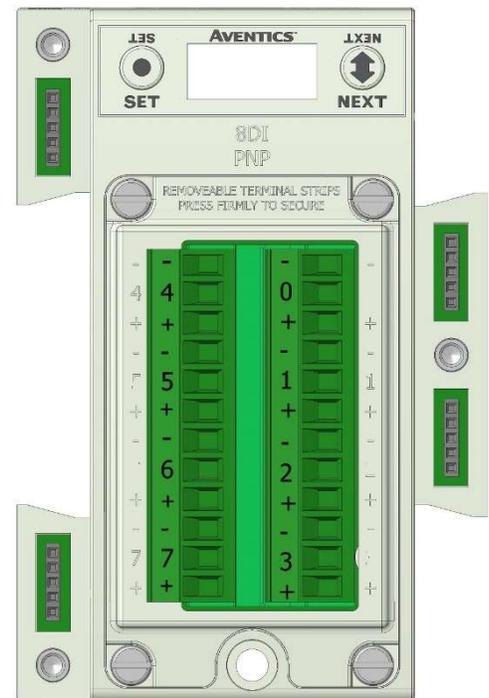
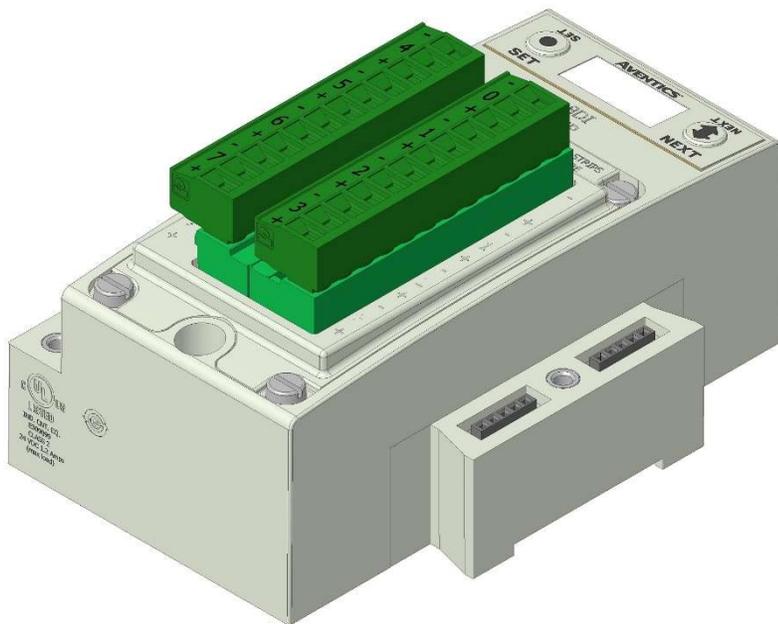
Eight Digital Inputs – Terminal Strip Modules

Specifications

- Wire Range: 12 to 24 AWG
- Strip Length: 7mm
- Tightening Torque: 0.5 Nm

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-316	PNP (Sourcing)	YES	YES	8

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Selectable)	Input 7 SCP Status	Input 6 SCP Status	Input 5 SCP Status	Input 4 SCP Status	Input 3 SCP Status	Input 2 SCP Status	Input 1 SCP Status	Input 0 SCP Status



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One Digital Input per Connector – M8 Female Modules

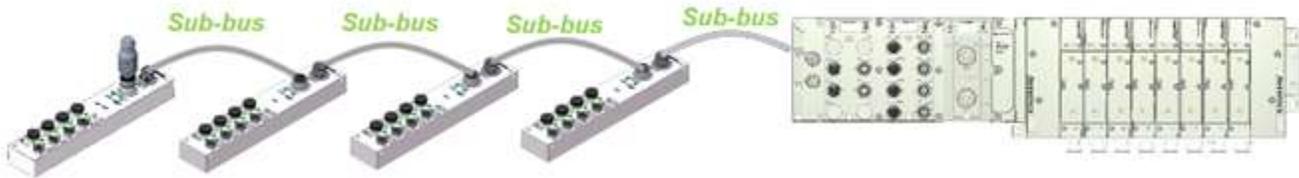
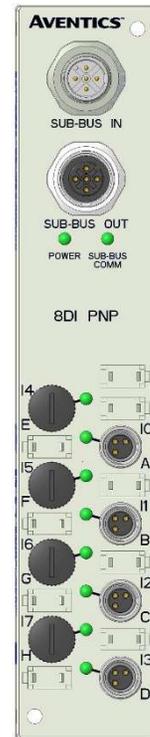
Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-379	PNP (Sourcing)	YES – Visual	YES – Optional	8

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Diagnostics								
X (Selectable)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status



FEMALE

PIN 1= +24VDC (UNSW)
 PIN 3= 0VDC (UNSW)
 PIN 4= INPUT



An external terminating resistor, p/n: TA05TR000000000, is required when the 240-379 is the last I/O module on the sub-bus.



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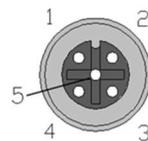
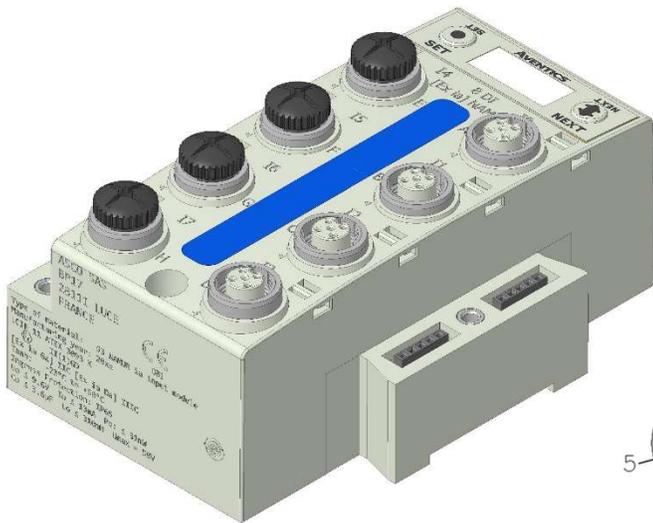
Intrinsically safe [Ex ia] NAMUR Compatible Input Module

One Digital Input per Connector – M12 Female

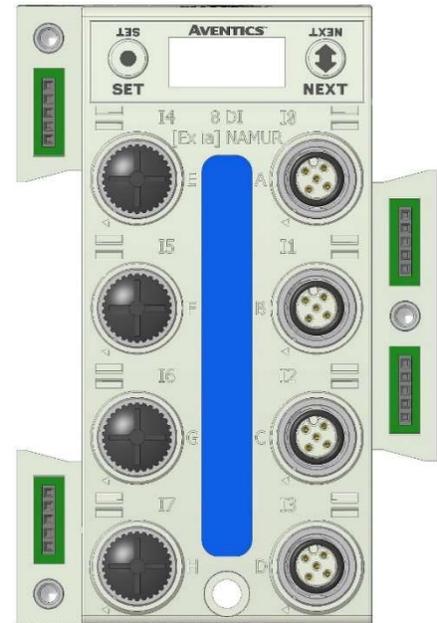
Input module is for use with NAMUR certified intrinsically safe (IS) sensors. The module can be placed in any G3 I/O position available but must be used in conjunction with appropriate clips with partition plates (see picture on page 8-67). This module is for use with (IS) sensors (certified to EN 60947-5-6) where the sensor is placed within the hazardous area, (e.g. ATEX 0-20, 1-21, and 2-22). This [Ex ia] module is part of the G3 electronics platform, which is designed to reside outside of the hazardous environment or in Zone 2-22, inside of a cabinet with appropriate ingress protection. The partition plate clips used between standard G3 modules and [Ex ia] modules are required to maintain ATEX approval. The 8.2V sensor supply for each input connector is short circuit protected.

Part Numbers and Mapping

Module Part No.	I/O Type	Short Circuit /Open Circuit Protection			Short Circuit /Open Circuit Present Status Bits			Input Points
240-320	NAMUR	YES - Visual			YES - Optional			8
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Selectable)	Conn. H SC Status	Conn. G SC Status	Conn. F SC Status	Conn. E SC Status	Conn. D SC Status	Conn. C SC Status	Conn. B SC Status	Conn. A SC Status
X + 2 (Selectable)	Conn. H Open Status	Conn. G Open Status	Conn. F Open Status	Conn. E Open Status	Conn. D Open Status	Conn. C Open Status	Conn. B Open Status	Conn. A Open Status



FEMALE
 PIN 1 = SENSOR +
 PIN 2 = SENSOR -
 PIN 3 = Not Connected
 PIN 4 = Not Connected
 PIN 5 = Not Connected

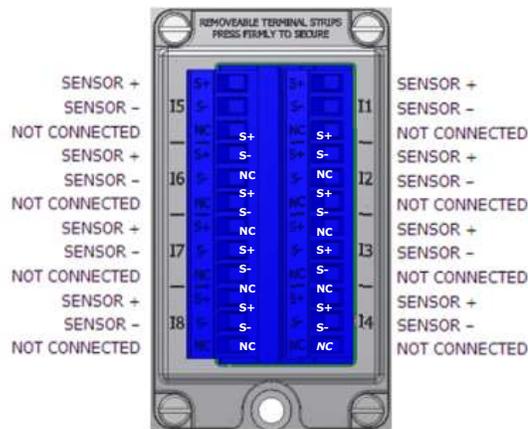
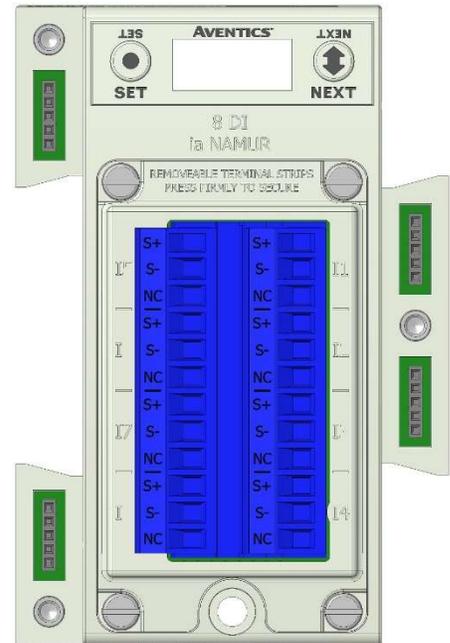
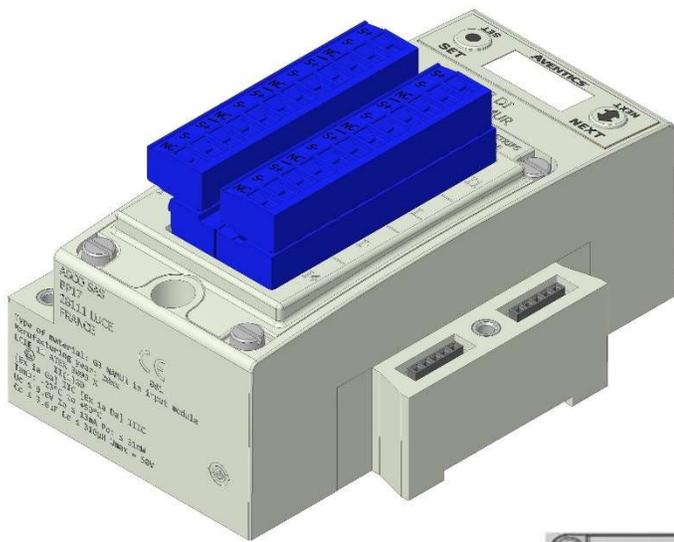


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Intrinsically safe [Ex ia] NAMUR Compatible Input terminal strip module

Module Part No.	I/O Type	Short Circuit /Open Circuit Protection	Short Circuit /Open Circuit Present Status Bits	Input Points
240-322	NAMUR	YES - Visual	YES - Optional	8

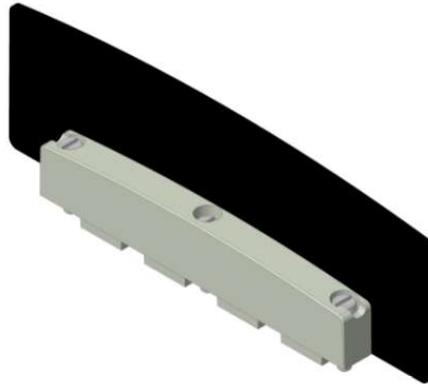
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Selectable)	Conn. H SC Status	Conn. G SC Status	Conn. F SC Status	Conn. E SC Status	Conn. D SC Status	Conn. C SC Status	Conn. B SC Status	Conn. A SC Status
X + 2 (Selectable)	Conn. H Open Status	Conn. G Open Status	Conn. F Open Status	Conn. E Open Status	Conn. D Open Status	Conn. C Open Status	Conn. B Open Status	Conn. A Open Status



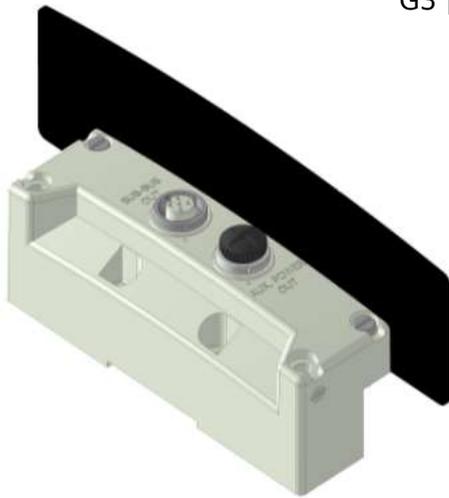
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Intrinsically safe [Ex ia] Support Modules

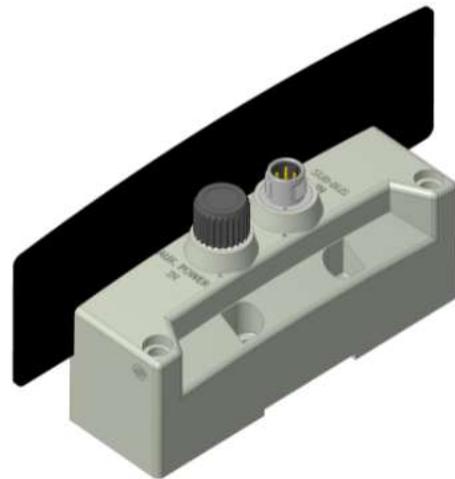
Mechanical isolation between standard and [Ex ia] modules is mandatory to fulfill ATEX certification. Clips with Partition Plates are available to achieve the required isolation.



G3 [Ex ia] Clip 240-317



G3 [Ex ia] Sub-Bus Out 240-318



G3 [Ex ia] Sub-Bus In 240-319

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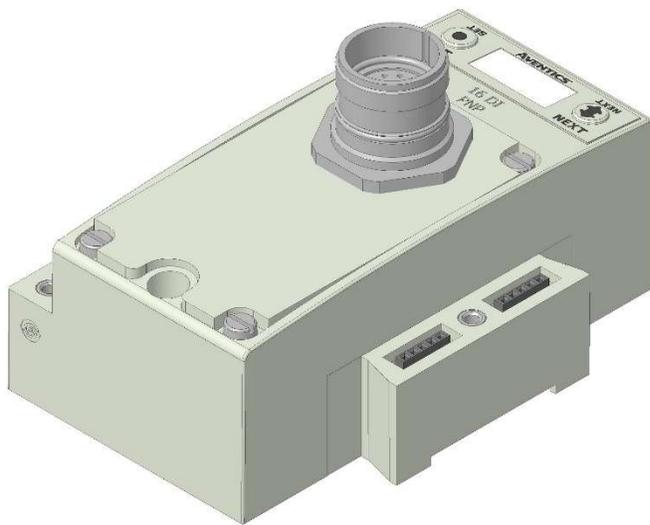
19 Pin M23 Input Module

The 19 Pin M23 Input module is for use with any Input block available from Phoenix Contact, Turck, Brad Harrison, etc. It can also be used with a single ended 19 Pin Cable.

Part Numbers and Mapping

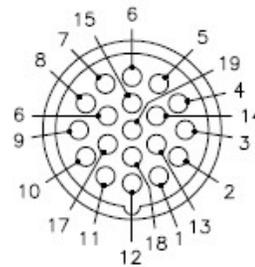
Module Part No.	I/O Type	Short Circuit /Open Circuit Protection	Short Circuit /Open Circuit Present Status Bits	Input Points
240-323	Digital	YES - Visual	YES - Optional	16

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 2 (Selectable)	Short Circuit							



Pin Out Information

- | | |
|-------------------|-------------------|
| Pin 1 = Input 14 | Pin 11 = Input 12 |
| Pin 2 = Input 10 | Pin 12 = P.E. |
| Pin 3 = Input 6 | Pin 13 = Input 11 |
| Pin 4 = Input 3 | Pin 14 = Input 7 |
| Pin 5 = Input 2 | Pin 15 = Input 0 |
| Pin 6 = 0 VDC | Pin 16 = Input 4 |
| Pin 7 = Input 1 | Pin 17 = Input 8 |
| Pin 8 = Input 5 | Pin 18 = Input 15 |
| Pin 9 = Input 9 | Pin 19 = + 24 VDC |
| Pin 10 = Input 13 | |



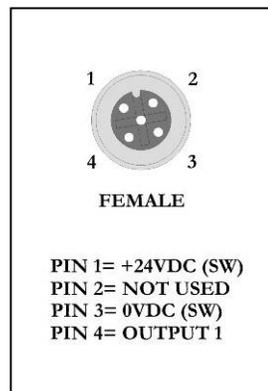
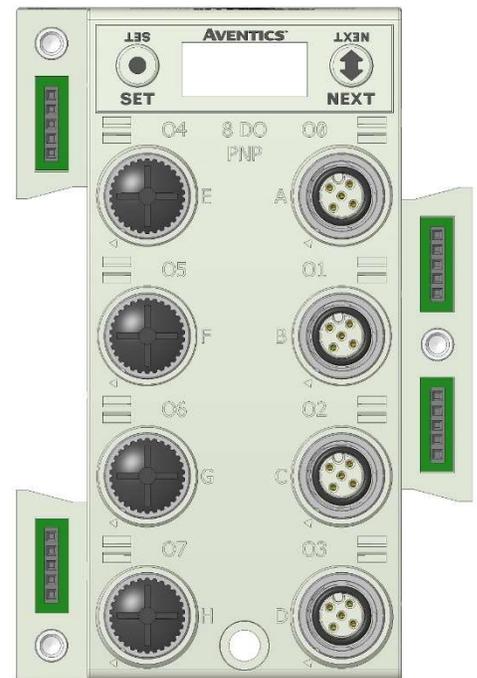
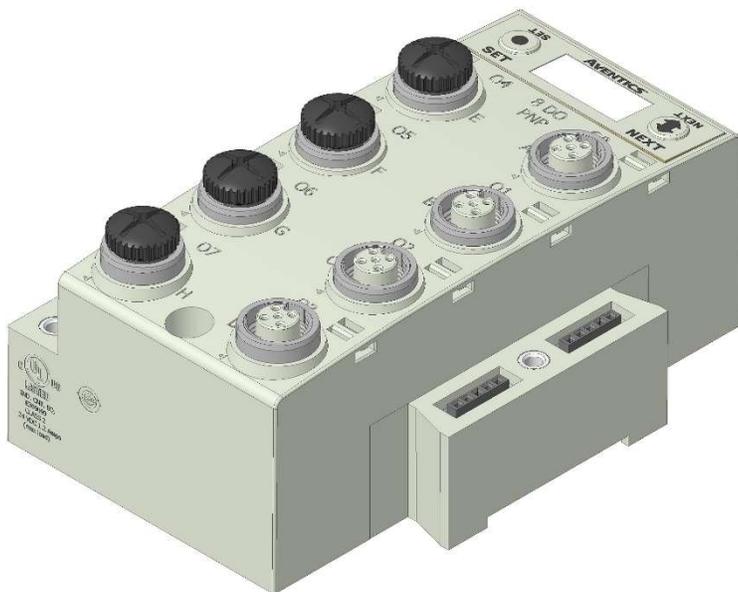
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9.5 Digital Output Modules

One Digital Output per Connector - M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
240-208	PNP (Sourcing)	YES – Visual	YES (8) – Optional	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status

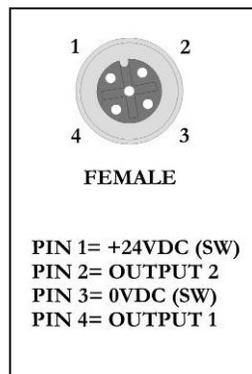
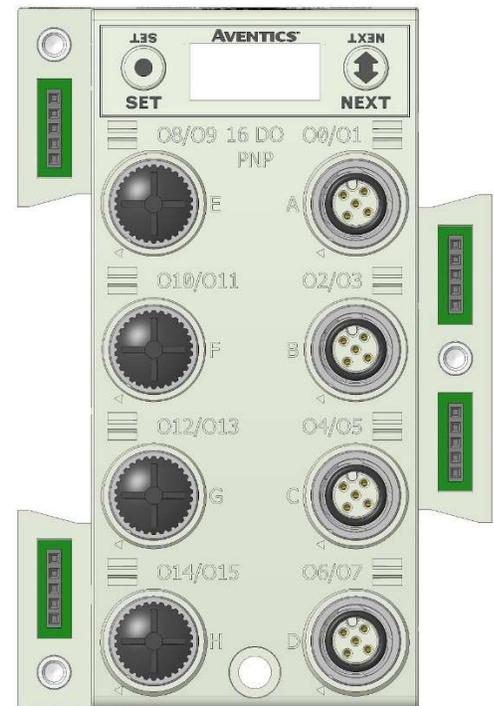


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Two Digital Outputs per Connector - M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
240-207	PNP (Sourcing)	YES – Visual	YES (8) – Optional	16

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
X + 1 (Required)	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status
X + 1 (Selectable)	Output 15 Status	Output 14 Status	Output 13 Status	Output 12 Status	Output 11 Status	Output 10 Status	Output 9 Status	Output 8 Status



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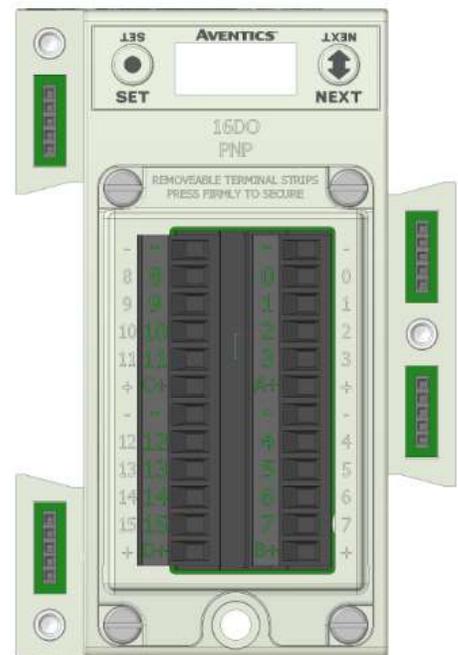
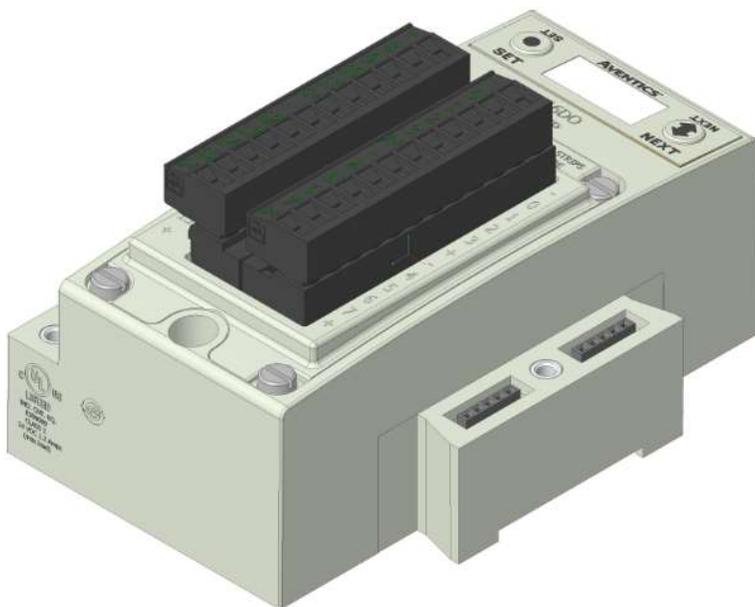
Sixteen Digital Outputs – Terminal Strip Modules

Specifications:

- Wire Range: 12 to 24 AWG
- Strip Length: 7mm
- Tightening Torque: 0.5 Nm

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
240-330	PNP (Sourcing)	YES	YES	16

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
X + 1 (Required)	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status
X + 1 (Selectable)	Output 15 Status	Output 14 Status	Output 13 Status	Output 12 Status	Output 11 Status	Output 10 Status	Output 9 Status	Output 8 Status



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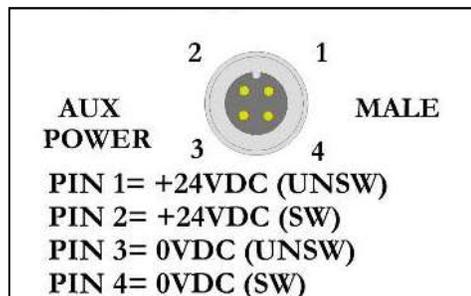
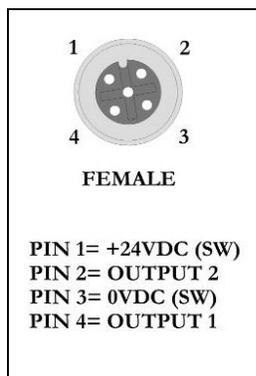
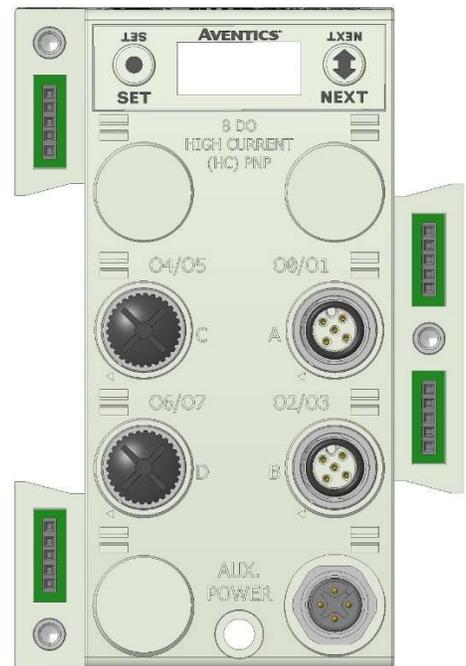
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Two Digital High Current Outputs per Connector - M12 Female Modules

The high current output module is to be used with output devices requiring between 0.5 and 1 Amps. Each connector incorporates two outputs that are capable of sourcing 1.0A per output.

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
240-300	PNP (Sourcing)	YES - Visual	YES (8) - Optional	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status



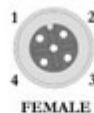
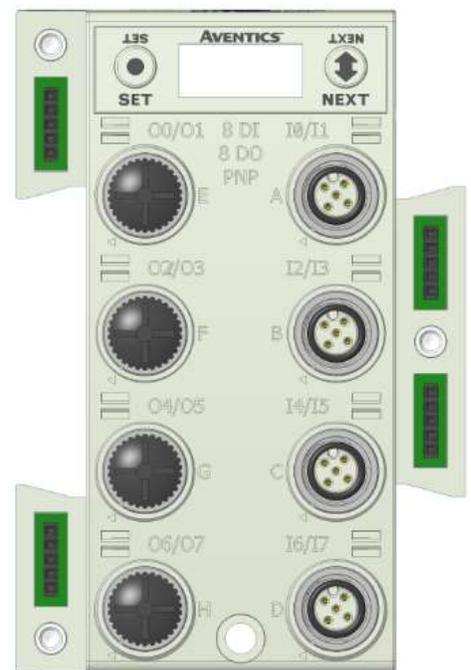
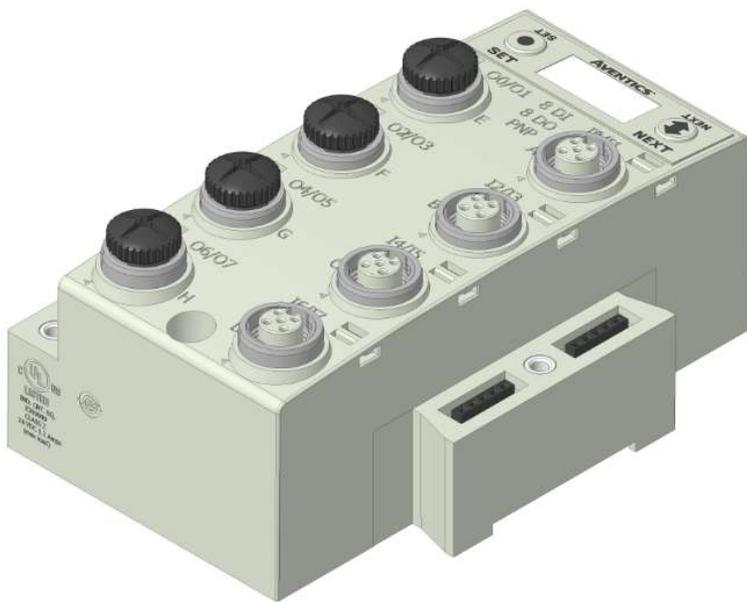
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9.7 Digital Input/Output Modules

Two Digital I/O per Connector - M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points	Input Points
240-211	PNP (Sourcing)	YES - Visual	YES (8) - Optional	8	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status
X + 2 (Selectable)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status



CONNECTORS E, F, G, & H	CONNECTORS A, B, C, & D
PIN 1= +24VDC (SW)	PIN 1= +24VDC (UNSW)
PIN 2= OUTPUT 2	PIN 2= INPUT 2
PIN 3= 0VDC (SW)	PIN 3= 0VDC (UNSW)
PIN 4= OUTPUT 1	PIN 4= INPUT 1

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10. Valve Interface Modules

10.1 2000 Series & 500 Series Valve Driver

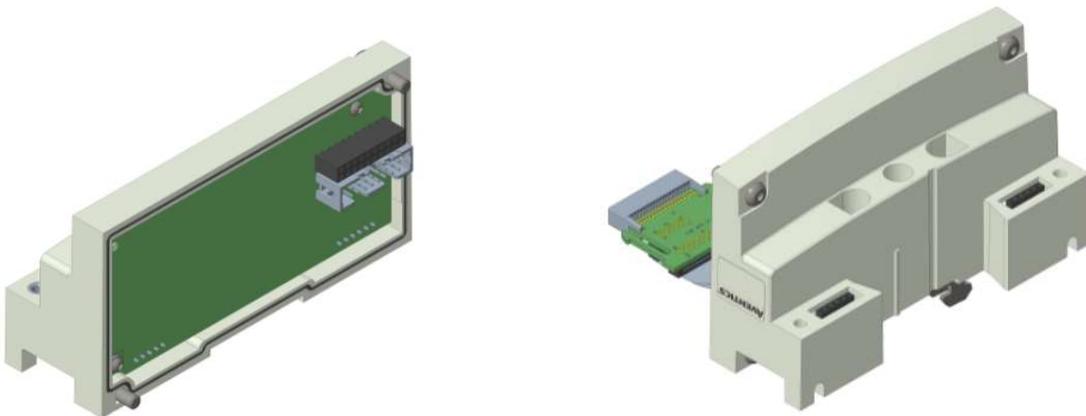
Output Data Mapping

Interface to control valves from a G3 communication module.

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
219-828	NPN (Sinking) 2000 Series	YES – Visual	YES (32) – Optional	32
P599AE50882700x	NPN (Sinking) 500 Series	YES – Visual	YES (32) – Optional	32

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X+1 (Selectable)	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
X+2 (Selectable)	Valve Coil No. 23	Valve Coil No. 22	Valve Coil No. 21	Valve Coil No. 20	Valve Coil No. 19	Valve Coil No. 18	Valve Coil No. 17	Valve Coil No. 16
X+3 (Selectable)	Valve Coil No. 31	Valve Coil No. 30	Valve Coil No. 29	Valve Coil No. 28	Valve Coil No. 27	Valve Coil No. 26	Valve Coil No. 25	Valve Coil No. 24

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status
X+2	Coil 23 Status	Coil 22 Status	Coil 21 Status	Coil 20 Status	Coil 19 Status	Coil 18 Status	Coil 17 Status	Coil 16 Status
X+3	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status



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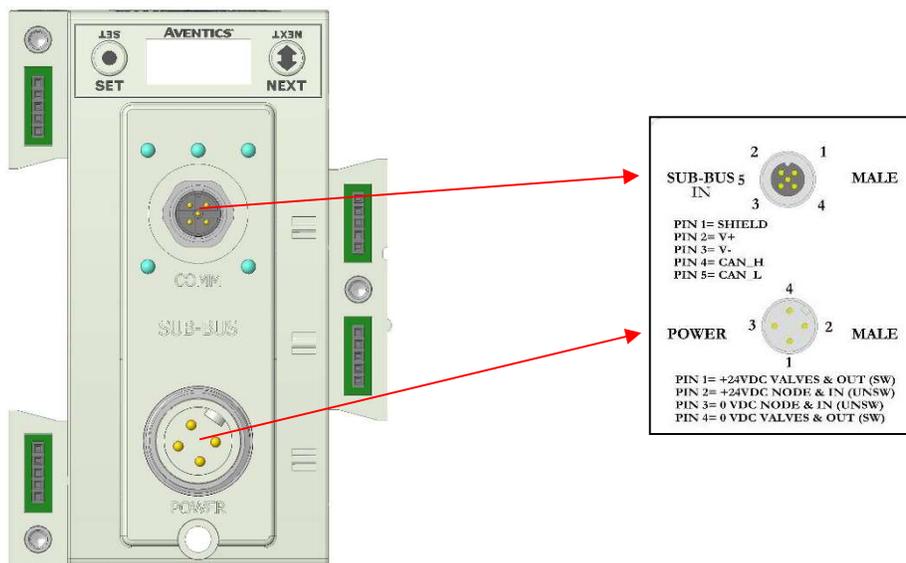
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9.2 Sub-Bus Valve Module

Used to control a distributed valve manifold through the Sub-Bus. See page 55 for more information.

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
240-241	NPN (Sinking)	YES – Visual	YES (32) – Optional	32

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X + 1 (Selectable)	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
X + 2 (Selectable)	Valve Coil No. 23	Valve Coil No. 22	Valve Coil No. 21	Valve Coil No. 20	Valve Coil No. 19	Valve Coil No. 18	Valve Coil No. 17	Valve Coil No. 16
X + 3 (Selectable)	Valve Coil No. 31	Valve Coil No. 30	Valve Coil No. 29	Valve Coil No. 28	Valve Coil No. 27	Valve Coil No. 26	Valve Coil No. 25	Valve Coil No. 24
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X + 1 (Selectable)	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status
X + 2 (Selectable)	Coil 23 Status	Coil 22 Status	Coil 21 Status	Coil 20 Status	Coil 19 Status	Coil 18 Status	Coil 17 Status	Coil 16 Status
X + 3 (Selectable)	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status



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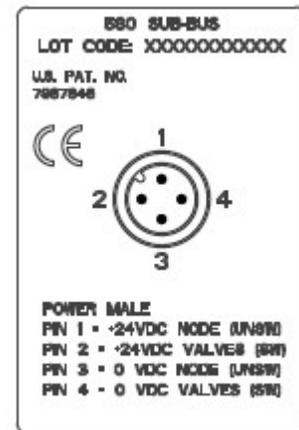
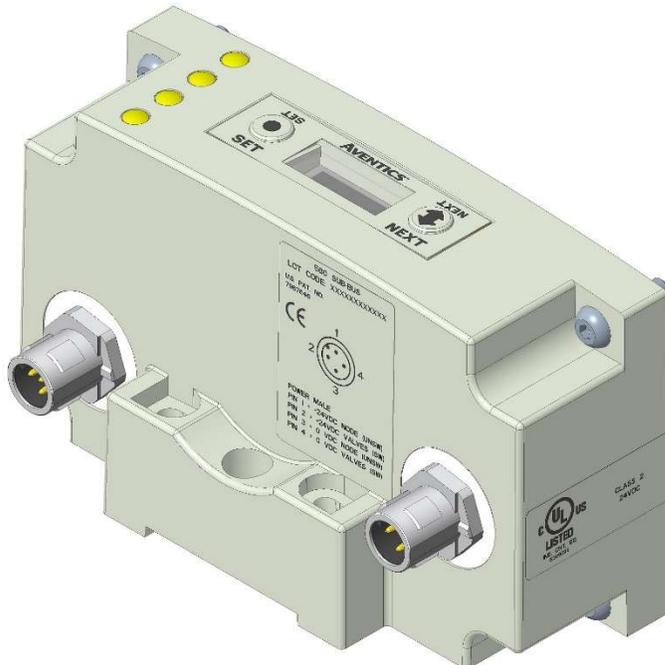
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9.6 Sub-bus Valve Module without Distribution and I/O

Used to control a distributed valve manifold through the Sub-Bus. See page 7-49 for more information.

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points
P580AEDS4010A00	NPN (Sinking)	YES – Visual	YES (32) – Optional	32

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X + 1 (Selectable)	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
X + 2 (Selectable)	Valve Coil No. 23	Valve Coil No. 22	Valve Coil No. 21	Valve Coil No. 20	Valve Coil No. 19	Valve Coil No. 18	Valve Coil No. 17	Valve Coil No. 16
X + 3 (Selectable)	Valve Coil No. 31	Valve Coil No. 30	Valve Coil No. 29	Valve Coil No. 28	Valve Coil No. 27	Valve Coil No. 26	Valve Coil No. 25	Valve Coil No. 24
Diagnostics								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X + 1 (Selectable)	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status
X + 2 (Selectable)	Coil 23 Status	Coil 22 Status	Coil 21 Status	Coil 20 Status	Coil 19 Status	Coil 18 Status	Coil 17 Status	Coil 16 Status
X + 3 (Selectable)	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status



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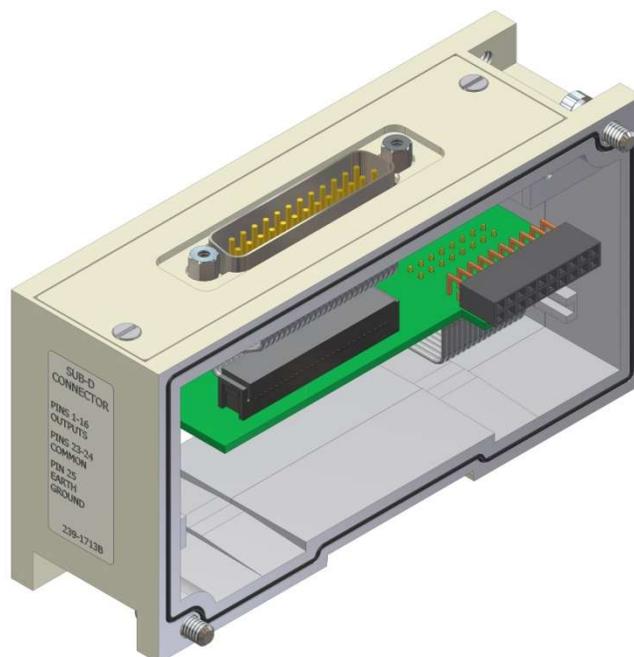
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9.8 Valve Side Digital Output Modules

The valve side output module is used to distribute available valve side output points via a Sub-D connector (i.e. when a Sub-D valve manifold is located away from the rest of the electronics). This module goes to the right of the G3 valve adapter. The 16-bit output module utilizes the last 16 output bits on the valve side of the manifold (bits 16-31). Refer to page **Error! Bookmark not defined.** for more information.

Sixteen Outputs per Connector - Sub-D 25 Pin Female Module

Module Part No.	I/O Type	Short Circuit Protection	Internal Status Bits	Output Points	Module Size
239-1713	NPN (Sinking)	Yes	16 - Optional	16	Narrow



10. Analog I/O Modules

10.1 Analog I/O Module Rules

The analog I/O modules follow the same rules as the digital I/O modules. The maximum total number of modules on the Sub-Bus is 16. The analog boards allow the user to control devices using an analog signal. The analog modules also allow the user to relay analog information from input devices. These modules are available in two analog signal types: 0-10 V and 4-20 mA. These two signal types are offered in two different I/O configurations: 2 analog input channels/ 2 analog outputs channels and 4 analog input channels.

Four I/O - 12mm Female Modules

Specifications

- Input Resolution: 16 bit (65,536 Counts),
- Output Resolution: 16 bit (65,536 Counts)
- Settling Time: 3ms Max
- Absolute Precision: $\leq 1.0\%$ of Signal
- Voltage Input Impedance: 0-10VDC – 40K Ohms
- Current Input Impedance: 250 Ohms
- Input Cutoff Frequency: 100 Hz

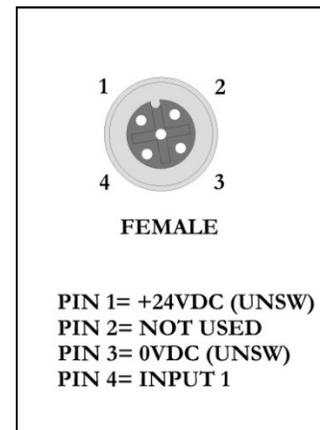
<i>Module Part No.</i>	<i>Signal Type</i>	<i>Input Points</i>	<i>Output Points</i>	<i>Short Circuit Protection</i>
240-212	0 - 10V	4	0	Yes
240-213	0 - 10V	2	2	
240-214	4 - 20mA	4	0	
240-215	4 - 20mA	2	2	
240-307	0 - 10V	2	2	
240-363	4 - 20mA	4	4	

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One Analog Input per Connector – M12 Female Modules

Module Part No.	Signal Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-212	0-10 VDC	YES – Visual	YES (4) – Selectable	4
240-214	4-20 mA			

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)				
X + 1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1
X + 2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)				
X + 3 (Required)	Input No. 2 (MSB)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2
X + 4 (Required)	Input No. 3	Input No. 3	Input No. 3	Input No. 3 (LSB)				
X + 5 (Required)	Input No. 3 (MSB)	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3
X + 6 (Required)	Input No. 4	Input No. 4	Input No. 4	Input No. 4 (LSB)				
X + 7 (Required)	Input No. 4 (MSB)	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4
X + 8 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
X + 9 (Selectable)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A

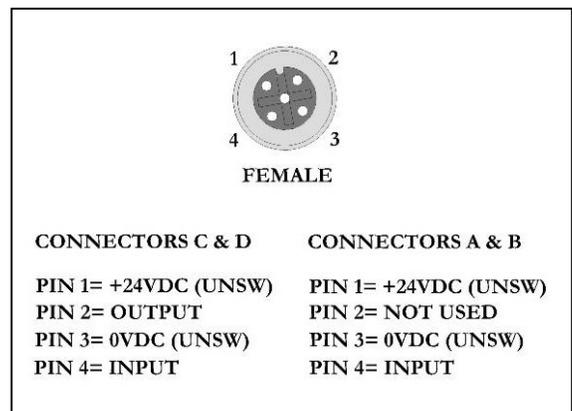


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One Analog I/O per Connector – M12 Female Modules

Module Part No.	Signal Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points	Input Points
240-213	0-10 VDC	YES – Visual	YES (4) – Selectable	2	2
240-215	4-20 mA				

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)				
X + 1 (Required)	Output No. 1 (MSB)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1
X + 2 (Required)	Output No. 2	Output No. 2	Output No. 2	Output No. 2 (LSB)				
X + 3 (Required)	Output No. 2 (MSB)	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)				
X + 1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1
X + 2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)				
X + 3 (Required)	Input No. 2 (MSB)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2
X + 4 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
X + 5 (Selectable)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A

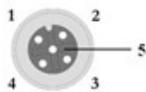


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One Analog I/O per Connector – M12 Female Modules

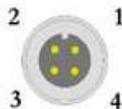
Module Part No.	Signal Type	Short Circuit Protection	Short Circuit Protection Status Bits	Output Points	Input Points
240-307	0-10 VDC	YES	YES	2	2

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)				
X + 1 (Required)	Output No. 1 (MSB)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1
X + 2 (Required)	Output No. 2	Output No. 2	Output No. 2	Output No. 2 (LSB)				
X + 3 (Required)	Output No. 2 (MSB)	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)				
X + 1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1
X + 2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)				
X + 3 (Required)	Input No. 2 (MSB)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2
X + 4 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power / Short Status for Conn. D	Power / Short Status for Conn. C	Allocated and Reserved	Allocated and Reserved
X + 5 (Selectable)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A



I/O Connectors C & D (Female)

Pin 1 = +24 VDC
 Pin 2 = OUTPUT
 Pin 3 = 0 VDC
 Pin 4 = INPUT
 Pin 5 = NOT USED



AUXILIARY POWER (Male)

Pin 1 = +24 VDC (For Conn. C)
 Pin 2 = +24 VDC (For Conn. D)
 Pin 3 = 0 VDC (For Conn. C)
 Pin 4 = 0 VDC (For Conn. D)

Input Connectors A & B (Female)

Pin 1 = +10 VDC
 Pin 2 = NOT USED
 Pin 3 = 0 VDC
 Pin 4 = INPUT
 Pin 5 = NOT USED



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One Analog Input + One Analog Output per Connector – M12 Female Modules

Module Part No.	Signal Type	Short Circuit Protection	Short Circuit / Power Present Status Bits	Input Channels	Output Channels
240-363	4-20 mA	YES	YES (4) – Selectable	4	4

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)
X+1 (Required)	Output No. 1 (MSB)	Output No. 1						
X+2 (Required)	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2 (LSB)
X+3 (Required)	Output No. 2 (MSB)	Output No. 2						
X+4 (Required)	Output No. 3	Output No. 3	Output No. 3	Output No. 3	Output No. 3	Output No. 3	Output No. 3	Output No. 3 (LSB)
X+5 (Required)	Output No. 3 (MSB)	Output No. 3						
X+6 (Required)	Output No. 4	Output 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4 (LSB)
X+7 (Required)	Output No. 4 (MSB)	Output 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4	Output No. 4
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)
X+1 (Required)	Input No. 1 (MSB)	Input No. 1						
X+2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)
X+3 (Required)	Input No. 2 (MSB)	Input No. 2						
X+4 (Required)	Input No. 3	Input No. 3	Input No. 3	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)
X+5 (Required)	Input No. 3 (MSB)	Input No. 3	Input No. 3	Input No. 1				
X+6 (Required)	Input No. 4	Input No. 4	Input No. 4	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)
X+7 (Required)	Input No. 4 (MSB)	Input No. 4	Input No. 4	Input No. 2				



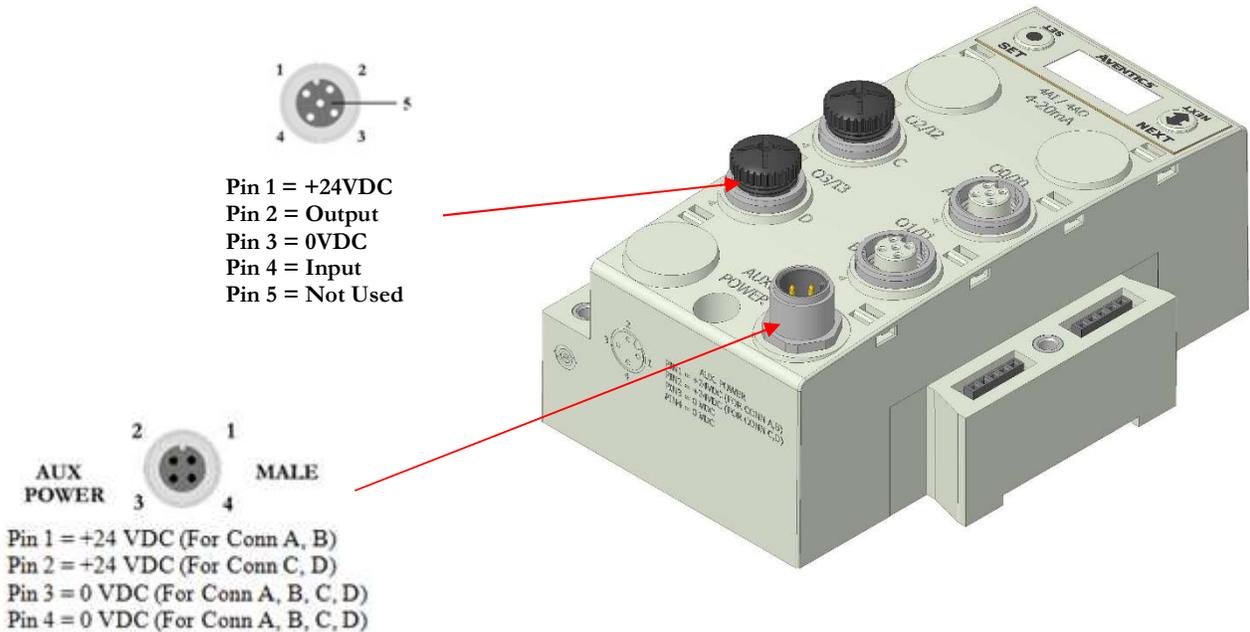
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Module Part No.	Signal Type	Short Circuit Protection	Short Circuit / Power Present Status Bits	Input Channels	Output Channels
240-363	4-20 mA	YES	YES (4) – Selectable	4	4

Input Mapping (continued)								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X+8 (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power/Short Status for Conn. D	Power/Short Status for Conn. C	Power/Short Status for Conn. B	Power/Short Status for Conn. A
X+9 (Selectable)	High Alarm for Conn. D Input	Low Alarm for Conn. D Input	High Alarm for Conn. C Input	Low Alarm for Conn. C Input	High Alarm for Conn. B Input	Low Alarm for Conn. B Input	High Alarm for Conn. A Input	Low Alarm for Conn. A Input
X+10 (Selectable)	High Alarm for Conn. D Output	Low Alarm for Conn. D Output	High Alarm for Conn. C Output	Low Alarm for Conn. C Output	High Alarm for Conn. B Output	Low Alarm for Conn. B Output	High Alarm for Conn. A Output	Low Alarm for Conn. A Output



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Internal or Aux. Power Select (240-363 Only)

Analog devices connected to the 240-363 can be powered from the Aux. Power supply port (Internal Power Disabled) or from the module backplane (Internal Power Enabled). This is selected through the "Internal Power Menu" as shown. Channels A/B and C/D are controlled independently.



Internal Power Settings

1. Press the SET button to enter the INTERNAL POWER menu.



CHANNELS A & B DISABLE

2. Press the NEXT button to scroll through the choices to enable or disable the feature.
 - a. ENABLED (Factory Default)
 - b. DISABLED
 - c. RETURN (this will return you to the main menu)



Press the SET button to confirm your choice.



CHANNELS C & D DISABLE

3. Press the NEXT button to scroll through the choices to enable or disable the feature.
 - a. ENABLED (Factory Default)
 - b. DISABLED
 - c. RETURN (this will return you to the main menu)



Press the SET button to confirm your choice.

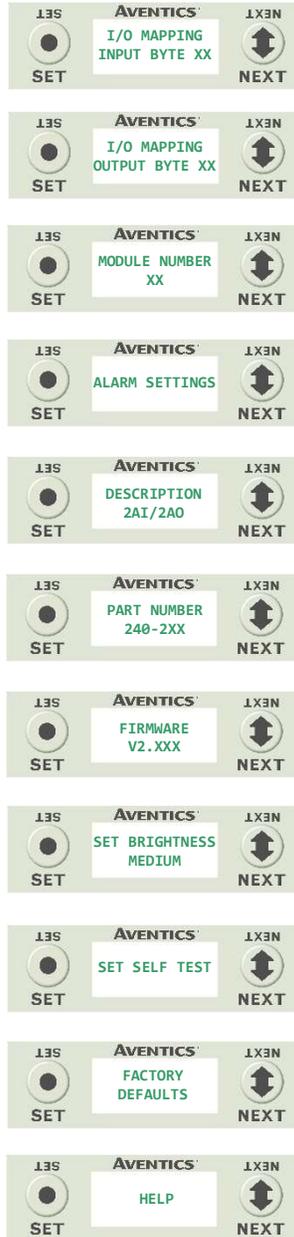


Power Source	Current Limitation for Module	Current Limitation for Connector
Aux Power	8A (From Aux. Power Conn.)	2.0A / output connector (2.0A Pin 1 to Pin 3)
Internal Power	1.2A (from Backplane)	.15A (Pin 1 to Pin 3)

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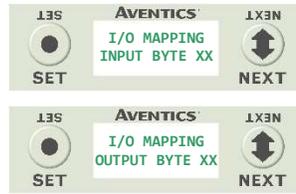
10.2 Analog Graphic Display

The G3 Analog I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as show diagnostic information. Please see the following pages for detailed information regarding these displays.



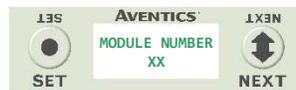
Analog Module / I/O Mapping

Displays the starting Input and Output byte address for the module



Analog Module / Module Number

Displays the module number; identifying its position in the G3 I/O system.



Analog Module / Alarm Settings

Allows the setting of low and high alarms for analog inputs and outputs



Alarm Settings Steps

1. Press the SET button to enter the Alarm Settings sub-menu.
2. Press the SET button to Disable all alarms (default setting).
*Note- Setting the Minimum value for Low alarm and the Maximum value for High alarm (for a channel) disables the alarm for that channel.
3. Press the NEXT button to scroll to the appropriate analog channel.
4. Press the SET button to set the LO alarm setting
 - a. Push the SET button to access the menu and enter the alarm value
5. Press the NEXT button to SET the HI alarm setting.
 - a. Push the SET button to access the menu and enter the alarm value
 - b. Accept the changes by selecting Y and pushing SET
6. Press the SET button while in the RETURN screen to return to the main menu

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Analog Module / Description

Displays the quantity and type of I/O on the module.
Ex. 2 analog Inputs and 2 analog outputs



Analog Module / Part number

Displays the replacement part number of the module.



Analog Module / Firmware

Displays the firmware revision level for the module.



Analog Module / Brightness



Brightness Settings

1. Press the SET button to enter the SET BRIGHTNESS menu.
2. Press the NEXT button to scroll the choices for the desired brightness of the LCD display for the analog module.
 - a. LOW
 - b. MEDIUM (Factory Default)
 - c. HIGH
 - d. RETURN (this will return you to the main menu)

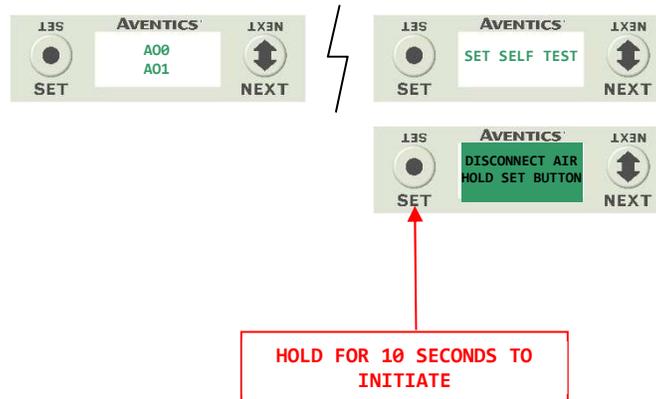
Press the SET button to confirm your choice. The changes will take effect immediately.

10.3 Analog Module / Self Test Mode

Self Test mode is an internal diagnostic tool that can be enabled on the analog module using the graphic display. This tool allows the user to confirm that all of the outputs on the module are fully functional without needing a network connection or controller. The test will cycle the analog outputs. Starting with Output 0 it will increment the analog signal at 10% intervals; once it has reached 100% it will test the next available output. The self-test will continue to run until it is turned off by pressing the SET button.

To use the Self Test Mode, the user must first set some initial conditions. Follow these steps to initiate the self-test mode.

- 1) **Disconnect Air and Communication from the manifold!**
- 2) Starting at the Home Screen, navigate the menus by selecting the NEXT button until the SELF-TEST menu is shown.
- 3) Select the SET button to access the SELF-TEST menu
- 4) A message will appear: DISCONNECT AIR HOLD SET BUTTON
- 5) Hold the SET button down for approximately 10 seconds to enable the test. The Display will flash the above message while the button is pushed.
- 6) When the display stops flashing, the self-test mode will be running
- 7) Push or hold the NEXT button to cycle through the outputs. Holding the NEXT button will allow the analog outputs to cycle through the 10% intervals automatically. Pushing the NEXT button will allow the outputs to manually step through each 10% interval.
- 8) Releasing the NEXT button will keep the output in its current state.
- 9) The self-test mode can only be disabled by pushing the SET button



10.4 Analog Module / Factory Defaults

Factory Default Settings



1. Press the SET button to enter the FACTORY DEFAULTS sub-menu.



2. Press the NEXT button to select Yes or No.
 - a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
 - b. Selecting Yes will cause the module to reset and return all parameters to the factory default conditions.

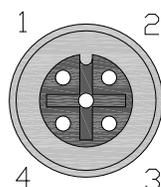
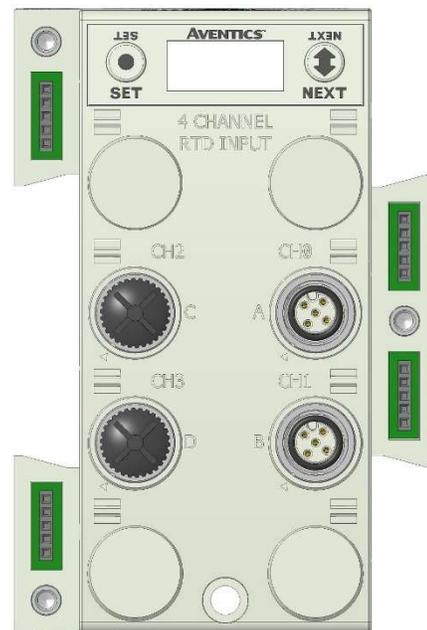
Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	Default
Low Alarm Values	0 V / 4 mA
High Alarm Values	10 V / 20 mA
Brightness	Medium

11. Specialty Modules

11.1 RTD Module

The G3 RTD Temperature module is used with Resistive Temperature Detectors (RTDs) and can support up to 4 RTD devices simultaneously. This module supports various RTD types including: Pt100, Pt200, Pt500, Pt1000, Ni100 and Ni1000. Standard M12 single key connector types are used; each connector/port supports one RTD device, but four different device types can be used simultaneously. User configuration of parameters include: RTD type, temperature scale (Celsius or Fahrenheit), Hi/Low temperature alarms, and filter times, and can be selected individually for each connector port using the integrated display. The G3 RTD module can be incorporated into any G3 electronic system regardless of the protocol or I/O module position.



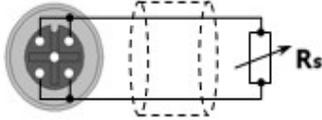
FEMALE

- PIN 1 = Sensor Current Source (I+)
- PIN 2 = Sense Voltage (VIN+)
- PIN 3 = Sensor Current Source (I-)
- PIN 4 = Sense Voltage (VIN-)
- PIN 5 = Not Used

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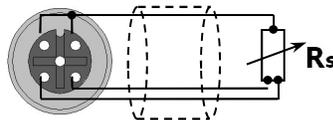
Sensor Wiring Diagrams

2 Wire Sensor Type
2 Wire Cable (Fig 1)



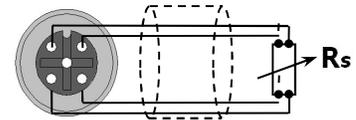
2 Wire
Sensor Type
Low Accuracy

3 Wire Sensor Type
3 Wire Cable (Fig 2)

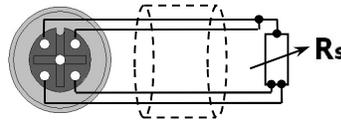


3 Wire
Sensor Type
Medium Accuracy

4 Wire Sensor Type
4 Wire Cable (Fig 4)



4 Wire
Sensor Type
High Accuracy



3 Wire Sensor Type
4 Wire Cable (Fig 3)

Electrical Data

Voltage	24 VDC Module Supply (Via G3 System Aux. Power Connection)
Input Type	RTD (Resistive Temperature Detector), 4 per Module
Supported Sensor Types	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000
Supported Temperature Coefficients	.00385; .00392;Ω/Ω/°C
Resolution	15 bits, plus sign.
Data Format	Signed Integer; Two's complement.
Calibration	Factory Calibrated. Field Calibration w/ high tolerance (±0.005%) 100Ω and 350Ω resistor.
Input Update (filter) Rate	Adjustable (5-20mS), factory default: 5mS
Accuracy	0.1% of full scale @ 25° C

Mechanical Data

I/O Connector	M12 4 Pin Female (Accepts 5 Pin)
Mass	247g / 8.7oz

Operating Data

Temperature Range	-10° to 115° F (-23° to 46° C)
Humidity	95% relative humidity: non-condensing
Ingress Protection	IP65 (with appropriate assembly and terminations)



- For maximum accuracy on a 3-wire sensor type make identified jumper connections at the sensor end (see Figure 3). Cable resistance, resulting from cable length, affects measuring error; therefore, use cables that are as short as possible.
- For long cable runs and high accuracy use 4 wire sensor types.

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Part Numbers and Mapping

Module Part No.	I/O Type	Alarms	Diagnostics	Input Points
240-311	RTD	Hi/Low Temp for each Channel	Open/Short, Out of Range	4

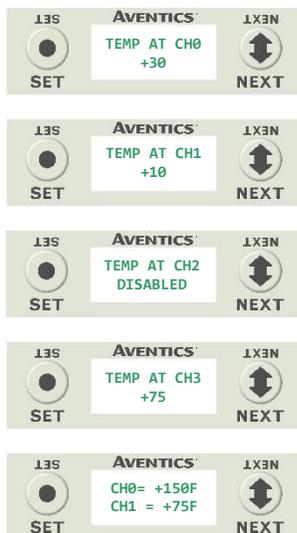
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0
X + 1 (Required)	Sign Bit Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0	RTD Channel 0
X + 2 (Required)	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1
X + 3 (Required)	Sign Bit Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1	RTD Channel 1
X + 4 (Required)	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2
X + 5 (Required)	Sign Bit Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2	RTD Channel 2
X + 6 (Required)	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3
X + 7 (Required)	Sign Bit Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3	RTD Channel 3
X + 8 (Selectable)	Channel 3 Out of Range	Channel 2 Out of Range	Channel 1 Out of Range	Channel 0 Out of Range	Channel 3 Open/Short	Channel 2 Open/Short	Channel 1 Open/Short	Channel 0 Open/Short
X + 9 (Selectable)	Channel 3 High Alarm	Channel 3 Low Alarm	Channel 2 High Alarm	Channel 2 Low Alarm	Channel 1 High Alarm	Channel 1 Low Alarm	Channel 0 High Alarm	Channel 0 Low Alarm



Data is represented by Two's Complement, in tenths of a degree.

RTD Module Graphic display

RTD Module / Temperature Monitoring



- 1) Press the NEXT button to scroll through the Temperature Monitoring display options.

Pressing the SET button while in one of the Temperature Monitoring displays, will return the display back to the home screen.

If "DISABLED" is the temperature identified at any channel, advance the display to Sensor Type Select, to choose a sensor/Enable the channel, or press the "SET" button to jump directly to the selection display.

Unused channels should be left "DISABLED".

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RTD Module / Sensor Type Select (Channel Enable)

Allows the sensor type for each channel to be selected, and, enable the channel selected

-
- 1) Press the SET button to enter the Sensor Type Select sub menu.
 - 2) Press the NEXT button to scroll through the channels.
 - 3) Press the SET button to select the desired channel. If "DISABLED" is the first selection, the channel is not enabled. Select a sensor type to enable the channel.
 - 4) Press the NEXT button to scroll through the available sensor types.
 - 5) Press the SET button to select the desired sensor type.
 - 6) Press the SET button to load the selected sensor type.

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RTD Module / Temperature Scale

Allows the temperature scale for each channel to be set to Celsius or Fahrenheit.



1) Press the SET button to enter the Temp Scale sub menu.



2) Press the NEXT button to scroll through the channels. Press the SET button to choose the desired channel.



3) Press the NEXT button to scroll through the available scales. Press the SET button to choose the desired scale.



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RTD Module / Alarm Settings

Allows the Low and High alarms of each RTD Input channel to be set. This parameter generates a visual and logical (bit) when set value is achieved.



- 1) Press the SET button to enter the Alarm Settings sub-menu.
- 2) Press the NEXT button to scroll through the RTD Input channels.
- 3) Press the SET button to enter the alarm setting for the selected Input channel.
- 4) Press the NEXT button to select the Lo or High setting for the selected channel.
- 5) Press the SET button to select the change process for the chosen alarm. The first digit/sign will be highlighted.
- 6) Press the NEXT button to choose the value, or the SET button to select and move to the next digit.
- 7) Press the NEXT button to choose "Y" or "N". Select. Then press the SET Button to Accept.



- When alarm values are set to maximum/minimum values, the alarm function is disabled.
- Factory default settings for all alarms are disabled.



RTD Module / Advanced Setting

Allows the Update Filters for each channel to be set.



- 1) Press the SET button to enter the Advance Settings sub-menu.



- 2) Press the NEXT button to choose the option; Update Filters or Calibrate RTD.

Update Filters



- 3) Press the SET button to choose the Update Filter setting.



- 4) Press the NEXT button to scroll through the filter times.

- 5) Press the SET button to select the desired Update Filter time.

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RTD Module / I/O Mapping Input Byte



RTD Module / Module Number (Position)



RTD Module / Module Description



RTD Module / Part Number



RTD Module / Firmware Revision



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RTD Module / Set Display Brightness

Allows the Brightness of the display to be changed



- 1) Press the SET button to enter the Set Brightness sub menu.
- 2) Press the NEXT button to scroll through the brightness options.
- 3) Press the SET button to load the selection.

RTD Module / Flip Display

Allows the Display to be flipped 180 degrees



- 1) press the SET button to enter the Flip Display sub menu.
- 2) Press the NEXT button to choose the orientation.
- 3) Press the SET button to load the selection.

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RTD Module / Factory Defaults

Set all parameter settings to default values.



1) Press the SET button to enter the Factory Defaults sub menu.



2) Press the NEXT button to choose Yes or No.



3) Press the SET button to confirm.



4) Press the SET button again.



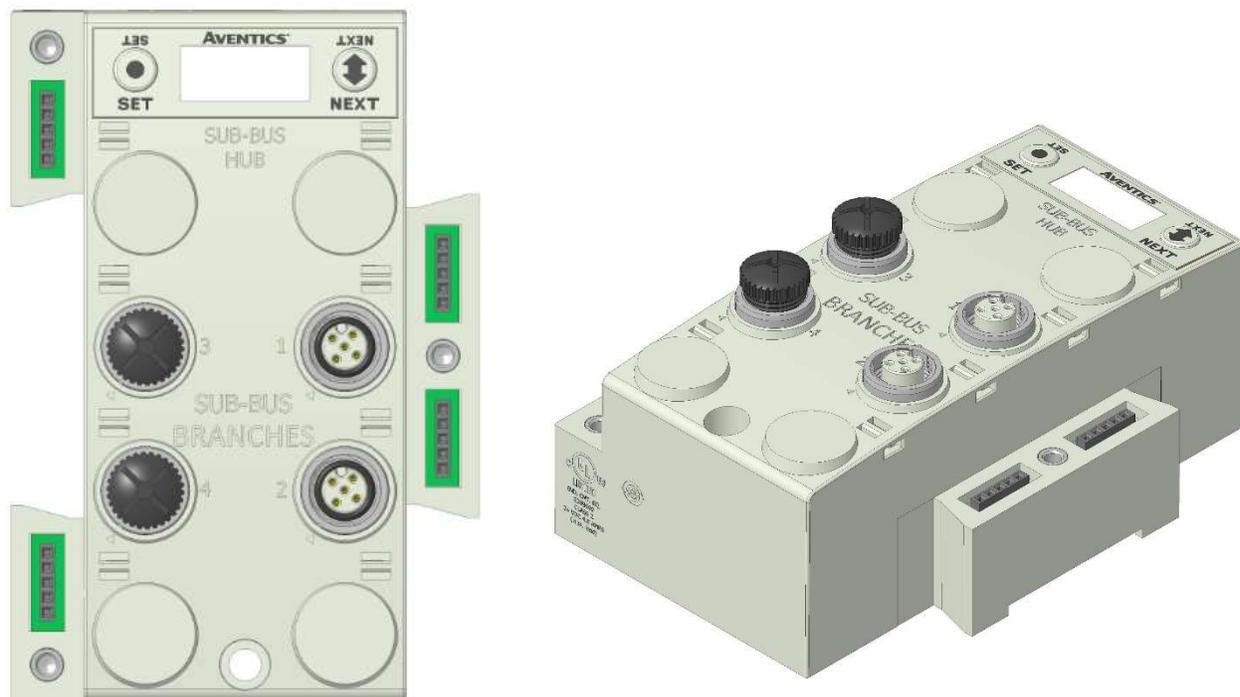
Factory Default Settings	
Alarm - High & Low	Disabled (Set to Min/Max for each chosen sensor)
Input Update Filter	5 mS
Sensor Type	Pt 100 385
Temp Scale	Celsius
Display Brightness	Medium
Flip Display	Normal

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11.2 Sub-Bus Hub Module

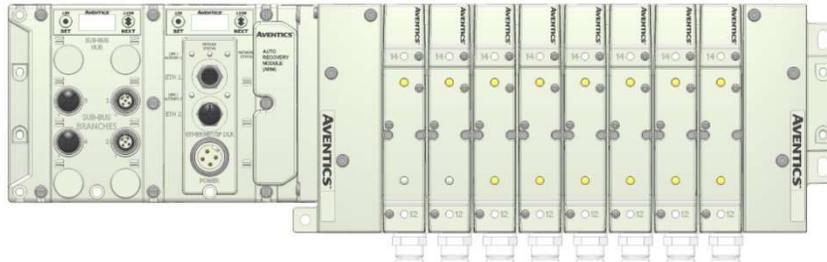
The G3 HUB module allows for branch distribution from the I/O side of the G3 System and can be integrated into the existing G3 Series Sub-Bus configuration. Auto Addressing allows for trouble free set up and configuration. Input, Output, as well as Valve manifolds can be attached to the available four Branches on a HUB module. Each G3 System can support up to two HUB modules, allowing for maximum flexibility. The HUB module is transparent to the I/O side of the G3 and does not reserve one of the potential sixteen positions.

Module Part No.	Module Type	Diagnostics	Input Size / Output Size	Branches
240-326	HUB	Sub-Bus Short Circuit	0 / 0 - See Note	4



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240-205 240-205



Example I/O Mapping of Attached Modules

BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 2 (Selectable)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status
X + 3 (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X + 4 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X + 5 (Selectable)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status

Where X = starting byte



The Sub-bus hub module does not produce mapped diagnostics. The data table in this example represents what is physically attached to the HUB module. This will change as modules are added or removed.



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Hub Module / Identification



- 1) Identifies HUB module in G3 System.

Hub Module / Description



- 2) Identifies Module type.

Hub Module / Advanced Settings

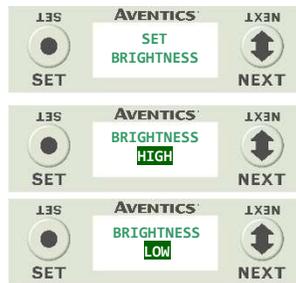


- 3) Allows the user to set/configure module parameters.

Press the SET button to advance to the first parameter/setting.

Hub Module / Brightness

Allows the brightness of the LCD display to be adjusted

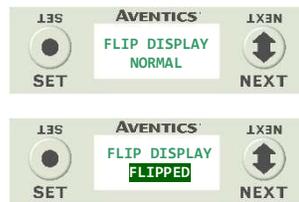


- A) Press the SET button to enter the Set Brightness sub-menu and highlight the selection.
- B) Press the NEXT button to select the desired Brightness selection, (Low, Medium, High).
- C) Press the SET button to select the desired Brightness level.

Screen Jumps to Next Parameter/Selection

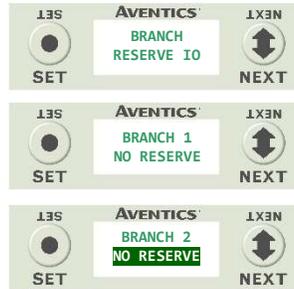
Hub Module / Flip Display

Allows the Display to be flipped 180 degrees



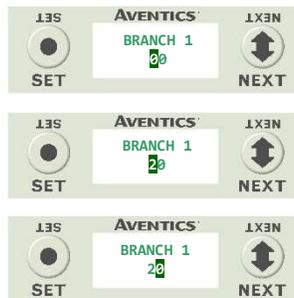
- A) Press the SET button to enter the Flip Display sub-menu and highlight the selection.
- B) Press the NEXT button to select the desired Flip Display selection, (Normal, Flipped).
- C) Press the SET button to select the desired display orientation.
- D) Press NEXT to advance to the next parameter selection (Branch Reserve I/O).

Branch Reserve I/O



- A) Press the SET button to enter the Branch Reserve IO sub-menu.
- B) Press the NEXT button to select the desired Branch to reserve I/O bytes.

I/O data bytes can be reserved on each branch for future expansion within the G3 system. Space is reserved in Byte levels, and populates Input, Output, and Status depending on the protocol and configuration chosen (e.g. DeviceNet™).



- C) Press the SET button to enter the chosen Branch/Byte Selection screen.
- D) Press the NEXT button to select the desired Tens value of reserved bytes.
- E) Press the SET button to set the desired Tens value.
- F) The screen will advance to the Ones selection.
- G) Press the NEXT button to select the desired Ones value for reserved bytes.
- H) Press the SET button to set the desired Ones value.

Once the desired byte size is chosen for the selected branch, the screen will jump to the next branch. The same process is performed for the remaining branches, if desired. Press the NEXT button to skip over branches that do not require reserving I/O.

Factory Defaults



4) Allows all parameter settings to be set back to default values.

- A) Press the SET button to enter the Factory Defaults sub menu.
- B) Press the NEXT button to choose Yes or No.
- C) Press the SET button to confirm.
- D) Press the SET button again.



<i>Factory Default Settings</i>	
Brightness	Medium
Flip Display	Normal
Reserve I/O	No Reserve (all Branches)

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Diagnostics



- 5) Allows the user to reference Part No., Firmware Rev., and Branch Connections.

Part Number



- A) Press the NEXT button to enter the Diagnostics sub-menu.

The Part Number screen is displayed (reference only).

Firmware Rev.



- B) Press the NEXT button to advance to the Firmware revision screen (reference only).

Branch Connections



- C) Press the NEXT button to advance to the Branch Connections screen.

- D) Press the SET button to enter the Branch Connections sub-menu.



- E) Press the NEXT button to advance through the Branches.



Each Branch screen indicates identifies the module numbers that are currently connected to that Branch.

HELP



- 6) Directs the user to the ASCO website.



- A) Press the SET button for website address.

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Error/Event Messages

The following are error messages that are displayed when specific faults/events occur during operation:

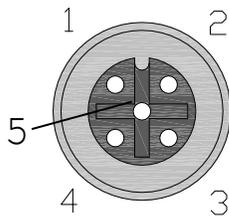


Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration.



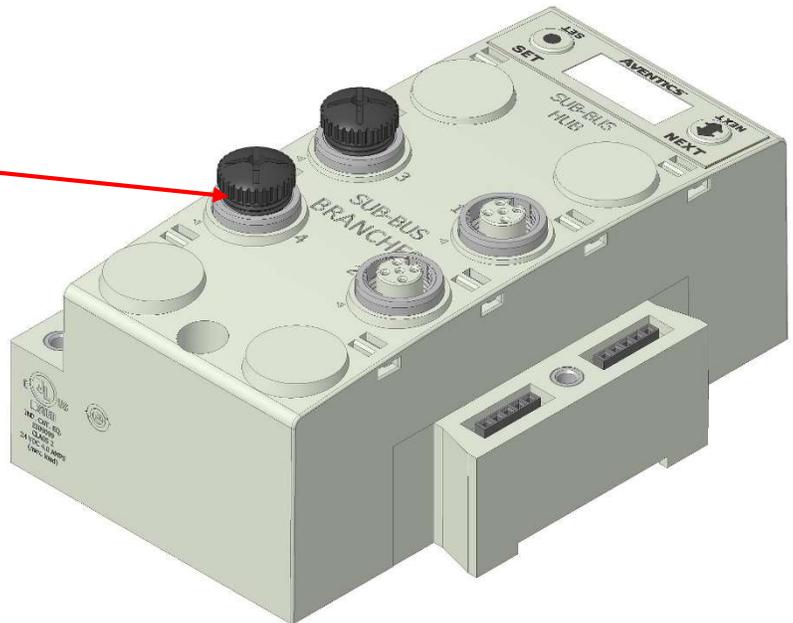
Displayed when a Sub-Bus power short circuit condition is detected.

Connector Pin Out



FEMALE

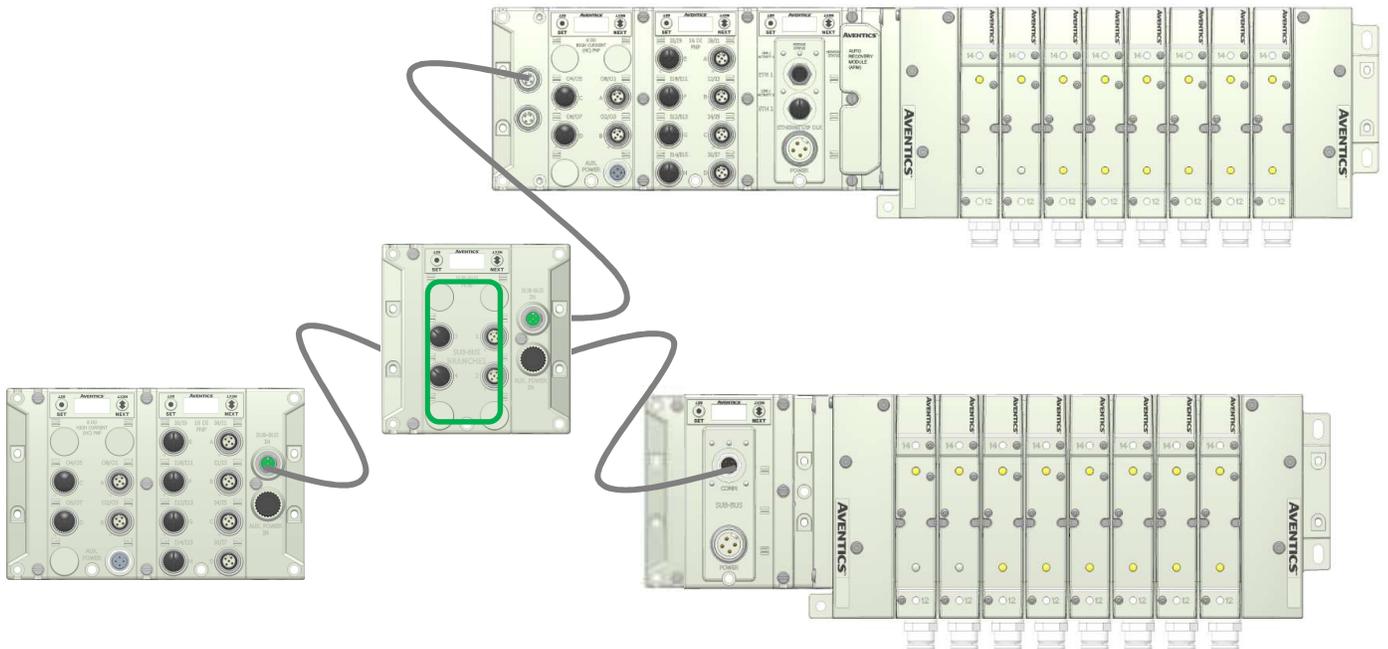
- PIN 1 = Shield
- PIN 2 = V+
- PIN 3 = V-
- PIN 4 = CAN_H
- PIN 5 = CAN_L



- Length of molded or field wired Sub-Bus Branch cables should not exceed the maximum length of 30 meters per Sub-Bus Branch communication link.
- The molded cable assemblies and bulk cable are the only approved cables for the G3 Sub-Bus and Branch Link. Please refer to the G3 Electronics catalog (LT-G3Catalog), for Sub-Bus cable and connectors options. See Technical Document TDG3SBWD1-0EN for proper installation and wiring of field wire-able connectors.

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HUB Integration - Example



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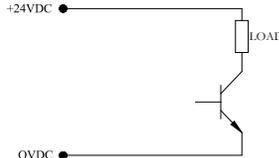
12. I/O Module(s) Wiring Diagrams

NPN/PNP Definitions

There is confusion between NPN, PNP, Sinking and Sourcing terminologies. Basically, if one is using sensors that provide a 24 VDC signal to the input module then a PNP input module type will be required. If one is using a sensor that supplies a 0 VDC signal to the input module then an NPN input module type will be required.

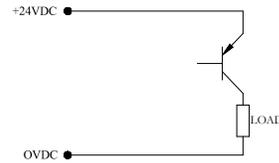
NPN Descriptions

- Sinking
- Switching Negative
- Positive Common



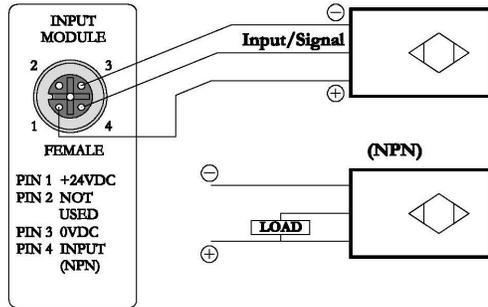
PNP Descriptions

- Sourcing
- Switching Positive
- Negative Common

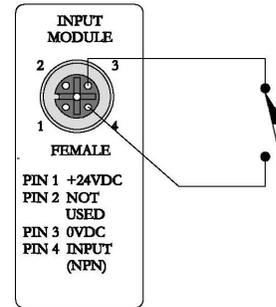


NPN (Sinking) Input Connection

Electric Sensor Type

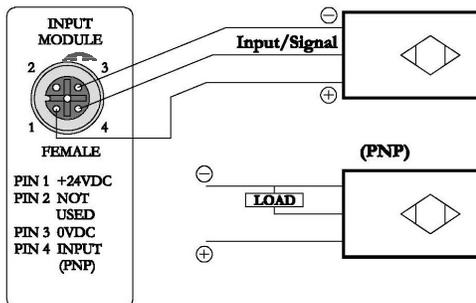


Mechanical Sensor Type

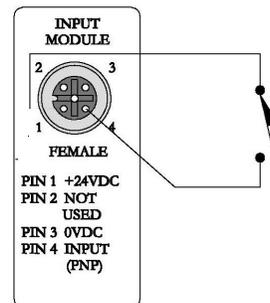


PNP (Sourcing) Input Connection

Electric Sensor Type



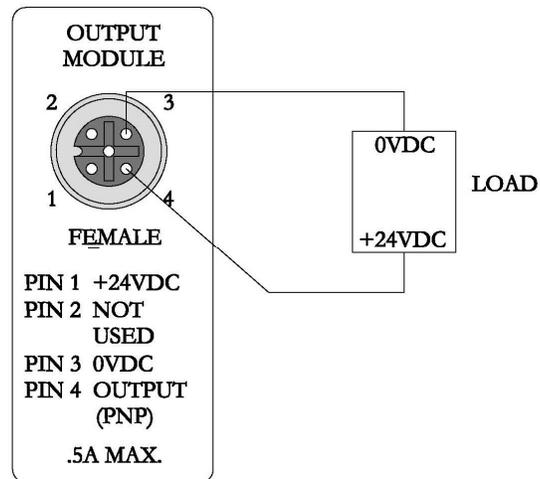
Mechanical Sensor Type



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I/O Module(s) Wiring Diagrams Continued

PNP (Sourcing) Output Connection



13. DeviceNet™ Configuration and Mapping

13.1 EDS File

The EDS file contains configuration information required to establish communication to a node on a DeviceNet™ network. EDS files are available on the ASCO website at www.ASCO.com/G3.

13.2 I/O Message Types

The AVENTICS G3 series DeviceNet™ communication node supports 3 different I/O message types. Below are brief definitions for the supported types:

Polled

The poll command is an I/O message that is transmitted by the Master. A Poll Command is directed towards a single, specific Slave (point to point). A Master must transmit a separate Poll Command Message for each one of its Slaves that is to be polled. The slave can respond with an I/O Message that is transmitted back to the Master.

Cyclic

The Cyclic message is transmitted by either the Master or the Slave. An Acknowledge Message may be returned in response to this message. The message is sent based on the value of a cyclic timer, which is set by the user.

Change of State

The Change of State message is transmitted by either the Master or the Slave. An Acknowledge Message may be returned in response to this message. The message is sent whenever a change of state occurs (i.e. an input changes from "On" to "Off").

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13.3 User Configurable Device Parameters

The AVENTICS G3 DeviceNet™ node allows the user to set many user options which define how the manifold behaves in certain instances. The following are descriptions of these device parameters. All of these configurable parameters can be adjusted using appropriate DeviceNet™ configuration software (i.e. RSNetWorx, DeviceNet™ Manager, etc.), selecting the appropriate parameters in the node's graphic display screen, or by initiating the explicit messaging function. The network address parameter can also be adjusted using the optional Manual Configuration Module (MCM) see page 5-475.

Parameter Name	Description	Settable Via		
		Display	Software	MCM
MAC ID	Node address	✓	✓	✓
Baud Rate	Network speed	✓	✓	✓
Autobaud	Enables/Disables Autobaud setting	✓	✓	✓
Diagnostic Word	Enables/Disables the diagnostic Input word	✓	✓	✗
Quick Connect	Enables/Disables the Quick Connect feature	✓	✓	✗
I/O Allocation Coils	Allocates how many valve output points are mapped (0, 8, 16, 24, 32)	✓	✗	✗
I/O Allocation Inputs	Allows a fixed value to be set for the number of Input Bytes allocated for the assembly	✓	✗	✗
I/O Allocation Output	Allows a fixed value to be set for the number of Output Bytes allocated for the assembly	✓	✗	✗
I/O Diagnostic Status	Allocates I/O diagnostic status bits	✓	✓	✗
Output Idle Action	Determines whether to use idle value attribute or hold last state	✓	✓	✗
Output Fault Action	Determines whether to use idle value attribute or hold last state	✓	✓	✗

13.4 Explicit Messaging

			Explicit Message Information (values in decimal)			
Name	Description	MCM Settings	Class	Instance	Attribute	Data
MAC ID	Node address	SW 1-6	3	1	1	0 - 63
Baud Rate	Network speed	SW 7-8	3	1	2	0 = 125K 1 = 250K 2 = 500K
Autobaud	Enables/Disables Autobaud setting	SW 7-8	15	3	1	0 = Enabled 1 = Disabled
Assembly Parameter	Allocates how many valve output drivers are mapped (0, 8, 16, 24 or 32 outputs)	N/A	4	100	3	0 = 0 bytes 1 = 1 byte 2 = 2 bytes 3 = 3 bytes 4 = 4 bytes
Quick Connect		N/A	3	1	10	0 = Enabled 1 = Disabled
I/O Diagnostic Status	Enables/Disables I/O diagnostic status bits	N/A	15	5	1	0 = Enabled 1 = Disable
Diagnostic Word	Enables/Disables the diagnostic Input word	N/A	15	4	1	0 = Enabled 1 = Disable
MCM	Indicates whether the MCM module is installed or not.	N/A	15	6	1	Read only
Valve Driver Part Number	Valve Driver part number	N/A	15	7	1	Read only
I/O part number	Part numbers of all I/O modules installed	N/A	15	8-22	1	Read only
I/O serial number	Serial numbers of all I/O modules installed	N/A	15	23-37	1	Read only
Output Idle Action Attribute	Determines whether to use idle value attribute or hold last state	N/A	9	1	7	0 = Outputs Off 1 = Hold Last State
Output Fault Action Attribute	Determines whether to use idle value attribute or hold last state	N/A	9	1	5	0 = Outputs Off 1 = Hold Last State

Explicit messages provide multi-purpose, point-to-point communication paths between two devices. These messages use the typical request/response-oriented network communication to perform node configuration and problem diagnosis. Explicit messages typically use low priority identifiers and contain the specific meaning of the message as part of the data field; including the service to be performed and the specific object attribute address. Each explicit message uses a four-level address scheme; Node Address (MAC ID), Object Class Identifier, Instance, Attribute and Data. Explicit messaging requires appropriate DeviceNet™ configuration software (i.e. RSNetWorx, DeviceNet™ Manager, etc.). It can also be used via control program (ladder logic, function block, etc.)

Changing Configurable Parameter Example

Change "Assembly Parameter" Setting of node

1. Using appropriate DeviceNet™ configuration software (i.e. Rockwell's RSNetWorx for DeviceNet™ or similar) select the "Class Instance editor"
2. Select the appropriate node's address (MAC ID), select service "Set Single Attribute" (code 10 hex), Insert "4" in the Class section (value from table); Instance "1" (value from table), Attribute "1" (value from table) and desired Data 0 or 1 or 2 or 4 (value from table).

13.5 Communication Fault/Idle Mode Parameter

This parameter is used to set the behaviors of output points (bits) during a communication fault or an "idle" event (when a PLC is "Idle mode" not in RUN mode). The parameter shown below is used to determine what state the outputs will have during an "Idle" event and a "Fault" event. It will allow control of all output points, valves and discrete I/O, on the manifold.

The user, through the graphic display or software, can determine how the outputs behave when a communication fault or idle actions occurs. These settings are non-volatile and thus will not change upon loss of power.

The two behavior options are:

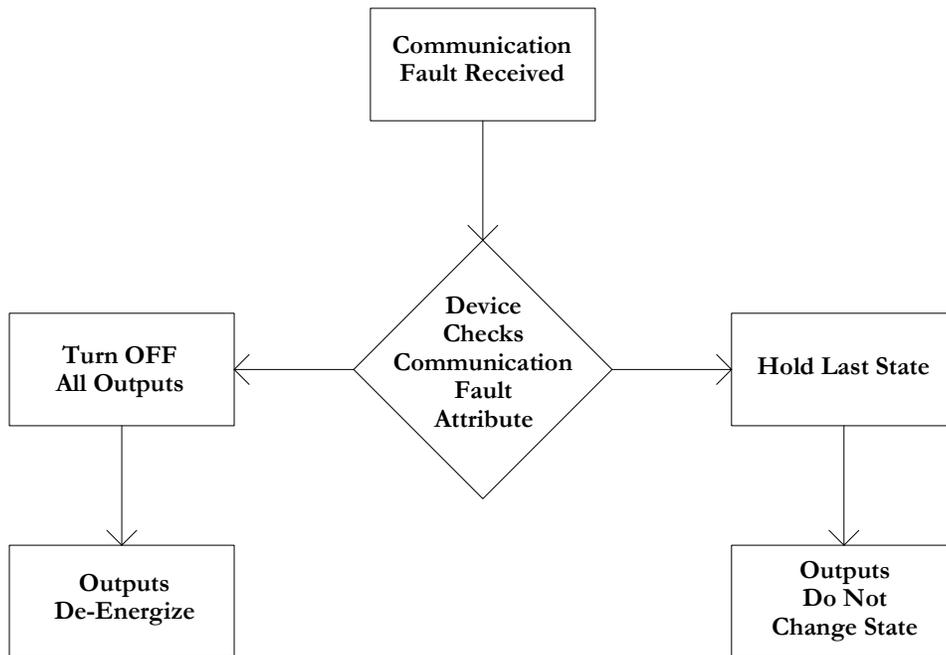
1. Hold Last State of Outputs
2. Turn Off All Outputs

Communication Fault/Idle Mode Sequence

The Communication Fault/Idle Mode parameter determines the output state if the device encounters a communication fault and/or idle action. A Communication Fault is defined as an inability for the master node to communicate with a slave node on a network. Idle Mode is a condition when the processor is in program mode.

The process for determining the output state during a Communication Fault/Idle Mode is as follows:

1. The device receives a Communication Fault/Idle Mode event.
2. The device determines what action to take based on the Communication Fault/Idle Mode attribute setting.
3. If the attribute is set to turn off all outputs, all of the outputs will turn off (Factory Default Setting).
4. If the attribute is set to hold last state, all of the outputs will hold their last state.



14. DeviceNet™ Mapping

14.1 I/O Sizes - Rx/Tx

Outputs

Outputs are defined as any valve solenoid coil and/or any discrete output point from any output module. The output size depends upon the physical configuration of the manifold (i.e. module type and how many are used). Please reference the following pages for a detailed explanation for calculating the output size.

Inputs

Inputs are defined as physical input bits from input modules and status bits (i.e. diagnostic word generated by the node, status input bits produced by output drivers and SCP status bits). Thus, the input size will include physical input points, as well as status input bits. Please reference the following pages for a detailed explanation for calculating the input size.

Valve Side

The size for the “valve side” of the manifold consists of an output bit for each valve solenoid coil driver and an input bit for the corresponding diagnostic status input bit. This value for the valve side size is configurable. See the following table:

Selection	Outputs Bytes	Inputs Bytes
0 Coils	0	0
8 Solenoid Coils	1	1
16 Solenoid Coils	2	2
24 Solenoid Coils	3	3
32 Solenoid Coils (factory default)	4	4

Please refer to page 32 for further details.

Discrete Side

The discrete side of the manifold is defined as all I/O modules connected to the left of the communication node. This includes physically attached modules as well as any distributed sub-bus modules. I/O sizes for the discrete side are automatically configured based on the I/O module type installed. However, the user can affect these sizes manually via settable parameters on the node. The output value consists of physical outputs (i.e. output bit for each output point). The input value consists of physical inputs (i.e. input bit for each input point) and user settable status input bits for corresponding physical outputs and SCP status bits.

Total I/O Size

The overall size of the I/O data for the manifold will consist of the valve size plus the discrete I/O size and all enabled Diagnostic bits. The I/O size can vary greatly, due to the many physical configuration and user settable parameters combinations. The worksheet on page 119 will allow accurate sizing of the I/O data.

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14.2 Manifold and I/O Data Sizing Worksheet

Step	
1	: Choose corresponding Rx and Tx values based a chosen "Valve Side Output Options" and place the values in the boxes labeled, "Valve Side Byte Requirements" at the bottom of the page
2	: Choose up to sixteen modules to be included on the discrete I/O side of the manifold (including distributed modules) and place sum of the corresponding input bytes and output bytes in the boxes labeled, "Discrete Side Byte Requirements" at the bottom of the page.
3	: Add the input bytes and output bytes values from the boxes labeled "Discrete Side Byte Requirements" and "Valve Side Byte Requirements" and place total in the boxes labeled "Total I/O (Rx/Tx) Bytes for Manifold. This is the total input and output byte count values required for the configured manifold (total Rx/Tx values).

Valve Side					
Step	Valve Side Output Options (selected on node)	Input Bytes (Rx)		Output Bytes (Tx)	
		Status Enabled	Status Disabled		
1	0 Coils	0	0	0	
	Up to 8 Solenoid Coils	1	0	1	
	Up to 16 Solenoid Coils	2	0	2	
	Up to 24 Solenoid Coils	3	0	3	
	Up to 32 Solenoid Coils (factory default)	4	0	4	

Digital Modules					
Step	Module Part Number	Description	Input Bytes (Rx)		Output Bytes (Tx)
			Status Enabled	Status Disabled	
2	240-203/204	16 Inputs	3	2	0
	240-205/209	16 Inputs	3	2	0
	240-206/210/379	8 Inputs	2	1	0
	240-207	16 Outputs	2	0	2
	240-208	8 Outputs	1	0	1
	240-211	8 Inputs / 8 Outputs	3	1	1
	240-241	Sub-Bus Valve Output	4	0	4
	240-300	High Current 8 Outputs	1	0	1

Analog Modules					
Step	Module Part Number	Description	Input Bytes (Rx)		Output Bytes (Tx)
			Status Enabled	Status Disabled	
2	240-212/214	4 Inputs	10	8	0
	240-213/215/307	2 Inputs / 2 Outputs	6	4	4

Total Input/Output Size Calculation				
Step	Module Position (includes distributed modules)	Module Part Number	Input Bytes (Rx)	Output Bytes (Tx)
2	1 st			
	2 nd			
	3 rd			
	4 th			
	5 th			
	6 th			
	7 th			
	8 th			
	9 th			
	10 th			
	11 th			
	12 th			
	13 th			
	14 th			
	15 th			
	16 th			
		Discrete Side Byte Requirements:		
		Optional Diagnostic Word:	2	0
1		Valve Side Byte Requirements:		
3		Total I/O (Rx/Tx) Bytes for Manifold		

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14.3 Bit Mapping Rules

The bit mapping for a G3 manifold varies with the physical configuration of the manifold. The following is a breakdown of the bit mapping rules associated with the AVENTICS valve manifold.

Valve Side

- 1) Solenoid coil outputs are connected to the valve coils using the Z-Boards™.
- 2) The valve solenoid coil output portion of the total output size is adjustable from 0 to 4 bytes, with 4 bytes (32 bits) as the factory default.
- 3) Each solenoid coil output has an associated status input bit (refer to the section labeled, "Output Short Circuit Protection", on page 27 for functional details). The solenoid coil status input size can be adjusted from 0 to 4 bytes, with 4 input bytes (32 bits) as the factory default.
- 4) Solenoid coil output addressing begins at the 1st manifold station nearest the node using "14" coil 1st and then, if applicable, the "12" coil, and continues in ascending order away from the communication node.
- 5) Each manifold station allocates 1 or 2 output bits. This is dependent on the Z-Board™ type installed. A single Z-Board™ allocates 1 output bit. A double Z-Board™ allocates 2 output bits.
- 6) Z-Boards™ can be used in any arrangement (all singles, all doubles, or any combination) as long as output group No.1 and output group No. 2 bits do not overlap (i.e. combinations of Z-Boards™ could exist where the physical configuration of the manifold could exceed the output capacity).



Single solenoid valves can be used with double Z-Boards™. However, one of the two available outputs will remain unused.

Discrete I/O Side

Outputs

- 1) The Sub-Bus output byte size portion is self-configuring in byte increments, after an output module is installed on the Sub-Bus and power is applied.
- 2) Outputs are mapped consecutively by module. The output bits from the 1st module will be mapped directly after the bits from the valve coils. The output bits from the second module will be mapped directly after the output bits from the 1st module and so on.

Inputs

- 1) The Sub-Bus input byte size portion is self-configuring in byte increments, after an input module is plugged into back plane and power is applied.
- 2) Inputs are mapped consecutively by module. The input bits from the 1st module will be mapped directly after the status bits from the valve side. The input bits from the second module will be mapped directly after the input bits from the 1st module and so on.
- 3) All of the modules have associated internal status bits, which will affect the total value of input bytes.
- 4) When a module has discrete and status inputs, the status bits are mapped after the discrete input bits.

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I/O Mapping Examples

14.4 Example No. 1

Assumed Settings

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated

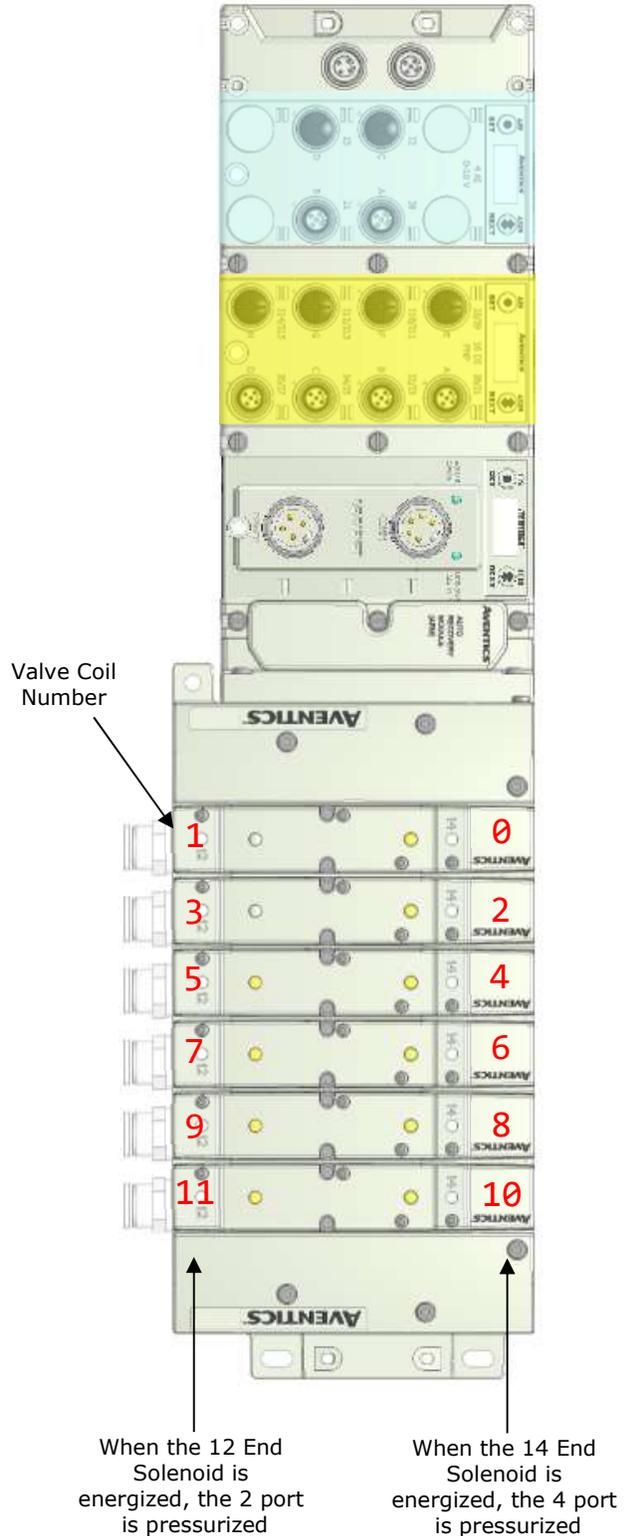
Manifold I/O Configuration

Pos. No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	3	0
2	4AI Analog	240-212	10	0
Diagnostic Word			2	0
Local Valve Size			4	4

Total: 19 4

How to Order

Qty	Part Number
1	8503AV3F300VA00
2	R503A1B10MA00F1
4	R503A1B40MA00F1
3	K503AMM22MA0010
1	G3DN102D0E44
1	240-205
1	240-212
	ASSEMBLED



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Example No. 1 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2 (Optional)	Allocated and Reserved							
3 (Optional)	Allocated and Reserved							

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit							
1 (Optional)	Sub-bus Diagnostic Bit							
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Allocated and Reserved							
5 (Optional)	Allocated and Reserved							
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1 (LSB)						
10	Analog Input No. 1 (MSB)	Analog Input No. 1						
11	Analog Input No. 2	Analog Input No. 2 (LSB)						
12	Analog Input No. 2 (MSB)	Analog Input No. 2						
13	Analog Input No. 3	Analog Input No. 3 (LSB)						
14	Analog Input No. 3 (MSB)	Analog Input No. 3						
15	Analog Input No. 4	Analog Input No. 4 (LSB)						
16	Analog Input No. 4 (MSB)	Analog Input No. 4						
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A



- The Comm. Module Diagnostic Bits, Sub-Bus Diagnostic Bits, Coil Status Bits and Power Status Bits are optional. The factory default condition is Diagnostic bits enabled. These bits may be disabled to optimize the logical size of the manifold
- The number of Outputs Bytes Allocated for valve coils may be optimized and set to 0, 8, 16, 24 or 32 coils. (32 Coils is the factory default setting.)

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14.5 Example No. 2

Assumed Settings

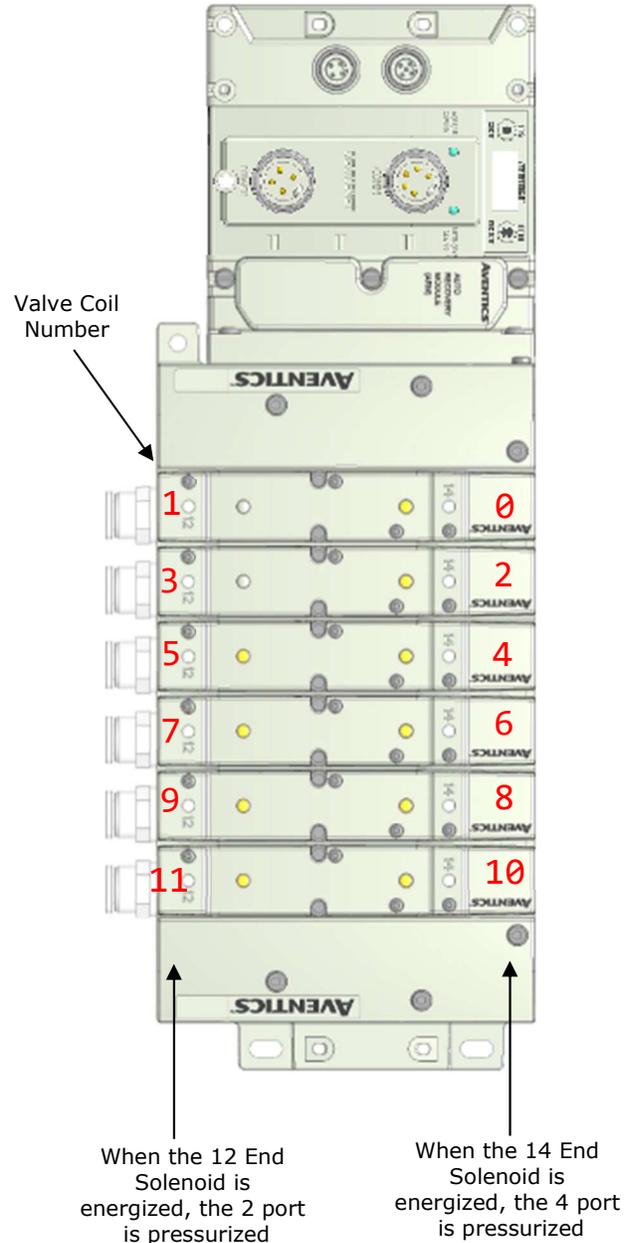
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated.

Manifold I/O Configuration

Pos. No.	Module Type	Part No.	In	Out
			Bytes	
		Diagnostic Word	2	0
		Local Valve Size:	4	4
		Total:	6	4

How to Order

Qty	Part Number
1	8503AV3F300VA00
2	R503A1B10MA00F1
4	R503A1B40MA00F1
3	K503AMM22MA0010
1	G3DN100D0E44
	ASSEMBLED



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Example No. 2 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2 (Optional)	Allocated and Reserved							
3 (Optional)	Allocated and Reserved							

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit							
1 (Optional)	Sub-bus Diagnostic Bit							
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	Coil No. 31 Status	Coil No. 30 Status	Coil No. 29 Status	Coil No. 28 Status	Coil No. 27 Status	Coil No. 26 Status	Coil No. 25 Status	Coil No. 24 Status



- The Comm. Module Diagnostic Bits, Sub-Bus Diagnostic Bits, Coil Status Bits and Power Status Bits are optional. The factory default condition is Diagnostic bits are enabled. These bits may be disabled to optimize the logical size of the manifold
- The number of Outputs Bytes Allocated for valve coils may be optimized and set to 0, 8, 16, 24 or 32 coils (32 coils is the factory default setting).

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14.6 Example No. 3

Assumed Settings

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated

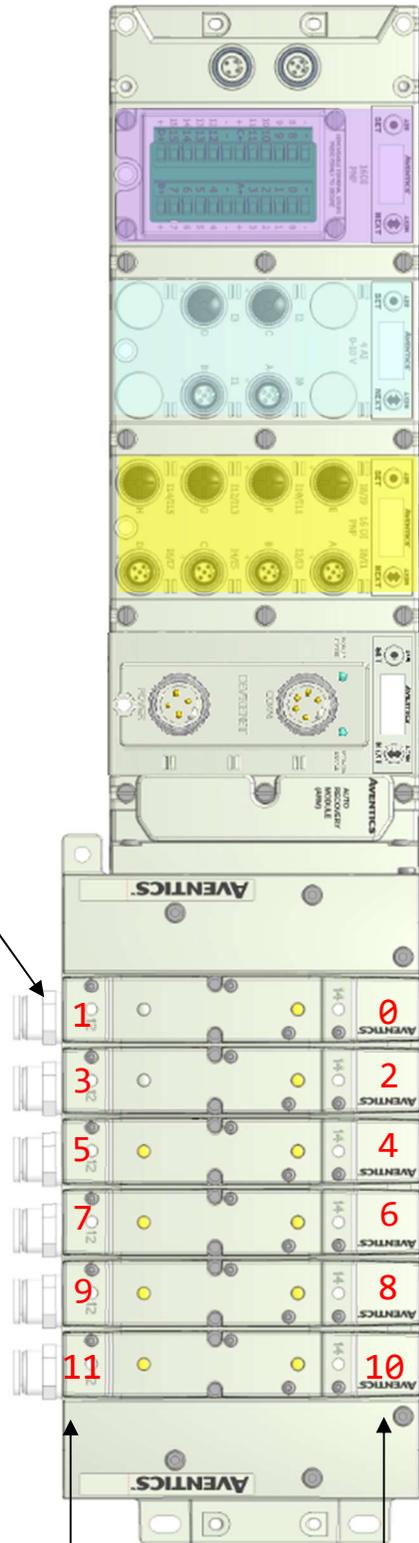
Manifold I/O Configuration

Pos. No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	3	0
2	4AI Analog	240-212	10	0
3	16I PNP	240-203	3	0
Diagnostic Word			2	0
Local Valves:			4	4

Total: 22 4

How to Order

Qty	Part Number
1	8503AV3F300VA00
3	R503A1B10MA00F1
3	R503A1B40MA00F1
3	K503AMM22MA0010
1	G3DN103D0E44
1	240-205
1	240-212
1	240-203
	ASSEMBLED



When the 12 End Solenoid is energized, the 2 port is pressurized

When the 14 End Solenoid is energized, the 4 port is pressurized

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Example No. 3 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2 (Optional)	Allocated and Reserved							
3 (Optional)	Allocated and Reserved							

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit							
1 (Optional)	Sub-bus Diagnostic Bit							
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	Coil No. 31 Status	Coil No. 30 Status	Coil No. 29 Status	Coil No. 28 Status	Coil No. 27 Status	Coil No. 26 Status	Coil No. 25 Status	Coil No. 24 Status
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1 (LSB)						
10	Analog Input No. 1 (MSB)	Analog Input No. 1						
11	Analog Input No. 2	Analog Input No. 2 (LSB)						
12	Analog Input No. 2 (MSB)	Analog Input No. 2						
13	Analog Input No. 3	Analog Input No. 3 (LSB)						
14	Analog Input No. 3 (MSB)	Analog Input No. 3						
15	Analog Input No. 4	Analog Input No. 4 (LSB)						
16	Analog Input No. 4 (MSB)	Analog Input No. 4						
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
19	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
20	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
21 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A

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14.7 Example No. 4

Assumed Settings

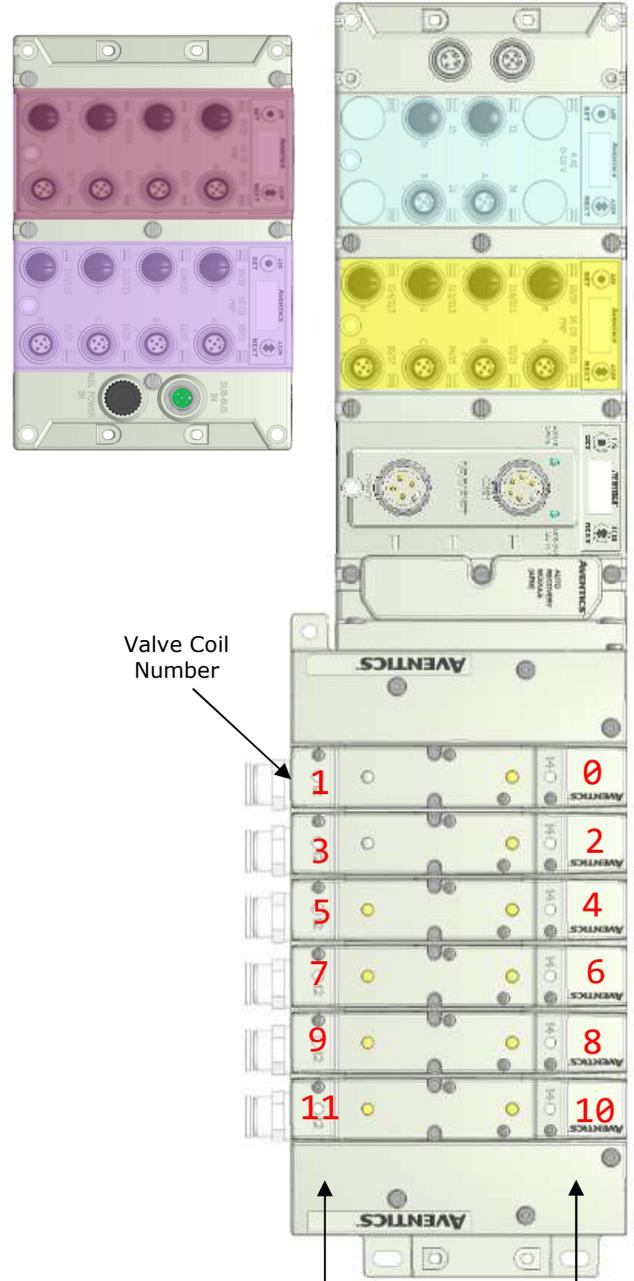
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated

Manifold I/O Configuration

Pos. No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	3	0
2	4I Analog	240-212	10	0
3	16I PNP	240-205	3	0
4	8DO PNP	240-205	2	0
Diagnostic Word			2	0
Local Valves:			4	4
Total:			24	4

How to Order

Qty	Part Number
1	8503AV3F300VA00
3	R503A1B10MA00F1
3	R503A1B40MA00F1
	K503AMM22MA0010
1	G3DN102D0E44
1	240-205
1	240-212
	ASSEMBLED
1	G3DS302R0STD
1	240-205
1	240-205
	ASSEMBLED



Valve Coil Number

When the 12 End Solenoid is energized, the 2 port is pressurized

When the 14 End Solenoid is energized, the 4 port is pressurized



TDG3DNTM1-7EN 05/20
Subject to change without notice

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Example No. 4 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2 (Optional)	Allocated and Reserved							
3 (Optional)	Allocated and Reserved							

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit							
1 (Optional)	Sub-bus Diagnostic Bit							
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	Coil No. 31 Status	Coil No. 30 Status	Coil No. 29 Status	Coil No. 28 Status	Coil No. 27 Status	Coil No. 26 Status	Coil No. 25 Status	Coil No. 24 Status
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1 (LSB)						
10	Analog Input No. 1 (MSB)	Analog Input No. 1						
11	Analog Input No. 2	Analog Input No. 2 (LSB)						
12	Analog Input No. 2 (MSB)	Analog Input No. 2						
13	Analog Input No. 3	Analog Input No. 3 (LSB)						
14	Analog Input No. 3 (MSB)	Analog Input No. 3						
15	Analog Input No. 4	Analog Input No. 4 (LSB)						
16	Analog Input No.4 (MSB)	Analog Input No. 4						
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
19	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
20	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
21 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
22	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
23	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
24 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A

14.8 Example No. 5

Assumed Settings

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled
- 32 coils are allocated

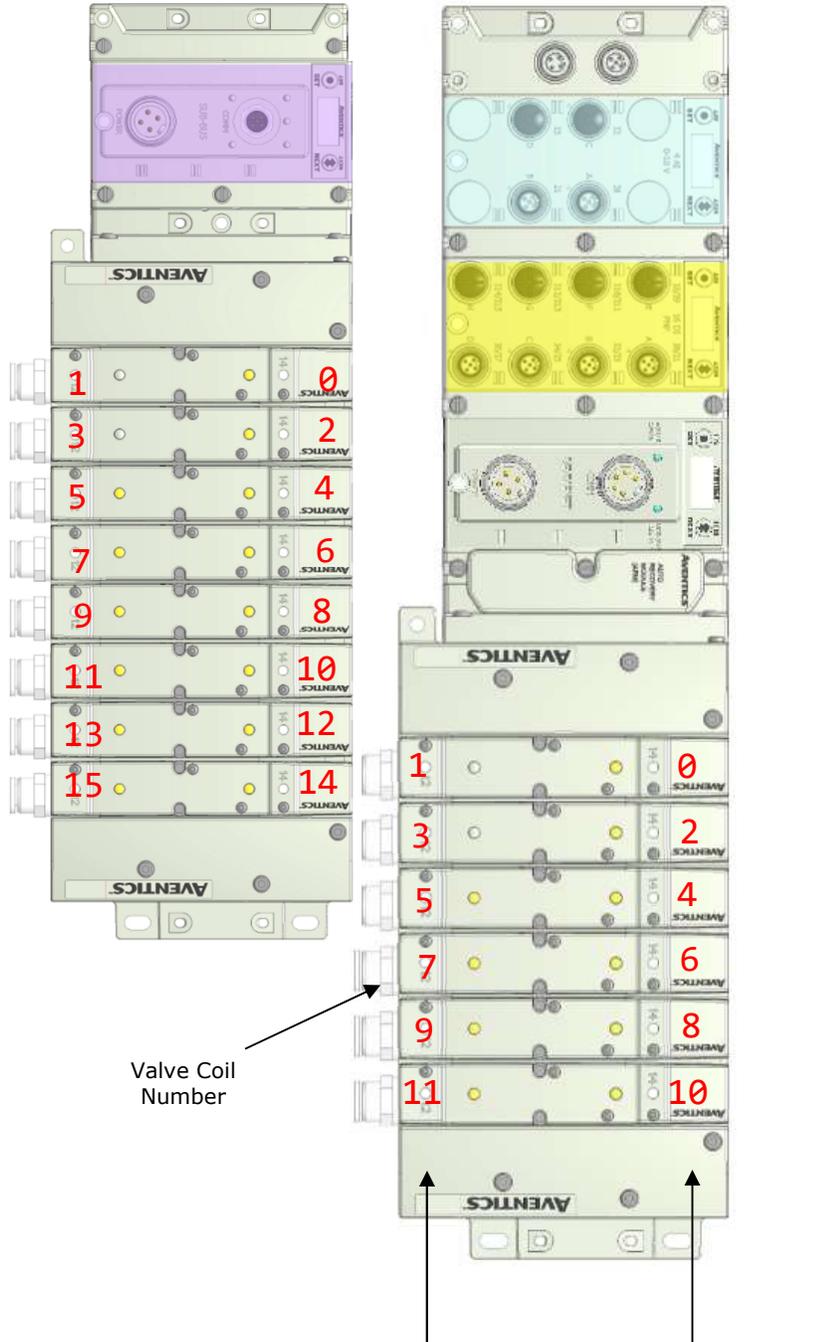
Manifold I/O Configuration

Pos No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	3	0
2	4I Analog	240-212	10	0
Diagnostic Word			2	0
Local Valves (DeviceNet)			4	4
Local Valves (Sub-Bus)			4	4
Total:			23	8

How to Order

Qty	Part Number
1	8503AV3F300VA00
2	R503A1B10MA00F1
4	R503A1B40MA00F1
3	K503AMM22MA0010
1	G3DN102D0E44
1	240-205
1	240-212
	ASSEMBLED

1	8503AV3H00VA00
2	R503A1B10MA00F1
6	R503A1B40MA00F1
4	K503AMM22MA0010
1	G3DS201R0STD
	ASSEMBLED



When the 12 End Solenoid is energized, the 2 port is pressurized

When the 14 End Solenoid is energized, the 4 port is pressurized

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Example No. 5 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2 (Optional)	Allocated and Reserved							
3 (Optional)	Allocated and Reserved							
4	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
5	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
6 (Optional)	Allocated and Reserved							
7 (Optional)	Allocated and Reserved							

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit							
1 (Optional)	Sub-bus Diagnostic Bit							
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	Coil No. 31 Status	Coil No. 30 Status	Coil No. 29 Status	Coil No. 28 Status	Coil No. 27 Status	Coil No. 26 Status	Coil No. 25 Status	Coil No. 24 Status
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Short Circuit Status for Conn. H	Short Circuit Status for Conn. G	Short Circuit Status for Conn. F	Short Circuit Status for Conn. E	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1 (LSB)						
10	Analog Input No. 1 (MSB)	Analog Input No. 1						
11	Analog Input No. 2	Analog Input No. 2 (LSB)						
12	Analog Input No. 2 (MSB)	Analog Input No. 2						
13	Analog Input No. 3	Analog Input No. 3 (LSB)						
14	Analog Input No. 3 (MSB)	Analog Input No. 3						
15	Analog Input No. 4	Analog Input No. 4 (LSB)						
16	Analog Input No.4 (MSB)	Analog Input No. 4						
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Short Circuit Status for Conn. D	Short Circuit Status for Conn. C	Short Circuit Status for Conn. B	Short Circuit Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
18 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
19 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
20 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
21 (Optional)	Coil No. 31 Status	Coil No. 30 Status	Coil No. 29 Status	Coil No. 28 Status	Coil No. 27 Status	Coil No. 26 Status	Coil No. 25 Status	Coil No. 24 Status

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14.9 Diagnostic Word

<i>Diagnostic Word Format</i>								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Comm. Status)	Reserved	Reserved	Reserved	Reserved	Sub-Bus Short Circuit (1 = Error)	Sub-Bus Module Error (1=Error)	Un-Switched Power Status (1=Error)	Switched Power Status (1=Error)
1 (Sub-Bus Status)	Error Code	Error Code	Error Code	Module Address	Module Address	Module Address	Module Address	Module Address

Byte 0 (Communication Status)

Byte 0, Bit 0 Switched Power Status = Bit is high when valve / output power is not present on the comm. module.

Byte 0, Bit 1 Un-switched Power Status = Bit is high when node / input power is below 19VDC.

Byte 0, Bit 2 Sub-Bus Module Error = Bit is high when there is an error on a Sub-Bus module; see "Byte 1" of diagnostic word for description.

Byte 0, Bit 3 Sub-Bus Short Circuit = A short circuit has been detected across the Sub-Bus.

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Diagnostic Word Cont.

Byte 1 (Sub-Bus Status)

Module Address

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	No error
0	0	0	0	1	Communication Module
0	0	0	1	0	I/O module No. 1
0	0	0	1	1	I/O module No. 2
0	0	1	0	0	I/O module No. 3
0	0	1	0	1	I/O module No. 4
0	0	1	1	0	I/O module No. 5
0	0	1	1	1	I/O module No. 6
0	1	0	0	0	I/O module No. 7
0	1	0	0	1	I/O module No. 8
0	1	0	1	0	I/O module No. 9
0	1	0	1	1	I/O module No. 10
0	1	1	0	0	I/O module No. 11
0	1	1	0	1	I/O module No. 12
0	1	1	1	0	I/O module No. 13
0	1	1	1	1	I/O module No. 14
1	0	0	0	0	I/O module No. 15
1	0	0	0	1	I/O module No. 16
1	0	0	1	1	Communication Valve driver
1	0	1	0	0	ARM
1	0	1	0	1	MCM
X	X	X	X	X	N/A

Sub-Bus Errors

Error Code	Bit 7	Bit 6	Bit 5
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

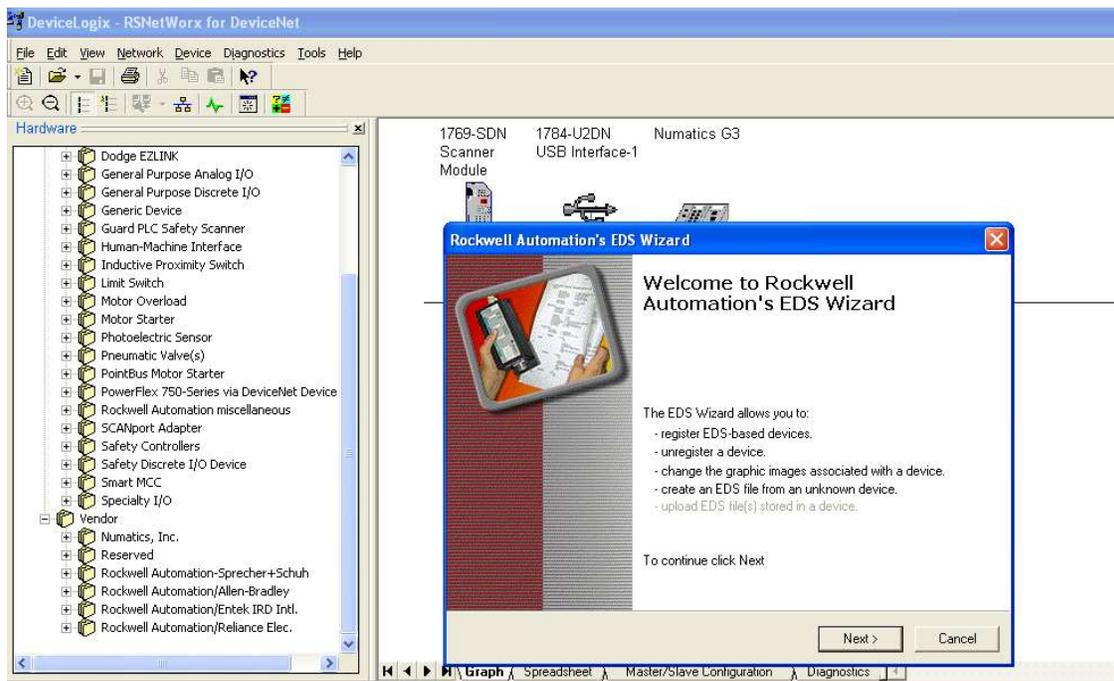
- Error Code 0 = No Errors
- Error Code 1 = Lost communications between I/O module and communications module
- Error Code 2 = Valve / Output power is below 19VDC
- Error Code 3...7 = not defined / reserved

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14.10 Commissioning G3 DeviceNet™ with RSNetWorx software

Register the AVENTICS G3 EDS File

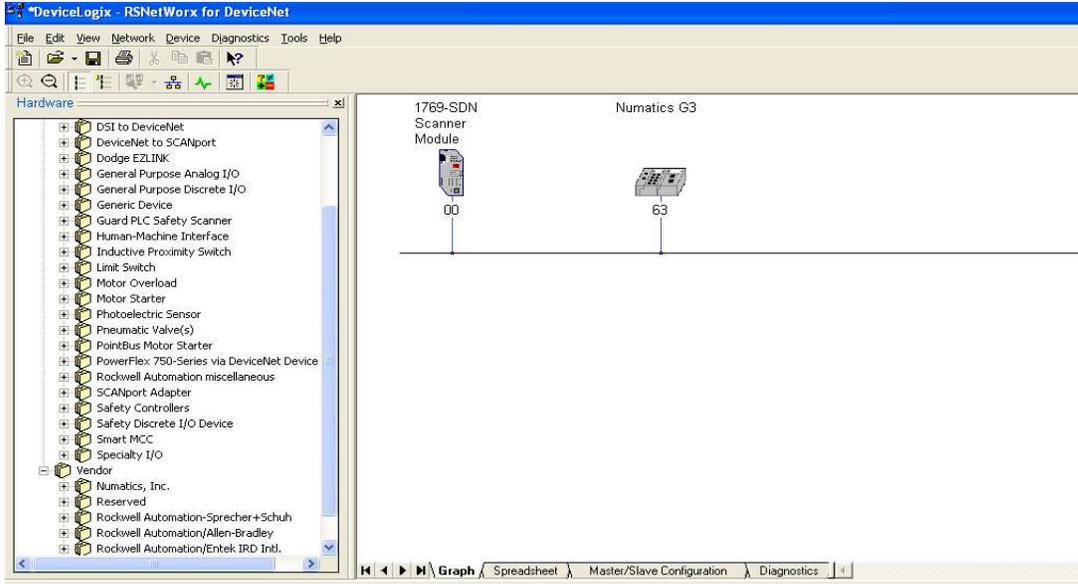
Download the AVENTICS G3 DeviceNet™ EDS file from ASCO.com. Open RS Networks for DeviceNet™ select "Tools" and run the "EDS Wizard" to register the AVENTICS G3 DeviceNet™ EDS file.



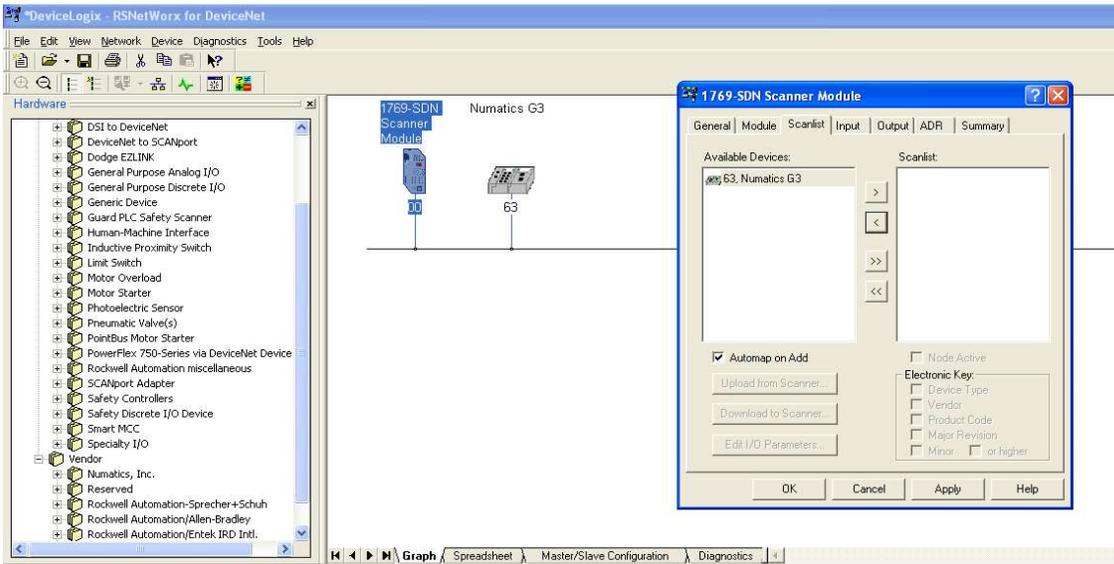
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Add the G3 DeviceNet™ node to the RSNetWorx configuration

From RS Networks for DEVICENET™ and add the Numatics G3 module. Double click on the Numatics G3 address to modify the DeviceNet™ address. Enter the address for the G3 DeviceNet™ node.



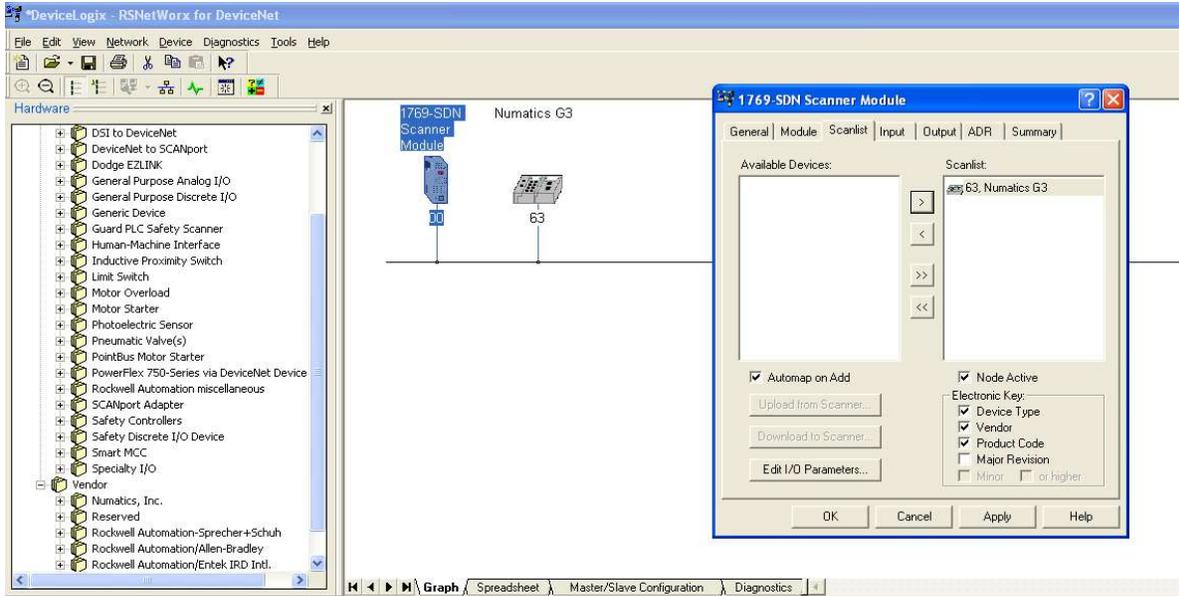
Configure the DeviceNet™ scanner module.
Double click on the DEVICENET™ scanner and select "Scanlist".



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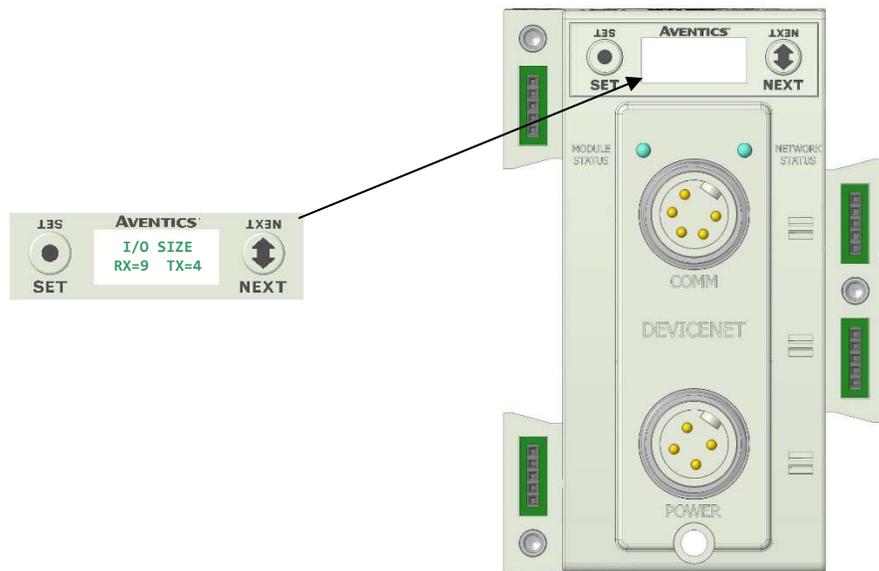
Add the Numatics G3 node to the "Scanlist"

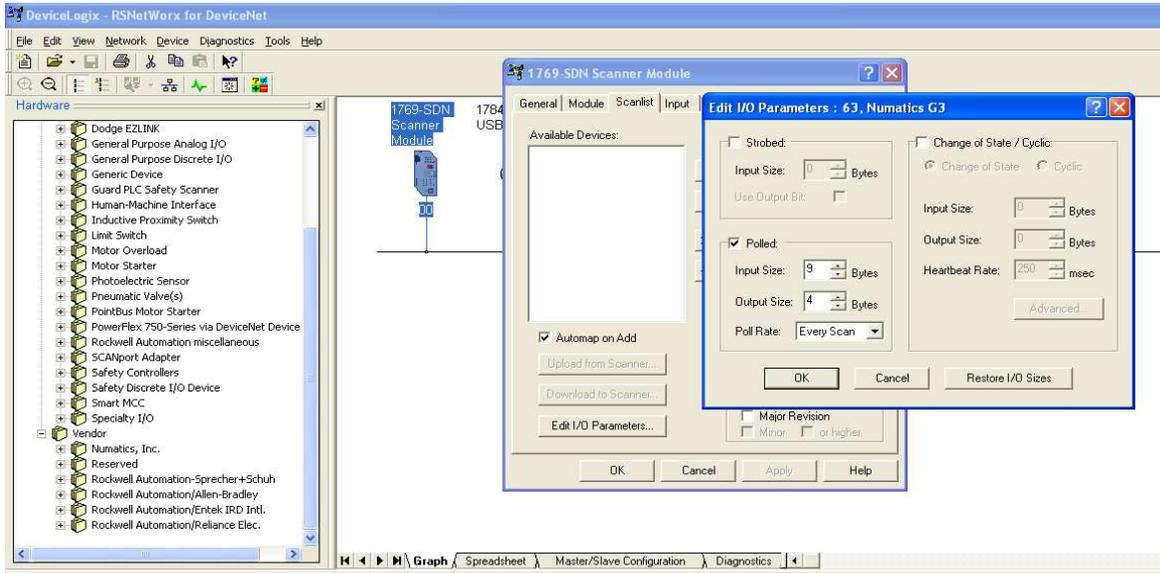
Select Numatics G3 under available devices. Select > to move Numatics G3 into the "Scanlist". Select Edit I/O Parameters.



I/O sizes - RX and TX Values

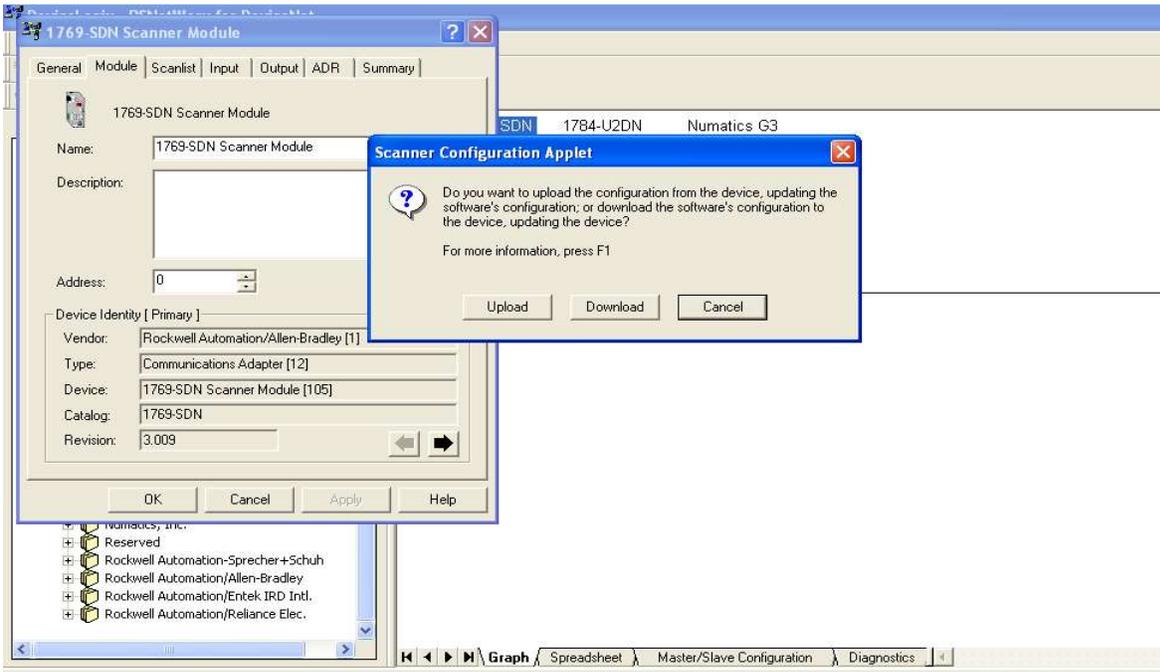
The I/O sizes (RX and TX bytes) are determined by the G3 manifold configuration. These I/O sizes are automatically calculated by the G3 DeviceNet™ node on power up. These values must be assigned in the scan list (see next step).





Enter the I/O sizes as Scan List Parameters

The required I/O sizes obtained from the G3 display in the previous step (RX=9 TX=4 in this example) are assigned in the polled section of the scan list. Select OK to exit 63, Numatics G3 I/O parameters.



Download the scanner module parameters

Go online and download the scanner parameters (includes "ScanList") to the scanner module.

15. Appendix

15.1 System Specifications

<i>Electrical</i>	
Supply Voltage	Valves (2005, 2012, 2035): 24 VDC + 10%, -15% Node and Discrete I/O: 24 VDC ± 10%
Current	Total current on the Auxiliary Power Connector ("Valves and Outputs" and "Node and Inputs" Pins) must not exceed 8 Amps.
Internal Electronic Resettable Fuses	The Auxiliary Power Connector pins are each internally fused with an electronically resettable fuse. These fuses are set to the maximum current allowable through the G3 electronics.
Recommended External Fuse	External fuses should be chosen depending upon manifold configuration. Please refer to power consumption chart on page 3-22 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for both discrete and valve outputs.
Discrete Outputs (NPN (Sinking) or PNP (Sourcing))	Maximum 0.5 Amps per output. All outputs are short circuit protected and have internal spike suppression. Contact factory for higher current requirements.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	23 to 114°F (-5 to 46°C)

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15.2 Factory Default Settings

<i>Description</i>	<i>Default</i>
Node Address	63
Baud Rate	Auto-Baud enabled
Valve Side Output Bytes	4 Bytes (32 Allocated Valve Coil Outputs)
	4/4
Rx/Tx Values	Self-Configuring
Diagnostic Word	Enabled
I/O Status	Enabled
DeviceNet™ Quick Connect	Disabled
Fault Action	Reset to Off
Idle Action	Reset to Off

15.3 Troubleshooting

Communication Node

<i>Symptom</i>	<i>Possible Cause</i>	<i>Solution</i>
The wrong valve solenoid coils are being energized.	Z-Board™ type mismatch. Single Z-Board™ present where double Z-Board™ expected or vice versa.	Check that correct Z-Board™ types are installed. Check that ribbon cable (Output group No. 2) is connected to appropriate valve station. See page 118 for bit mapping rules.
Valve outputs do not energize.	Output power not present or connected improperly on Auxiliary Power connector.	Check for 24VDC on the +24 VDC (Valves and Outputs) pin of the MINI Auxiliary Power connector of the Comm. module.

I/O Modules

<i>Symptom</i>	<i>Possible Cause</i>	<i>Solution</i>
Outputs remain ON when communication is lost and/or PLC is in "Program" mode.	Communication Fault parameters are set incorrectly. See page 4-36.	Check the communication fault/idle mode parameter setting to ensure that it is not set to "Hold Last Output State".

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15.4 Glossary of Terms

The following is a list and description of common terms and symbols used throughout this document:

Term	Description
ADR	Auto-Device Replacement is a feature (enabled by Allen Bradley scanners) that consists of Configuration Recovery and Auto-Address Recovery. Configuration Recovery (CF) refers to the scanner's ability to store a device's configuration. Auto-Address Recovery (AAR) refers to the ability of the scanner to change a device's node address from 63 to that desired by the scanner. Please refer to Allen Bradley's Release Notes No. 1747-5.8-RN1 for additional information.
Assembly parameter	An AVENTICS term describing a user definable parameter that allows user to allocate the number of valve output drivers. A 0, 8, 16, 24, 32 option is available and is helpful if there are I/O memory constraints in the PLC.
Auto-Baud	A technology that enables the communication node to automatically set its own baud rate to match the DeviceNet™ scanners' baud rate.
Bit	Smallest unit of digital information either a "0" or "1".
Bit mapping	Chart showing which bit is connected to which physical input or output point.
Byte	8 bits (1/2 word).
CAN_H	Controller Area Network – High; Communication Line.
CAN_L	Controller Area Network – Low; Communication Line.
CANBUS	Serial communication BUS network based on CAN protocol.
Change of State	I/O message type in which either the expiration of the transmission timer or a change in input state triggers data production.
Comm. Fault	One or more of the I/O connections have timed out.
Cyclic	I/O message type in which data production is triggered by the expiration of the transmission timer.
DeviceNet™ Manager	Allen-Bradley's DeviceNet™ configuration software.
Discrete I / O	The Inputs / Outputs that are available via the "Discrete I/O" side of manifold.
EDS file	<u>E</u> lectronic <u>D</u> ata <u>S</u> heet. A text file, which contains specific product information, definitions of product capabilities and configurable parameters necessary for operation on a DeviceNet™ network.
EDS Stub file	An abridged version of the EDS file, which contains only the minimum information necessary to make the product functional on a DeviceNet™ network.
Ground	This term is used to indicate an earth ground.
Group 2	DeviceNet™ message group applicable to AVENTICS Serial/Bus products.
I/O	Any combination of Inputs and Outputs.
Idle	A zero (0) length poll message (i.e. scanner in program mode).
MAC ID	Media Access Connection Identification (00-63) – Node (network drop) address.
MCM	<u>M</u> anual <u>C</u> onfiguration <u>M</u> odule. A module that allows MAC ID, baud rates and other configurable parameters to be set manually via DIP switches and rotary switches. Not required if software configuration is used.
NEMA	National Electrical Manufacturers Association.
ODVA	Open DeviceNet™ Vendor Association (www.odva.org)
Polled	I/O message type in which the device consumes I/O data from its master and produces I/O data when the master requests it.
RSNetWorx	Allen-Bradley's DeviceNet™ configuration software.

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Glossary of Terms Continued

Term	Description
Rx/Tx	Rx = Consumed byte size; analogous to Input byte size. Tx = Produced byte size; analogous to Output byte size.
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive.
SCP	Short Circuit Protection.
Sourcing (PNP)	Method of connecting electrical circuits in which the positive side is switched and the common is zero (0) volts DC.
Status Input bit	A bit in the input table that reports the health of a corresponding output. Indicates short circuit or open coil (load) diagnostics.
Word	2 Bytes (16 bits).
Z-Board™	Circuit board installed in the valve sub-base which electrically connects the valve solenoid to the electrical/electronics interface. Available in single or double solenoid versions.

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15.5 Technical Support

For technical support, contact your local AVENTICS distributor. If further information is required, please call AVENTICS Technical Support Department at (248) 596-3333.

Issues relating to network setup, PLC programming, sequencing, software related functions, etc. should be handled with the appropriate product vendor.

Information on device files, technical manuals, local distributors, and other AVENTICS products and support issues can be found on the ASCO website at www.ASCO.com.

