AVENTICS™

G3 Series
PROFIBUS™ DP-V0 DP-V1
Technical Manual

EMERSON

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

Electrical installation and operational guidelines

CAUTION

- *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's 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*

Table of Contents

1. About PROFIBUS-DP™

1.1 Overview

PROFIBUS-DP™ is a communication protocol used to network industrial devices to eliminate labor intensive and expensive point to point wiring schemes. Siemens originally developed PROFIBUS DP, but it is now supported by a multitude of manufacturers and the protocol standard governed by the PROFIBUS Trade Organization (PTO).

The G3 Series PROFIBUS-DP™ product is designed to conform to the PROFIBUS standard EN50170 and is certified by PROFIBUS Interface Center (PIC) according to the guidelines determined by the PROFIBUS Trade Organization (PTO). The certification process ensures interoperability for all PROFIBUS-DP devices. This product supports PROFIBUS DP-V0 and DP-V1

PROFIBUS-DP™ uses a 2-wire (plus shield) network and can have up to 126 nodes. The protocol can transfer a maximum of 244 bytes of data per node cycle with nine selectable communication (baud) rates of 9.6 Kbps, 19.2 Kbps, 45.45 Kbps, 93.75 Kbps, 187.5 Kbps, 500 Kbps, 1.5 Mbps, 3 Mbps, 6 Mbps and 12 Mbps. Maximum distance is depended upon baud rate and cable media type. Refer to the section below for details.

More information about PROFIBUS can be obtained from the PROFIBUS web site www.PROFIBUS.com

1.2 G3 PROFIBUS-DP™ Features

Features	*Description*
Bus Topology	Linear bus, active bus termination on both ends. Stub lines permitted only for <= 1.5Mbit/sec baud rates.
Baud Rates Supported	9.6 Kbps, 19.2 Kbps, 45.45 Kbps, 93.75 Kbps, 187.5 Kbps, 500 Kbps, 1.5Mbps, 3 Mbps, 6 Mbps and 12 Mbps
Duplicate address detection	Node address must match address in Master configuration software, before node will enter the data exchange mode
Error Correction	If error detected, sender is requested to repeat the message
Address Setting options	Via Software (with Profibus-DP™ Class 2 Master), with standard Manual Configuration Module (MCM), or graphic display

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

Maximum Cable Length

Baud Rate	9.6Kbps	19.2Kbps	93.75Kbps	187.5Kbps	500Kbps	1.5Mbps	12Mbps
Range/ Segment	1200M	1200M	1200M	1000M	400M	200M	100M

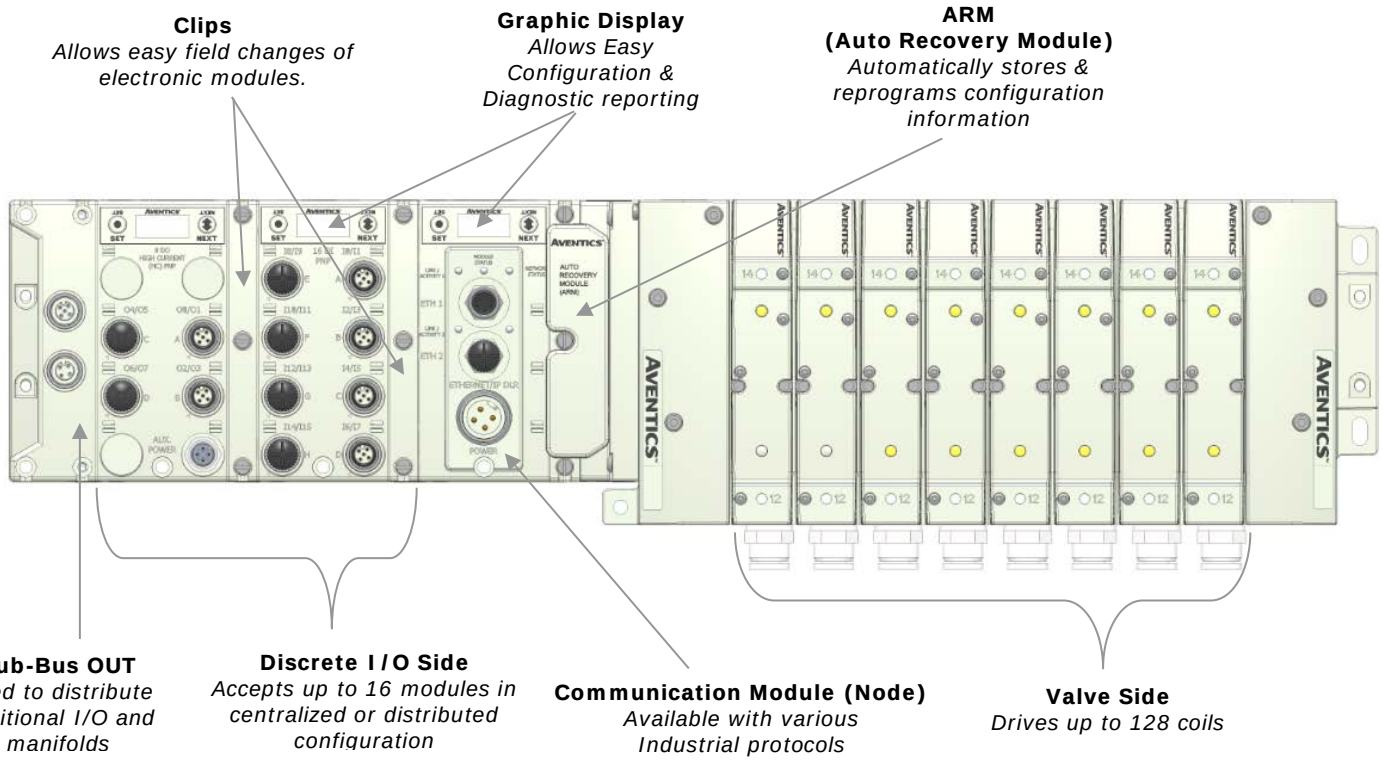
2. G3 Introduction

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 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 128 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.

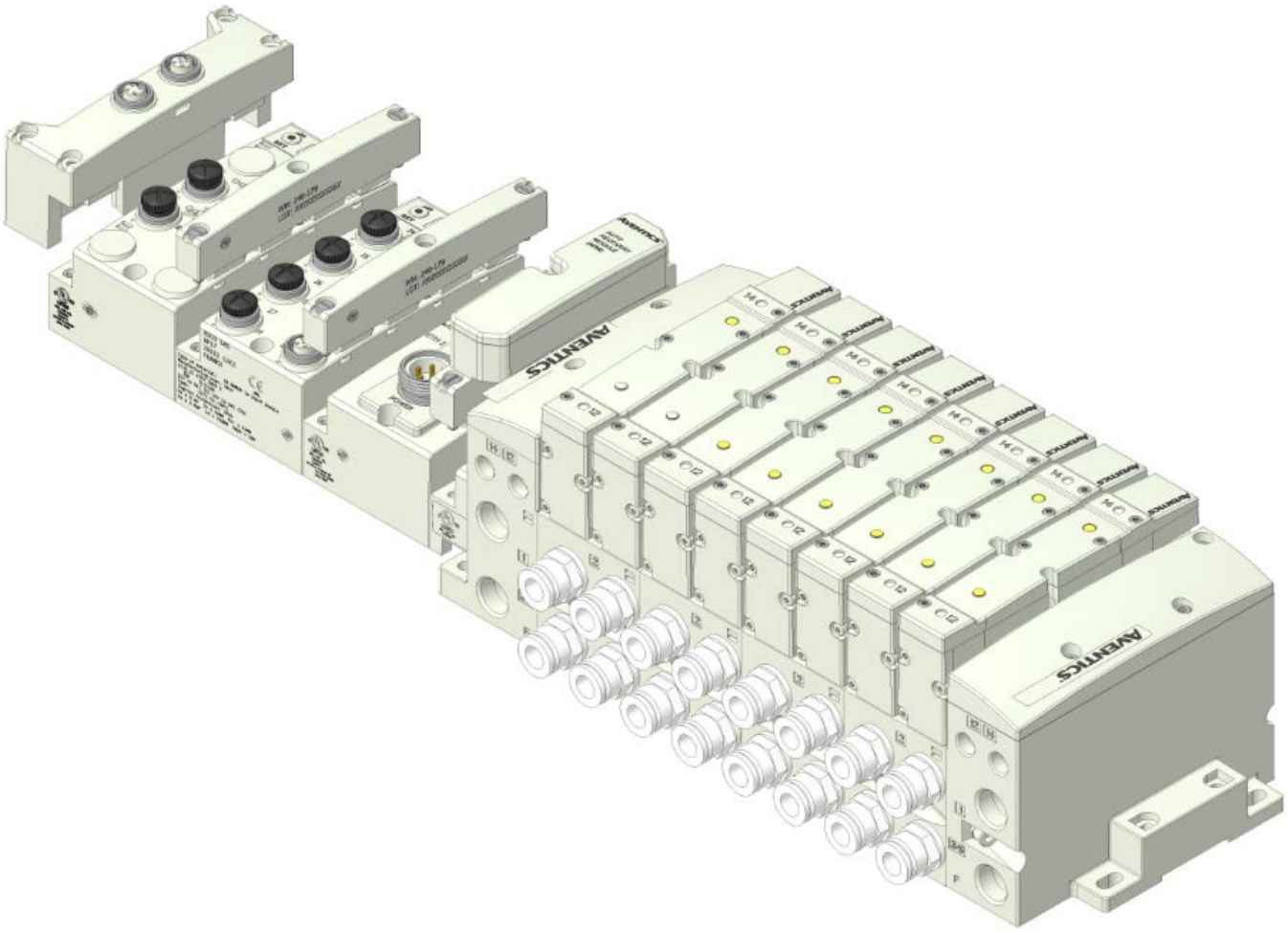
Various discrete modules with integrated graphic display are available. They include digital I/O, analog I/O, and specialty modules which cover various application needs. Pin-outs for all connectors are labeled on the side of the respective modules and are also detailed in the module section of this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

This manual details specific information for configuring and commissioning the Aventics G3 Series product line. For more information relating to pneumatic valving and valve manifold assemblies, please refer to the appropriate valve series catalog at www.asco.com.



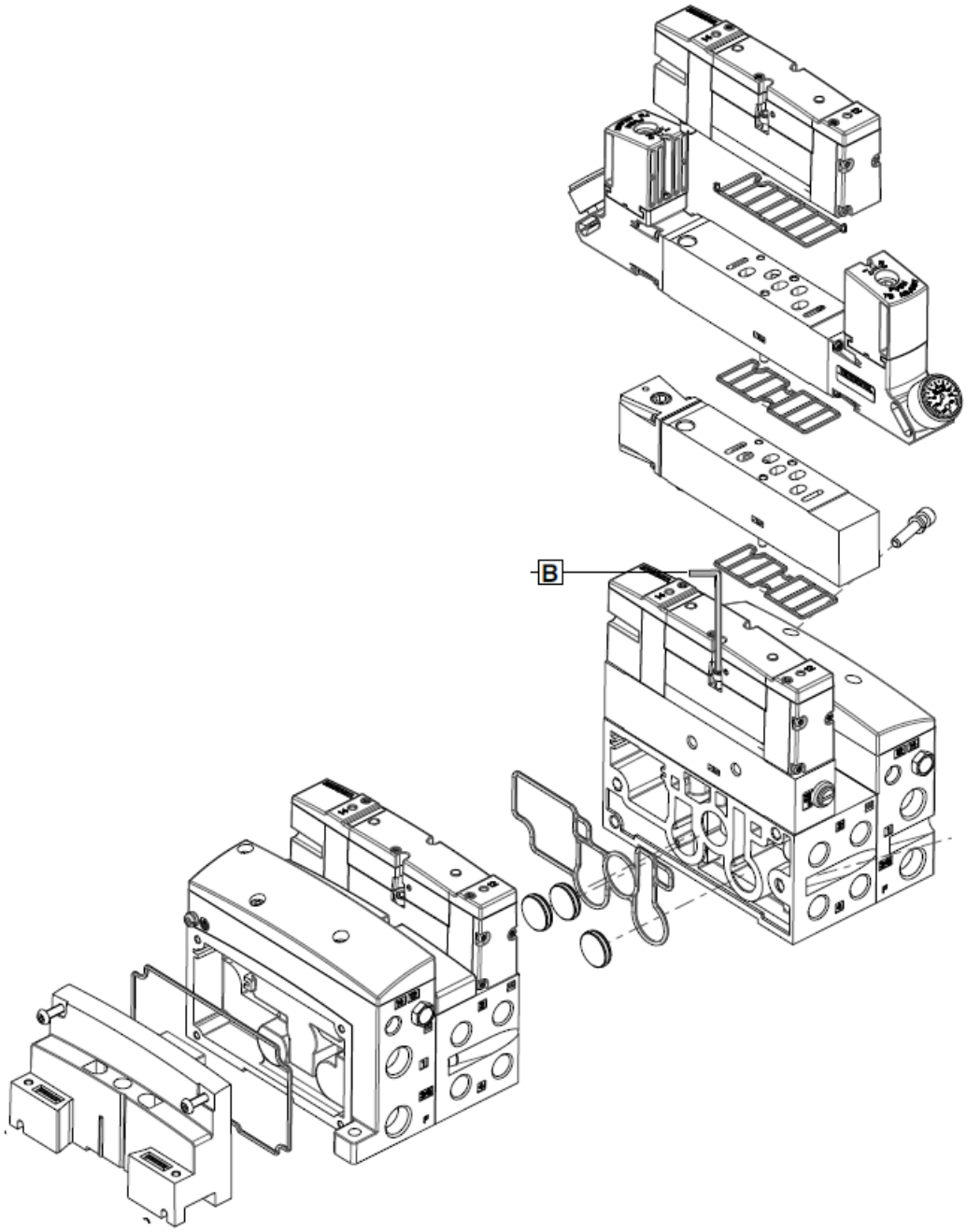
2.1 G3 Electronics Modularity

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 easy assembly and field changes.



2.2 Pneumatic Valve Manifold – 500 Series

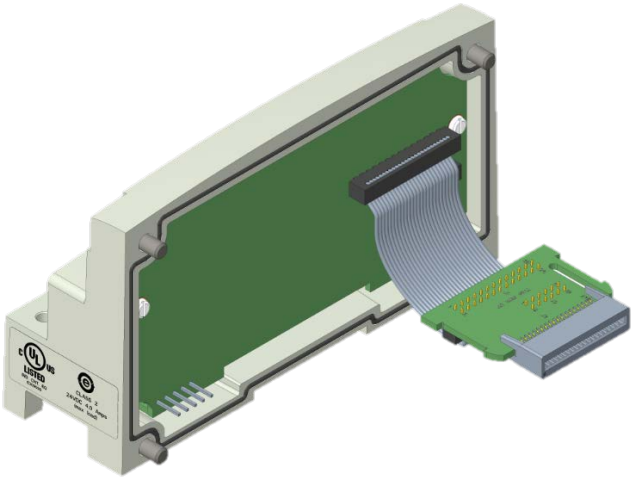
The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires). This allows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

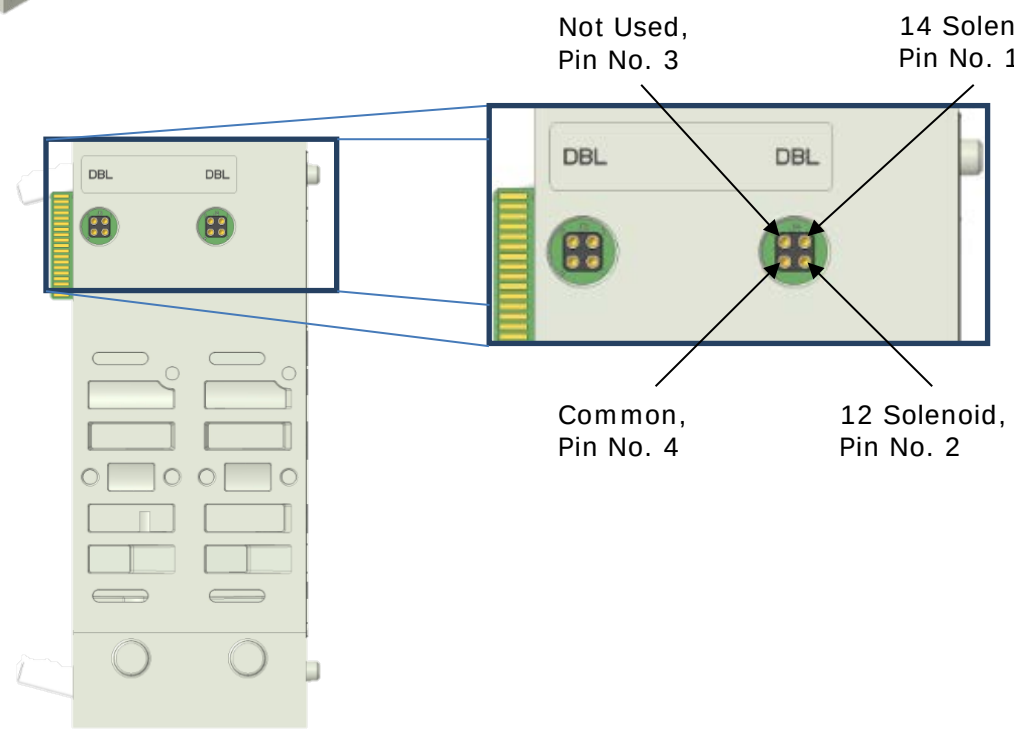


2.3 Manifold Connectors

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 and 503 series utilizing 2 station manifolds.





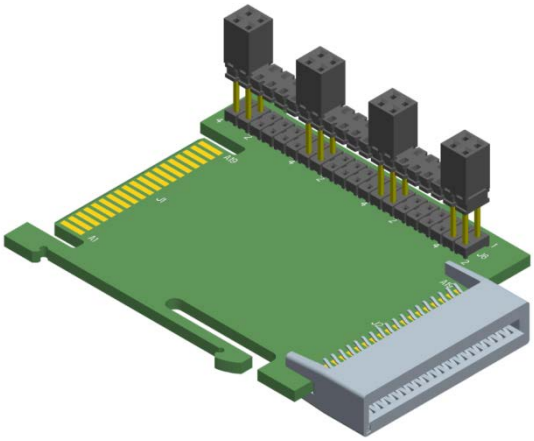
NOTE!

- *A single solenoid valve's coil is always on the "14" end.*

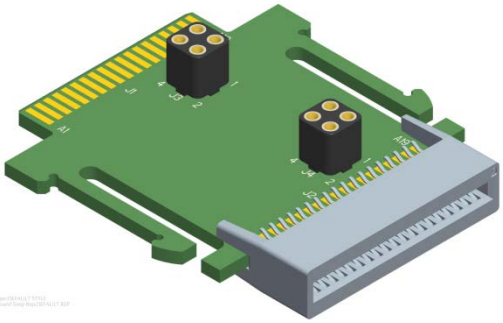
2.4 500 Series Z-Board™ Connectors

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.

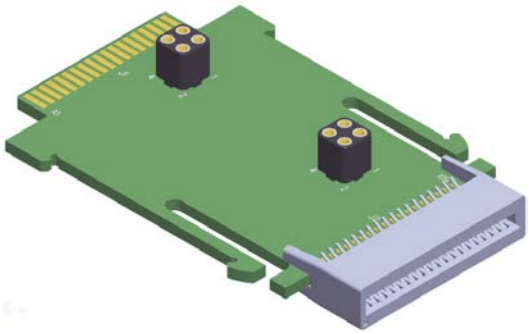
501 Series



502 Series

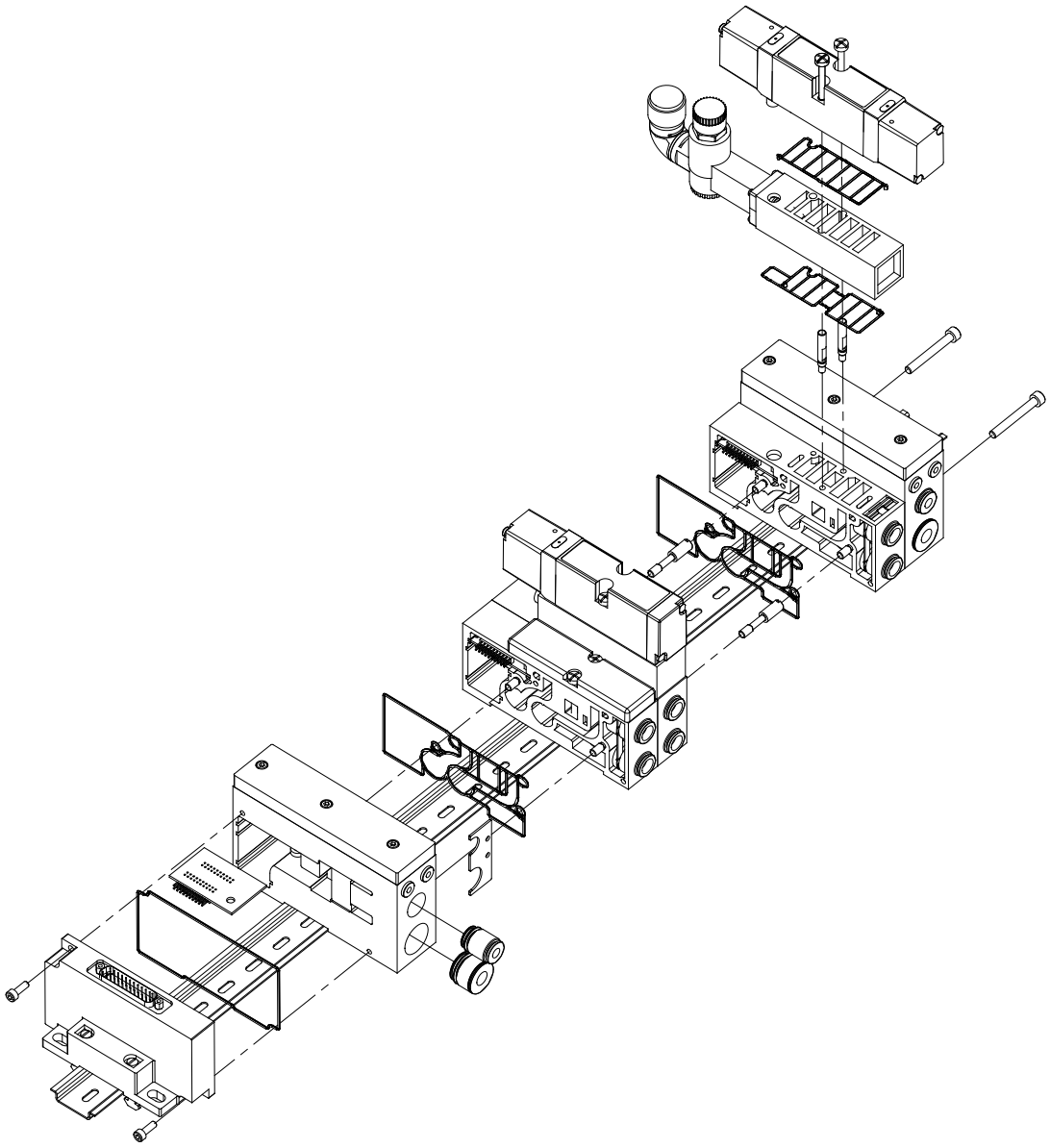


503 Series



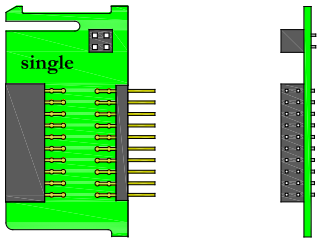
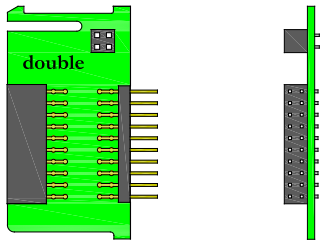
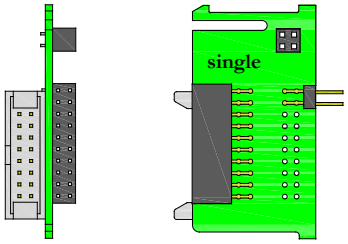
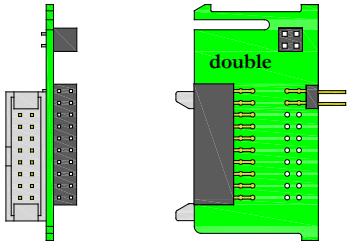
2.5 2000 Series Pneumatic Valve Manifold

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.



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.

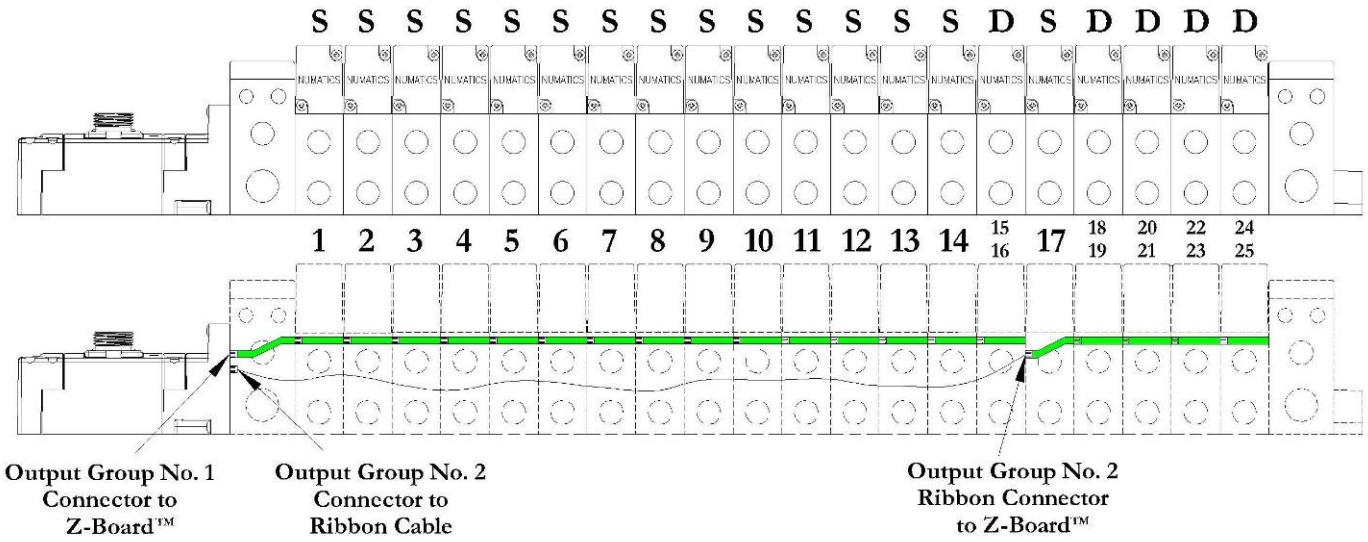
Single Z-Board™	*Double Z-Board™*
	
Ribbon Connection Single Z-Board™	*Ribbon Connection Double Z-Board™*
	

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.

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 ™

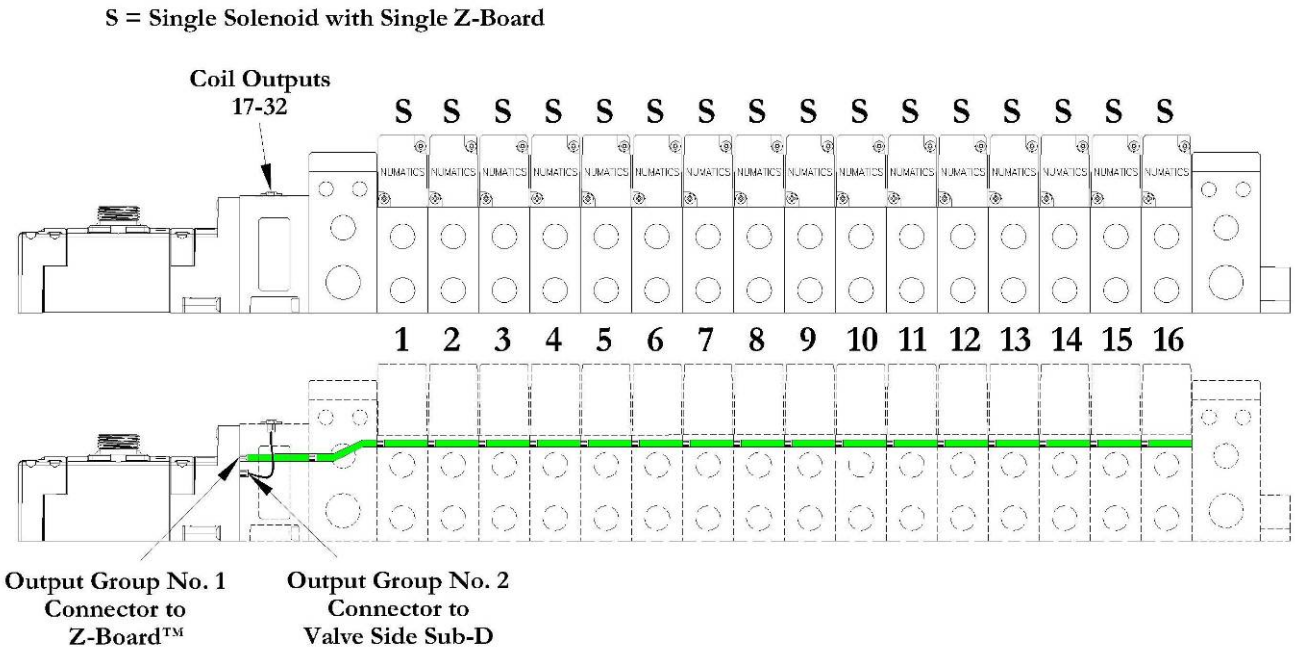


Output Word	0								1							
Output Byte	0								1							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Output Word	1															
Output Byte	2								3							
Output Bit No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	17	18	19	20	21	22	23	24	25	n/a						

2.8 2000 Series Z-Board™ and 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:

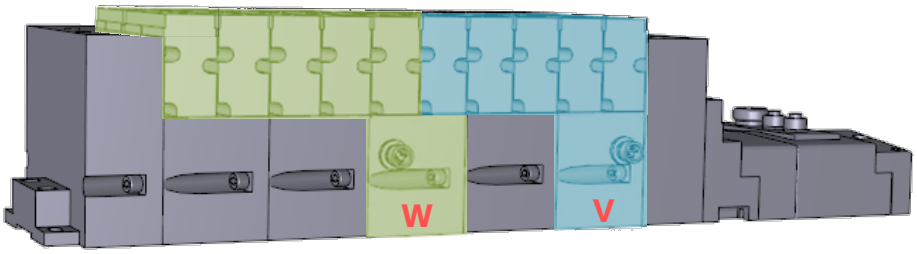


Output Word	0																1													
Output Byte	0								1								2								3							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28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

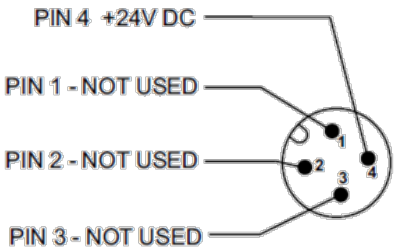
3. Zoned Power

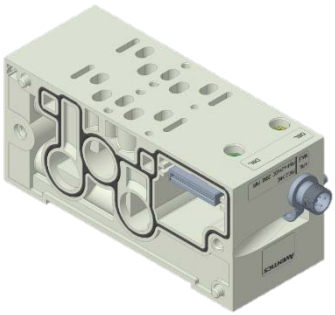
3.1 503 Series Zoned Power application

The Zoned Power Manifold blocks can be incorporated into a 503 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.

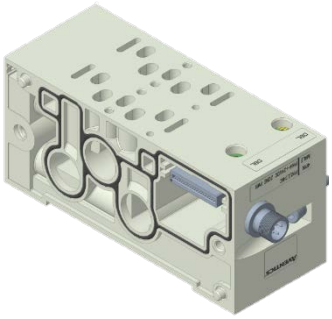


W & V Connector Pin Out





V Wiring Option



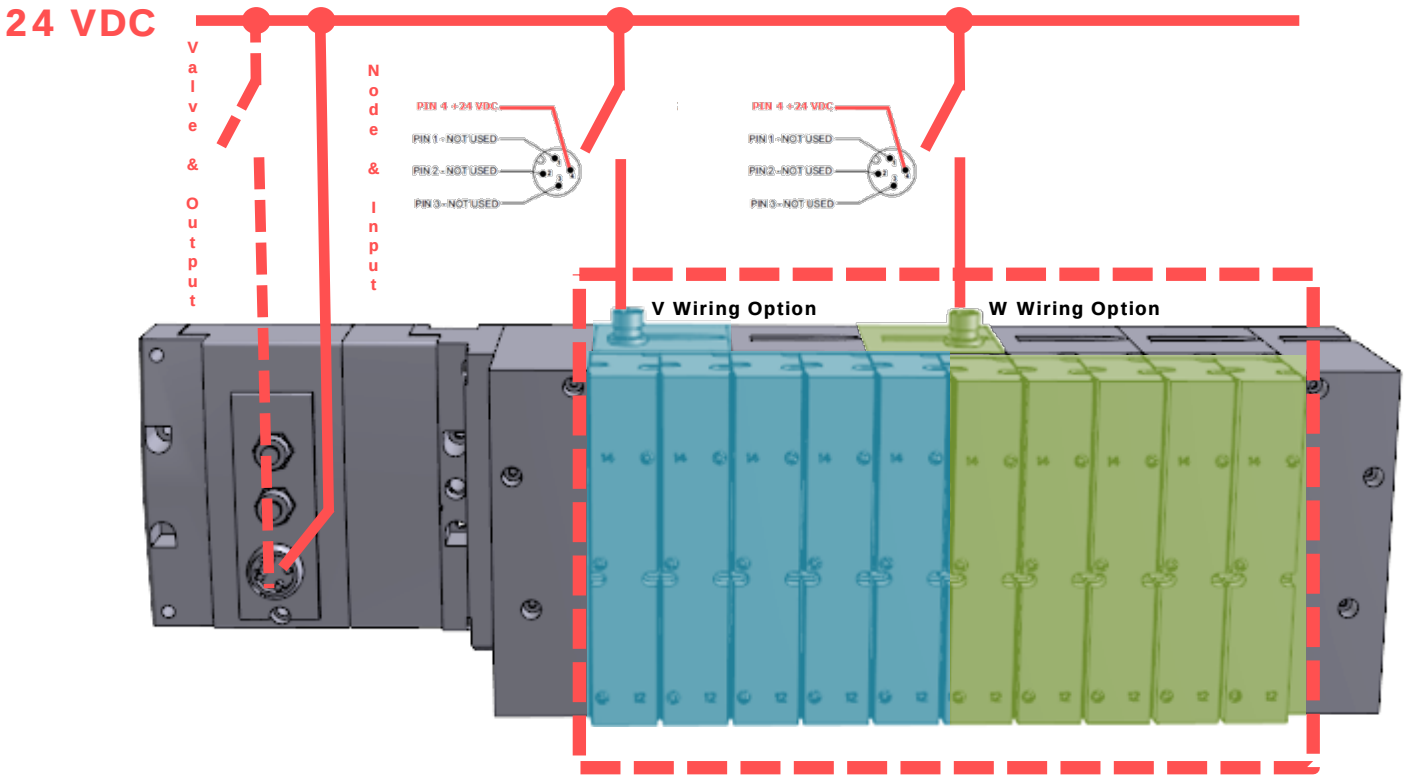
W Wiring Option

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)

3.2 503 Series Zoned Power example

In the example shown below there are two Zoned Power Manifold blocks used. One is a "W" wiring option and the other is a "V" 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 of 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



NOTE!

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.

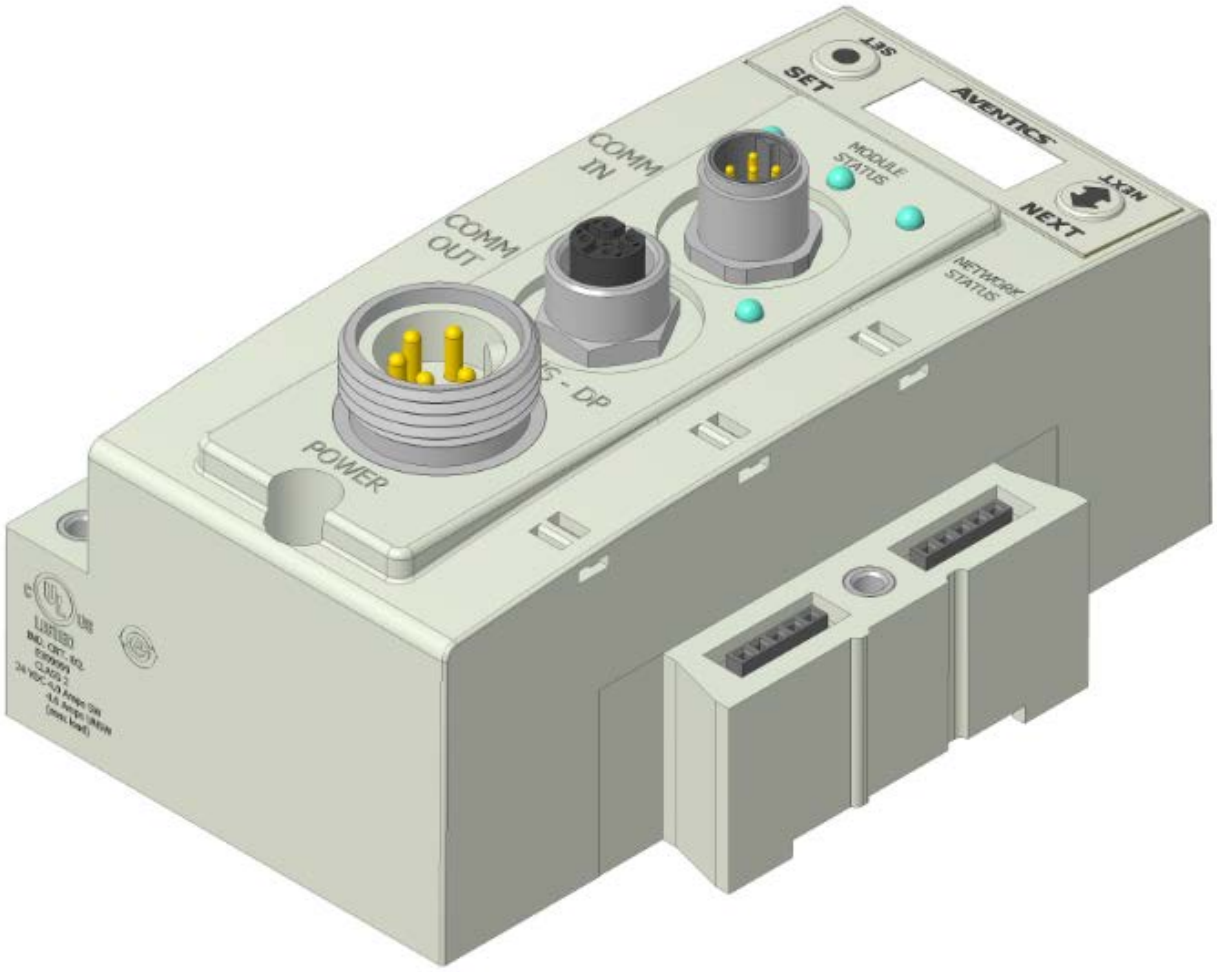
4. Communication Module

4.1 PROFIBUS-DP™ 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).

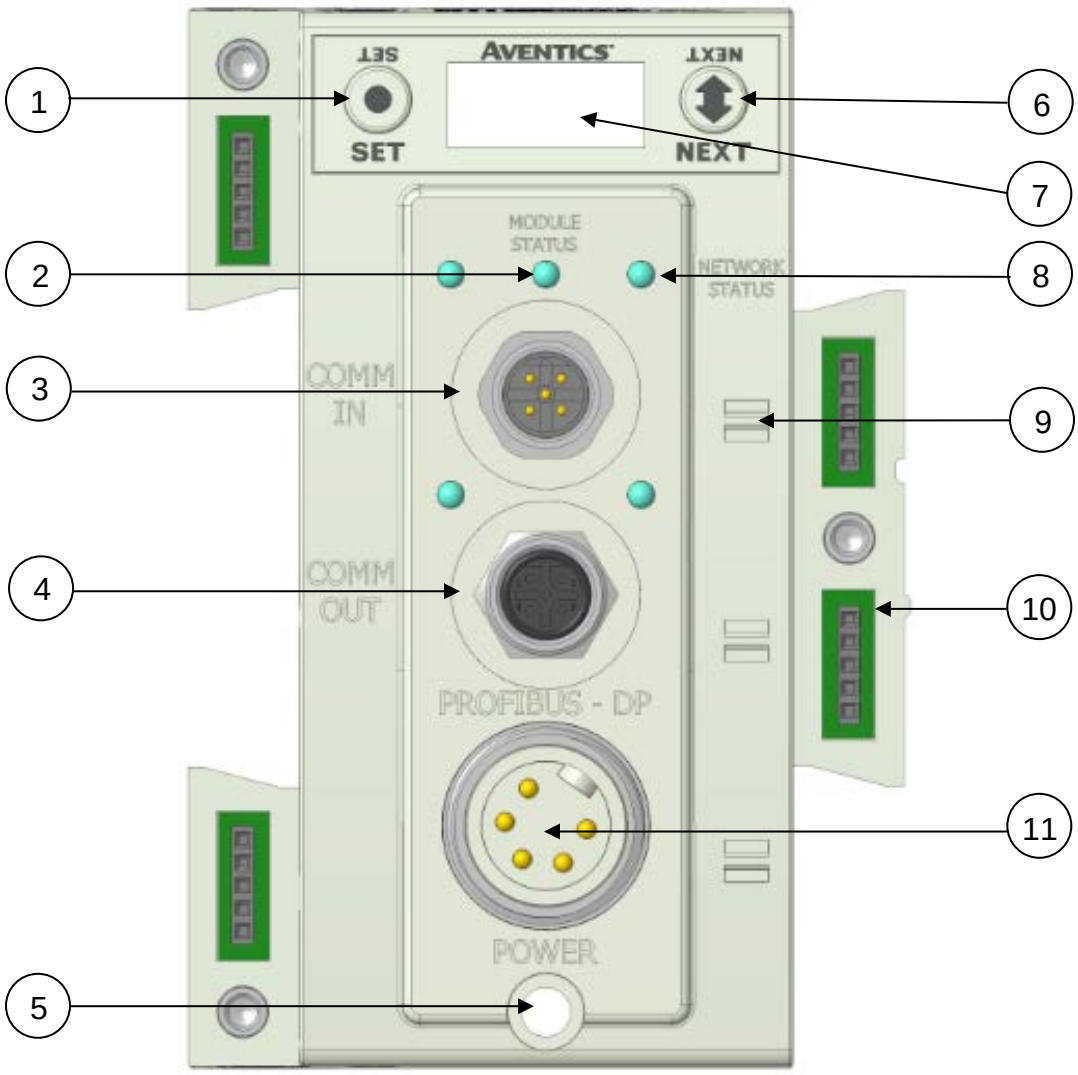
The Aventics G3 PROFIBUS-DP™ node is tested by the PIC to ensure compatibility and interoperability.

Communication Module	*Part Number*
PROFIBUS-DP™ Communication module	240-239



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 M12 Reverse Key Male Communication Connector
4	5 Pin M12 Reverse Key Female Communication Connector
5	Mounting Hole
6	“Next” Button – used to navigate through user menus and to set parameters
7	Graphic Display – used to display parameter information
8	Network Status LED
9	Slot for text ID tags
10	Keying for preventing I/O module insertion
11	5 Pin MINI Male Power Connector



4.3 Connector Pin-Outs

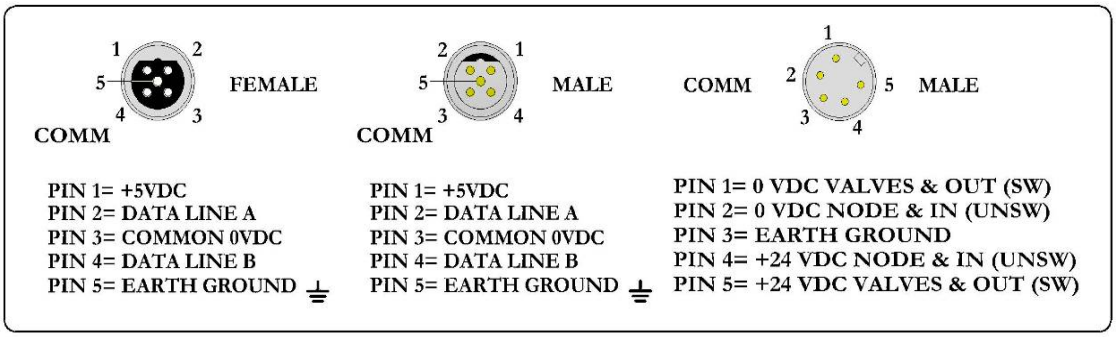
Industry standard connectors are used for communication and power. The PROFIBUS-DP™ communication connectors are a M12 reverse key 5 pin male connector and a M12 reverse key 5 pin female connector. The Power connector is a 7/8" MINI 5 pin male connector.

PROFIBUS Communication Connector Pin-Out

Pin No.	*Function*	*Description*
1	+5 VDC	+5 volt output from node, used for termination of network or auxiliary devices.
2	Data Line A	Profibus-DP™ Communication Line A (Green)
3	0VDC Common	Common for +5V output and Data Lines A & B
4	Data Line B	Profibus-DP Communication Line B (Red)
5	Earth Ground	Internally connected to earth ground (case). Connect to shield of Profibus-DP™ cable.

Power Connector Pin-Out

Pin No.	*Function*	*Description*
1	0 VDC Common (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW
2	0 VDC Common (Node and Inputs)	0 VDC Voltage used to power discrete inputs and node electronics UNSW
3	Earth Ground	Protective Earth
4	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
5	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW



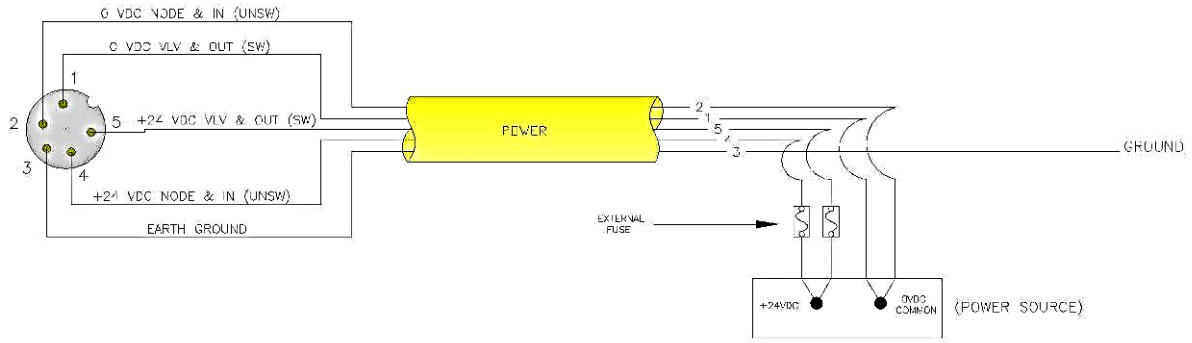
ATTENTION

- *Power common (0 VDC) pins 1 and 2 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 combined 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 pin supplies power to the node electronics. This pin must be powered at all times for communication node to be functional.*
- *To be connected to Class 2 power source only*

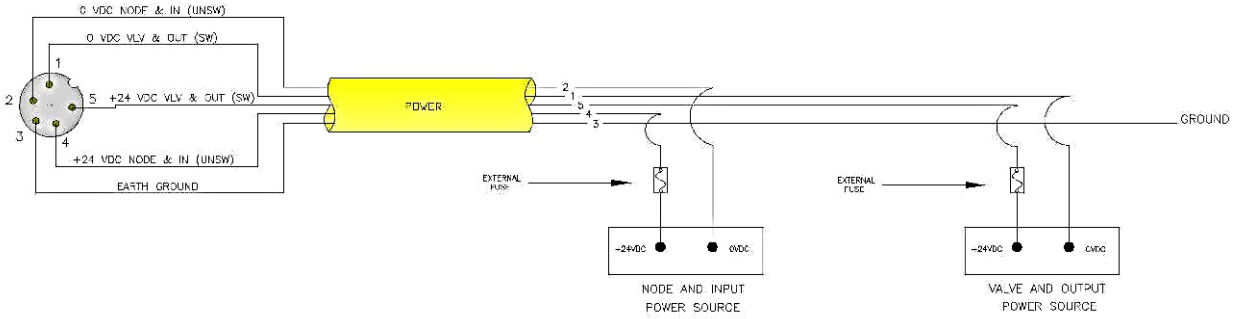
4.4 Electrical Connections

Standard Power Connector Wiring Diagram Examples

Single Power Supply Example (Non-isolated commons)



Separate Power Supply Example (Isolated commons)



ATTENTION

- *Please see page 4-24 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.*
- *SYSTEM MAXIMUM MODULES: Up to 16 I/O modules (units) can be connected to 1 Communication Module not including any Sub-Bus and Miscellaneous modules, or equivalent.*
- 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.

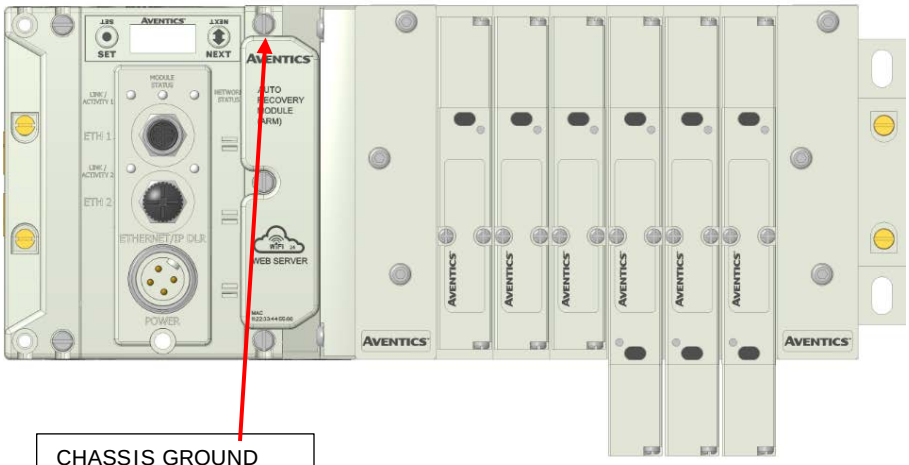
4.5 Ground Wiring

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.

CHASSIS GROUND CONNECTION POINT

500 Series

2000 Series



CHASSIS GROUND CONNECTION POINT

CAUTION

- *Proper grounding will alleviate and 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.*

4.6 Power Consumption

Power Connection

Pin No.	Function	Description
1	0 VDC Common (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW
2	0 VDC Common (Node and Inputs)	0 VDC (-V) Voltage used to power discrete inputs and node electronics UNSW
3	Earth Ground	Protective Earth
4	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
5	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW

Power Rating

- For maximum supply current capability please refer to page 8-53.
- 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 & 5		+24VDC (Node and Inputs) Pins 2 & 4	
			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%	0.05 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%	0.03 A	0.72 W	0.02 A	0.48 W
Valve Adapter (Driver) 500 Series	24 VDC	+/- 10%	0.03 A	0.72 W	0.02 A	0.48 W
501 Series 32+ Valve Driver Board	24 VDC	+/- 10%	0.03 A	0.72 W	0.05 A	1.20 W
502 Series 32+ Valve Driver Board	24 VDC	+/- 10%	0.03 A	0.72 W	0.05 A	1.20 W
503 Series 32+ Valve Driver Board	24 VDC	+/- 10%	0.03 A	0.72 W	0.05 A	1.20 W
Digital Module (M12 Style)	24 VDC	+/- 10%	0.04 A	0.96 W	0.05 A*	1.20 W*
Digital Module (M8 Style)	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 A	0 W	0.08 A*	1.92 W*
Sub-Bus Valve Module	24 VDC	+/- 10%	0 A	0 W	0.03 A*	0.72 W*
580 Sub-Bus Valve Module	24 VDC	+/- 10%	0.034 A	0.8 W	0.04 A*	0.9 W*
Auto Recovery Module (ARM)	24 VDC	+/- 10%	0 A	0 W	0.02 A	0.48 W
ARM-Clip Module	24 VDC	+/- 10%	0 A	0 W	0.02 A	0.48 W
Manual Configuration Module (MCM)	24 VDC	+/- 10%	0 A	0 W	0.01 A	0.24 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.*

4.7 Recommended External Fuses

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

External Fuse Sizing Chart

Power Consumption - Power Connector Pin for Valves and Outputs		
Description		*Current*
Number of Solenoid Valve Coils Energized Simultaneously Number of coils ____ X ____ A (Reference Chart 1 above for specific current draw based on valve series)	=	_____Amps
		+
Total load current drawn by simultaneously energized Discrete Outputs	=	_____Amps
		+
Number of I/O modules installed ___ X 0.023 A	=	_____Amps
		+
Main Valve Driver	=	0.03 Amps
		+
Number of +32 Valve Drivers ___ X 0.03 A	=	_____Amps
Communication Node Power Consumption	=	.006 Amps
		+
Total:		_____Amps
Surge Compensation:	X	1.25
Suggested External +24 VDC (Valves and Outputs) Fuse Value:		_____Amps

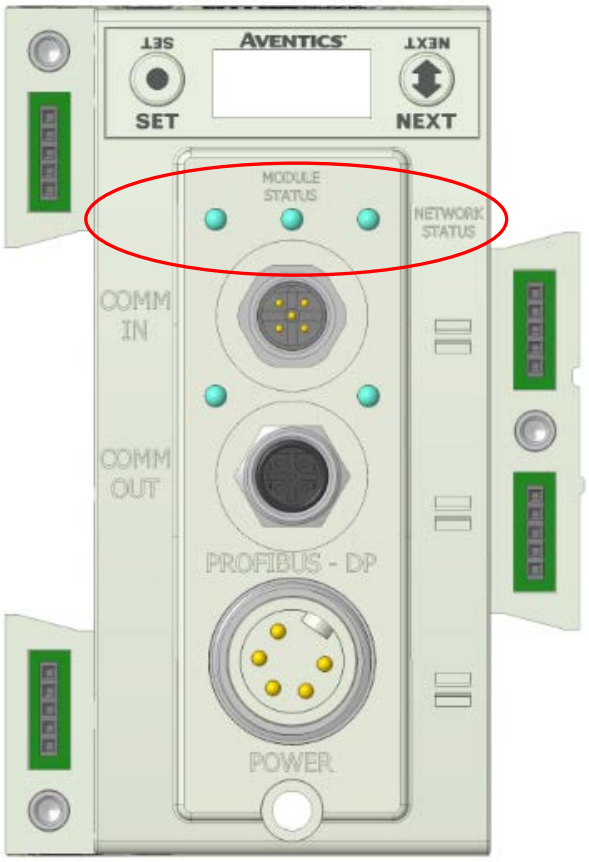
Power Consumption – Power Connector Pin for Node and Inputs		
Description		*Current*
Communication Node Power Consumption	=	.091 Amps
		+
Total load current drawn by Sensor Devices from Discrete Inputs source	=	_____Amps
		+
Number of I/O modules installed ___ X 0.075 A	=	_____Amps
		+
Total:		_____Amps
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.*

4.8 Diagnostics - Communication Module LED Functions

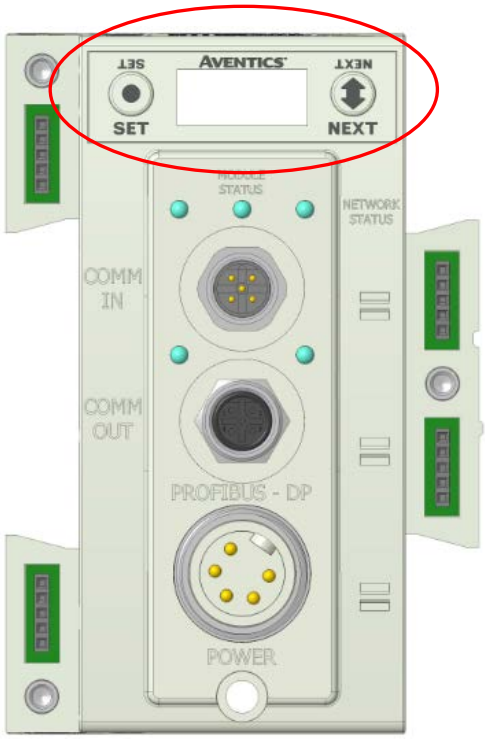
Upon power up, the Module and Network Status LEDs indicate the state of the unit. There are two LEDs on the G3 PROFIBUS-DP™ node. The LEDs functions are described in the table below.



LED Name	*Color*	*Status*	*Description*
NETWORK STATUS	Red	ON	Bus Error. Bus Connection failed or off-line; Invalid parameterization, configuration, or bus address
		FLASHING	The module configuration (I/O and valves) in the user application is different than the physical configuration of the manifold.
	Green	ON	Normal operation. The bus link is OK. Baud-rate detected parameterization and configuration OK. Unit is in data exchange mode.
MODULE STATUS	Red	ON	Critical hardware fault. The microprocessor is not running.
	Green	ON	Normal operation. Node hardware is OK.
	Green / Red	FLASHING	Module is in self-test mode. Cycle power to end self-test mode.

5. G3 Graphic Display

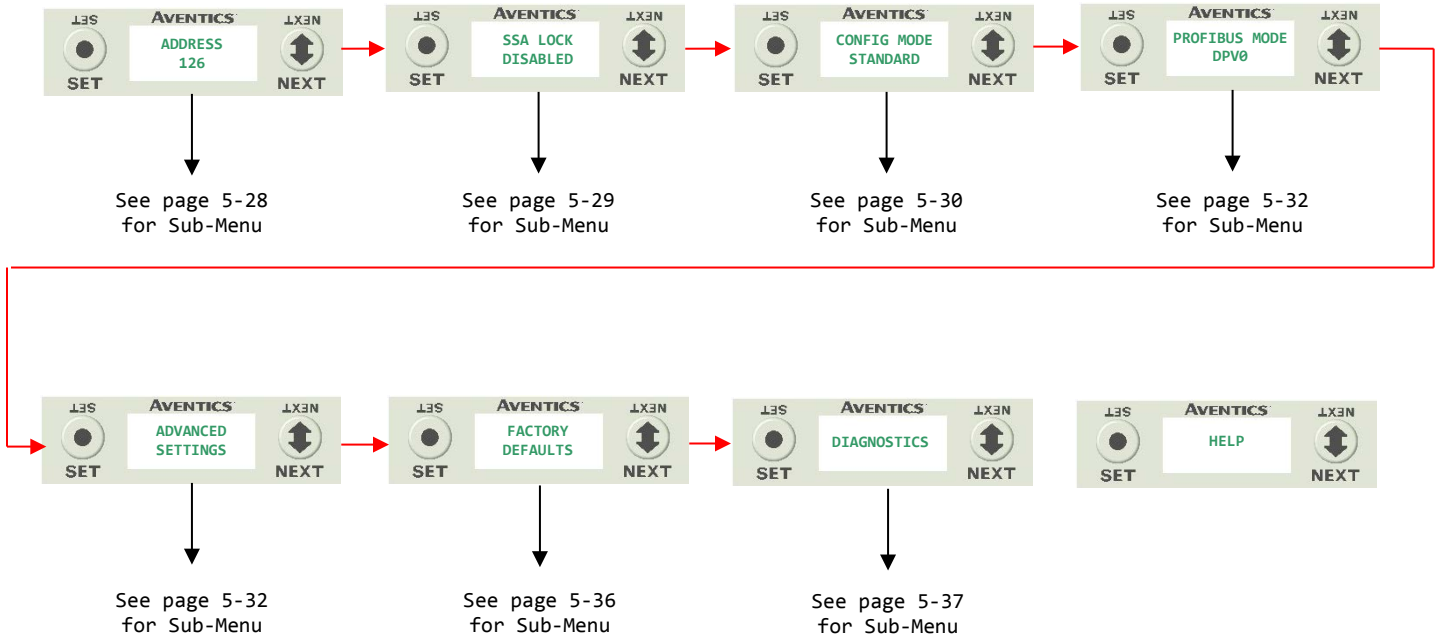
The G3 Communication and I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as showing diagnostic information.



The following graphic displays represent the main menu selections of the Profibus DP 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 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!*

5.1 Main Menu Structure

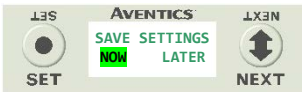
Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus.



NOTE!

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

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 hundreds digit of the node address.
   Press the **SET** button to select the hundreds digit and move into the tens digit selection.
3. 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.
   Change the ones digit using the same procedure.
4. Press the **NEXT** button to select **Y**es or **N**o to accept the address shown on the display,
   a. Selecting **N**o will bring you back to the main Address menu.
   b. Selecting **Y**es 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 to 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- 126 are valid.*
- *Address 126 is the Factory Default node address.*

5.3 SSA Lock Sub-Menu

Steps to Set SSA (Set Slave Address) LOCK

1. Press the **SET** button to enter the SSA Lock sub-menu.

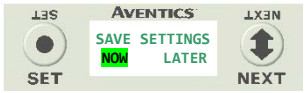
2. Press the **NEXT** button to enable / disable the SSA Lock
   a. ENABLE
      - allows the address to be set only through the G3 graphic display
   b. DISABLE
      - allows the address to be set through either the G3 graphic display or software
   c. RETURN (this will return you to the top of SSA LOCK menu)

Press the **SET** button to confirm your choice.

3. Press the **NEXT** button to select **Y**es or **N**o to accept the setting
   a. Selecting **N**o will bring you back to the main SSA LOCK menu.
   b. Selecting **Y**es will take you to the following SAVE SETTINGS menu.

Press the **SET** button to confirm your choice

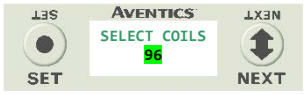
Saved Setting Steps

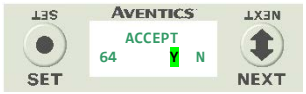


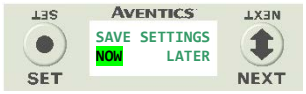
4. Press the **NEXT** button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the setting to be saved in temporary memory to allow you to make additional parameter changes before the node is reset. However, you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

Press the **SET** button to confirm your choice.

5.4 Config Mode Sub-Menu







Config Mode Settings

- Press the **SET** button to enter the CONFIG MODE sub-menu.

- Press the **SET** button and the **NEXT** button to change the number of coils.
  a. 64 - allows the node to recognize one additional valve driver.
  b. 96 - allows the node to recognize two additional valve drivers
  c. 128 - allows the node to recognize three additional valve drivers
  d. RETURN – Takes you back to the main menu

Press the **SET** button to confirm your choice.

- Press the **NEXT** button to select **Y**es or **N**o to accept the setting
  a. Selecting **N**o will bring you back to the main CONFIG MODE menu.
  b. Selecting **Y**es will take you to the following SAVE SETTINGS menu.

Press the **SET** button to confirm your choice

Saved Setting Steps

- 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 setting to be saved in temporary memory to 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.

5.5 Profibus Mode

Profibus Mode Settings

1. Press the **SET** button to highlight mode DPV0

2. Press the **NEXT** button to scroll the choices for the desired profibus mode

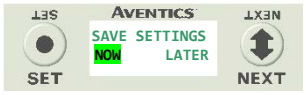
    a. DPV0
    b. DPV1
    c. RETURN

    Press the **SET** button to confirm your choice.

3. Press the **NEXT** button to select **Y**es or **N**o to accept the setting
    a. Selecting **N**o will bring you back to the main Profibus Mode menu.
    b. Selecting **Y**es 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 setting to be saved in temporary memory to 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.

5.6 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 CONFIG MENU / SET BRIGHTNESS.
   Press the **SET** button to enter the CONFIG MENU / SET BRIGHTNESS.

3. Press the **NEXT** button to scroll the choices for the desired brightness of the LCD display for all modules on the G3 system.

   a. LOW
   b. MEDIUM
   c. HIGH (Factory Default)
   d. RETURN (this will return you to the SET FAULT/IDLE menu)

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.*

5.7 Advanced Settings – Flip Display

Flip Display Settings

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

2. Press the **NEXT** button to scroll to the ADVANCED MENU /FLIP DISPLAY.
   Press the **SET** button to enter the ADVANCED MENU / FLIP DISPLAY.

3. Press the **NEXT** button to scroll the choices for flipping the LCD display for all modules on the G3 system 180.

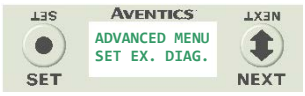
   a. YES
   b. RETURN (this will return you to the ADVANCED menu)

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

5.8 Advanced Settings - Extended Diagnostics

Extended Diagnostic Settings

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



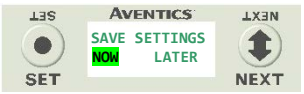
2. Press the **NEXT** button to scroll to the ADVANCED MENU / SET EX. DIAG

3. Press the **SET** button to enter the ADVANCED MENU / SET EX. DIAG

4. Press the **NEXT** button to scroll the choices for the desired brightness of the LCD display for all modules on the G3 system.

   a. DEVICE
   b. DVC. ID. CHN
   c. ID. CHN.HF
   d. RETURN (this will return you to the ADVANCED MENU / SET EX. DIAG menu)

Apply Changes 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 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.

5.9 Advanced Settings - Parameters

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)

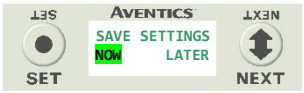
   Press the **SET** button to confirm your choice.

   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 **Y**es or **N**o to accept the selection.
   a. Selecting **N**o will bring you back to the main menu.
   b. Selecting **Y**es 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.

5.10 Factory Defaults

Factory Default Settings

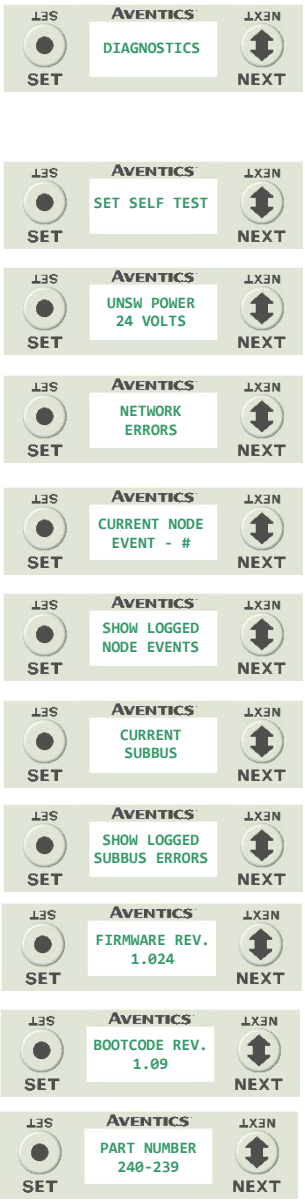
1. Press the **SET** button to enter the FACTORY DEFAULTS Sub-Menu.

2. Press the **NEXT** button to select **Y**es or **N**o.
   a. Selecting **N**o will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting **Y**es will cause the node to reset and return all parameters to the factory default conditions.

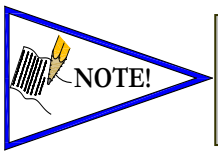
   Press the **SET** button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	*Default*
Node Address	126
Profibus mode	DP-V0
SSA Lock	Disabled
Brightness	High

5.11 Diagnostics



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. SET SELF TEST
      - Please see following page for description
   b. UNSW POWER
      - Displays voltage level of unswitched power (Node & Inputs)
   c. NETWORK ERRORS - ERROR CODE
      - Displays fieldbus network errors
   d. CURRENT COMM. EVENT NUMBER
      - Displays node event number
   e. SHOW LOGGED COMM. EVENTS
      - Displays log of node events
   f. CURRENT SUBBUS ERROR
      - Displays sub bus errors
   g. SHOW LOGGED SUBBUS ERRORS
      - Displays log of sub bus errors
   h. FIRMWARE REV.
      - For service personnel
   i. BOOTCODE REV.
      -For service personnel
   j. 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 4) 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).*

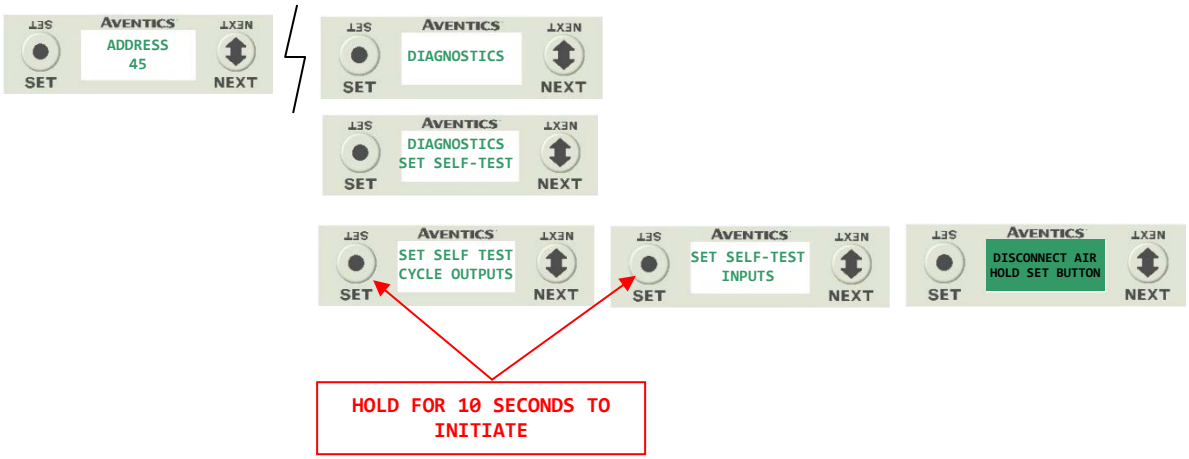
5.12 Diagnostics - Self Test Mode

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.



5.13 Network and Sub-Network Error Codes

Error Code	Error	Error Description	Module No.
Main Network			
1		Output power not present on communication module	Comm.
2		Node / Input power is below 19VDC	Comm.
4		Error associated with a sub-bus module (see sub-bus error)	Comm.
8		short circuit detected on the sub-bus	Comm.
Sub Network			
22	1	Module did not respond	1
23	1	Module did not respond	2
24	1	Module did not respond	3
25	1	Module did not respond	4
26	1	Module did not respond	5
27	1	Module did not respond	6
28	1	Module did not respond	7
29	1	Module did not respond	8
2A	1	Module did not respond	9
2B	1	Module did not respond	10
2C	1	Module did not respond	11
2D	1	Module did not respond	12
2E	1	Module did not respond	13
2F	1	Module did not respond	14
30	1	Module did not respond	15
31	1	Module did not respond	16
42	2	Switched power is missing	1
43	2	Switched power is missing	2
44	2	Switched power is missing	3
45	2	Switched power is missing	4
46	2	Switched power is missing	5
47	2	Switched power is missing	6
48	2	Switched power is missing	7
49	2	Switched power is missing	8
4A	2	Switched power is missing	9
4B	2	Switched power is missing	10
4C	2	Switched power is missing	11
4D	2	Switched power is missing	12
4E	2	Switched power is missing	13
4F	2	Switched power is missing	14
50	2	Switched power is missing	15
51	2	Switched power is missing	16
62	3	Combination of errors 1 and 2	1
63	3	Combination of errors 1 and 2	2
64	3	Combination of errors 1 and 2	3
65	3	Combination of errors 1 and 2	4
66	3	Combination of errors 1 and 2	5
67	3	Combination of errors 1 and 2	6
68	3	Combination of errors 1 and 2	7
69	3	Combination of errors 1 and 2	8
6A	3	Combination of errors 1 and 2	9
6B	3	Combination of errors 1 and 2	10
6C	3	Combination of errors 1 and 2	11
6D	3	Combination of errors 1 and 2	12
6E	3	Combination of errors 1 and 2	13
6F	3	Combination of errors 1 and 2	14
70	3	Combination of errors 1 and 2	15
71	3	Combination of errors 1 and 2	16

5.14 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.

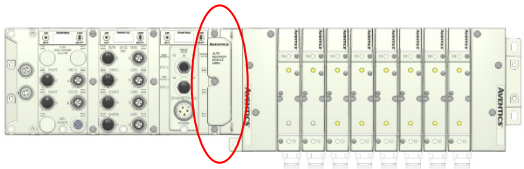
Displayed when a short circuit condition is detected on a valve coil

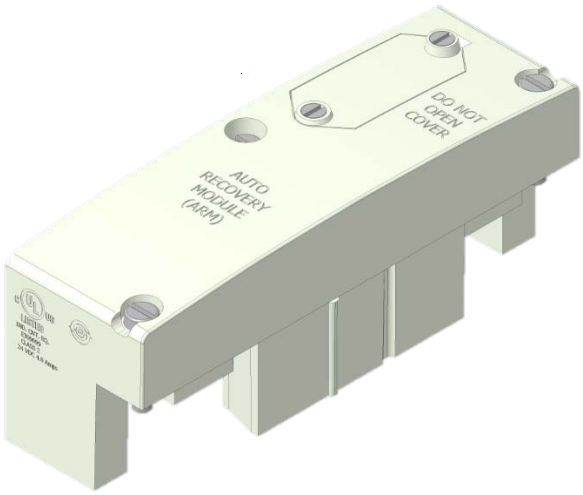
Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration

Displayed when +24 VDC on Pin No. 1 and 5 (Valves and Outputs) is not present or below 22 VDC

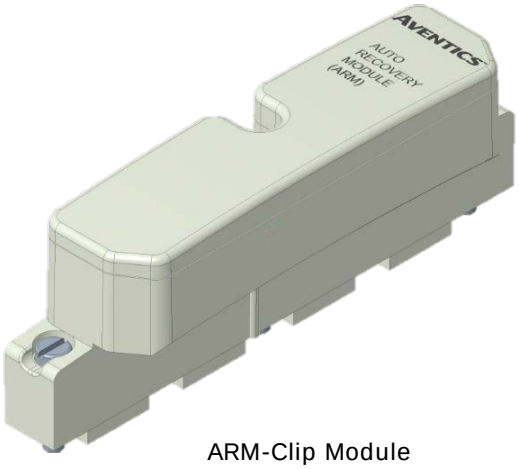
Displayed when +24 VDC on Pin No. 2 and 4 (Node and Inputs) is below 19 VDC

6. ARM – Auto Recovery Module





ARM Module (Legacy)

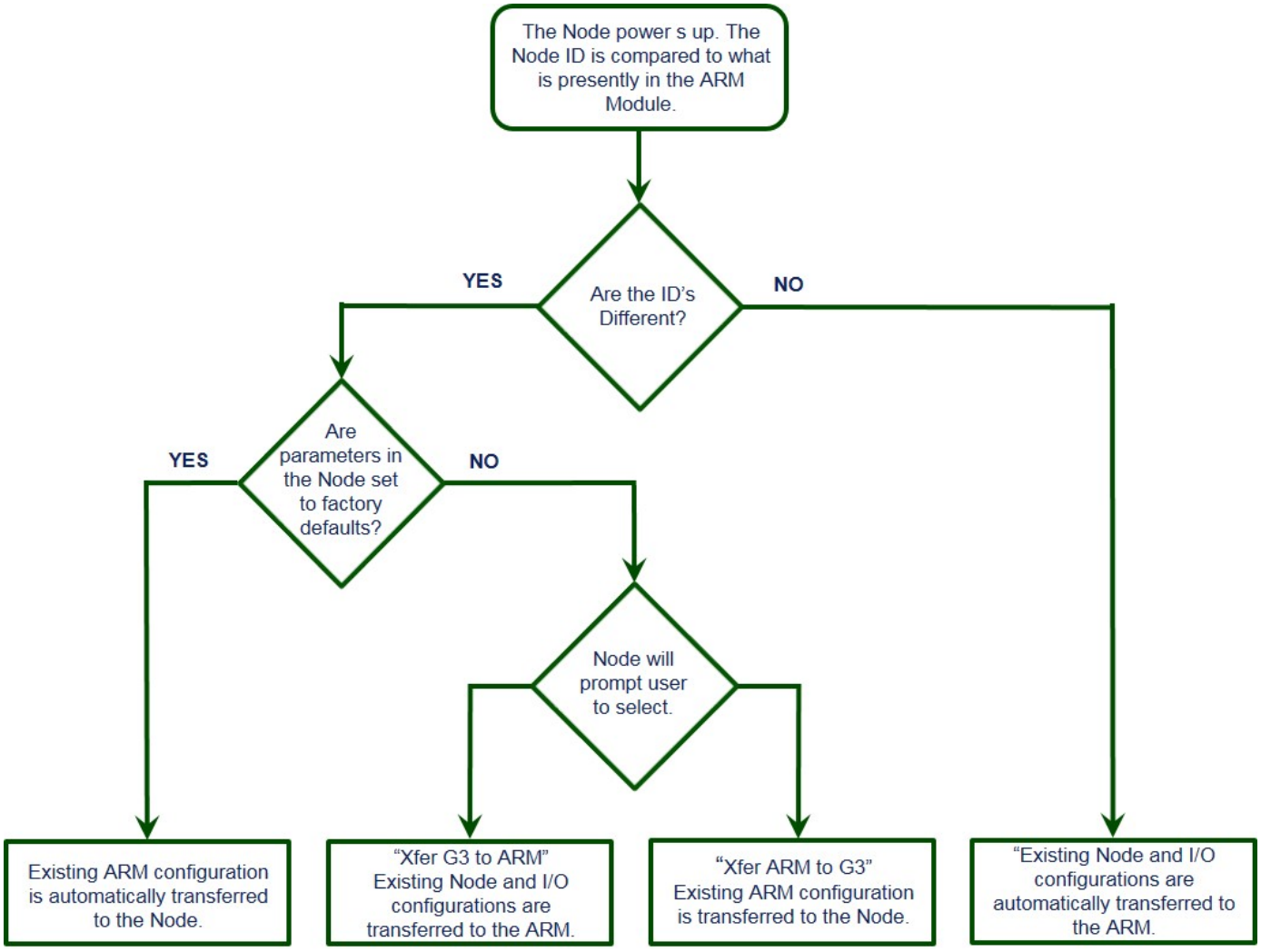


ARM-Clip Module

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 preserve the manifold system parameters even during catastrophic failure. During the power-up process it 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 automatically disconnects itself from the power circuits while still mechanically attached to the manifold.

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

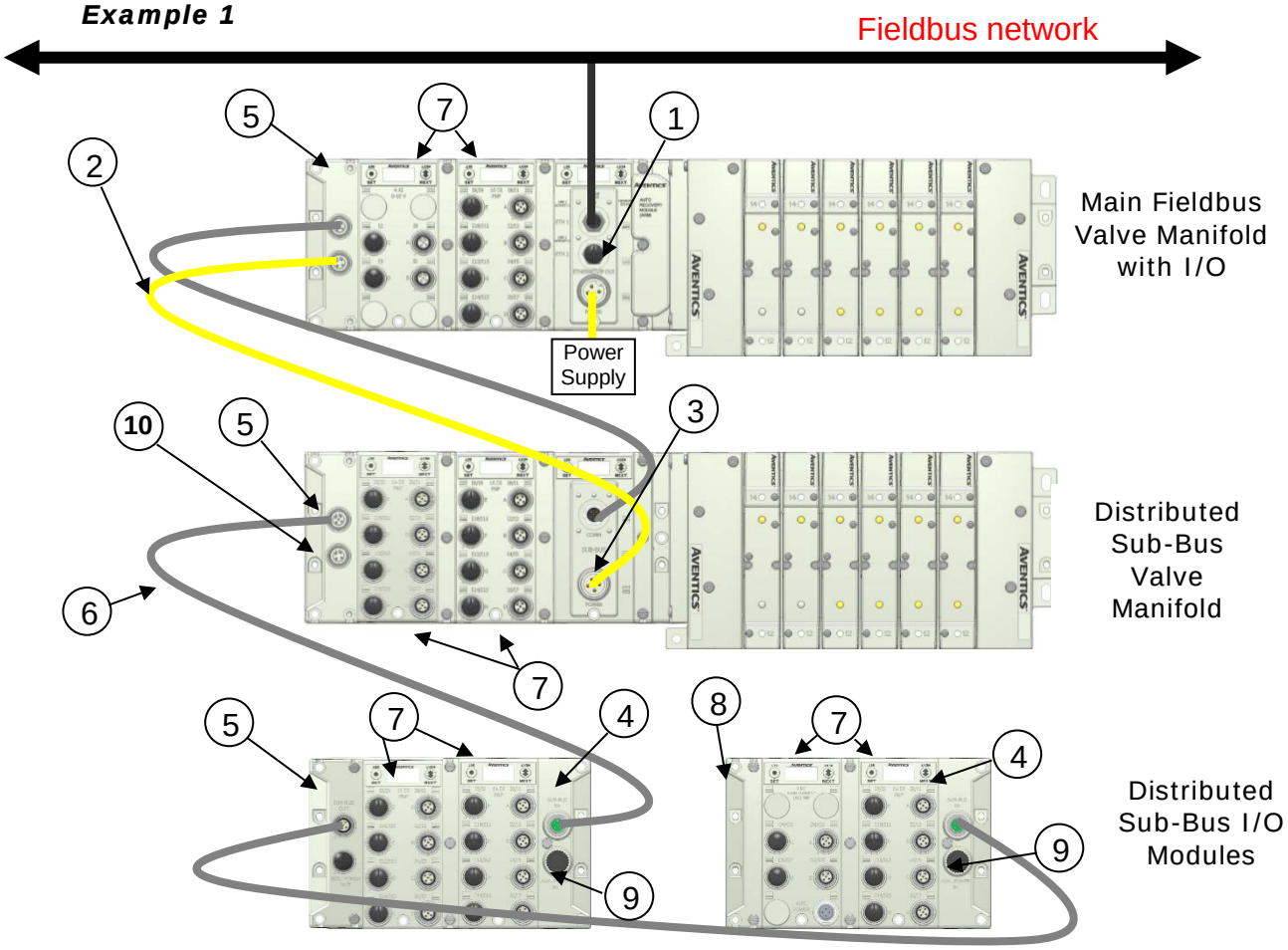
6.1 ARM process flowchart



7. Distribution

Distribution of I/O capability can be easily achieved with the G3 platform by means of Sub-Bus modules. I/O modules, valve manifolds and/or a combination of both can be simply separated from the main manifold and distributed via a sub-bus communication cable. The G3 platform uses the same I/O modules on the main manifold as on the distribution chain. The main communication module can control up to 16 I/O modules either on the main manifold or as part of the sub-bus connections. To utilize the sub-bus distribution capabilities the Sub-Bus OUT module must be located on the end of the main communication manifold and a Terminator Module must be located at the last sub-bus component.

Example 1



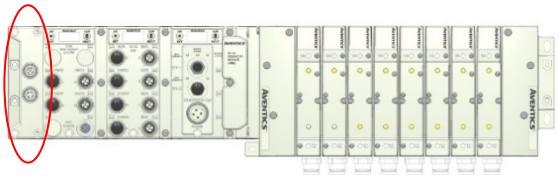
Detail No.	Description
1	Main Communication Module (Node)
2	Sub-Bus Power Cable (Can be connected to separate power supply for isolated power control)
3	Distributed Sub-Bus Valve Module
4	Sub-Bus IN module
5	Sub-Bus OUT module
6	Sub-Bus Communication Cable
7	I/O Modules
8	Terminator Module (Used to terminate sub-bus)
9	Aux. Power IN (Used to augment Input power and/or supply power to Output modules)
10	Aux. Power OUT (Can be used to supply power to distributed modules)

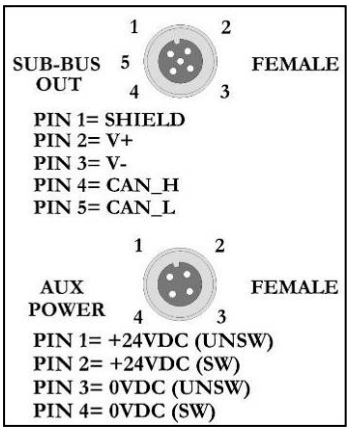
7.1 Sub-Bus Distribution Modules

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.

Description	*Replacement Part Number*
Sub-Bus Out Module with Din Rail Mounting	240-244
Sub-Bus Out module without Din Rail Mounting	240-183

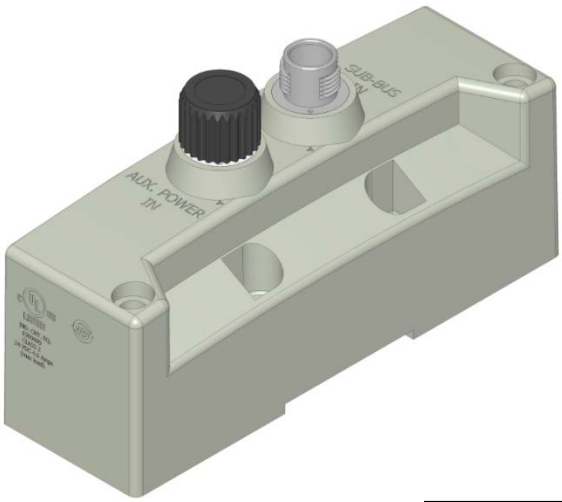


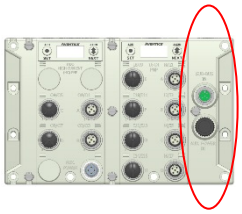


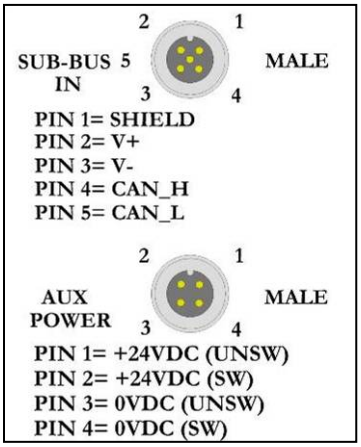
Sub-Bus In Modules

- 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 Sub-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



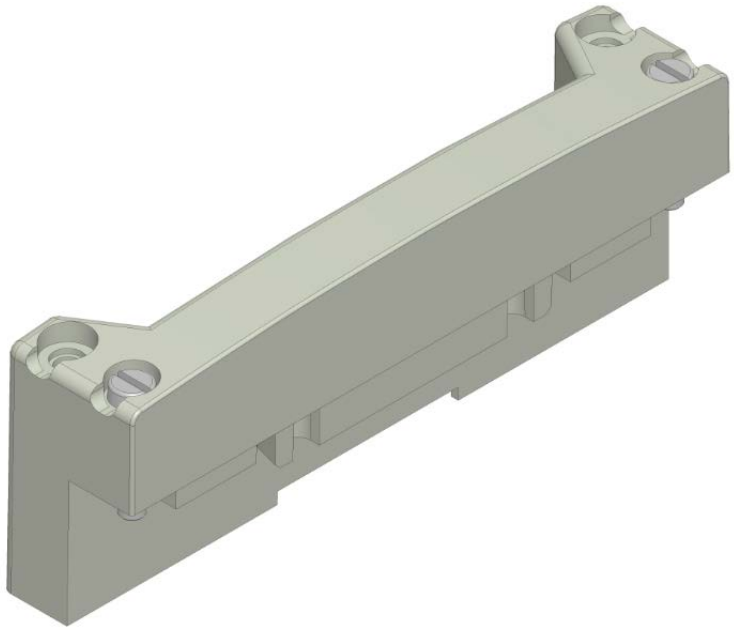


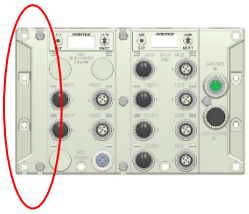


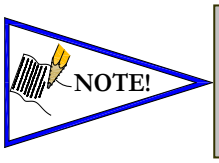
Terminator Module

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

Description	*Part Number*
Terminator Module with Din Rail Mounting	240-245
Terminator Module without Din Rail Mounting	240-184





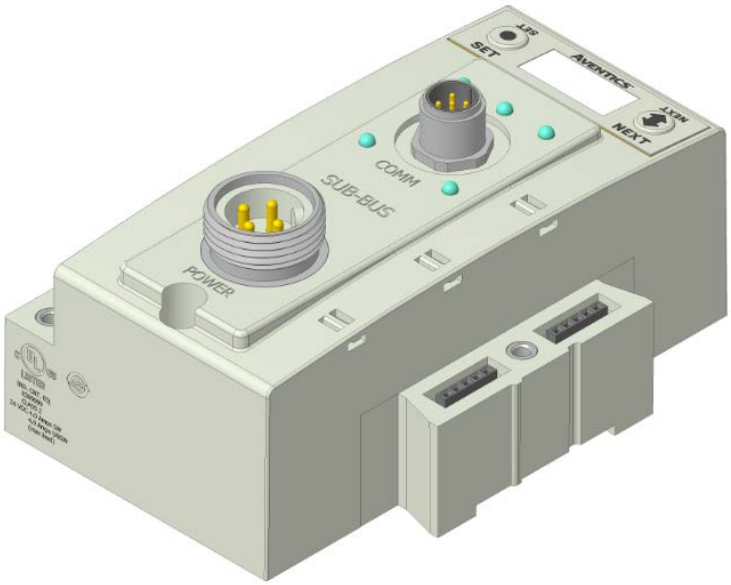


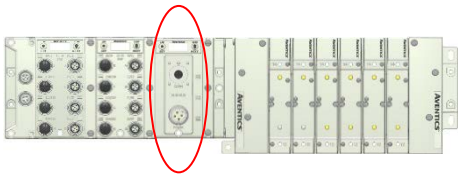
- *The terminator module is required to be installed in the G3 system for proper operation*

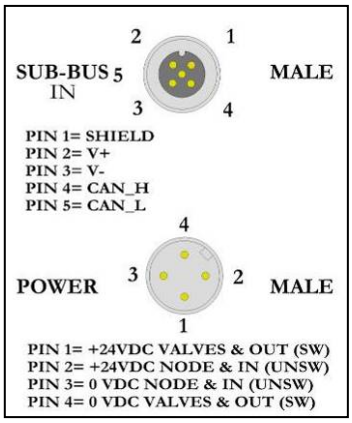
Sub-Bus Valve Module

- 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





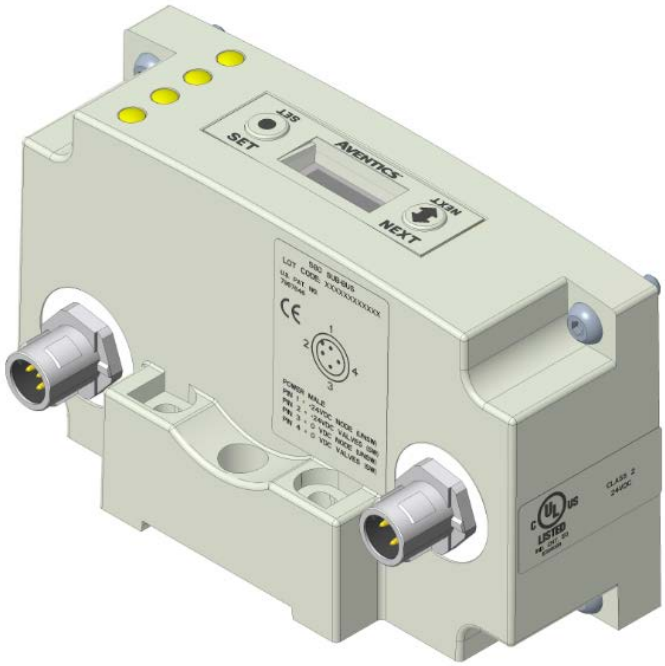


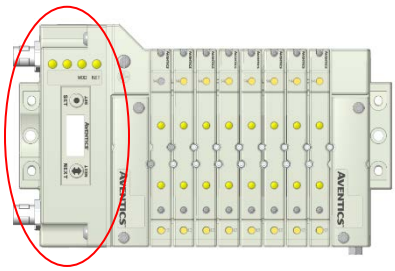
- *There is a 0.8 VDC drop in power across this module. Please consider this if distributing the Aux. Power after this module.*

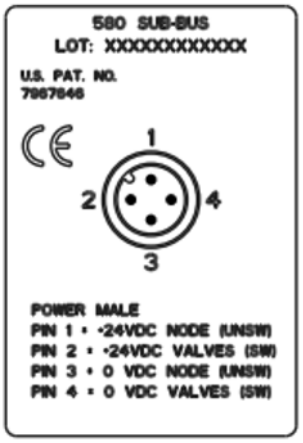
580 Sub-Bus Valve Module

- 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





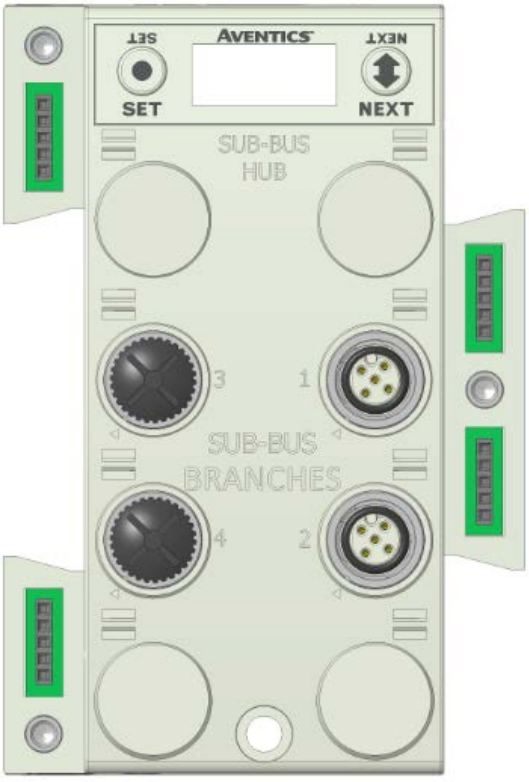


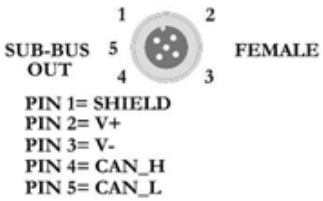
Sub-Bus Hub Module

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





7.2 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

TC05F2000000071V – 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

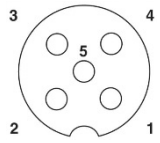
TECHNICAL DATA	CABLE	CONNECTORS	BULK CABLE
Molded Body / Insert	TPU	Zinc - Nickel Plated	N/A
Coupling Nut	Zinc - Nickel Plated	Brass - Nickel Plated	N/A
Cable Jacket Material	PUR	N/A	Gray RAL 7001
Cable O.D.	6.70 mm	N/A	6.70 mm
Voltage Rating (Nominal)	60 Volts	60 Volts	60 Volts
Current Rating	4.0 Amps	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

G3 Sub-Bus Field Wiring Directions

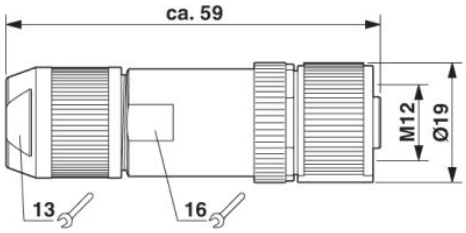
The purpose of this document is to instruct the end user of the proper wiring techniques required to make a G3 Sub-Bus cable from the available bulk cable and field wireable ends. The effectiveness of the resultant assembly remains on the end user and may have bearing on the proper functionality of the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

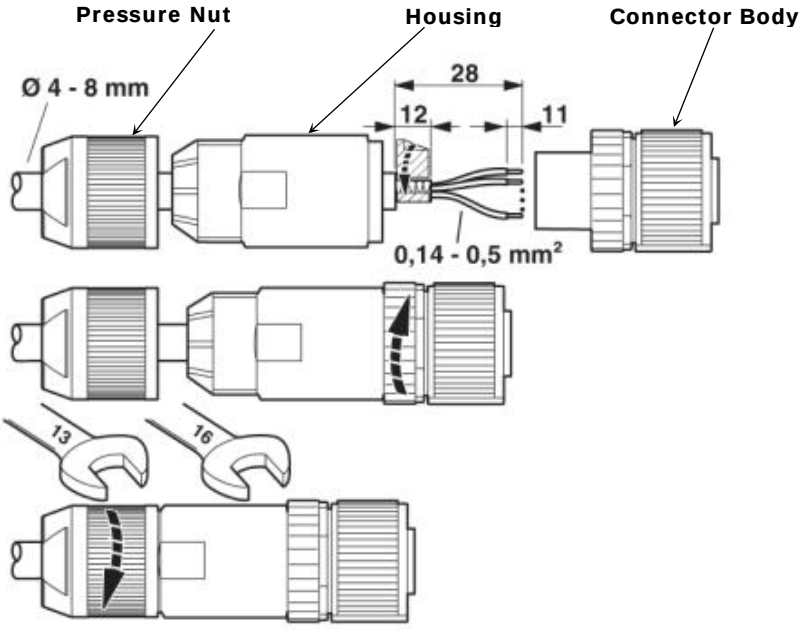
Cable Assembly Procedure

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.



1 = Shield Wire (must be connected)
2 = Red
3 = Black
4 = White
5 = Blue



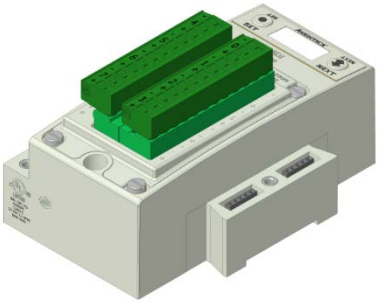


8. Digital I/O Modules

8.1 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



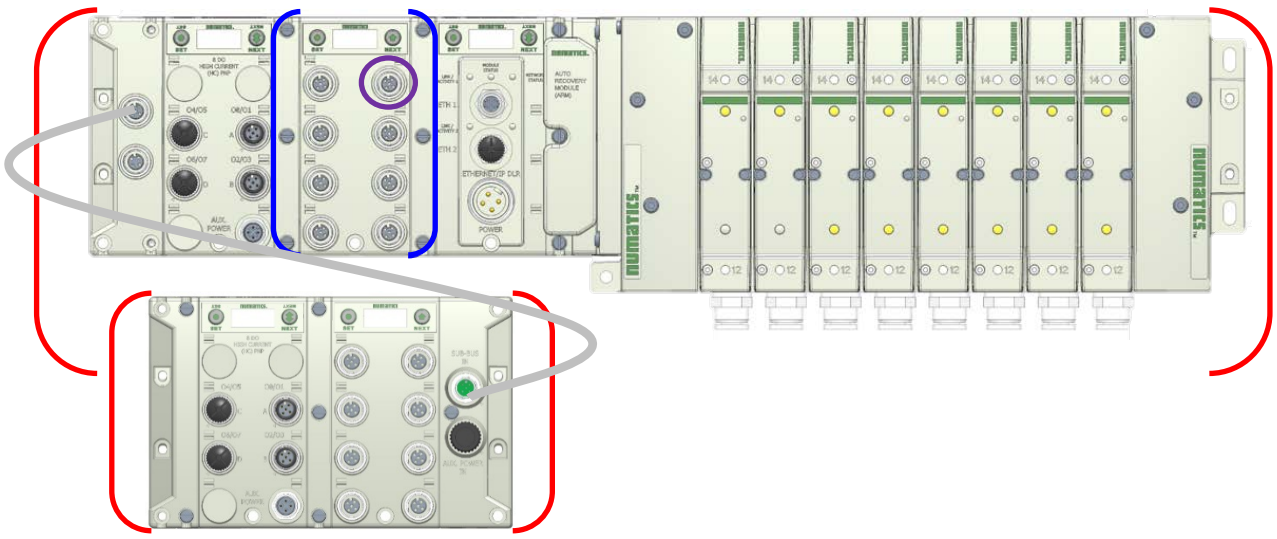
Output Module Types

Input/Output Module Types

Valve Side Output Module Types

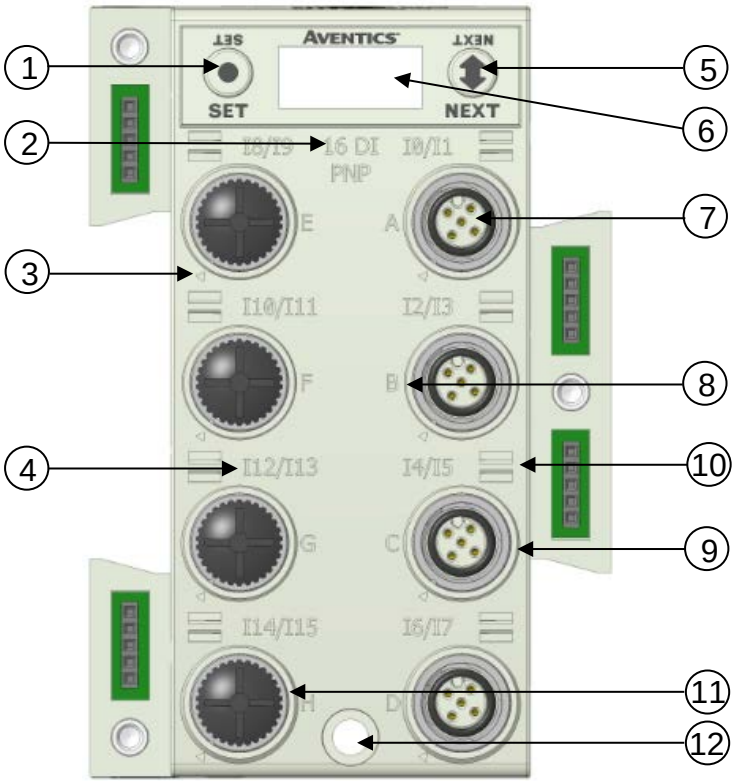
8.2 I/O Module Technical Data

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 4A for +24 Node and Inputs
240-204	16 NPN Inputs				
240-379	8 PNP Inputs	M8		.15A (Pin 1 to Pin 3)	
240-205	16 PNP Inputs	M12			
240-206	8 PNP Inputs				
240-207	16 PNP Outputs			.50A (Pin 3 to Pin 2/4)	
240-208	8 PNP Outputs				
240-209	16 NPN Inputs			.15A (Pin 1 to Pin 3)	
240-210	8 NPN Inputs				
240-211	8 PNP Input and 8 PNP Outputs			.50A / output connector (Pin 3 to Pin 2/4) .15A / input connector (Pin 1 to Pin 3)	
240-212 240-213 240-214 240-215	Analog IO modules			.15A (Pin 1 to Pin 3)	
240-300	8 High Current Outputs		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 Voltage Outputs		4A (From Aux. Power Conn.)	2.0A (Pin 3 to Pin 4)	N/A
240-311	RTD		1.2A	N/A	4A for +24 Valves and Outputs 4A for +24 Node and Inputs
240-316	8 PNP Inputs	Terminal Strip		.30A for each +24VDC terminal	
240-323	16 PNP Inputs			.30A for each +24VDC terminal	
240-330	16 PNP Outputs			.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



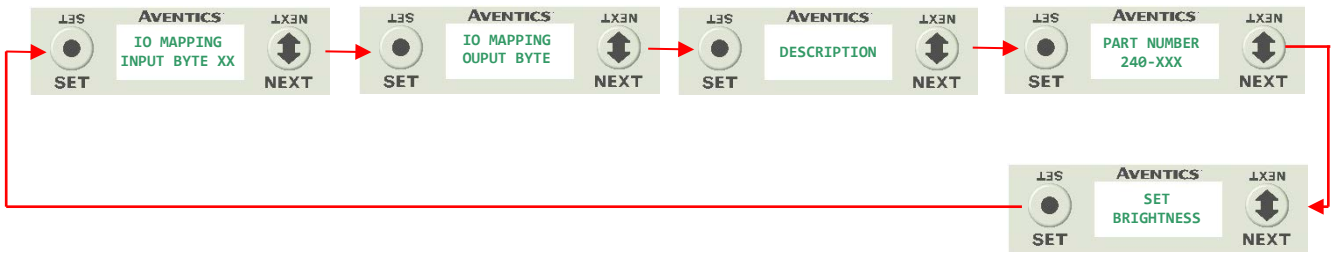
8.3 I/O Module Descriptions & Menus

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.

Menu

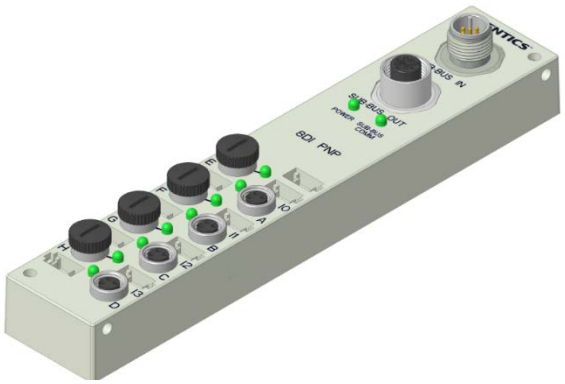


8.4 Digital Input Modules

One Digital Input per Connector – M8 Female Modules

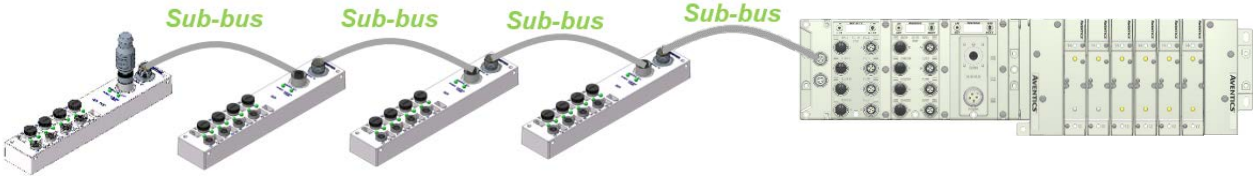
Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-379	PNP (Sourcing)	YES – Visual	YES – Optional	8

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
Diagnostic Telegram								
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

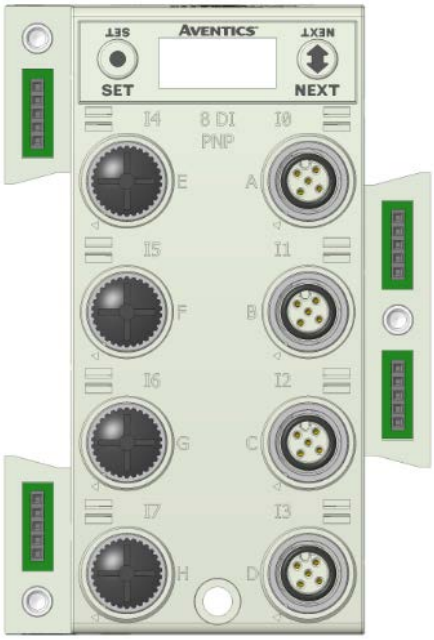


An external terminating resistor, p/n: TA05TR000000000, is required when the 240-379 is the last I/O module on the sub-bus.

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
Diagnostic Telegram								
X	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



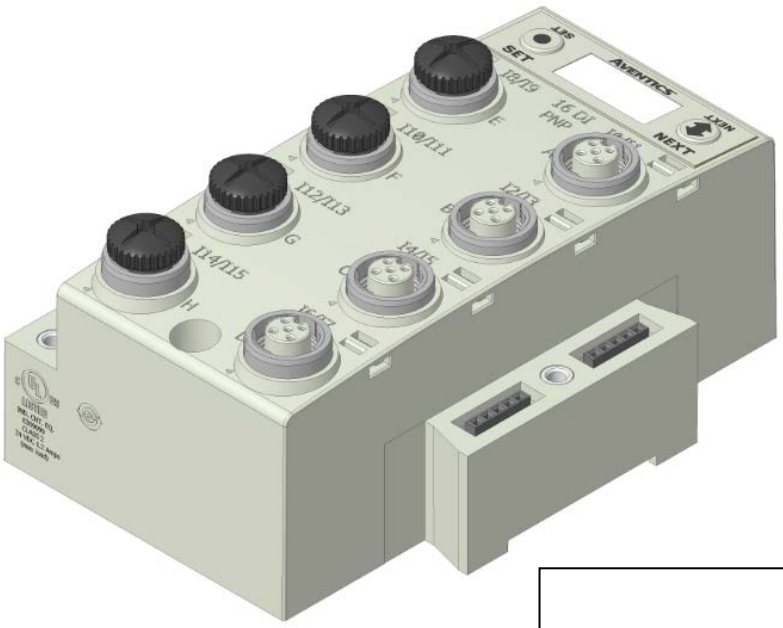
FEMALE

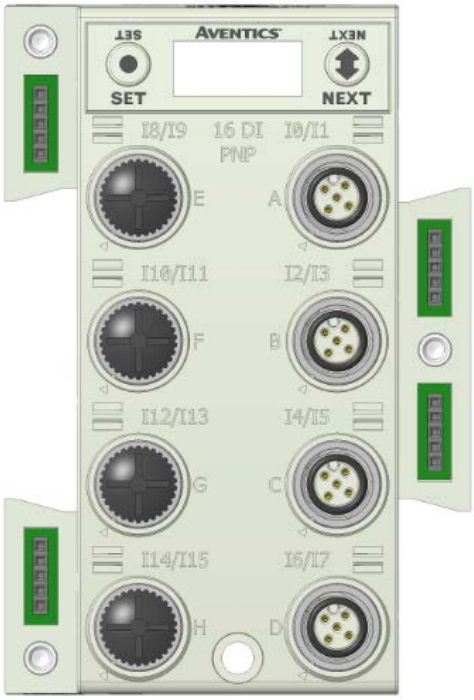
PIN 1= +24VDC (UNSW)
PIN 2= NOT USED
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

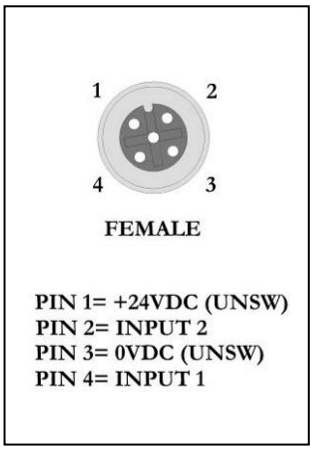
Two Digital Inputs per Connector – M12 Female Modules

Module Part No.	I/O Type	Short Circuit Protection	Short Circuit Protection Status Bits	Input Points
240-209	NPN (Sinking)	YES	YES	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	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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







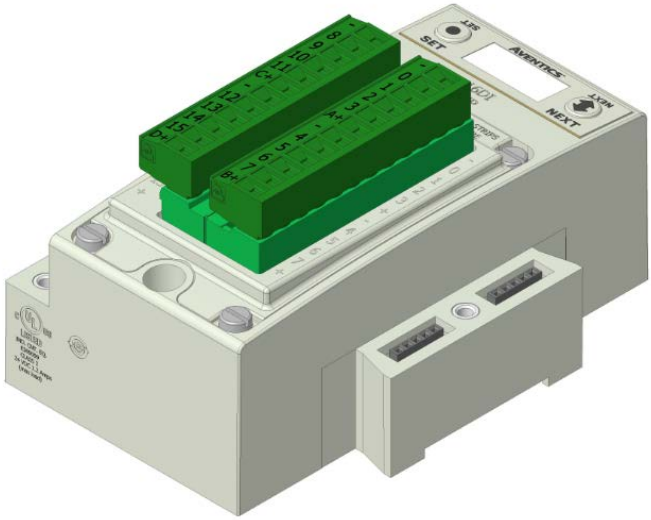
Sixteen Digital Inputs – Terminal Strip Modules

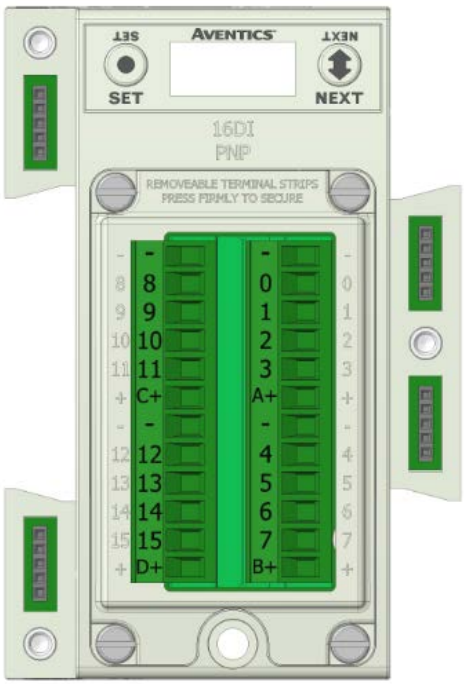
Specifications

- 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*
240-203	PNP (Sourcing)	YES	YES	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	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	D+ SCP Status	C+ SCP Status	B+ SCP Status	A+ SCP Status





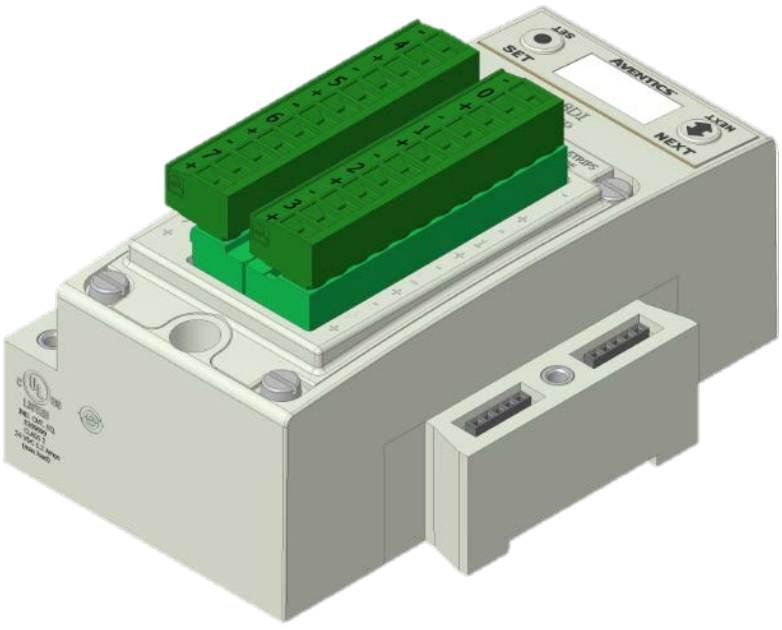
Eight Digital Inputs – Terminal Strip Modules

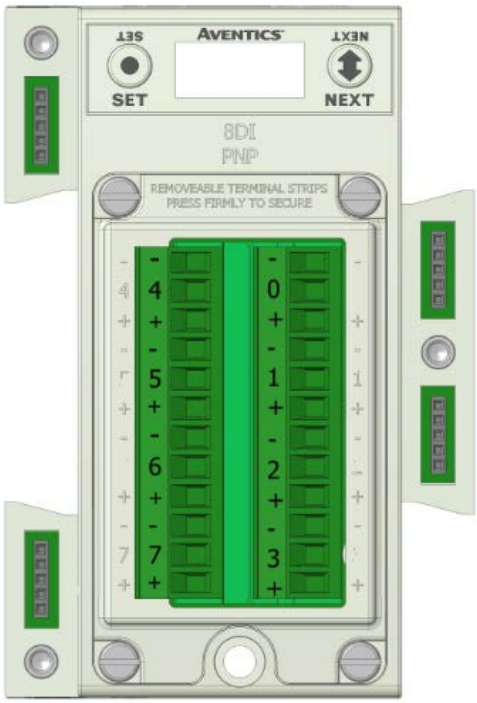
Specifications

- 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	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (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





Intrinsically safe [Ex ia] NAMUR Compatible Input Module

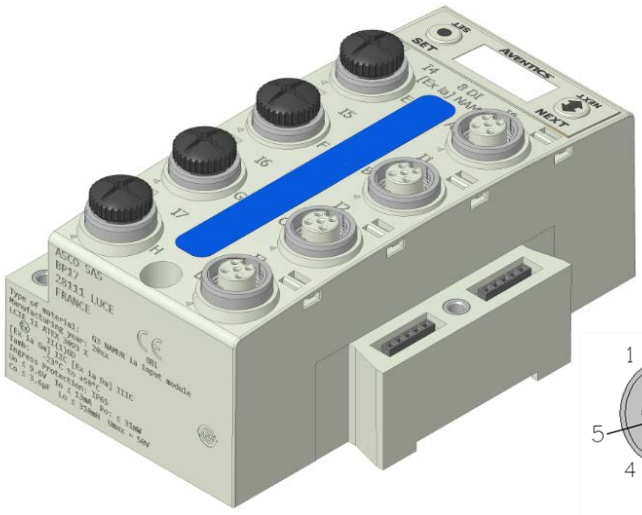
One Digital Input per Connector – M12 Female

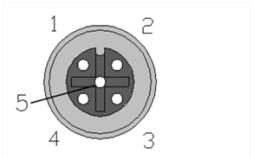
Input module is for use with NAMUR certified intrinsically safe (IS) sensors. The module can be placed in any G3 I/O position available but must be used in conjunction with appropriate clips with partition plates (see picture on page 8-62). This module is for use with (IS) sensors (certified to EN 60947-5-6) 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 8.2 V sensor supply for each input connector is short circuit protected.

Part Numbers and Mapping

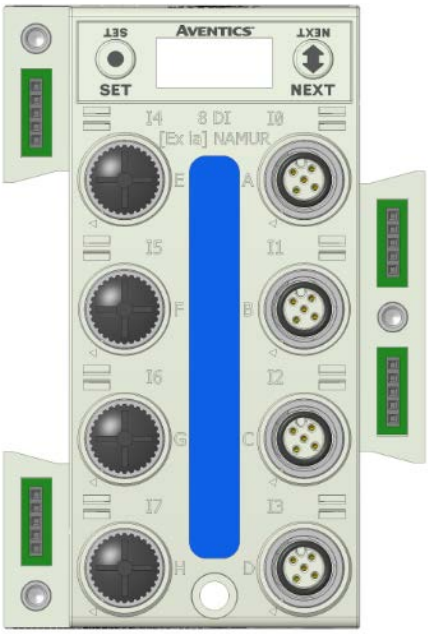
Module Part No.	*I/O Type*	*Short Circuit /Open Circuit Protection*	*Short Circuit /Open Circuit Present Status Bits*	*Input Points*
240-320	NAMUR	YES - Visual	YES - Optional	8

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
Diagnostic Telegram								
X	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 + 1	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





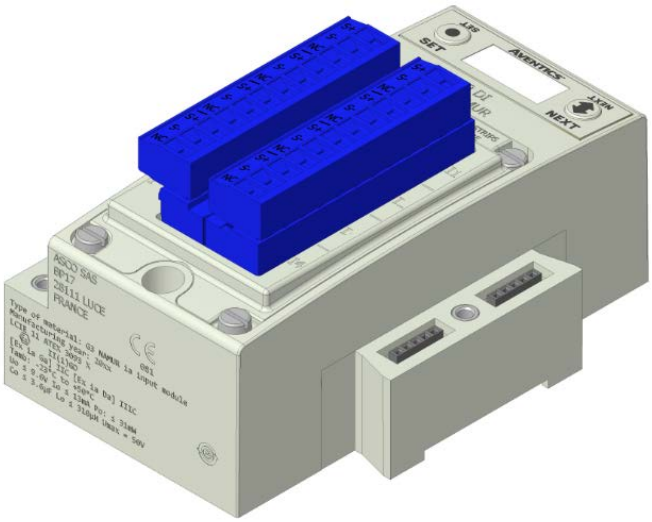
FEMALE
PIN 1 = SENSOR +
PIN 2 = SENSOR –
PIN 3 = Not Connected
PIN 4 = Not Connected
PIN 5 = Not Connected

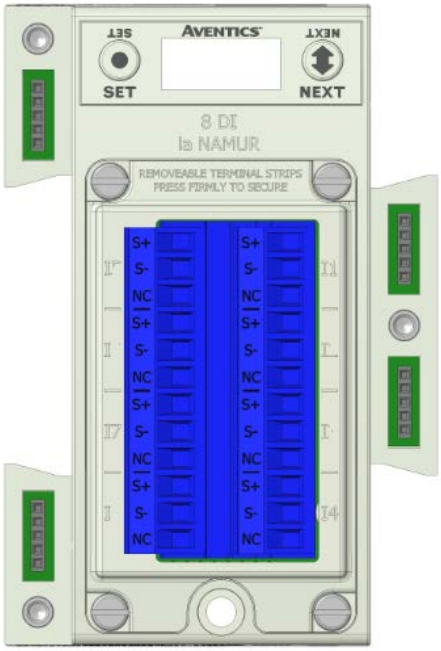


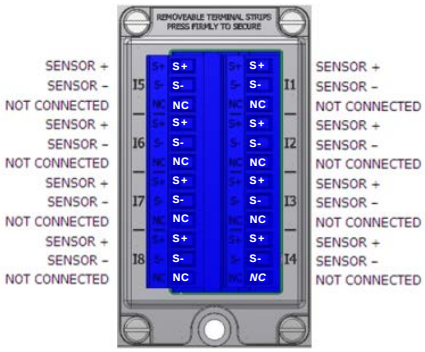
Intrinsically safe [Ex ia] NAMUR Compatible Input terminal strip module

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
Diagnostic Telegram								
X	Input 7 SC Status	Input 6 SC Status	Input 5 SC Status	Input 4 SC Status	Input 3 SC Status	Input 2 SC Status	Input 1 SC Status	Input 0 SC Status
X + 1	Input 7 Open Status	Input 6 Open Status	Input 5 Open Status	Input 4 Open Status	Input 3 Open Status	Input 2 Open Status	Input 1 Open Status	Input 0 Open Status

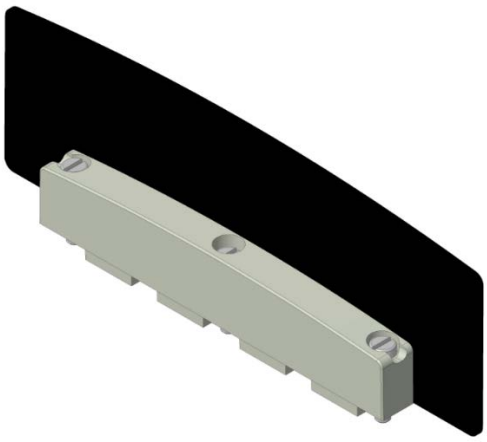




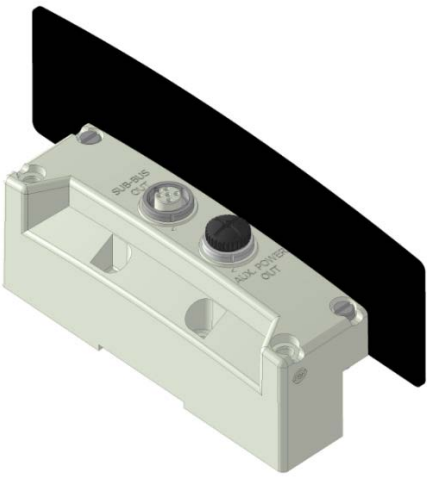


Intrinsically safe [Ex ia] Support Modules

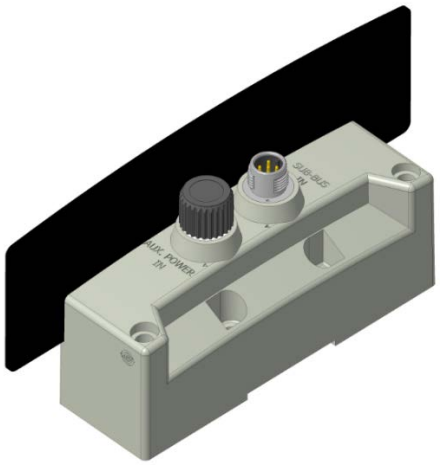
- Mechanical isolation between standard and [Ex ia] modules is mandatory to fulfill ATEX certification. Clips with Partition Plates are available to achieve the required isolation.



G3 [Ex ia] Clip 240-317



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



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

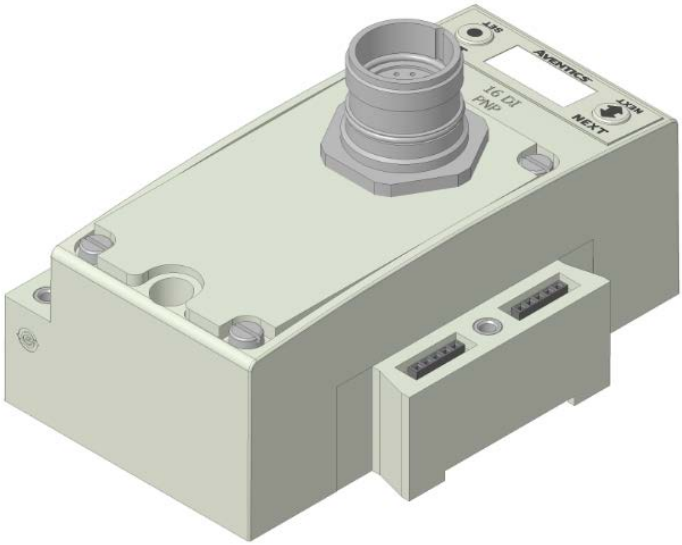
19 Pin M23 Input Module

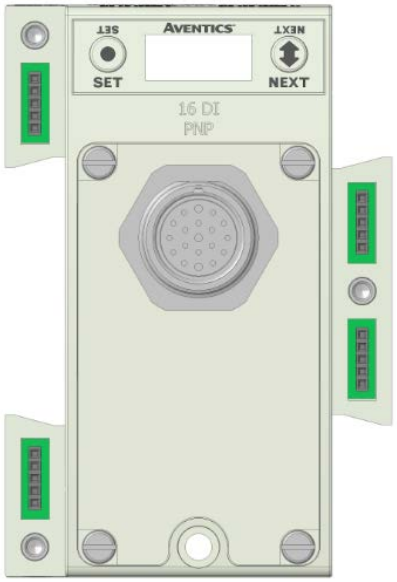
The 19 Pin M23 Input module is for use with any Input block available from Phoenix Contact, Turck, Brad Harrison, etc. It can also be used with a single ended 19 Pin Cable.

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

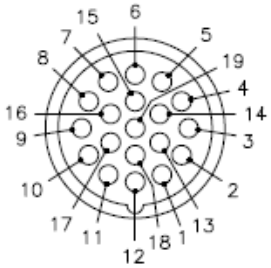
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X +1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
Diagnostic Telegram								
X	Short Circuit	Short Circuit	Short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





Pin Out Information

Pin 1 = Input 14
Pin 2 = Input 10
Pin 3 = Input6
Pin 4 = Input 3
Pin 5 = Input 2
Pin 6 = 0 VDC
Pin 7 = Input 1
Pin 8 = Input 5
Pin 9 = Input 9
Pin 10 = Input 13
Pin 11 = Input 12
Pin 12 = P.E.
Pin 13 = Input 11
Pin 14 = Input 7
Pin 15 = Input 0
Pin 16 = Input 4
Pin 17 = Input 8
Pin 18 = Input 15
Pin 19 = + 24 VDC

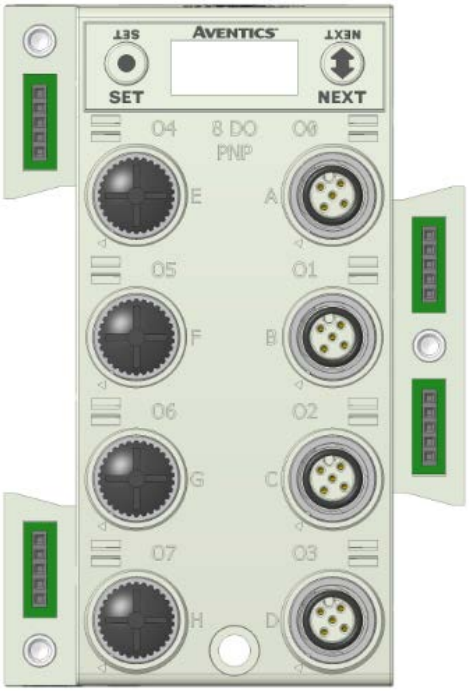


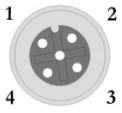
8.5 Digital Output Modules

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	YES	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Diagnostic Telegram								
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





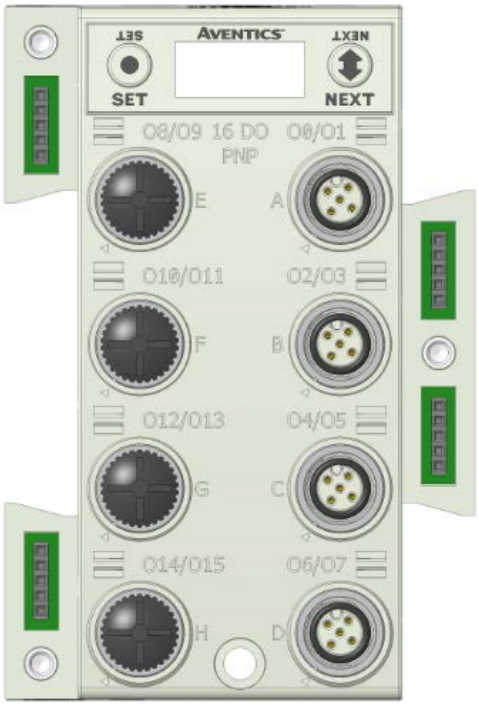
FEMALE

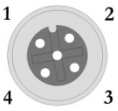
PIN 1= +24VDC (SW)
PIN 2= NOT USED
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

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	YES	16

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
X+1	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Diagnostic Telegram								
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





FEMALE

PIN 1= +24VDC (SW)
PIN 2= NOT USED
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

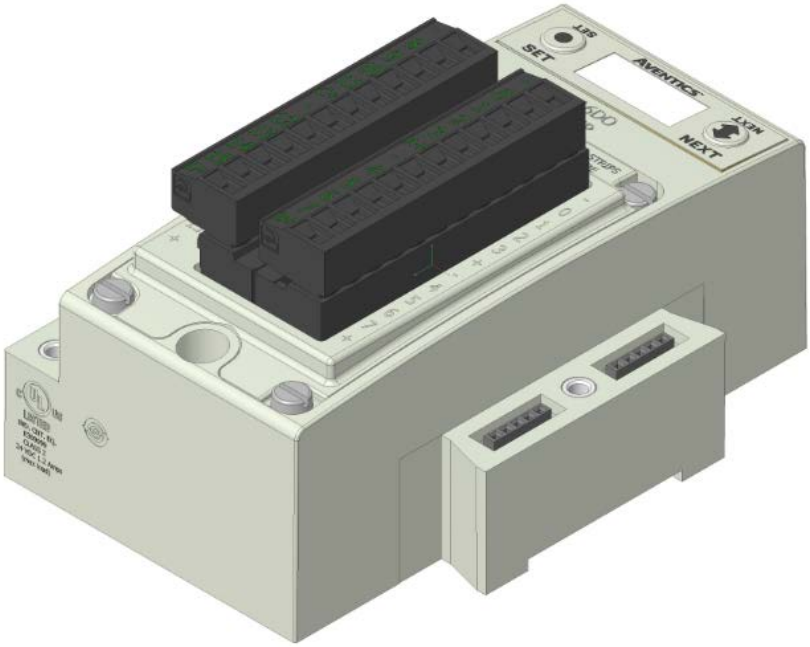
Sixteen Digital Outputs – Terminal Strip Modules

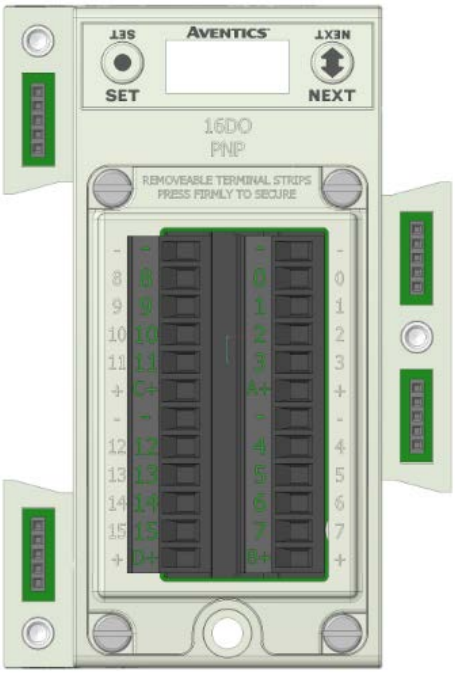
Specifications

- 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	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
X+1	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Diagnostic Telegram								
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 (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

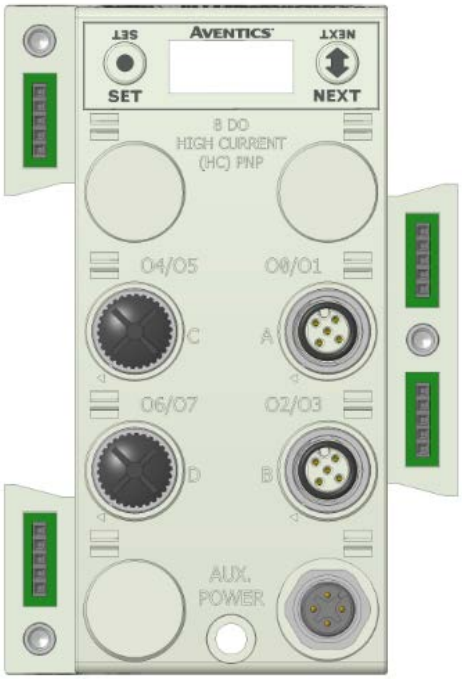


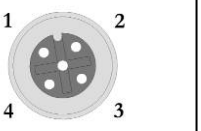


Two Digital High Current Outputs per Connector - M12 Female Modules

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

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Diagnostic Telegram								
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

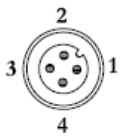




FEMALE

PIN 1= +24VDC (SW)
PIN 2= OUTPUT 2
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

AUX POWER



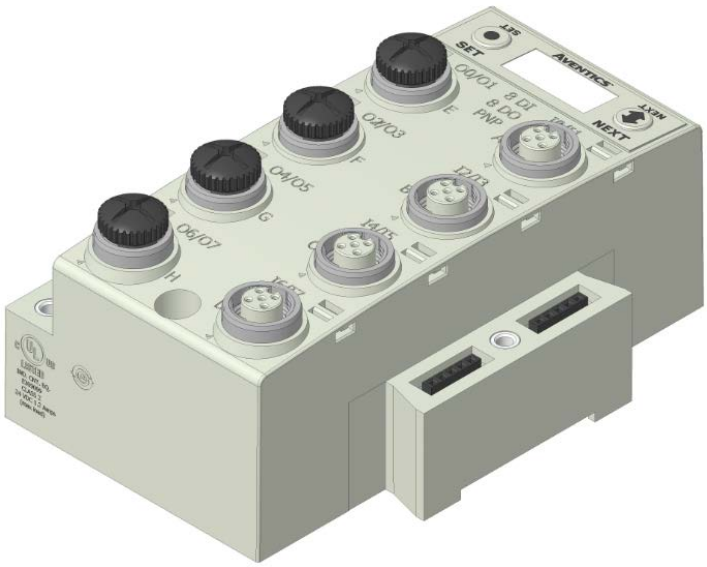
PIN 1= +24VDC (FOR CONN A, B)
PIN 2= +24VDC (FOR CONN C, D)
PIN 3= 0VDC (FOR CONN A, B, C, D)
PIN 4= 0VDC (FOR CONN A, B, C, D)

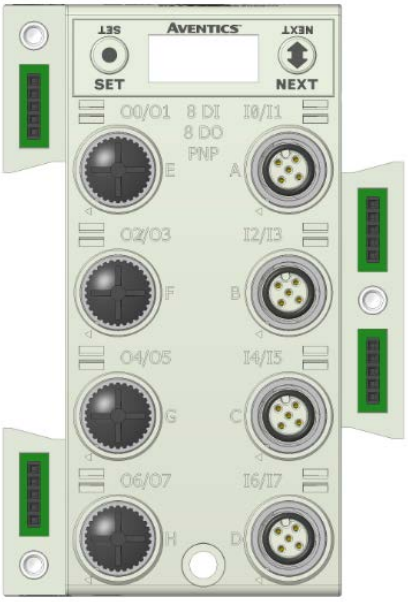
8.6 Digital Input/Output Modules

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	YES	8	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	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	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (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+1 (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





FEMALE

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

9. Valve Interface Modules

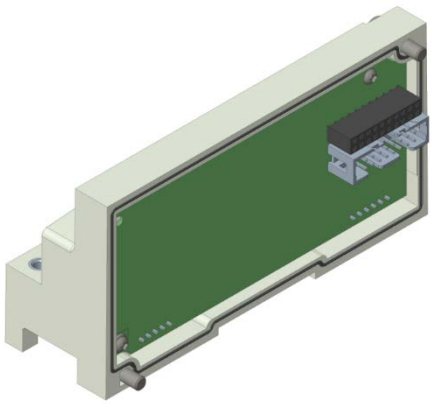
9.1 2000 Series & 500 Series Valve Driver

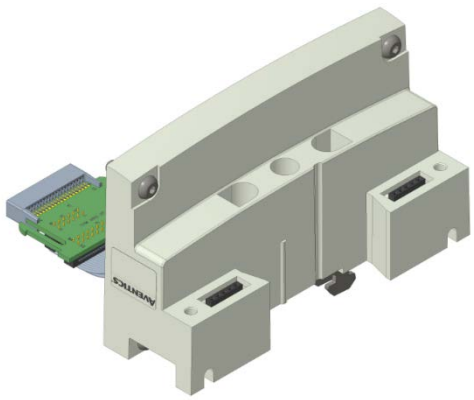
Output Data Mapping

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
P599AE42518801	NPN (Sinking) 500 Series	YES – Visual	YES (128) – Optional	128

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
32 additional coils available per each additional 32+ manifold driver board								
X+4 (Selectable)	Valve Coil No. 39	Valve Coil No. 38	Valve Coil No. 37	Valve Coil No. 36	Valve Coil No. 35	Valve Coil No. 34	Valve Coil No. 33	Valve Coil No. 32
X+5 (Selectable)	Valve Coil No. 47	Valve Coil No. 46	Valve Coil No. 45	Valve Coil No. 44	Valve Coil No. 43	Valve Coil No. 42	Valve Coil No. 41	Valve Coil No. 40
X+6 (Selectable)	Valve Coil No. 55	Valve Coil No. 54	Valve Coil No. 53	Valve Coil No. 52	Valve Coil No. 51	Valve Coil No. 50	Valve Coil No. 49	Valve Coil No. 48
X+7 (Selectable)	Valve Coil No. 63	Valve Coil No. 62	Valve Coil No. 61	Valve Coil No. 60	Valve Coil No. 59	Valve Coil No. 58	Valve Coil No. 57	Valve Coil No. 56
32 additional coils available per each additional 32+ manifold driver board								
X+15 (Selectable)	Valve Coil No. 127	Valve Coil No. 126	Valve Coil No. 125	Valve Coil No. 124	Valve Coil No. 123	Valve Coil No. 122	Valve Coil No. 121	Valve Coil No. 120





Diagnostic Data Mapping

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
P599AE42518801	NPN (Sinking) 500 Series	YES – Visual	YES (128) – Optional	128

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
32 additional coil status bits per each additional 32+ manifold driver board								
X+4	Coil 39 Status	Coil 38 Status	Coil 37 Status	Coil 36 Status	Coil 35 Status	Coil 34 Status	Coil 33 Status	Coil 32 Status
X+5	Coil 47 Status	Coil 46 Status	Coil 45 Status	Coil 44 Status	Coil 43 Status	Coil 42 Status	Coil 41 Status	Coil 40 Status
X+6	Coil 55 Status	Coil 54 Status	Coil 53 Status	Coil 52 Status	Coil 51 Status	Coil 50 Status	Coil 49 Status	Coil 48 Status
X+7	Coil 63 Status	Coil 62 Status	Coil 61 Status	Coil 60 Status	Coil 59 Status	Coil 58 Status	Coil 57 Status	Coil 56 Status
128 coil status bits possible								
X+15	Coil 127 Status	Coil 126 Status	Coil 125 Status	Coil 124 Status	Coil 123 Status	Coil 122 Status	Coil 121 Status	Coil 120 Status

9.2 Sub-bus Valve Module

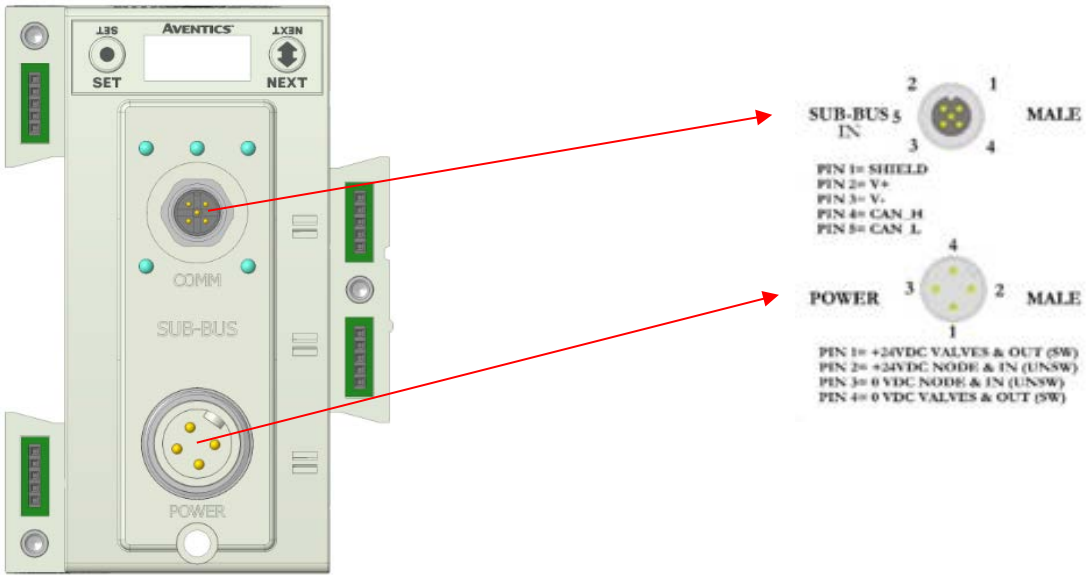
Output Data Mapping

Used to control a distributed valve manifold through the Sub-Bus. See page 7-47 for more information.

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Status Bit Data*	*Output Points*
240-241	NPN (Sinking)	YES – Visual	YES (128) – Optional	128

Output Mapping

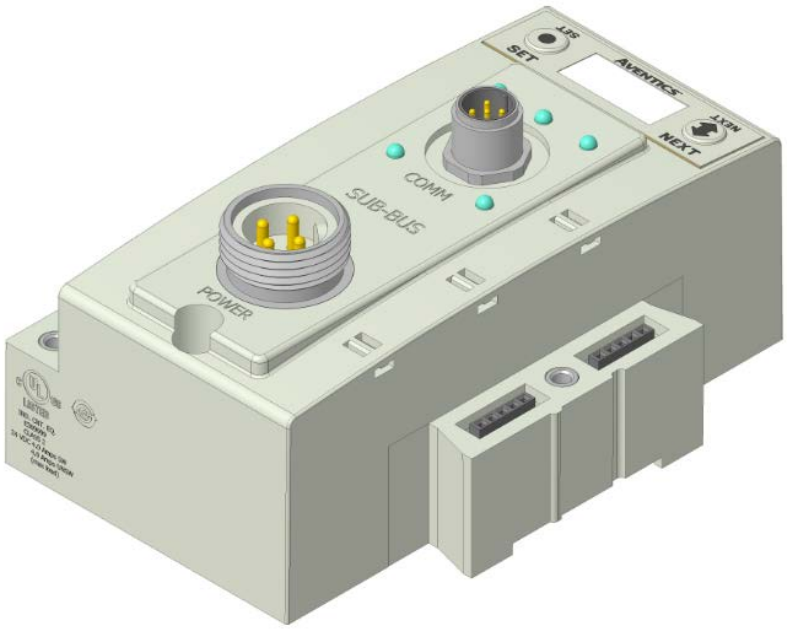
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X+1 (Selectable)	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil 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
32 additional coils available per each additional 32+ manifold driver board								
X+4 (Selectable)	Valve Coil No. 39	Valve Coil No. 38	Valve Coil No. 37	Valve Coil No. 36	Valve Coil No. 35	Valve Coil No. 34	Valve Coil No. 33	Valve Coil No. 32
X+5 (Selectable)	Valve Coil No. 47	Valve Coil No. 46	Valve Coil No. 45	Valve Coil No. 44	Valve Coil No. 43	Valve Coil No. 42	Valve Coil No. 41	Valve Coil No. 40
X+6 (Selectable)	Valve Coil No. 55	Valve Coil No. 54	Valve Coil No. 53	Valve Coil No. 52	Valve Coil No. 51	Valve Coil No. 50	Valve Coil No. 49	Valve Coil No. 48
X+7 (Selectable)	Valve Coil No. 63	Valve Coil No. 62	Valve Coil No. 61	Valve Coil No. 60	Valve Coil No. 59	Valve Coil No. 58	Valve Coil No. 57	Valve Coil No. 56
128 coils total possible								
X+15 (Selectable)	Valve Coil No. 127	Valve Coil No. 126	Valve Coil No. 125	Valve Coil No. 124	Valve Coil No. 123	Valve Coil No. 122	Valve Coil No. 121	Valve Coil No. 120



Diagnostic Data Mapping

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Status Bit Data*	*Output Points*
240-241	NPN (Sinking)	YES – Visual	YES (128) – Optional	128

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	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
32 additional coil status bits per each additional 32+ manifold driver board								
X+4	Coil 39 Status	Coil 38 Status	Coil 37 Status	Coil 36 Status	Coil 35 Status	Coil 34 Status	Coil 33 Status	Coil 32 Status
X+5	Coil 47 Status	Coil 46 Status	Coil 45 Status	Coil 44 Status	Coil 43 Status	Coil 42 Status	Coil 41 Status	Coil 40 Status
X+6	Coil 55 Status	Coil 54 Status	Coil 53 Status	Coil 52 Status	Coil 51 Status	Coil 50 Status	Coil 49 Status	Coil 48 Status
X+7	Coil 63 Status	Coil 62 Status	Coil 61 Status	Coil 60 Status	Coil 59 Status	Coil 58 Status	Coil 57 Status	Coil 56 Status
128 coil status bits possible								
X+15	Coil 127 Status	Coil 126 Status	Coil 125 Status	Coil 124 Status	Coil 123 Status	Coil 122 Status	Coil 121 Status	Coil 120 Status



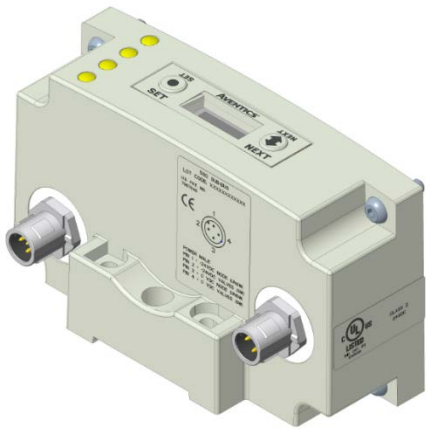
9.3 Sub-bus Valve Module without Distribution and I/O

Used to control a distributed valve manifold through the Sub-Bus. See page 7-48 for more information.

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Status Bit Data*	*Output Points*
P580AEDS4010A00	NPN (Sinking)	YES – Visual	YES (128) – Optional	128

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
32 additional coils available per each additional 32+ manifold driver board								
X+4 (Selectable)	Valve Coil No. 39	Valve Coil No. 38	Valve Coil No. 37	Valve Coil No. 36	Valve Coil No. 35	Valve Coil No. 34	Valve Coil No. 33	Valve Coil No. 32
X+5 (Selectable)	Valve Coil No. 47	Valve Coil No. 46	Valve Coil No. 45	Valve Coil No. 44	Valve Coil No. 43	Valve Coil No. 42	Valve Coil No. 41	Valve Coil No. 40
X+6 (Selectable)	Valve Coil No. 55	Valve Coil No. 54	Valve Coil No. 53	Valve Coil No. 52	Valve Coil No. 51	Valve Coil No. 50	Valve Coil No. 49	Valve Coil No. 48
X+7 (Selectable)	Valve Coil No. 63	Valve Coil No. 62	Valve Coil No. 61	Valve Coil No. 60	Valve Coil No. 59	Valve Coil No. 58	Valve Coil No. 57	Valve Coil No. 56
128 coils total possible								
X+15 (Selectable)	Valve Coil No. 127	Valve Coil No. 126	Valve Coil No. 125	Valve Coil No. 124	Valve Coil No. 123	Valve Coil No. 122	Valve Coil No. 121	Valve Coil No. 120



Used to control a distributed valve manifold through the Sub-Bus. See page 7-48 for more information.

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Status Bit Data*	*Output Points*
P580AEDS4010A00	NPN (Sinking)	YES – Visual	YES (128) – Optional	128

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	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
32 additional coil status bits per each additional 32+ manifold driver board								
X+4	Coil 39 Status	Coil 38 Status	Coil 37 Status	Coil 36 Status	Coil 35 Status	Coil 34 Status	Coil 33 Status	Coil 32 Status
X+5	Coil 47 Status	Coil 46 Status	Coil 45 Status	Coil 44 Status	Coil 43 Status	Coil 42 Status	Coil 41 Status	Coil 40 Status
X+6	Coil 55 Status	Coil 54 Status	Coil 53 Status	Coil 52 Status	Coil 51 Status	Coil 50 Status	Coil 49 Status	Coil 48 Status
X+7	Coil 63 Status	Coil 62 Status	Coil 61 Status	Coil 60 Status	Coil 59 Status	Coil 58 Status	Coil 57 Status	Coil 56 Status
128 coil status bits possible								
X+14	Coil 127 Status	Coil 126 Status	Coil 125 Status	Coil 124 Status	Coil 123 Status	Coil 122 Status	Coil 121 Status	Coil 120 Status

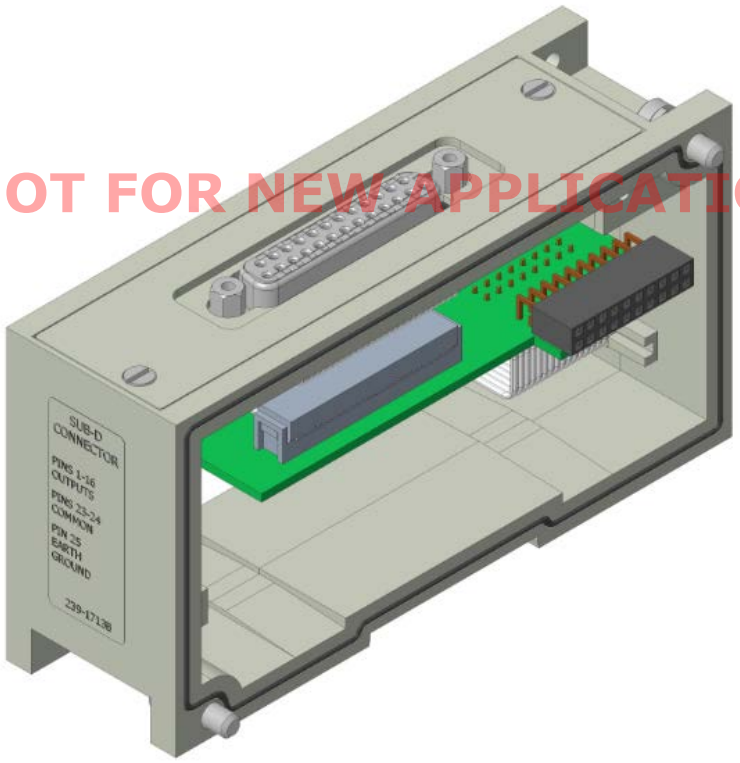
9.4 Valve Side Output Module

The valve side output module is used to distribute available valve side output points (i.e. when valves are located away from the rest of the electronics). These modules go 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).

This module is not available with the 501, 502 or 503 series valves.

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



9.5 500 Series Extended Coil Capability

The Extended Coil manifolds must be connected to a G3 Electronics Node to operate. Not all G3 supported protocols will support the Extended Coil Manifolds. Below is a list of the hardware and minimum firmware levels that support the Extended Coil Manifolds.

Extended Solenoid Coil Capability requirements:		
Module	**Part Number**	**Firmware**
Communication Module	240-239	Rev 2.034 Build 43220
Valve Driver Module	P599AE508827001	Rev 4.019

Module firmware revision levels can be confirmed in the integrated graphic display. See pg. 5-37 for more information.

9.6 Extended Coil Configuration

The Extended Coil Manifold can be configured to control 3 additional extended coil valve driver assemblies; unless already configured from the factory. Modify the configuration with the graphic display interface as shown on page 5-30.

Valve Series	Number of Extended Coil Valve Drivers	Total number of coils	**Configuration Selection**	Allocated number of I/O Bytes designated for valves
501	0	3-32	**32 coils**	4
	1	33-64	**64 coils**	8
	2	65-96	**96 coils**	12
	3	97-128	**128 coils**	16
502/503	0	1-32	**32 coils**	4
	1	33-48	**64 coils**	8
	2	49-64	**64 coils**	8
	3	65-80	**96 coils**	12

9.7 Extended Coil Valve driver IO Mapping

IO Mapping for each additional 501 series 32 coil valve driver added to the manifold assembly

Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X	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

Output Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X	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	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	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	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

IO Mapping for each additional 502/503 series 16 coil valve driver added to the manifold assembly

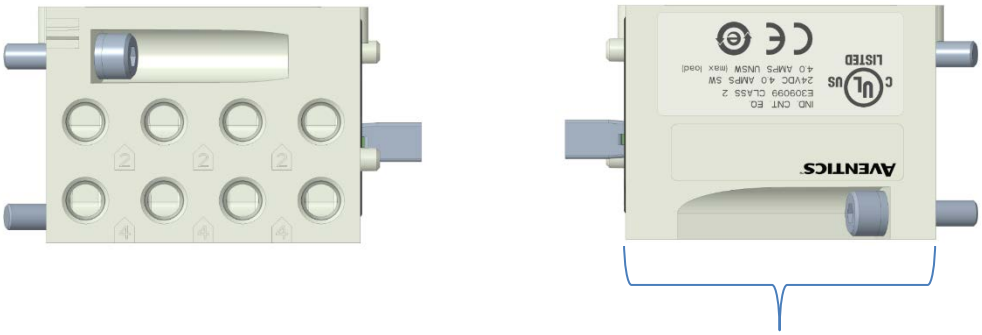
Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status

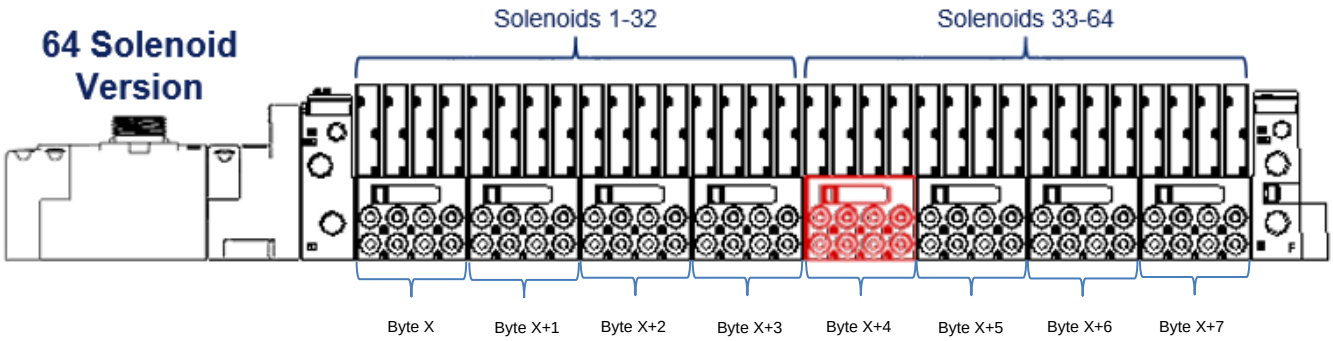
Output Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X+1	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8

9.8 501 Series, up to 64 solenoid coils

501 series, 4 station manifold block with an integrated 32 coil valve driver

- To be used with 501 series valves on valve manifold assemblies with 33-64 coils.
- Only to be used on assemblies where additional power, supply and/or exhaust capacity is not required

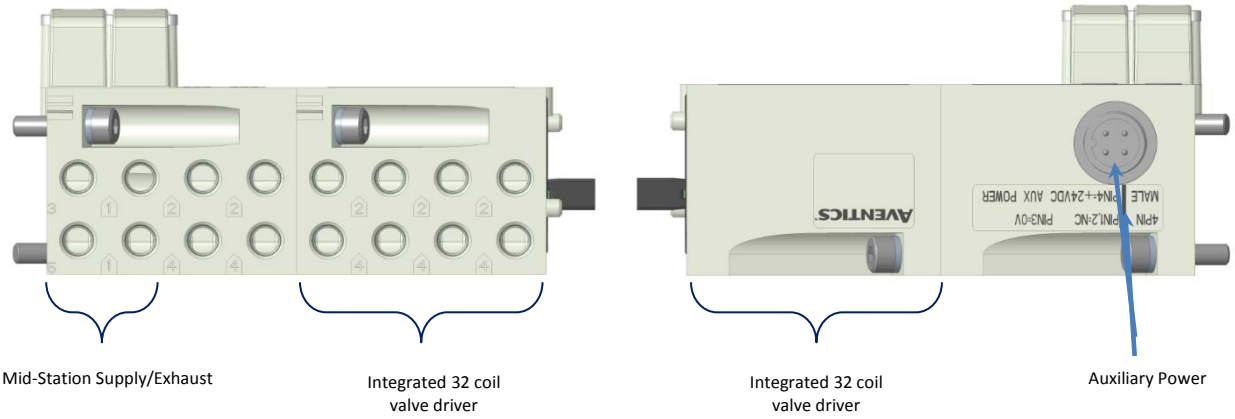


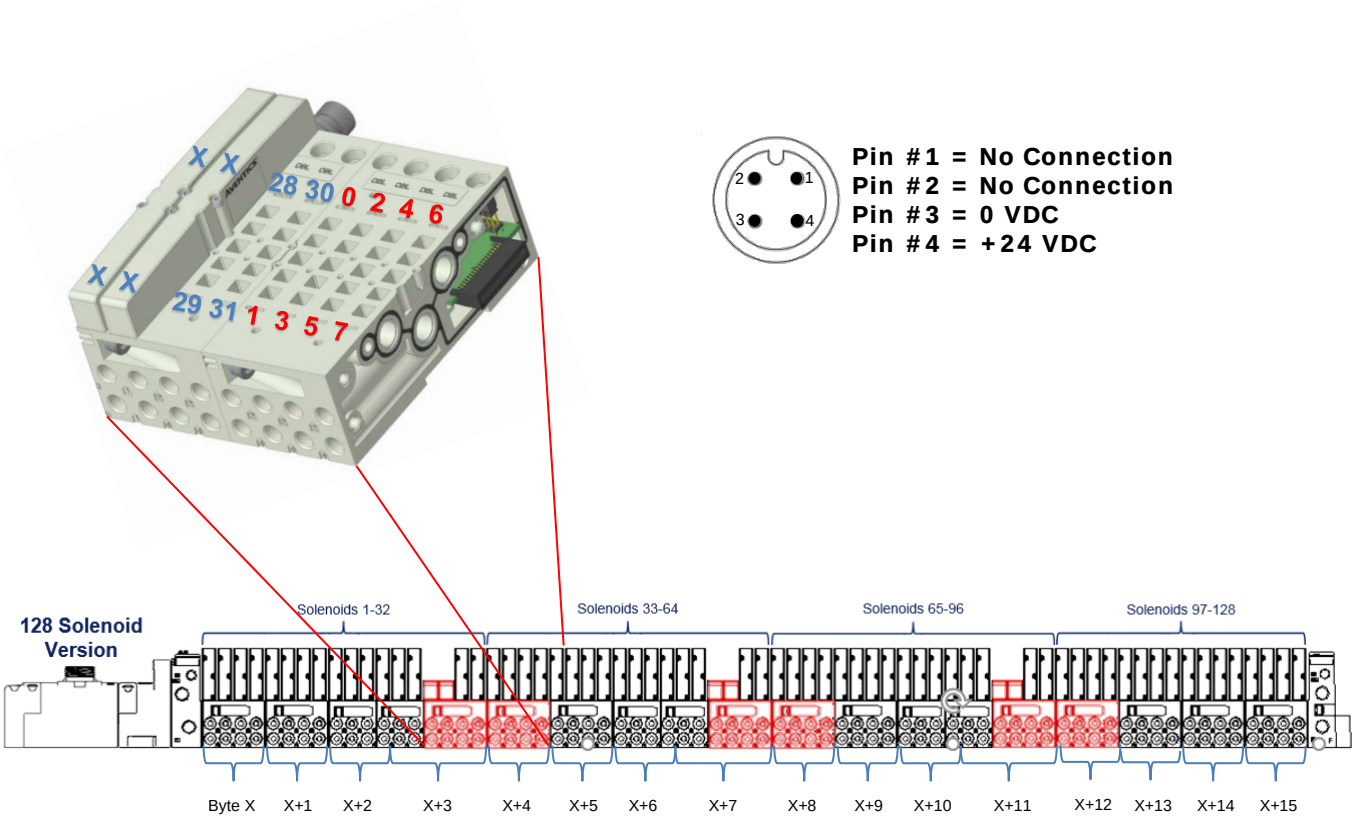


9.9 501 Series, up to 128 solenoid coils

501 series, 8 station manifold with integrated 32 coil valve driver, auxiliary power connector and mid-station supply and exhaust ports

- To be used with 501 series valves on valve manifold assemblies with 33-128 coils.
- Up to 3 of these valve drivers can be used on each assembly
- Required to use on manifold assemblies larger than 64 coils, this manifold block has an M12 power connector to supplement the main power connection on the G3 node and two additional port 1 supply and port 3/5 exhaust ports.
- Aux power is required to be connected to the aux power connector provided on the extended coil valve driver.

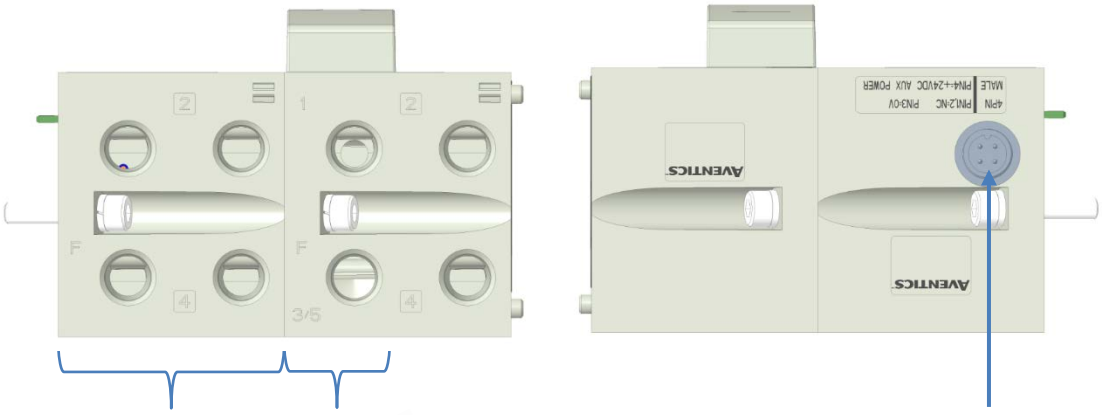


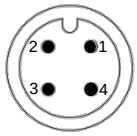


9.10 502 and 503 Series, up to 80 coils

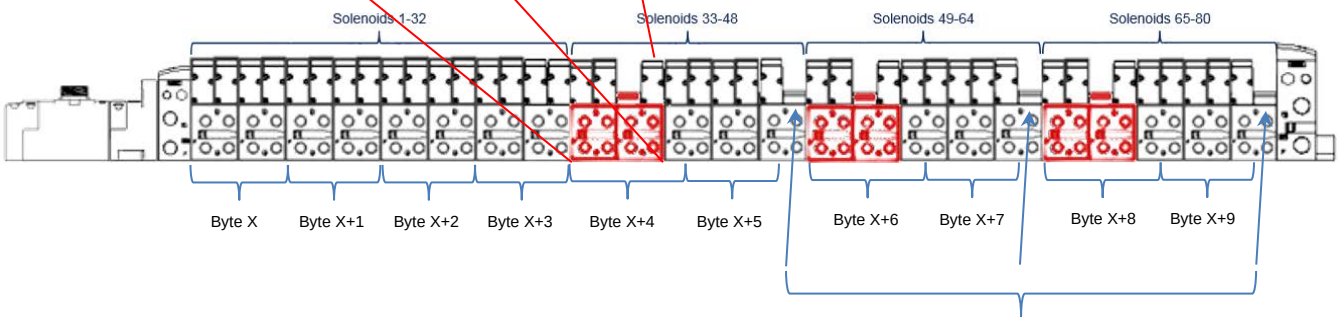
502 and 503 series, 4 station manifold with integrated 16 coil valve driver, power connector and mid-station supply and exhaust ports

- To be used with 502 and 503 series valves on valve manifold assemblies with 33-80 coils.
- Up to 3 of these valve drivers can be used on each assembly
- Required to use on manifold assemblies larger than 32 coils, this manifold block has an M12 power connector and two additional port 1 supply and port 3/5 exhaust ports.
- Aux power is required and will provide power to the 16 coils available via the extended coil valve driver.





Pin #1 = No Connection
Pin #2 = No Connection
Pin #3 = 0 VDC
Pin #4 = +24 VDC



Recommended blank station plates to achieve maximum number of coils with least number of stations

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 – M12 Female Modules

Specifications

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

Module Part No.	*Signal Type*	*Input Points*	*Output Points*	*Short Circuit Protection*
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	

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	YES	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	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	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	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	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	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3 (LSB)
X+5	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	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4 (LSB)
X+7	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
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Open Load Status Conn. D (4-20 mA only)	Open Load Status Conn. C (4-20 mA only)	Open Load Status Conn. B (4-20 mA only)	Open Load Status Conn. A (4-20 mA only)	SCP Status for Conn. D	SCP Status for Conn. C	SCP Status for Conn. B	SCP Status for Conn. A
X+1 (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

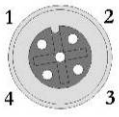
FEMALE

PIN 1= +24VDC (UNSW)
PIN 2= NOT USED
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

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	YES	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	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)
X+1	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	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	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	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	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	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	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
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Selectable)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	SCP Status for Conn. D	SCP Status for Conn. C	SCP Status for Conn. B	SCP Status for Conn. A
X+1 (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



FEMALE

CONNECTORS C & D	CONNECTORS A & B
PIN 1= +24VDC (UNSW)	PIN 1= +24VDC (UNSW)
PIN 2= OUTPUT	PIN 2= NOT USED
PIN 3= 0VDC (UNSW)	PIN 3= 0VDC (UNSW)
PIN 4= INPUT	PIN 4= INPUT

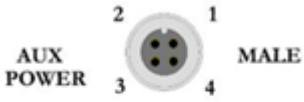
One High Current Analog I/O per Connector – M12 Female Modules

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	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	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	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	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	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	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	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	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
Diagnostic Telegram								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (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+1 (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

Connector A,B
Pin 1 = +10 VDC
Pin 2 = Not Used
Pin 3 = 0 VDC
Pin 4 = Input
Pin 5 = Not Used

Connector C,D
Pin 1 = +24 VDC
Pin 2 = Output
Pin 3 = 0 VDC
Pin 4 = Input
Pin 5 = Not Used



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

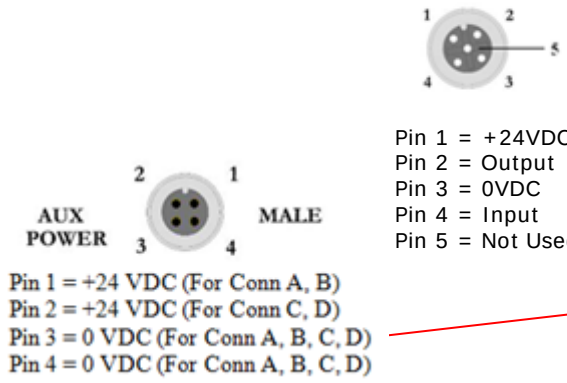
One Analog Input + One Analog Output per Connector – M12 Female Modules

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

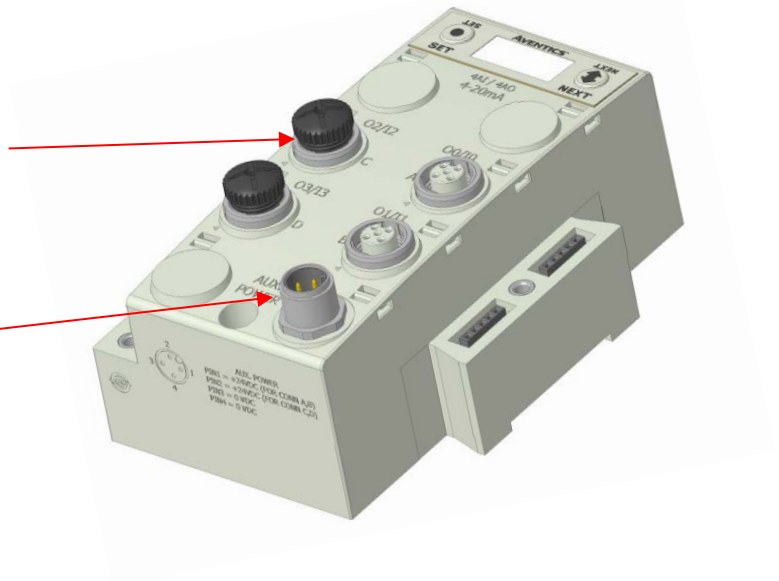
Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)
X + 1 (Required)	Output No. 1 (MSB)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output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

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

Diagnostic Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (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 + 1 (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 + 2 (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



Pin 1 = +24VDC
Pin 2 = Output
Pin 3 = 0VDC
Pin 4 = Input
Pin 5 = Not Used



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

2. CHANNEL A & B 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

4. CHANNEL C & D DISABLE

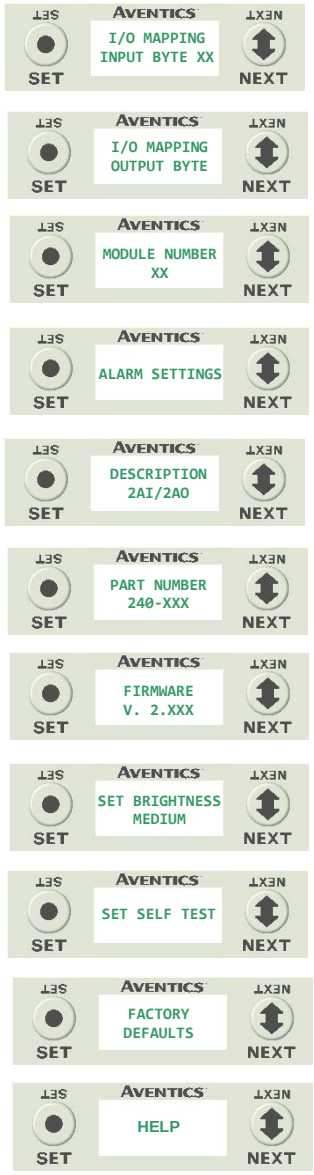
5. Press the **NEXT** button to scroll through the choices to enable or disable the feature.
   a. ENABLED (Factory Default)
   b. DISABLED
   c. RETURN (this will return you to the main menu)

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)

11.2 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.

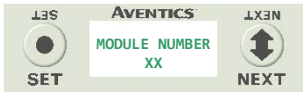


Analog Module / I/O Mapping

Displays the starting Input and Output byte address for the module

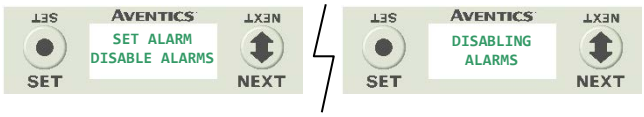
Analog Module / Module Number

Displays the assigned module number for the analog unit identifying its position in the G3 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
   b. Accept the changes by selecting **Y** and pushing **SET**
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 will return you to the main menu

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)

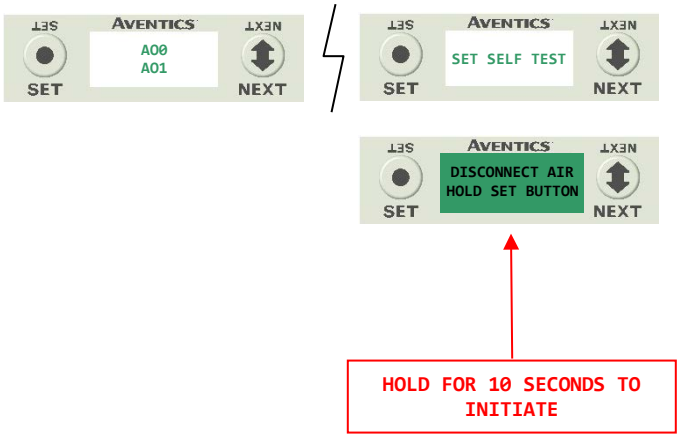
Press the **SET** button to confirm your choice. The changes will take effect immediately.

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 **Y**es or **N**o.
   a. Selecting **N**o will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting **Y**es will cause the module to reset and return all parameters to the factory default conditions.

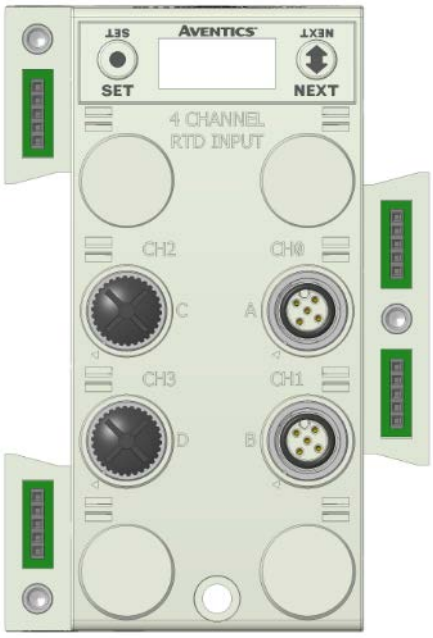
   Press the **SET** button to confirm your choice.

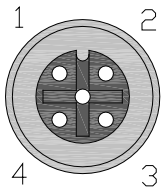
FACTORY DEFAULT SETTINGS	
Description	*Default*
Low Alarm Values	0 V / 4 mA
High Alarm Values	10 V / 20 mA
Brightness	Medium

11. Specialty Modules

11.1 G3 RTD Temperature 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.



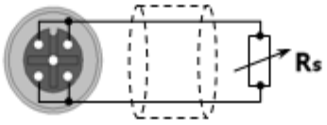


FEMALE

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

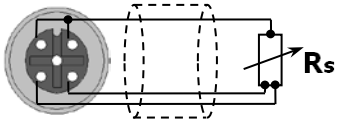
Sensor Wiring Diagrams

2 Wire Sensor Type
2 Wire Cable (Fig 1)



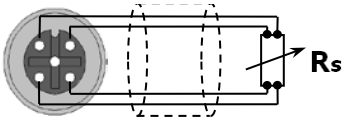
2 Wire
Sensor Type
Low Accuracy

3 Wire Sensor Type
3 Wire Cable (Fig 2)

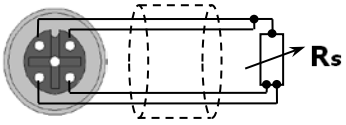


3 Wire
Sensor Type
Medium Accuracy

4 Wire Sensor Type
4 Wire Cable (Fig 4)



4 Wire
Sensor Type
High Accuracy



3 Wire Sensor Type
4 Wire Cable (Fig 3)

Technical Data

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%) 100 ohm and 350 ohm 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 / 8.7 oz
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.*

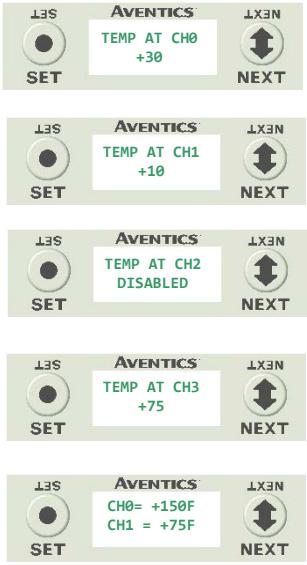
Part Numbers and Mapping

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	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	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	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	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	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	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	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	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
Diagnostic Telegram								
X + 8	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	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

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".

RTD Module / Sensor Type Select (Channel Enable):

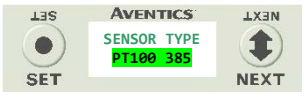
Allows the sensor type for each channel to be selected, and, enable the channel selected

A) Press the **SET** button to enter the Sensor Type Select sub menu.

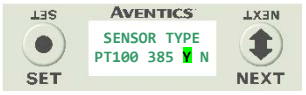
B) Press the **NEXT** button to scroll through the channels.

C) 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.

D) Press the **NEXT** button to scroll through the available sensor types.



E) Press the **SET** button to select the desired sensor type.

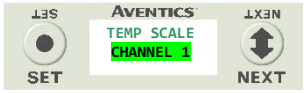


F) Press the **SET** button to load the selected sensor type.

RTD Module / Temperature Scale:

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

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



B) Press the **NEXT** button to scroll through the channels.

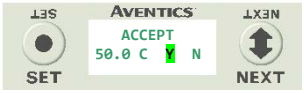
C) Press the **SET** button to choose the desired channel.

D) Press the **NEXT** button to choose the desired scale.

E) Press the **SET** button to load the selection.

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.



A) Press the **SET** button to enter the Alarm Settings sub-menu.

B) Press the **NEXT** button to scroll through the RTD Input channels.

C) Press the **SET** button to enter the alarm setting for the selected Input channel.

D) Press the **NEXT** button to select the Lo or High setting for the selected channel.

E) Press the **SET** button to select the change process for the chosen alarm. The first digit/sign will be highlighted.

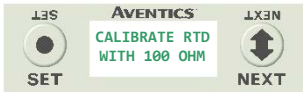
F) Press the **NEXT** button to choose the value, or the **SET** button to select and move to the next digit.

G) 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 and *Field Calibration to be performed.



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

B) Press the **NEXT** button to choose the option; Update Filters or Calibrate RTD.

Update Filters

C) Press the **SET** button to choose the Update Filter setting.

D) Press the **NEXT** button to scroll through the filter times.

E) Press the **SET** button to select the desired Update Filter time.

RTD Module / I/O Mapping Input Byte

RTD Module / Module Number (Position)

RTD Module / Module Description

RTD Module / Part Number

RTD Module / Firmware Revision

RTD Module / Set Display Brightness:

Allows the Brightness of the display to be changed

A) press the **SET** button to enter the Set Brightness sub menu.

B) Press the **NEXT** button to scroll through the brightness options

C) Press the **SET** button to load the selection.

RTD Module / Flip Display:

Allows the Display to be flipped 180 degrees.

A) press the SET button to enter the Flip Display sub menu.

B) Press the NEXT button to choose the orientation.

C) Press the SET button to load the selection.

RTD Module / Factory Defaults:

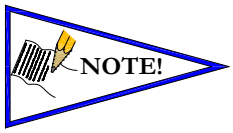
Set all parameter settings to default values.

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

B) Presss the **NEXT** button to choose **Y**es or **N**o.

C) Press the **SET** button to confirm.

D) Press the **SET** button again.

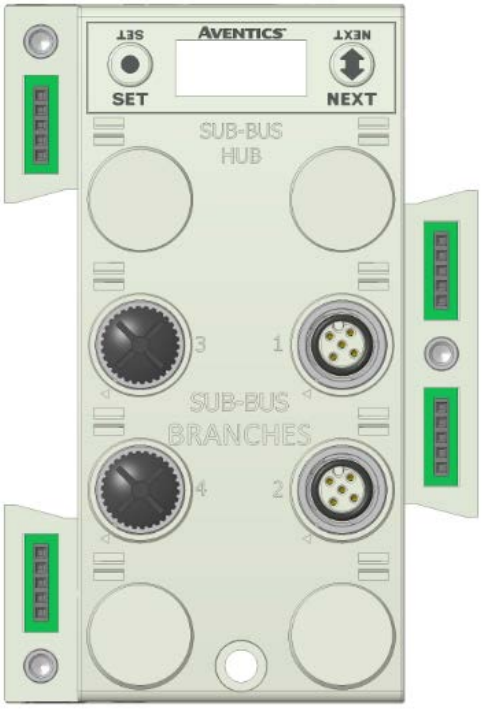


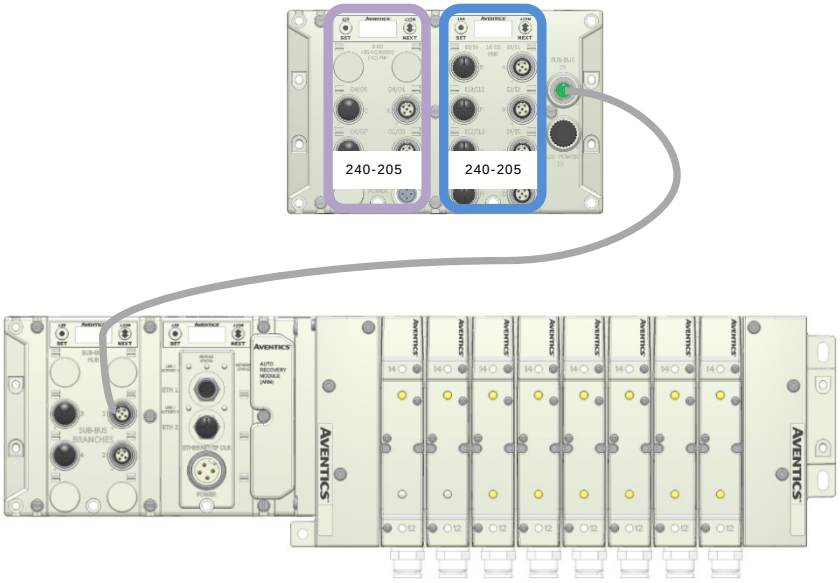
Factory Default Settings	
Alarm – High & Low	Disabled (Set to Min/Max for each chosen sensor)
Input Update Filter	5 mS
Sensor Type	Pt 100 385
Temp Scale	Celsius
Display Brightness	Medium
Flip Display	Normal

12.2 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





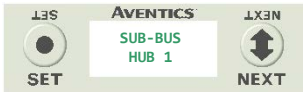
NOTE!

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.

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

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.

Brightness:

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 slect the desired Brightness level.

Screen Jumps to Next Parameter/Selection

Flip Display:

D) Press the **SET** button to enter the Flip Display sub-menu and highlight the selection.

E) Press the **NEXT** button to select the desired Flip Display selection, (Normal, Flipped).

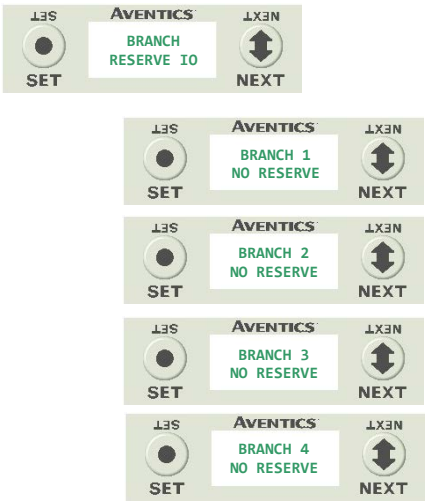
F) Press the **SET** button to select the desired display orientation.

G) Press **NEXT** to advance to the next parameter selection (Branch Reserve)

Branch Reserve I/O:

NOTE!

Branch Reserve is not applicable to PROFIBUS/DP, Branch reserve should remain at default setting of “NO RESERVE”



Factory Defaults:

1. 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 **Y**es or **N**o.

   c. Press the **SET** button to confirm.

   d. Press the **SET** button again.

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

Diagnostics:

1. Allows the user to refernce 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).

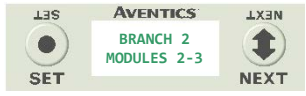
Firmware Rev. -

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 identifys the module numbers that are currently connected to that Branch.

HELP:

a. Directs the user to the Asco website.

b. Press the **SET** button for website address.

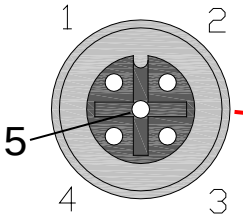
Error/Event Messages

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

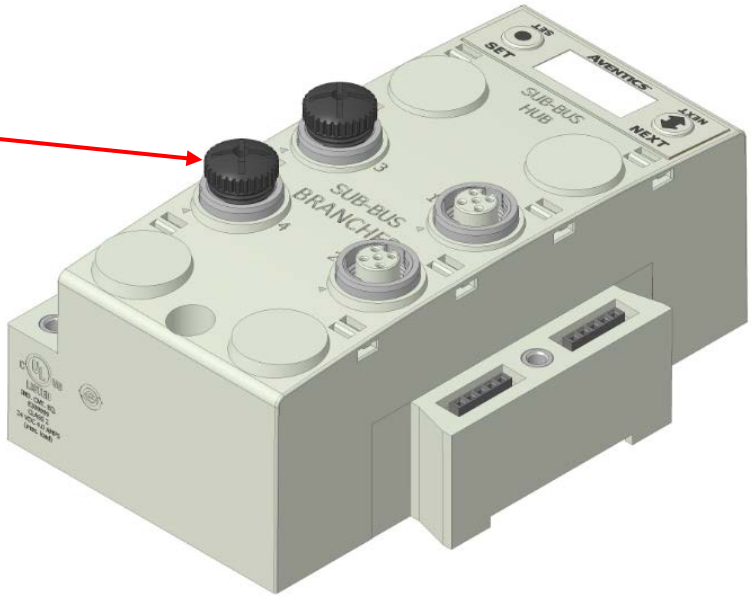
Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration

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

Connector Pin Out

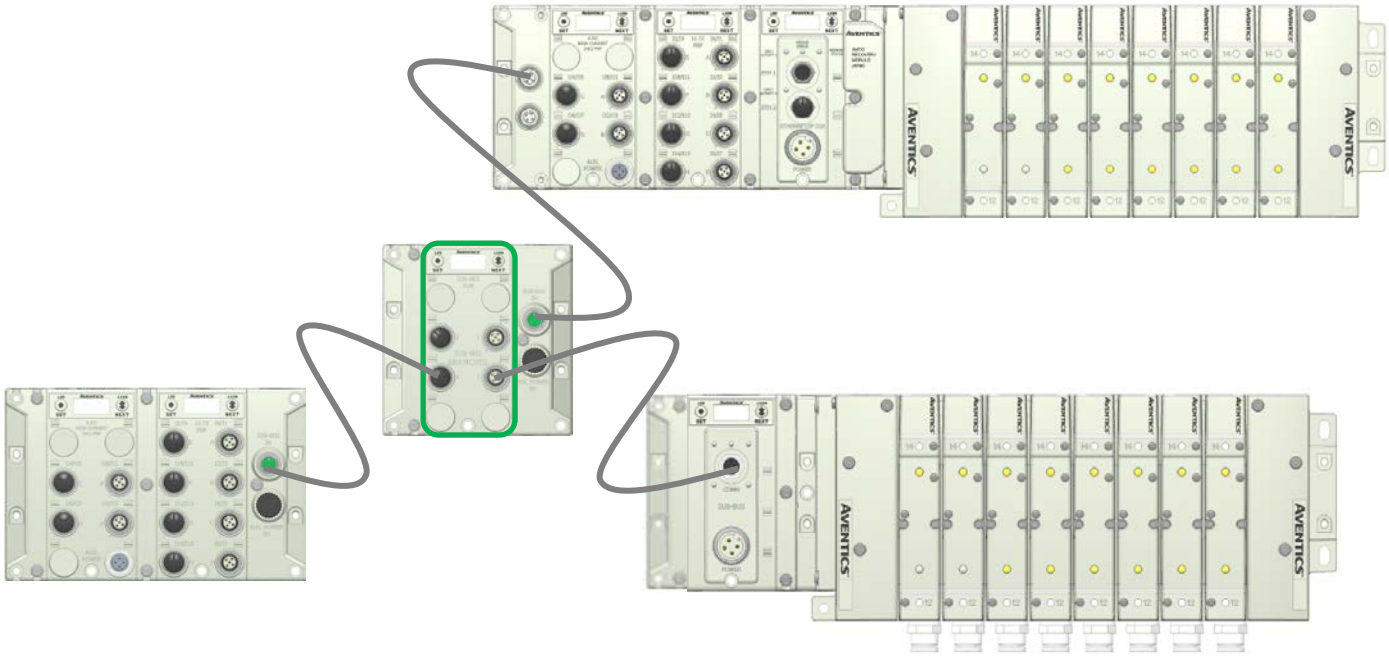


FEMALE
PIN 1 = Shield
PIN 2 = V+
PIN 3 = V-
PIN 4 = CAN_H
PIN 5 = CAN_L



- *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 page 7-50, for Sub-Bus cable and connectors options. See Technical Document on page 7-51 for proper installation and wiring of field wire-able connectors.*

HUB Integration - Example



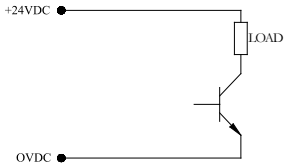
12. I/O Module(s) Wiring Diagrams

12.1 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.

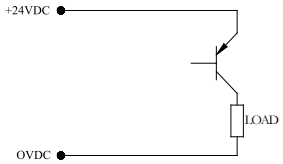
NPN Descriptions

- Sinking
- Switching Negative
- Positive Common

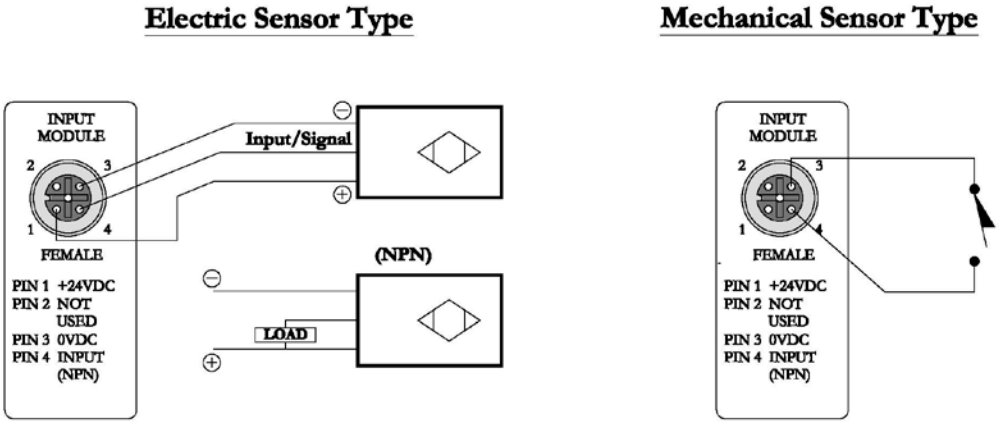


PNP Descriptions

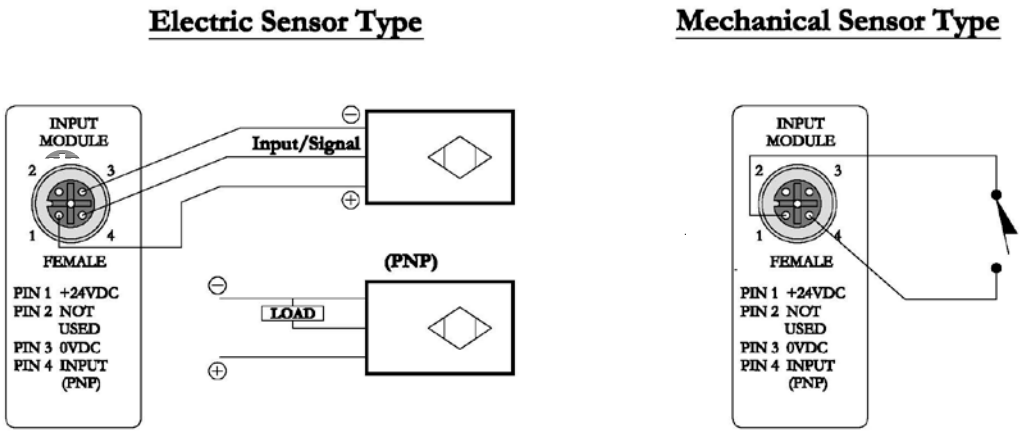
- Sourcing
- Switching Positive
- Negative Common



NPN (Sinking) Input Connection

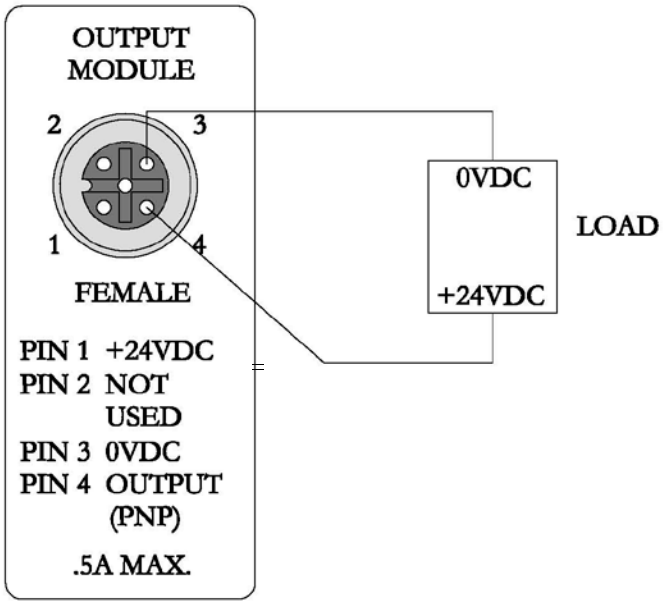


PNP (Sourcing) Input Connection



I/O Module(s) Wiring Diagrams Continued

PNP (Sourcing) Output Connection



13. PROFIBUS-DP™ Configuration and Commissioning

13.1 Parameters

The Aventics' G3 PROFIBUS-DP™ 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.

		Settable Via		
Parameter Name	*Description*	*Display*	*Software*	*MCM*
Address	Node address	√	√	√
Brightness	Adjust brightness of graphic display	√	X	X
Profibus Mode	Selects GSD file/Diagnostic capability DPV0 or DPV1	√	X	X
I/O Allocation Coils	Allocates how many valve output points are mapped (8, 16, 24, 32)	X	√	X
Output Idle Action	Determines whether to use idle value attribute or hold last state	X	√	X
Output Fault Action	Determines whether to use idle value attribute or hold last state	X	√	X
SSA Lock	Determines how the network address may be set	√	X	X

13.2 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:

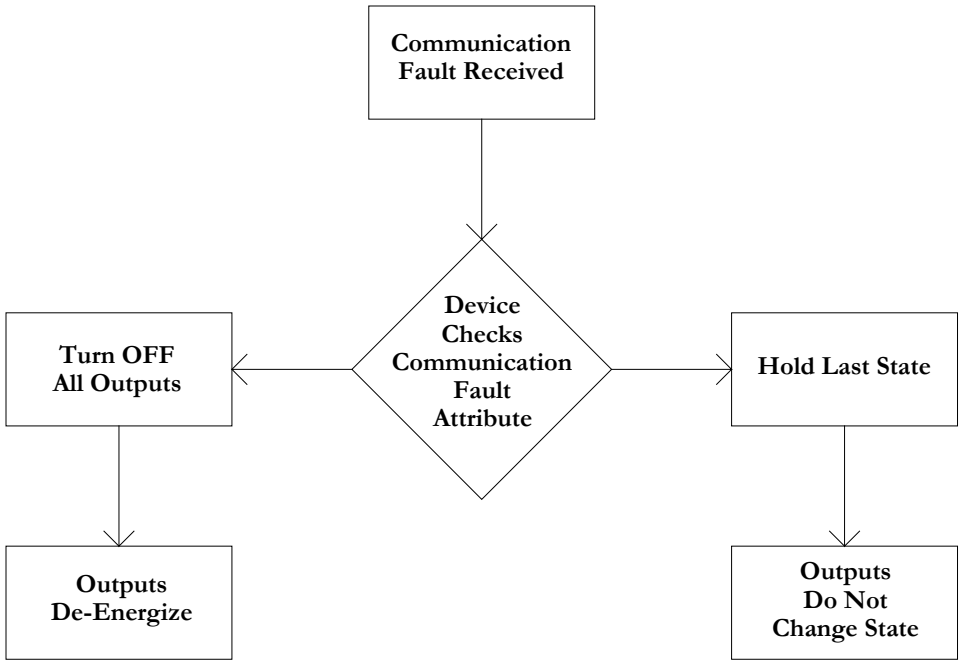
1. Hold Last State of Outputs
2. Turn Off All Outputs

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.

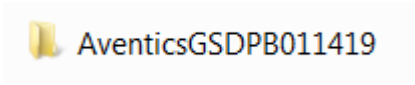
The process for determining the output state during a Communication Fault/Idle Mode is as follows:

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.



13.3 Profibus GSD File/Mode Selection

The G3 Profibus GSD files are contained in a zipped archive package. The archive can be downloaded from the Aventics website;
Go to; www.asco.com/g3 and search for GSD files for G3 Profibus.



The .zip archive contains the following GSD files;

NUMA0BDD.GSD

The NUMA0BDD.gsd file can be used with all applications that employ DPV0 (typical) diagnostic capability.

The G3 Profibus module mode must be set to DPV0 to use this GSD file.

NUMA0DDE.GSD

The NUMA0DDE.gsd file can be used with all applications that employ both DPV0 and DPV1 diagnostic capability.

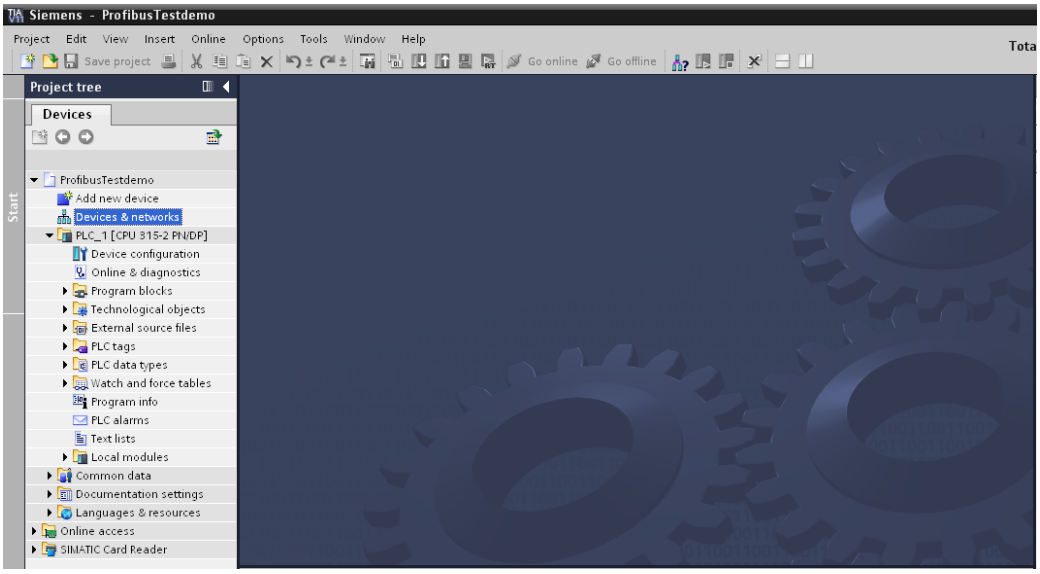
The G3 Profibus module mode must be set to DPV1 to use this GSD file.

- *For more information on setting Profibus Mode please refer to page 5-31.*

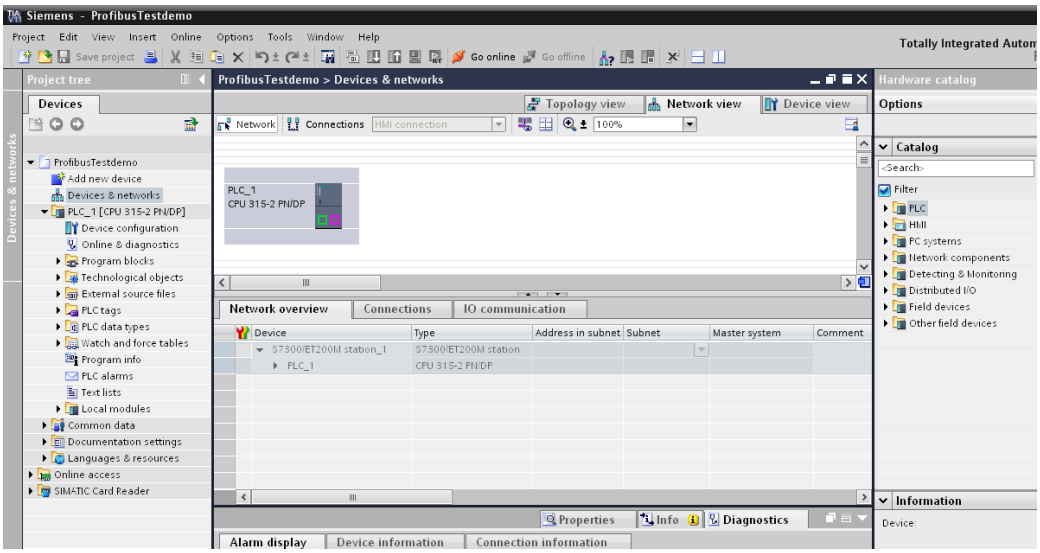
13.4 Commissioning G3 Profibus with Siemens TIA Portal Software

Follow your Siemens software help guide to install the G3 Profibus GSD file. Once the GSD file is installed select the correct profibus mode based on the GSD file selected. Please refer to Profibus GSD File/Mode Selection page 13-116.
Once the GSD file is installed select the various components to assemble your G3 manifold configuration and I/O map.

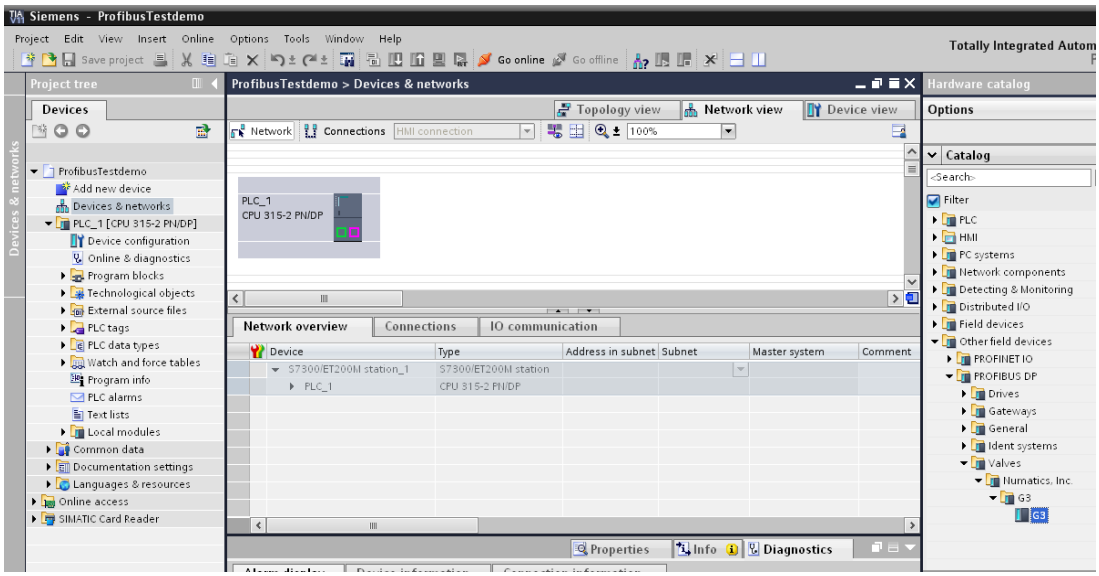
1. From the “Project Tree” (left panel) double click “Devices and networks”.



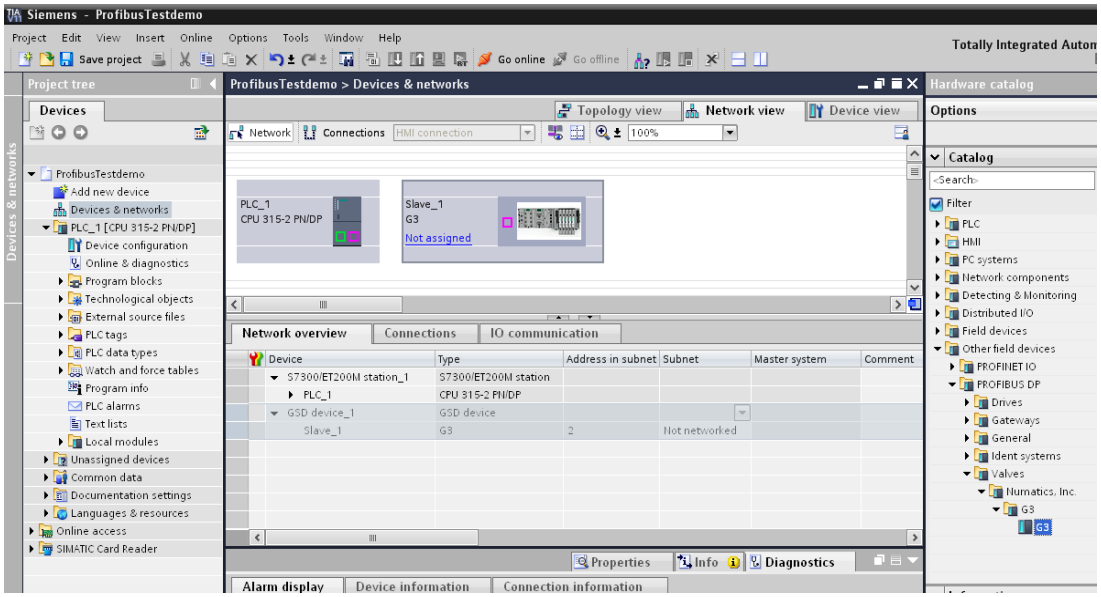
2. From the “Hardware catalog” (right panel), select the other field devices.



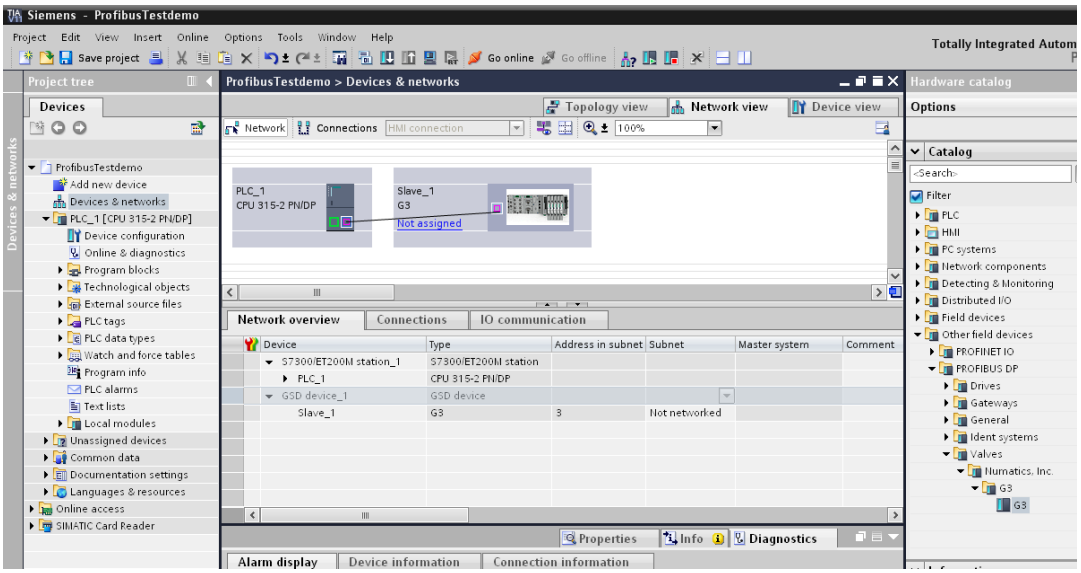
3. From the “Hardware catalog” select other field devices expand; Profibus DP\Valves\Numatics Inc.\G3. Then double click G3



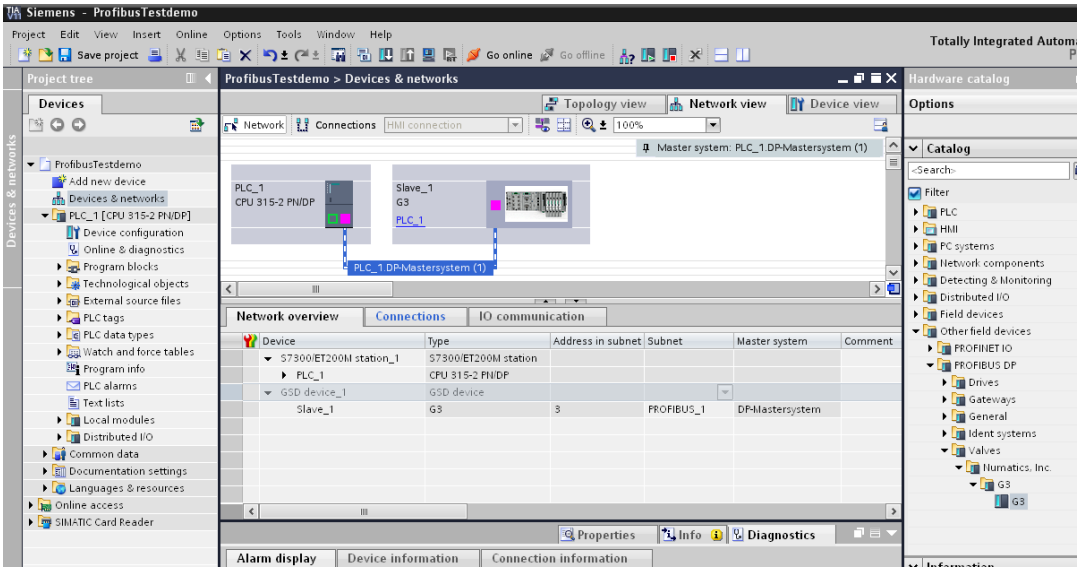
4. The G3 Slave_1 is added to the “Devices and networks” configuration



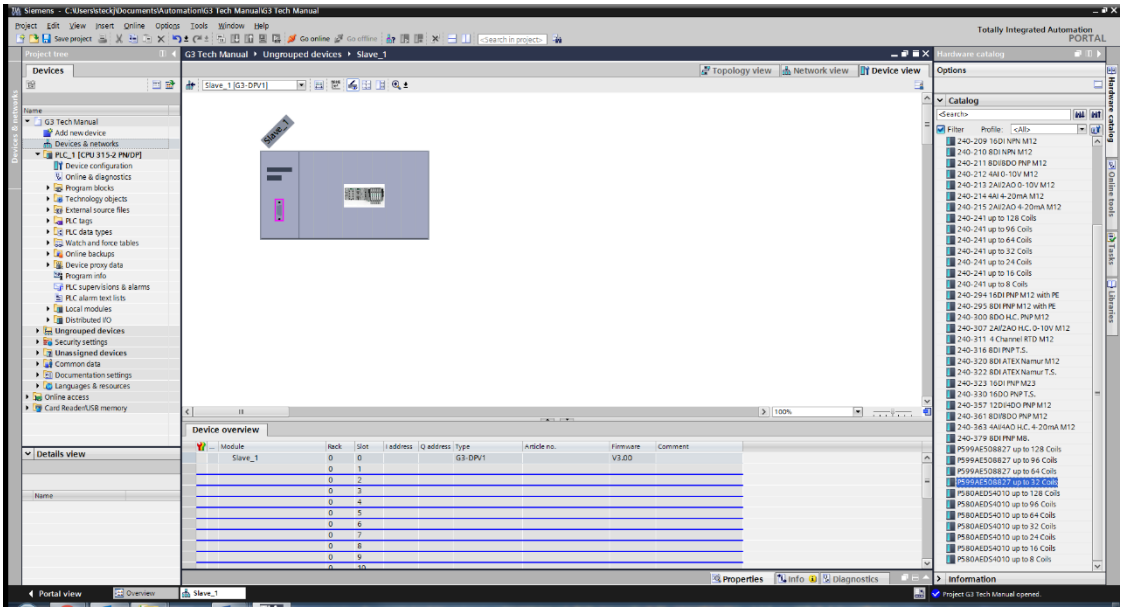
5. Select the Profibus port of the PLC then drag a line to Profibus port of the G3 Slave_1.



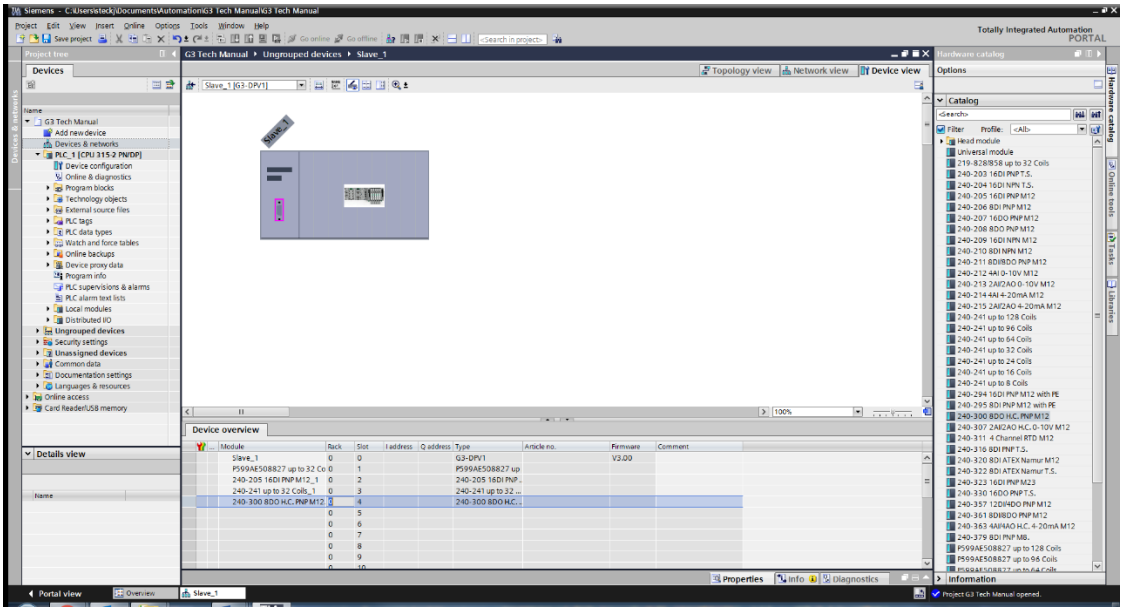
6. The Slave_1 G3 Manifold is connected and assigned to PLC_1. Double click the Slave_1 G3 Manifold to begin I/O configuration.



7. The Slave_1 G3 Manifold is expanded to show the I/O map. Select from the hardware catalog (right tab) to match the required I/O configuration.



8. Complete the I/O configuration by adding the remaining I/O modules. Once all the required modules are configured, the configuration is saved and downloaded to the PLC.

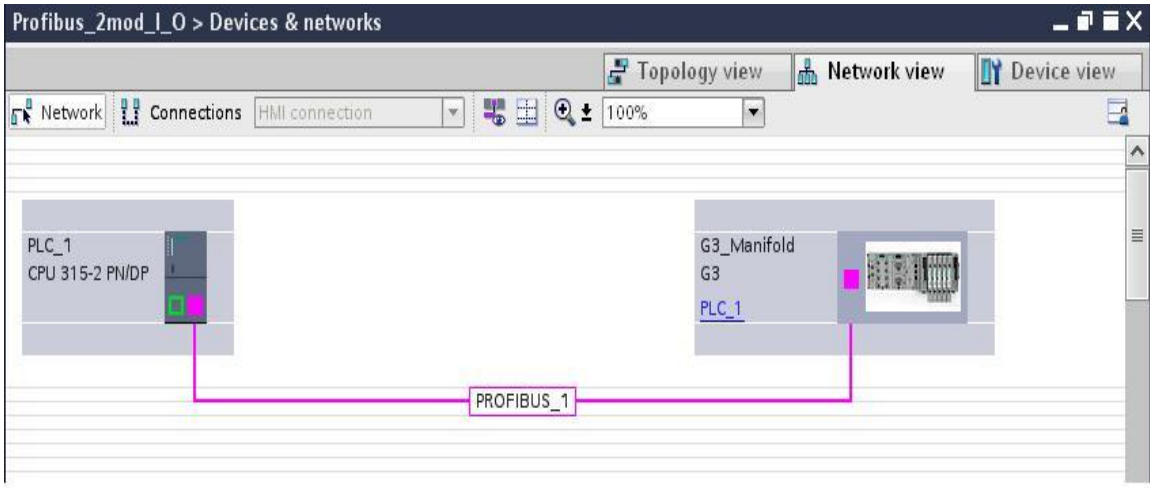


13.5 Profibus and G3 Diagnostics

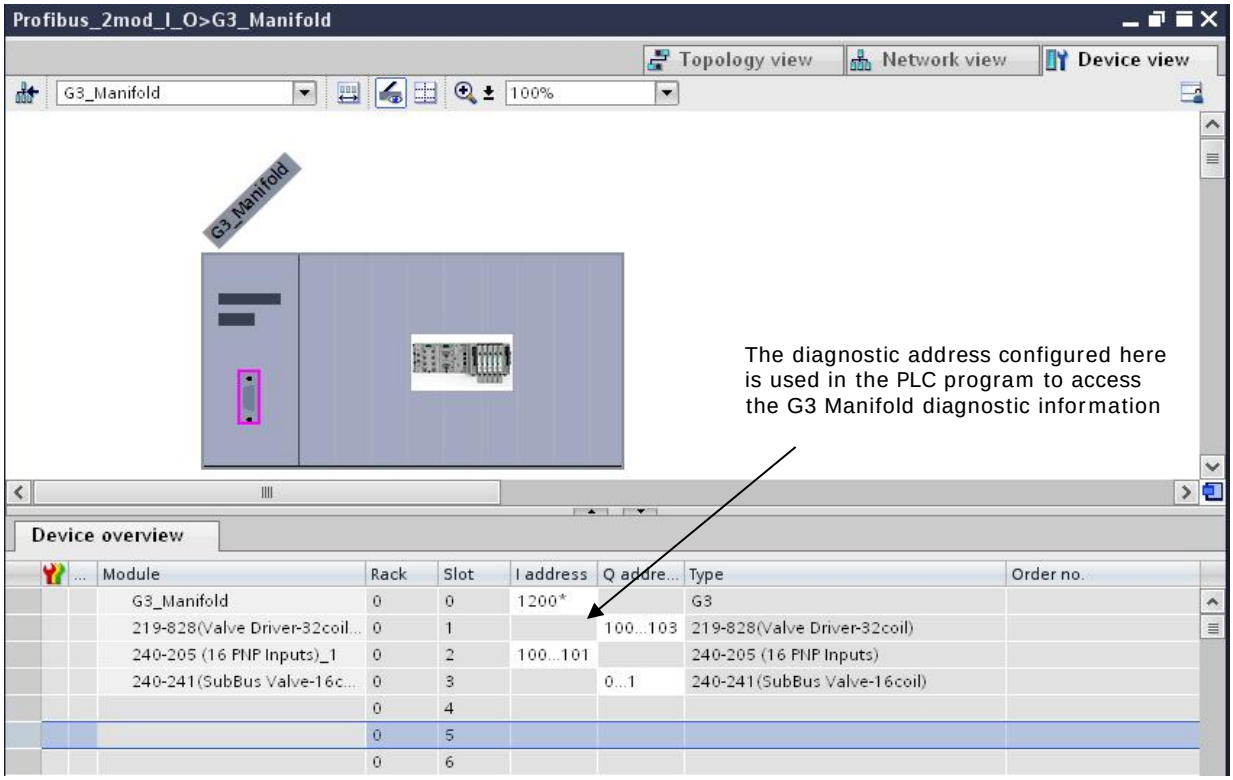
The following example illustrates how to use the diagnostic capability within the PLC program. This example uses an Aventics G3 Profibus Manifold, a Siemens S7-300 PLC and Siemens TIA Portal v15 programming software.

- Profibus Node (240-239)
- Valve driver interface module (219-828)
- 16 Point Input module (240-205)
- Sub-bus module (240-241)

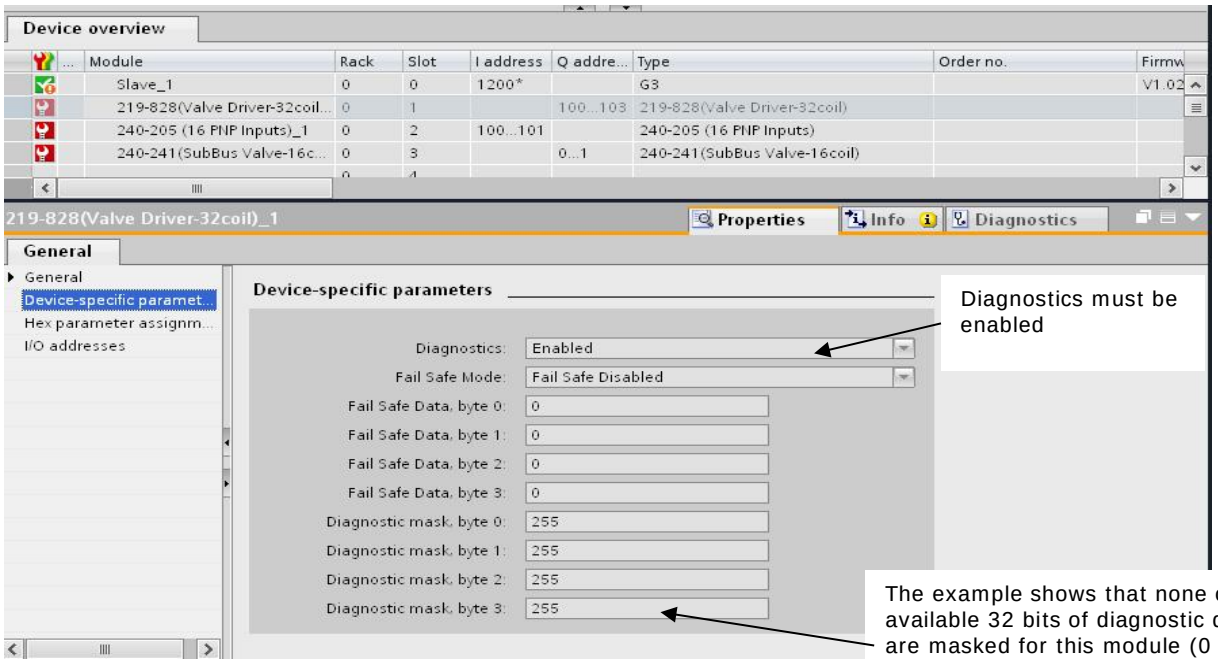
The G3 Manifold configured as a Profibus slave is shown in the network configuration



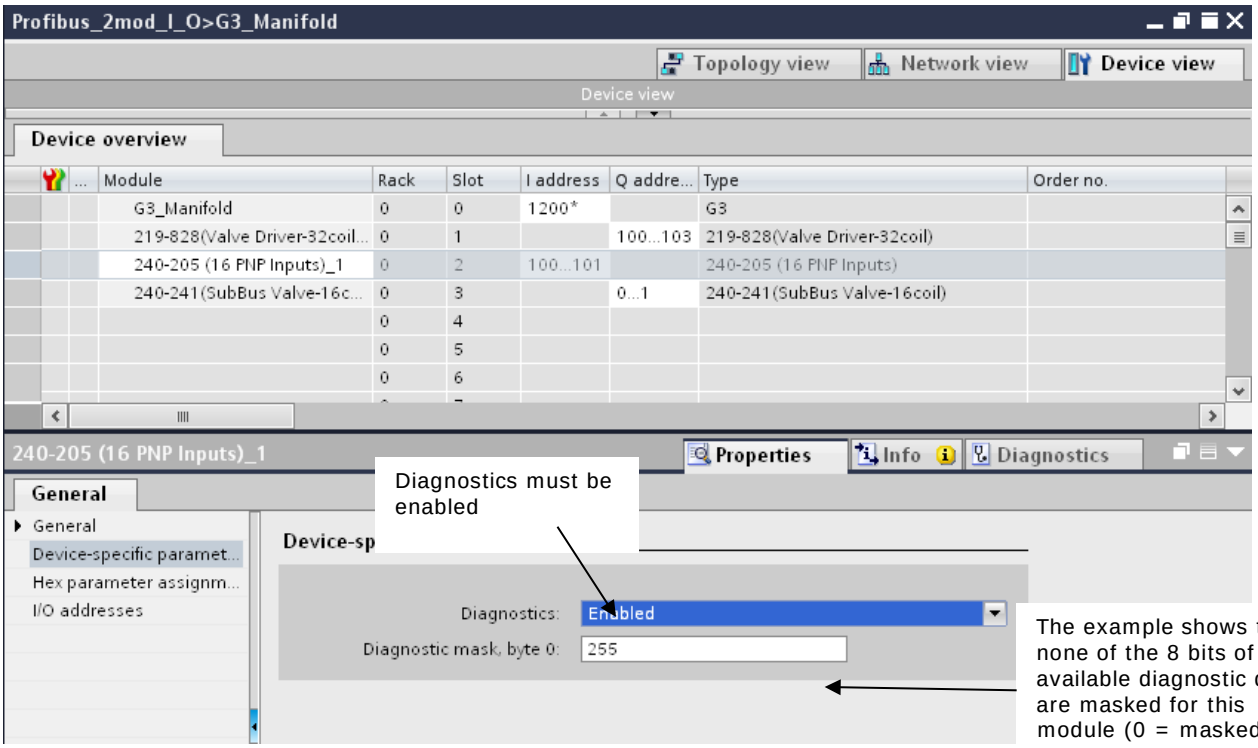
The G3 Manifold object can be opened to display the configuration



The 219-828 Valve Driver object is opened to display the module properties

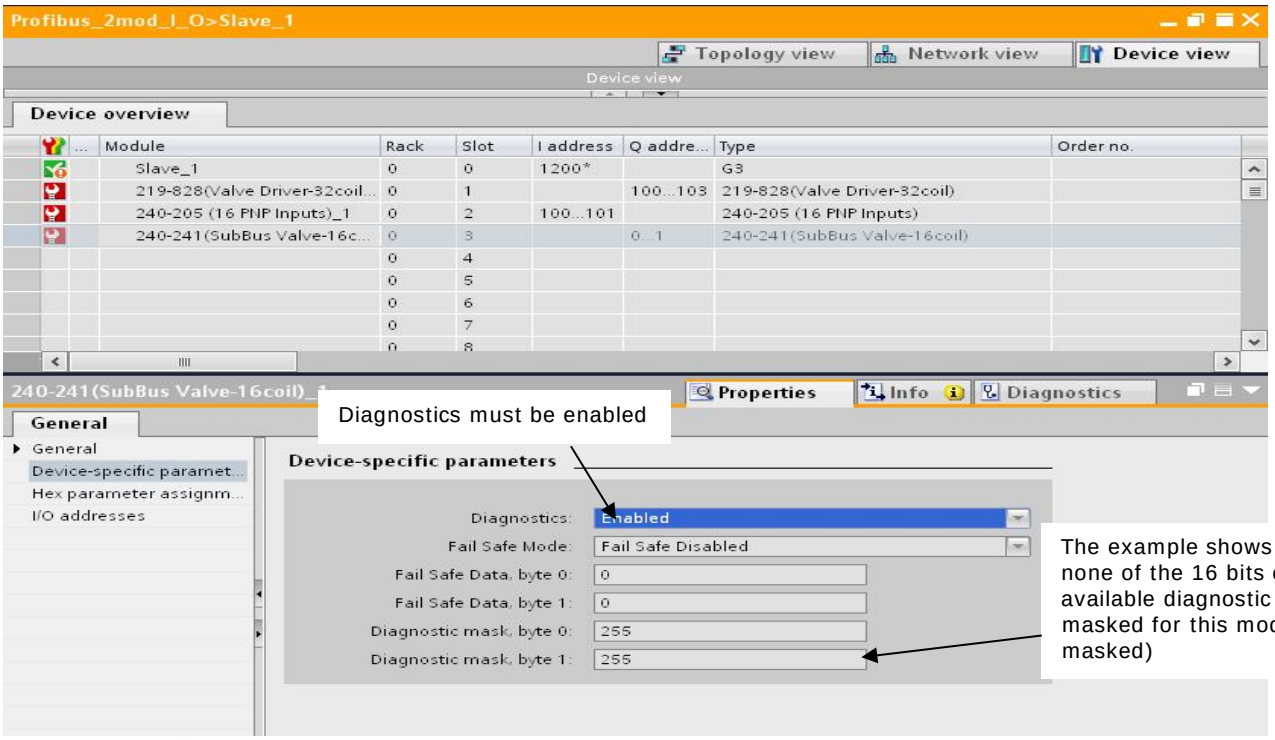


The 240-205 discrete input module object is opened to display the module properties



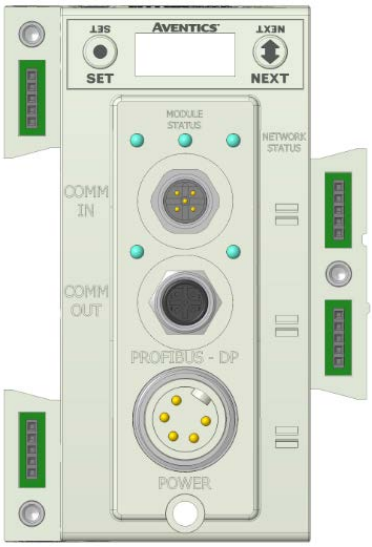
The example shows that none of the 8 bits of available diagnostic data are masked for this module (0 = masked)

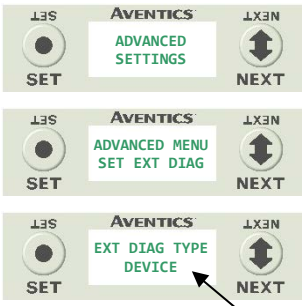
The 240-241 Sub Bus module object is opened to display the module properties



The example shows that none of the 16 bits of available diagnostic data are masked for this module (0 = masked)

For this example, the G3 Profibus node diagnostic configuration must be set at the module

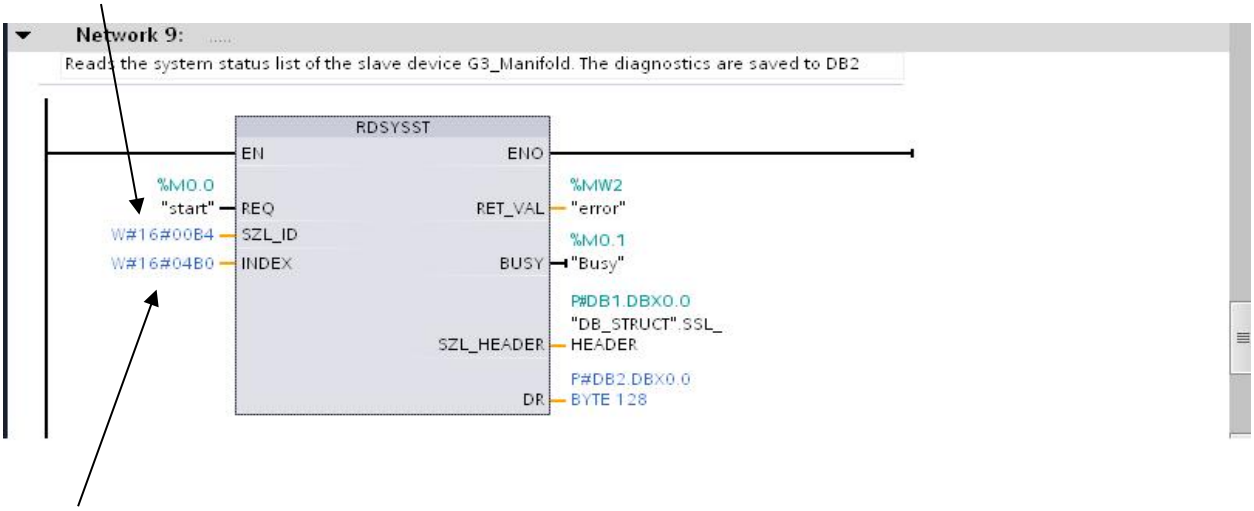




Set Ext. Diagnostic Type to Device

The Function Block RDSSYST (read system status list) is used to copy all available diagnostics into DB2 when "Start" (bit m0.0) is on.

Command ID 00B4 hex=
Read slave diagnostics



Diagnostic address of G3 node=
1200 decimal = 04B0 hex.

Slave diagnostic data written to DB2 (based on manifold configuration)
Refer to the G3 Profibus-DP™ Technical Manual Section 9 for more information on the specific diagnostic structure of all G3 I/O Modules

Data_block_1

		Name	Data type	Offset	Start value	Monitor value	
1		Static					
2		DiagByte	Byte	0.0	0	16#08	
3		DiagByte_1	Byte	1.0	0	16#0C	
4		DiagByte_2	Byte	2.0	0	16#00	
5		DiagByte_3	Byte	3.0	0	16#02	
6		DiagByte_4	Byte	4.0	0	16#0B	
7		DiagByte_5	Byte	5.0	0	16#DD	G3 Diagnostic Data
8		DiagByte_6	Byte	6.0	0	16#0A	
9		DiagByte_7	Byte	7.0	0	16#00	← Node Diagnostic
10		DiagByte_8	Byte	8.0	0	16#00	← Sub-Bus Diagnostic
11		DiagByte_9	Byte	9.0	0	16#F8	← Coil Status 0-7
12		DiagByte_10	Byte	10.0	0	16#FF	← Coil Status 8-15
13		DiagByte_11	Byte	11.0	0	16#FF	← Coil Status 16-24
14		DiagByte_12	Byte	12.0	0	16#FF	← Coil Status 25-32
15		DiagByte_13	Byte	13.0	0	16#00	← Module Connector A-H status
16		DiagByte_14	Byte	14.0	0	16#F8	← Coil Status 0-7 (Manifold 2)
17		DiagByte_15	Byte	15.0	0	16#FF	← Coil Status 8-16 (Manifold 2)

13.6 Commissioning DeltaV for G3 Profibus (DPV1) with AMS Suite

Prepare the G3 Aventics Profibus Node for communication

Supply power to the G3 Profibus node and connect it to the AMS device and supply power. Using the G3 Profibus node's integrated graphic display set the required node address (page 5-28) and enable Profibus mode DPV1.

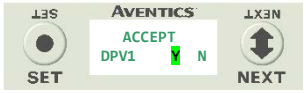
Profibus Mode Settings

1. Press the **SET** button to highlight mode

2. Press the **NEXT** button to scroll the choices for PROFIBUS MODE
   select DPV1

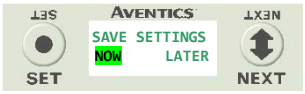
   a. DPV0
   b. DPV1
   c. RETURN

   Press the **SET** button to confirm your choice.



3. Press the **NEXT** button to select **Y**es to accept the setting
   a. Selecting **Y**es will take you to the following SAVE SETTINGS menu.

   Press the **SET** button to confirm your choice



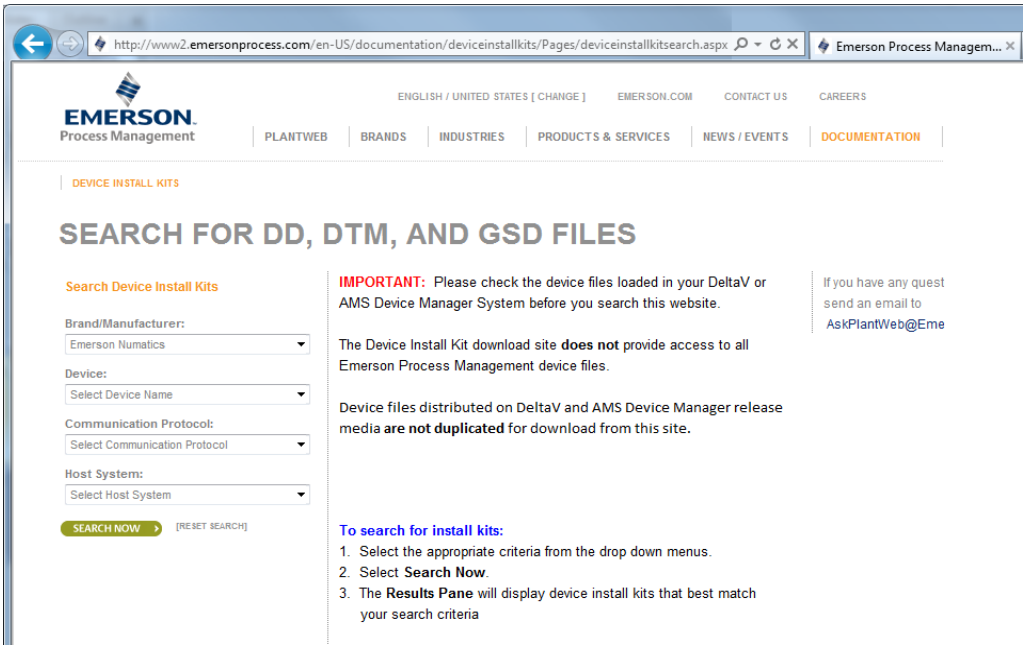
Saved Setting Steps

a. Press the **NEXT** button to select either NOW
b. Selecting NOW will cause the node to reset and apply the new setting.

Press the **SET** button to confirm your choice.

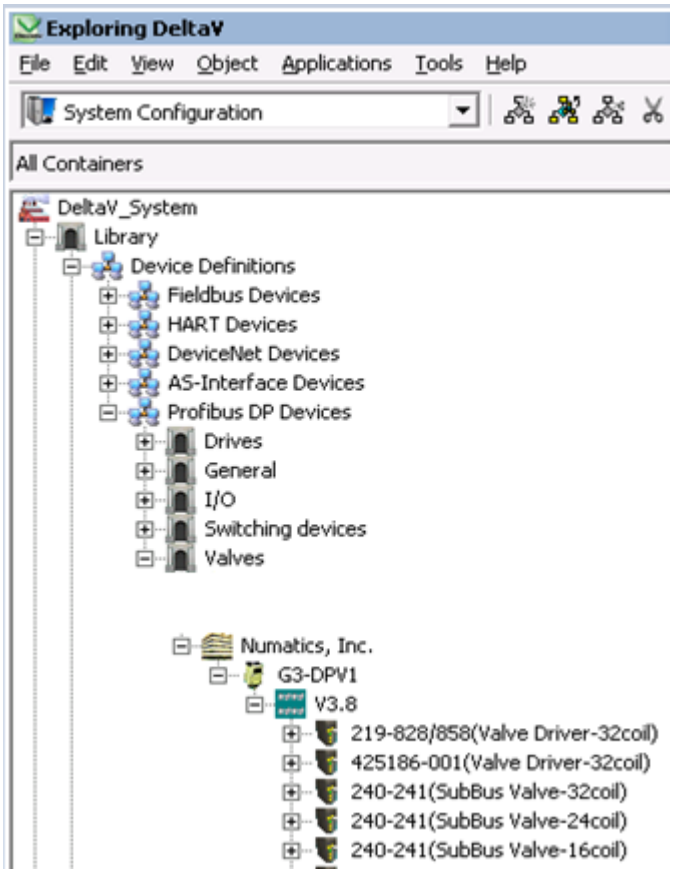
Download and install device data (DD) file for AMS and DeltaV

Download the Emerson Asset Management software (AMS) install kit at;
www2.emersonprocess.com/en-US/brands/amssuite/Pages/AMSSuite.aspx



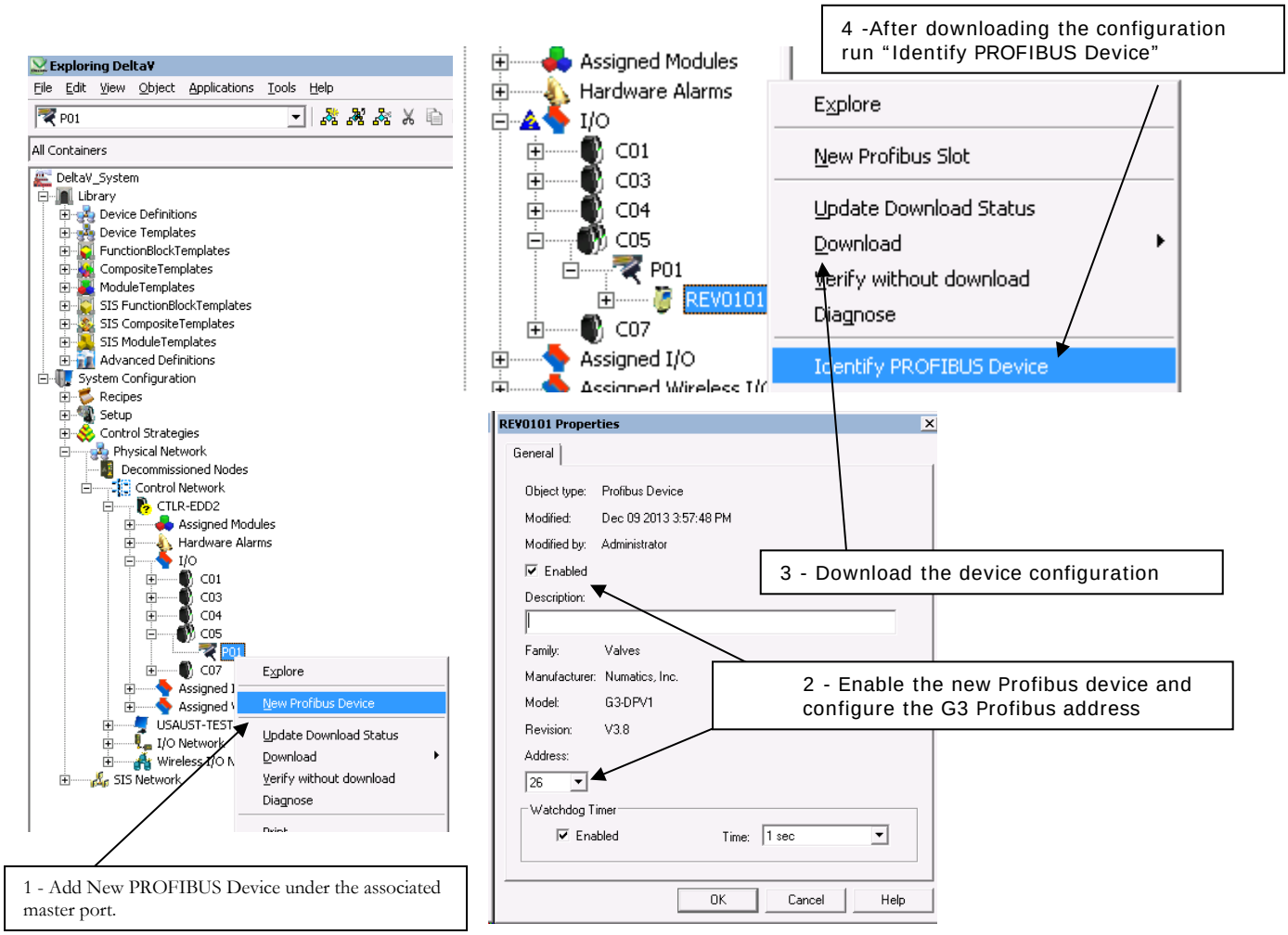
Install the AMS kit

The Delta V Explorer Library displays the G3 DPV1 device in the device list. Profibus DP Devices\Valves\Numatics, Inc. (as shown).



Create new Profibus device and identify in DeltaV/AMS

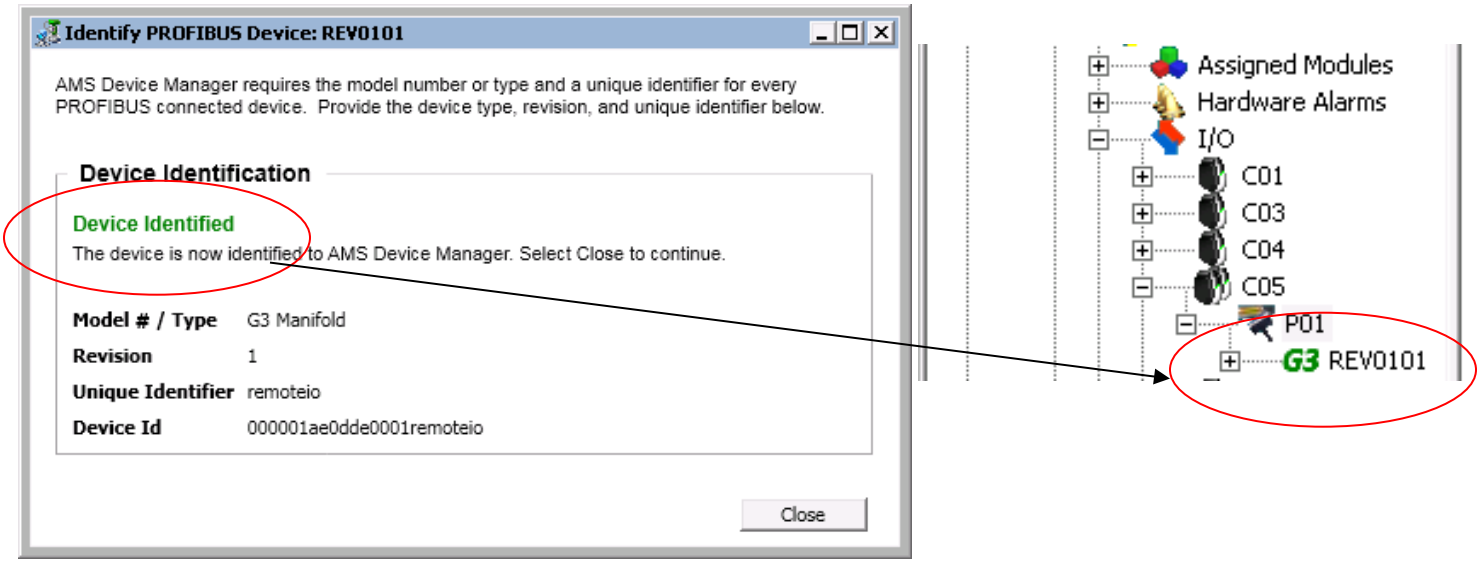
Add the Aventics G3 Profibus Module as a “New Profibus Device” under the control network I/O
Enable the new Profibus device and configure the Profibus address of the new device
Download the device configuration
Run identify “Profibus Device” to connect with the G3 Profibus manifold.



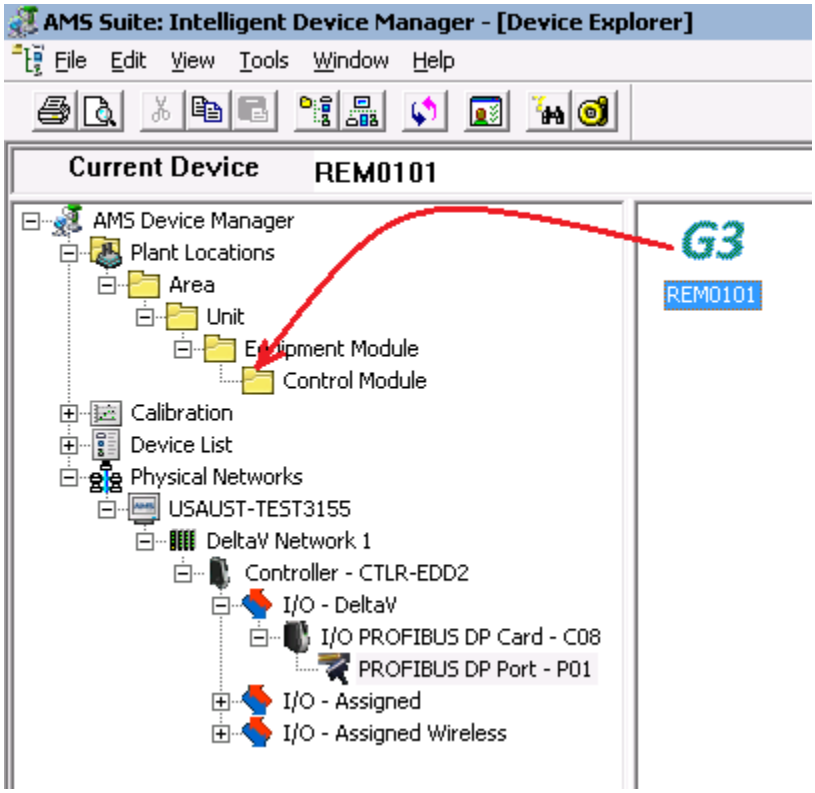
Identify in DeltaV/AMS

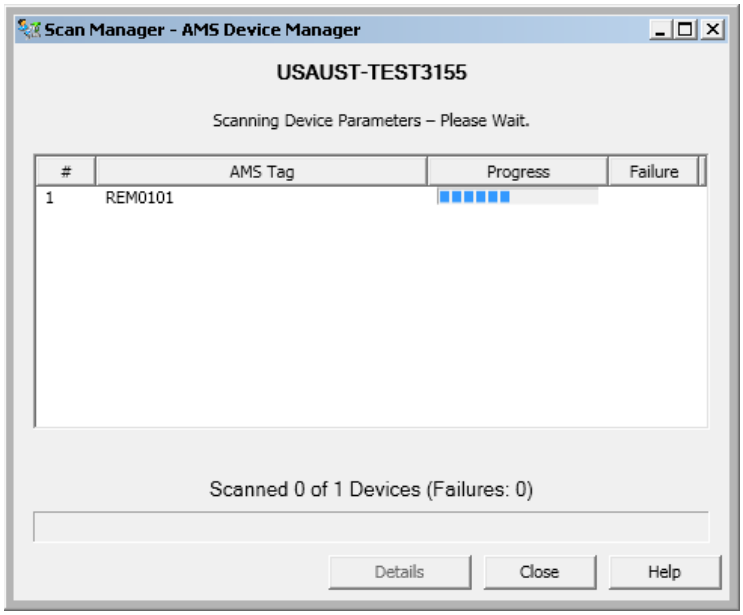
After the device is identified in DeltaV/AMS the placeholder displays the manufacturer's device icon instead of the Generic Profibus icon.

Note- AMS must confirm the device was identified correctly.



AMS scan and assign device

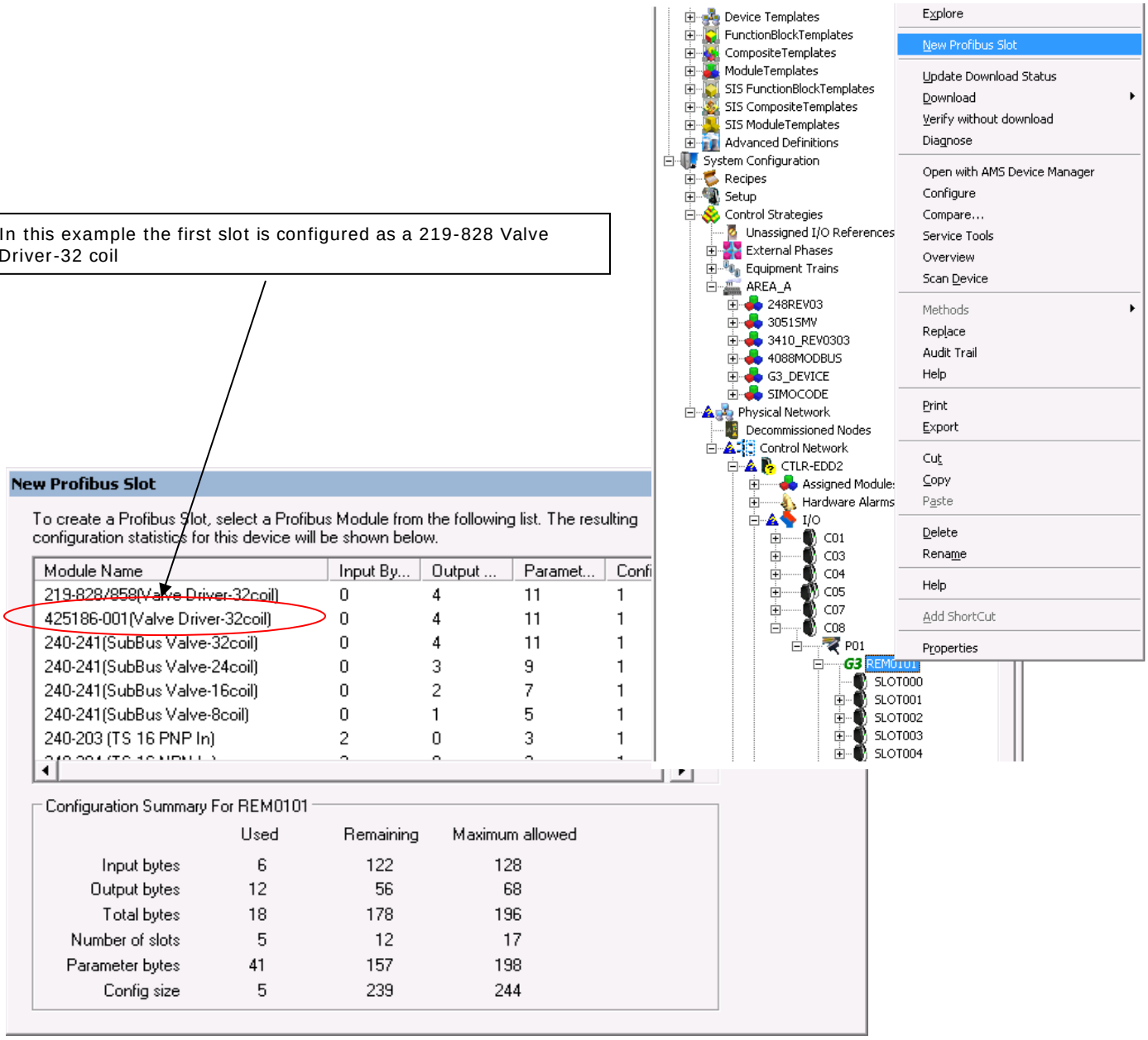




Create G3 Profibus Manifold Slot Configuration in DeltaV

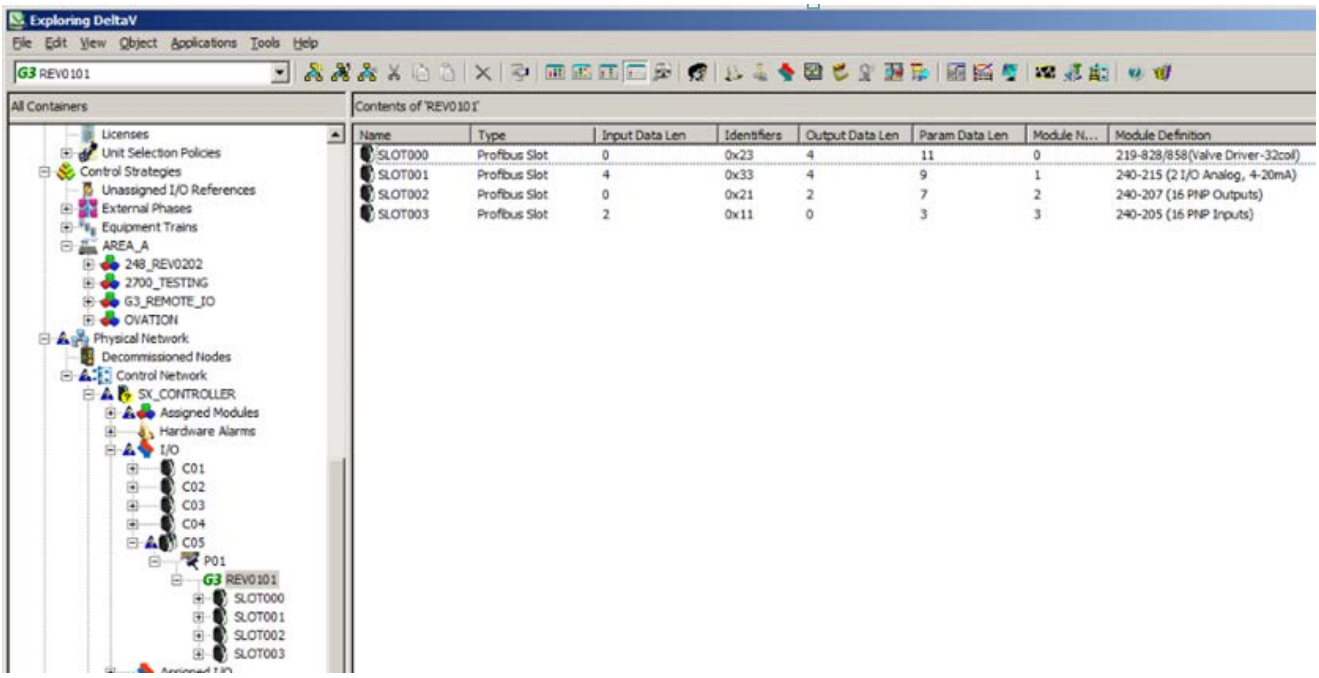
Expand the G3 Profibus
Add a slot for the first module
Populate the device slots with the module types

In this example the first slot is configured as a 219-828 Valve Driver-32 coil



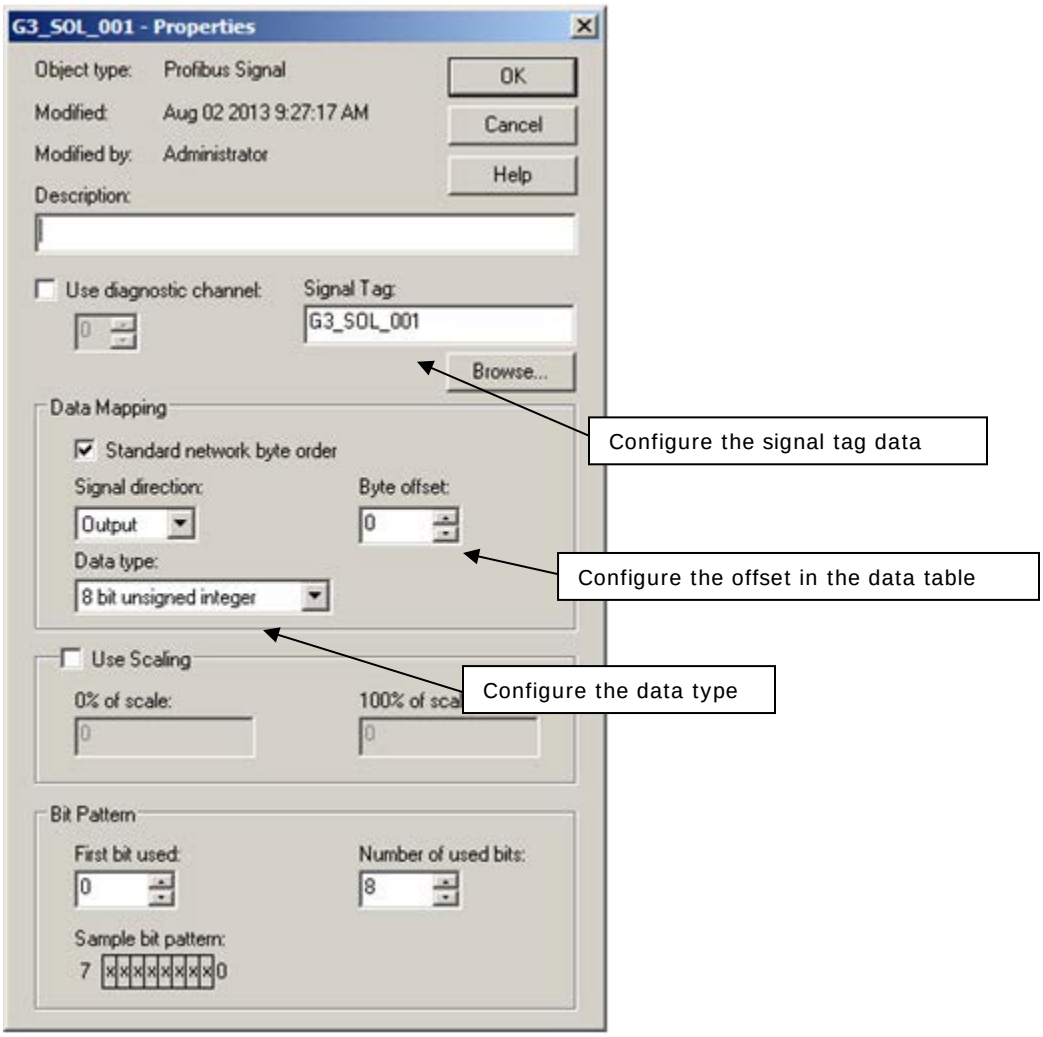
G3 Profibus Manifold Slot Configuration in DeltaV

Continue adding the required slots and G3 modules

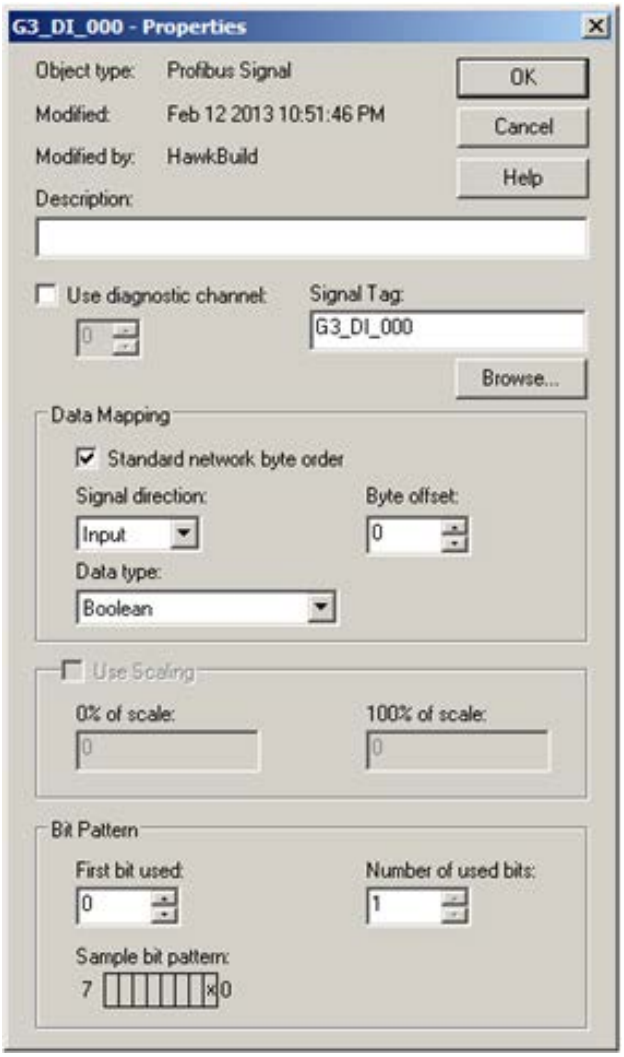


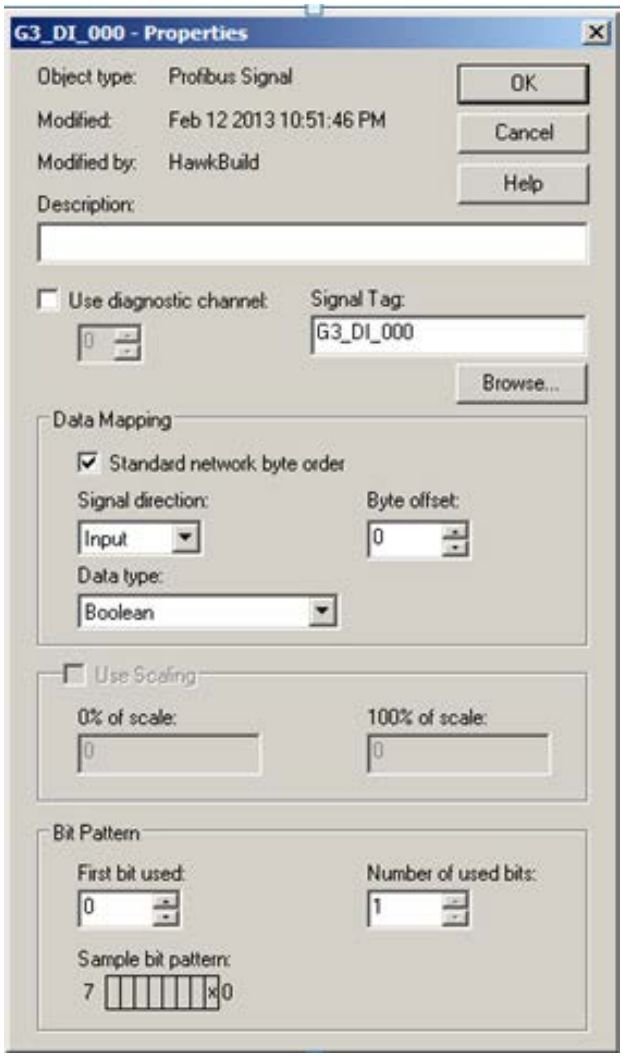
I/O Signal Configuration in Delta Explorer (examples)

Open each I/O module's properties and configure the tag and mapping data

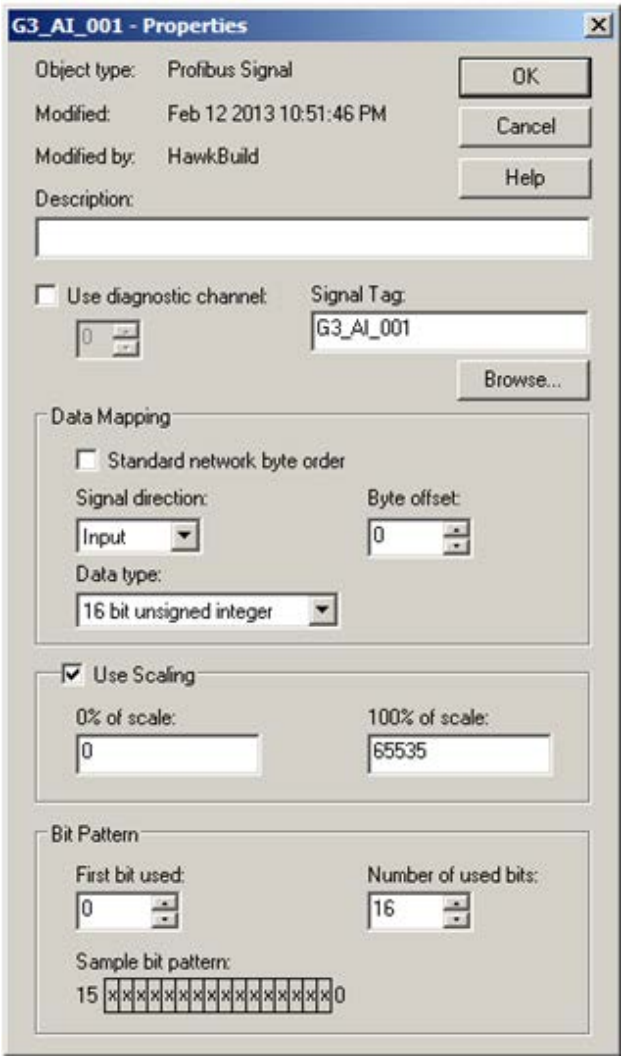


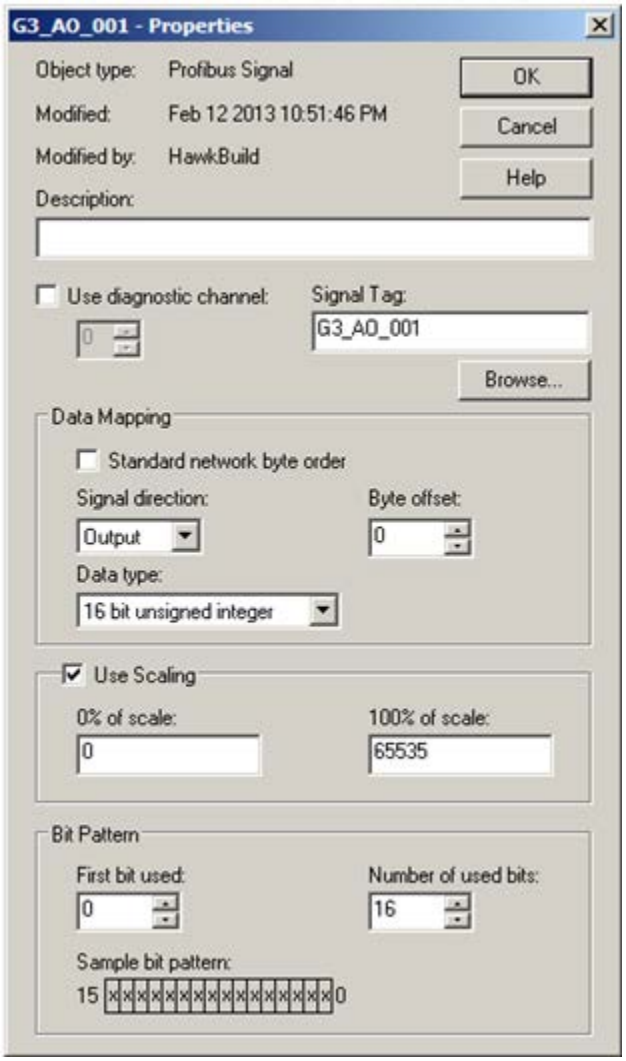
Discrete I/O Signal Configuration in Delta Explorer (examples)





Analog I/O Signal Configuration in Delta Explorer (examples)

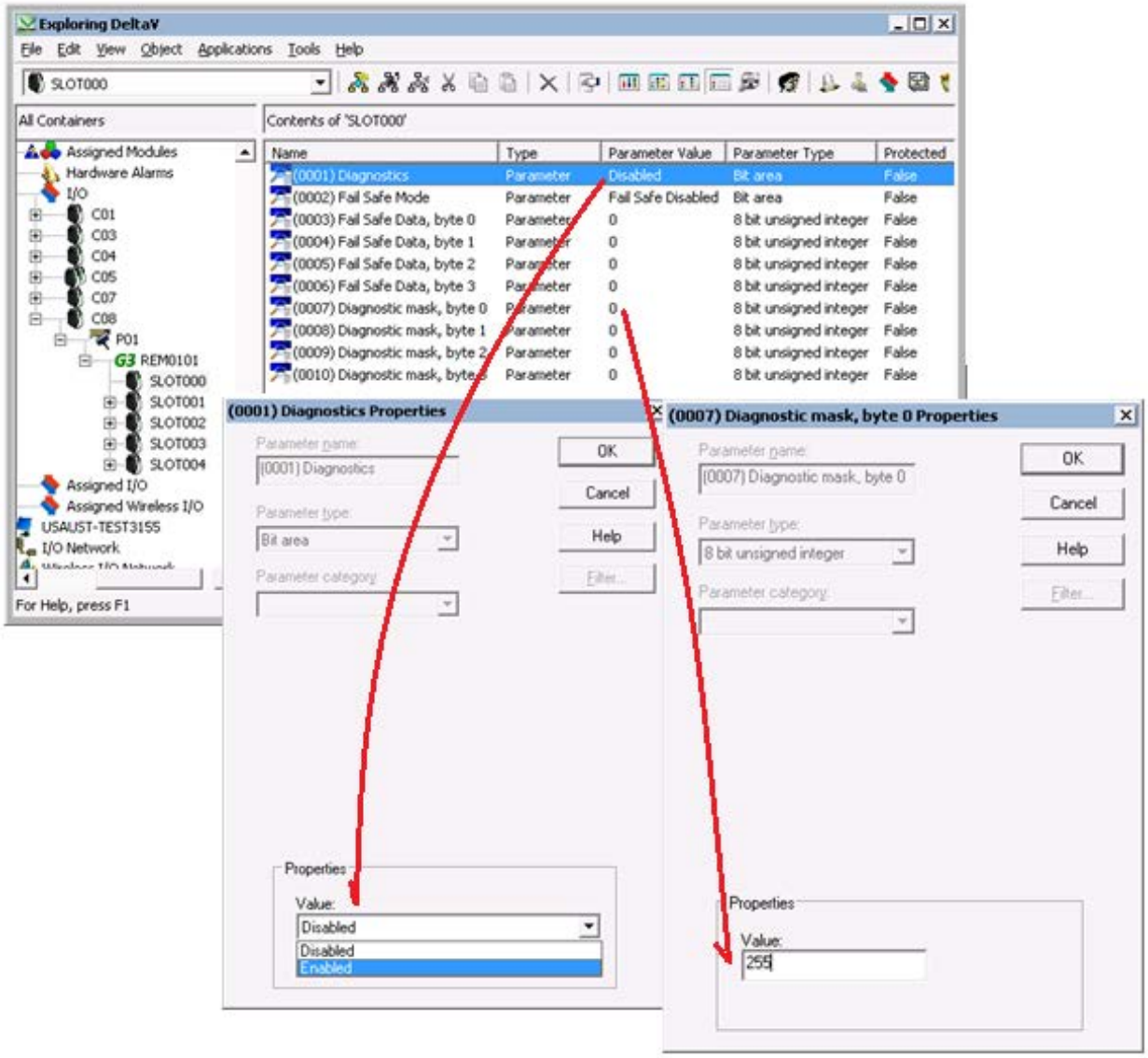




Configure Device diagnostics to report Alerts to AMS manager

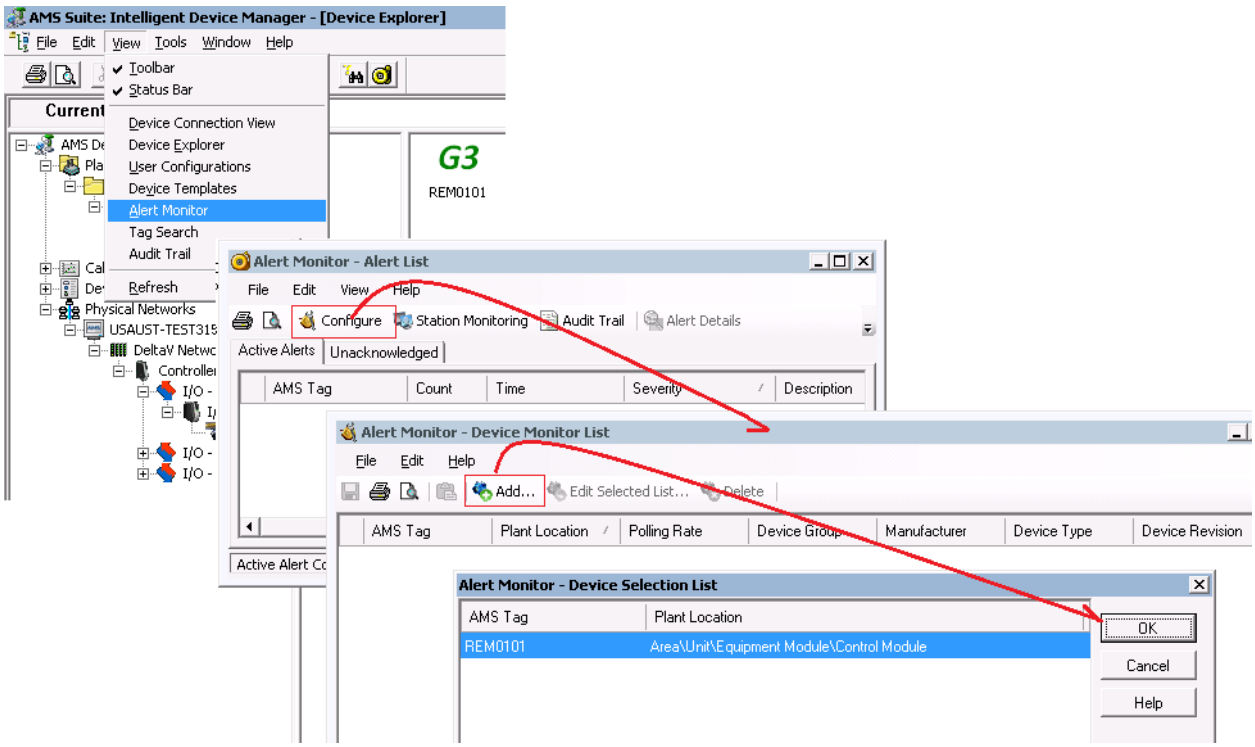
The value entered for diagnostic bytes 0 thru 3 depends on the number of configured input or output channels for the device. The value 255 for mask byte 0 determines the diagnostics of the first 8 channels will be reported to AMS.

Note - Fail safe function may also be enabled and fail safe data may be configured for output modules.

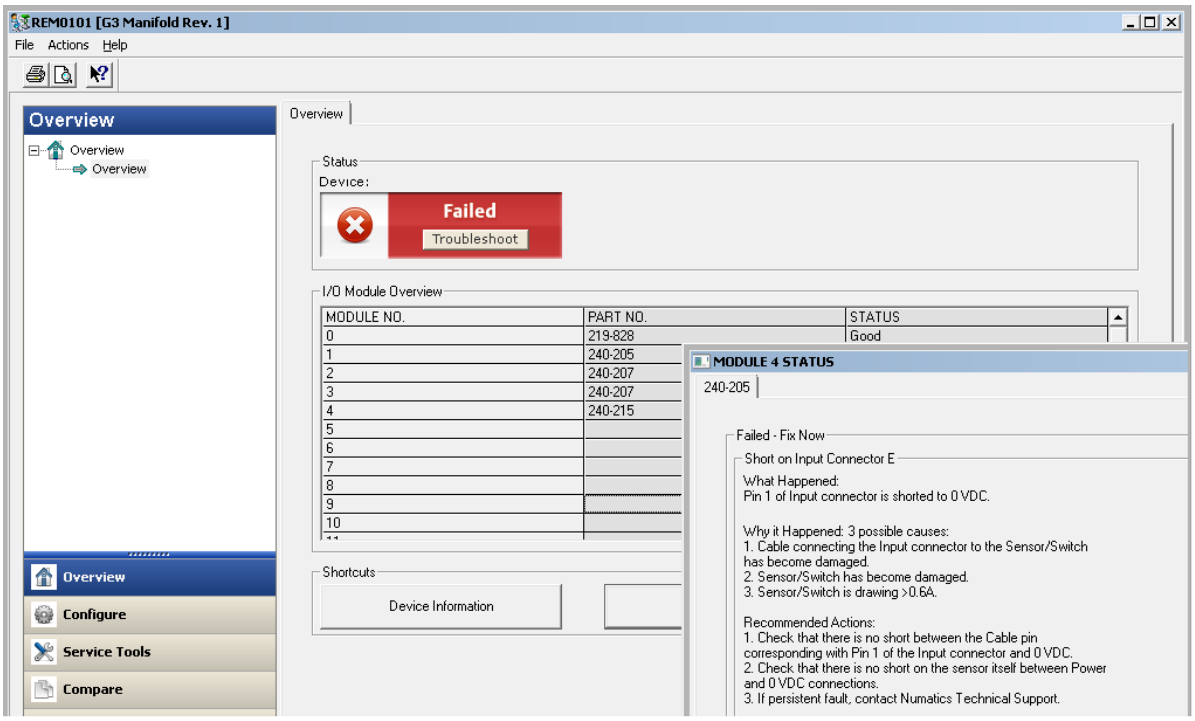


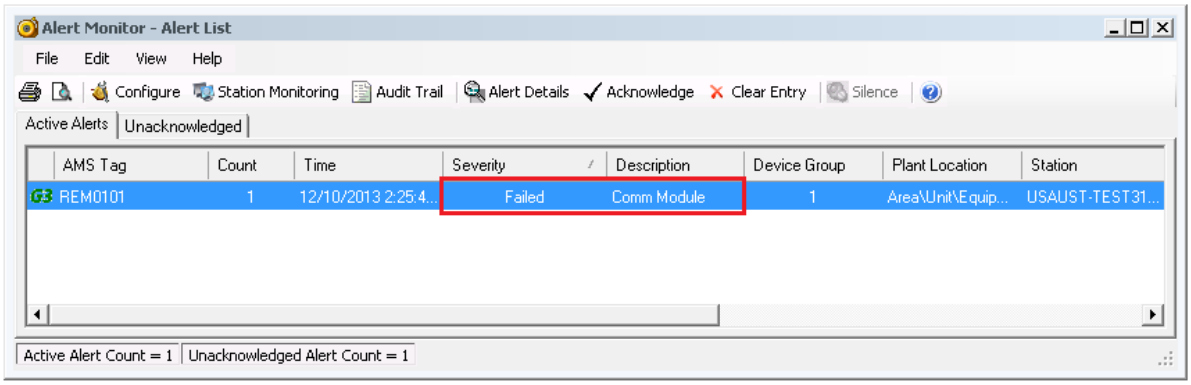
Configuring AMS to notify device alerts in Alert Monitor and Audit Trail

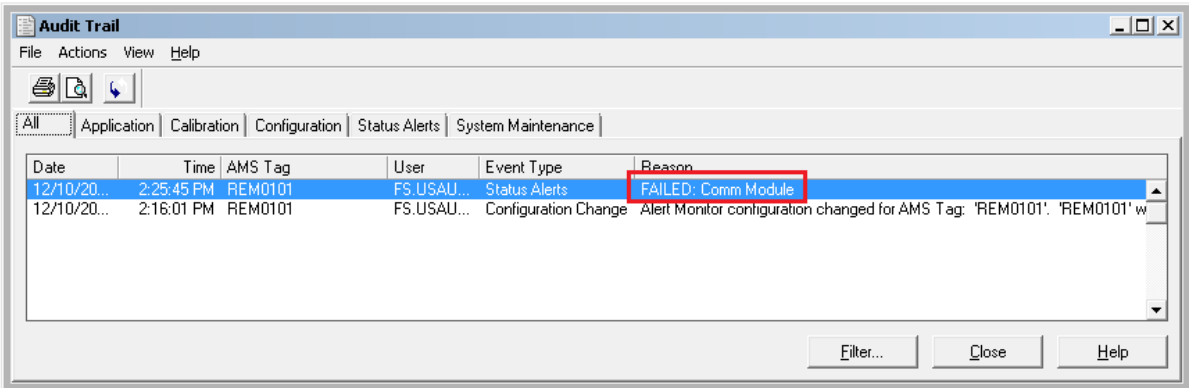
-Launch alert monitor
-Add device to the monitor list
-Save changes



Example Alert Notifications in AMS and Device Dashboard







14. PROFIBUS-DP™ Mapping

14.1 I/O Sizes

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).

Inputs

Inputs are defined as physical input bits from input modules

Valve Side

The size for the “valve side” of the manifold consists of an output bit for each valve solenoid coil driver. This value for the valve side size is 4 bytes of outputs

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. an input bit for each input point).

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. The I/O size can vary greatly, due to the many physical configurations. The worksheet on page 14-141 will allow accurate sizing of the I/O data.

14.2 Manifold and I/O Data Sizing Worksheet

Step	
1	: Choose corresponding *Input* and Output values based on the 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, "I/O Side Byte Requirements" at the bottom of the page.
3	: Add the input bytes and output bytes values from the boxes labeled "I/O Side Byte Requirements" and "Valve Side Byte Requirements" and place total in the boxes labeled "Total I/O Bytes for Manifold. This is the total input and output byte count values required for the configured manifold.

Valve Side

Step	*Valve Side Output Options (selected via GSD file)*	*Input Bytes*	*Output Bytes*
1	Up to 128 Solenoid Coils	0	4

Digital Modules

Step	*Module Part Number*	*Description*	*Input Bytes*	*Output Bytes*
2	240-203/204	16 Inputs - Terminal Strip	2	0
	240-205/209	16 Inputs - 8 x M12	2	0
	240-206/210	8 Inputs - 8 x M12	1	0
	240-379	8 Inputs – 8 x M8	1	0
	240-207	16 Outputs - 8 x M12	0	2
	240-208	8 Outputs - 8 x M12	0	1
	240-211	8 Inputs / 8 Outputs - 8 x M12	1	1
	240-241	Distributed Sub-Bus Valve Module	0	1, 2, 3 or 4
	240-300	8 Outputs – 4x M12 (High Current)	0	1

Analog Modules

Step	*Module Part Number*	*Description*	*Input Bytes*	*Output Bytes*
2	240-212/214	4 Inputs – 4 x M12	8	0
	240-213/215 / 307	2 Inputs/ 2 Outputs – 4 x M12	4	4
	240-363	4 Inputs / 4 Outputs – 4 x M12	8	8

Total Input/Output Size Calculation

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

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.

3) 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.

4) 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.

5) 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 at byte 0. The input bits from the second module will be mapped directly after the input bits from the 1st module and so on.

I/O Mapping Examples

14.4 Example No. 1

Assumed Settings

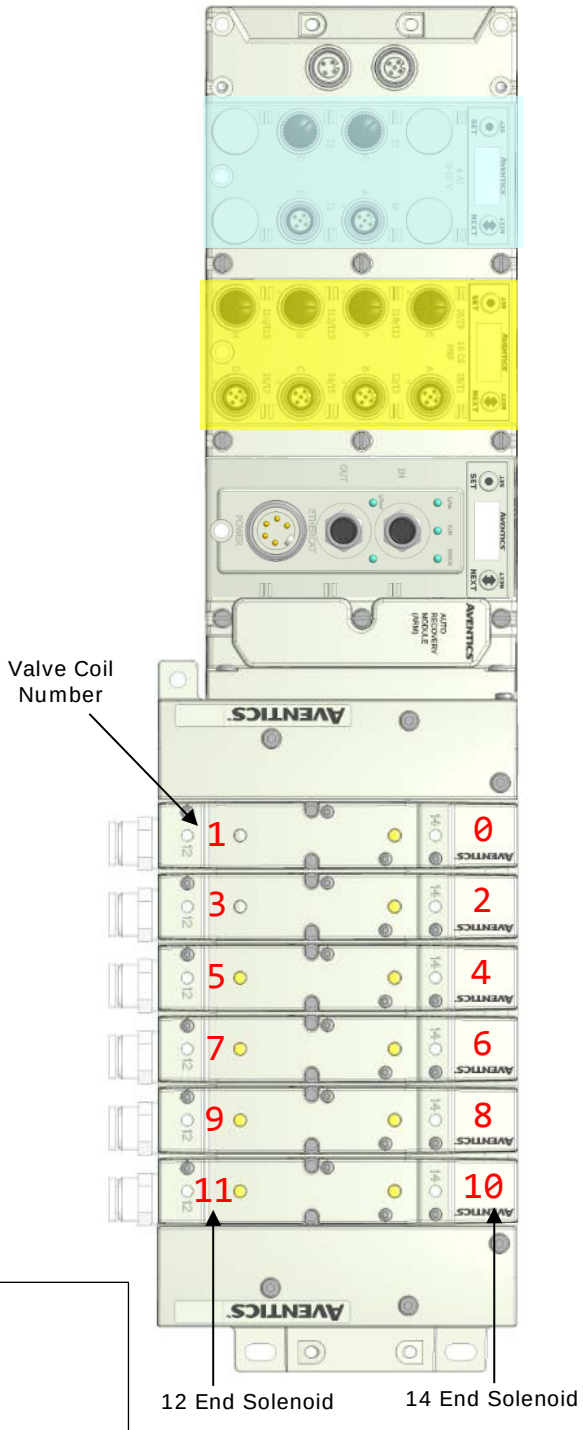
a. Double Z-Boards™ used with all valves
b. I/O Modules and mapping schemes are identified by their corresponding color.

Manifold I/O Configuration

Pos No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	2	0
2	4AI Analog	240-212	8	0
	Local Valve Size		0	4
		Total:	10	4

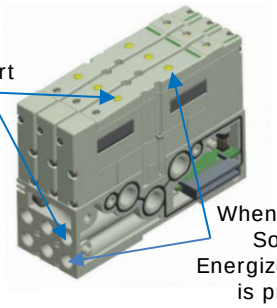
How to Order

Qty	Part Number
1	8502AV3F300VA00
6	R502A1B40MA00F1
3	K502AMM22MA0010
1	G3PT102R0E44
1	240-205
1	240-212
	ASSEMBLED



NOTE!

When the **12** End Solenoid is Energized, the **2** port is pressurized



When the **14** End Solenoid is Energized, the **4** port is pressurized

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	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	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
1	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
2	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
3	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
4	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
5	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
6	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
7	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
8	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
9	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4

14.5 Example No. 2

Assumed Settings

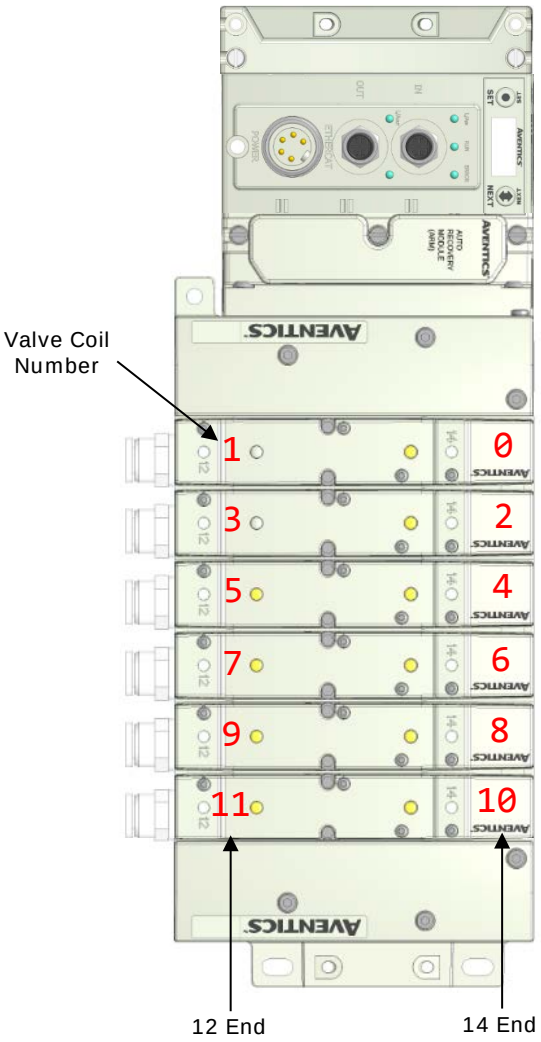
a. Double Z-Boards™ used with all valves
b. I/O Modules and mapping schemes are identified by their corresponding color.

Manifold I/O Configuration

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

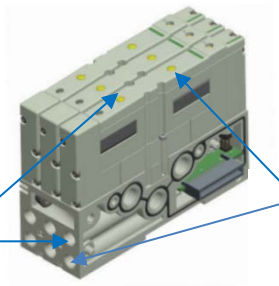
How to Order

Qty	Part Number
1	8502AV3F300VA00
6	R502A1B40MA00F1
3	K502AMM22MA0010
1	G3PT100R0E44
	ASSEMBLED



NOTE!

When the **12** End Solenoid is Energized, the **2** port is pressurized



When the **14** End Solenoid is Energized, the **4** port is pressurized

Example No. 2 Table

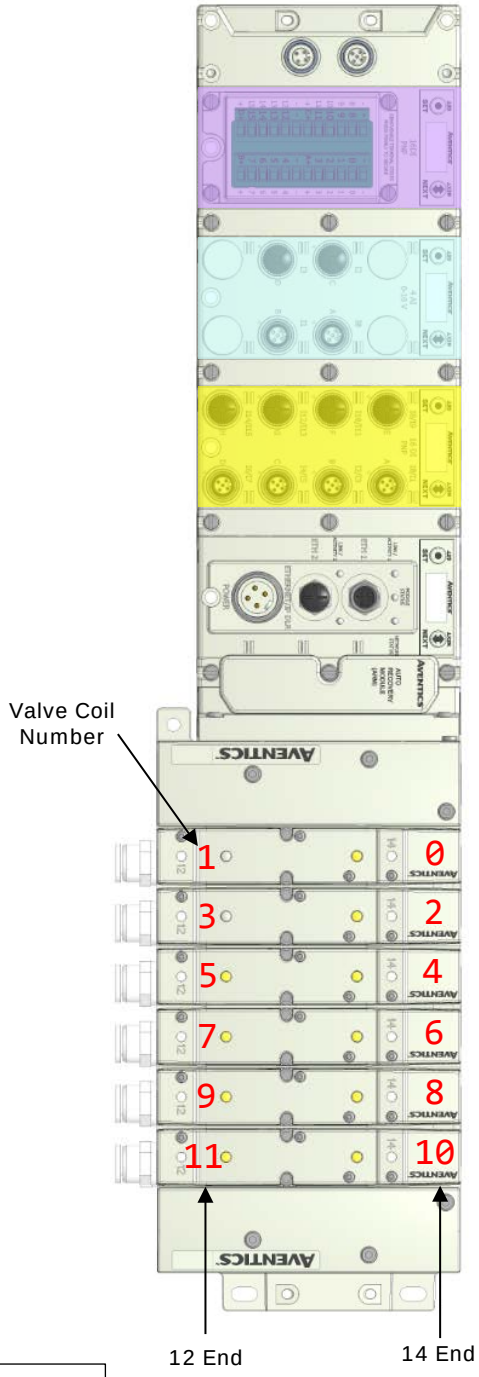
Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved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

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

14.6 Example No. 3

Assumed Settings

a. Double Z-Boards™ used with all valves
b. I/O Modules and mapping schemes are identified by their corresponding color.



Manifold I/O Configuration

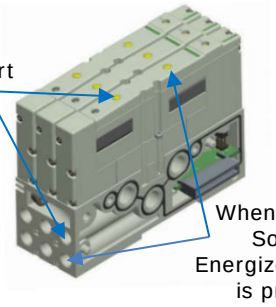
Pos No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	2	0
2	4AI Analog	240-212	8	0
3	16I PNP	240-203	2	0
		Local Valves:	0	4
		Total:	12	4

How to Order

Qty	Part Number
1	8503AV3F300VA00
6	R502A1B40MA00F1
3	K502AMM22MA0010
1	G3PT103D0E44
1	240-205
1	240-212
1	240-203
	ASSEMBLED

NOTE!

When the **12** End Solenoid is Energized, the **2** port is pressurized



When the **14** End Solenoid is Energized, the **4** port is pressurized

Example No. 3 Table

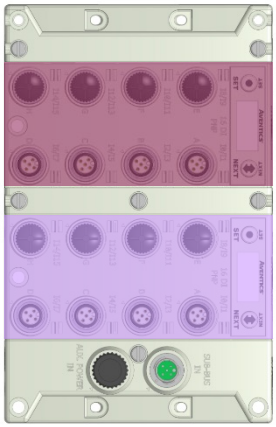
Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved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

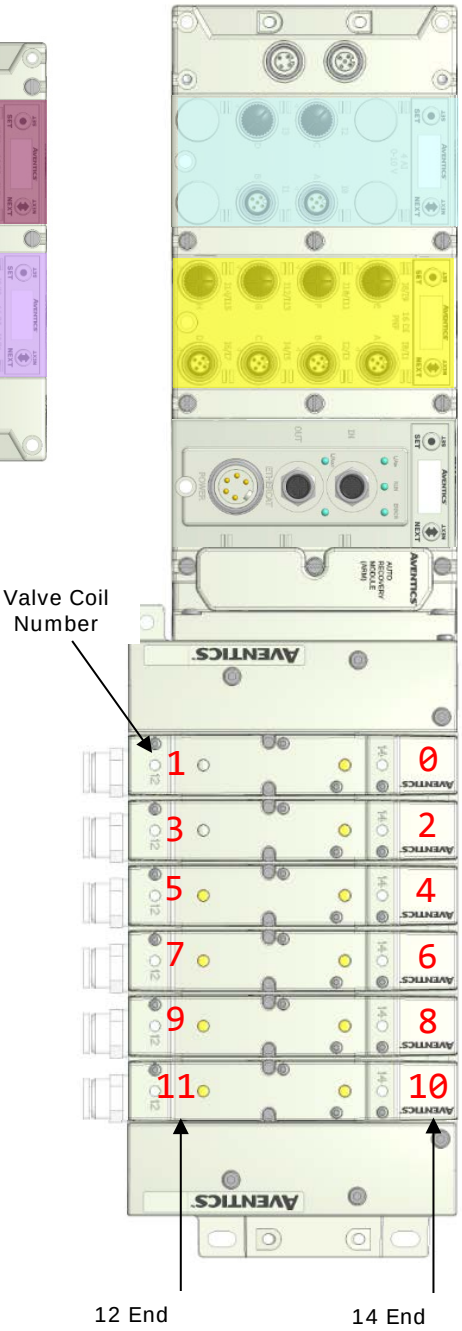
Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
1	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
2	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
3	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
4	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
5	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
6	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
7	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
8	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
9	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
10	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
11	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

14.7 Example No. 4

Assumed Settings

a. Double Z-Boards™ used with all valves
b. I/O Modules and mapping schemes are identified by their corresponding color.





Manifold I/O Configuration

Pos No.	Module Type	Part No.	In	Out
			Bytes	
1	16I PNP	240-205	2	0
2	4I Analog	240-212	8	0
3	16I PNP	240-205	2	0
4	16I PNP	240-205	2	0
		Local Valves:	0	4
		Total:	14	4

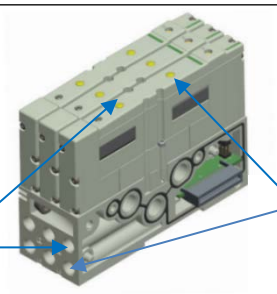
How to Order

Qty	Part Number
1	8503AV3F300VA00
6	R501A1B40MA00F1
3	K502AMM22MA0010
1	G3PT102D0E44
1	240-205
1	240-212
	ASSEMBLED

1	G3DS302R0STD
1	240-205
1	240-205
	ASSEMBLED

NOTE!

When the **12** End Solenoid is Energized, the **2** port is pressurized



When the **14** End Solenoid is Energized, the **4** port is pressurized

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	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	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
1	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
2	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
3	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
4	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
5	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
6	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
7	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
8	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
9	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
10	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
11	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
12	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
13	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

14.9 Extended Diagnostics

Data Diagnostic Telegram

Example data structure (Hexadecimal):

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
07	00	00	07	00	FF	FF	XX	XX	XX

Byte 0	07	Total number of bytes in telegram determined by physical configuration
Byte 1	00	Diagnostic Word, byte 0 (see below)
Byte 2	00	Diagnostic Word, byte 1 (see below)
Byte 3	07	1st diagnostic byte of valve driver module. Diagnostic for Output byte 0 (00000111) Diagnostic bit high for coils 0, 1, 2
Byte 4	00	2nd diagnostic byte of valve driver module. Diagnostics for output byte 1
Byte 5	FF	3rd diagnostic byte of valve driver module. Diagnostics for output byte 2
Byte 6	FF	4th diagnostic byte of valve driver module. Diagnostics for output byte 3
Byte 7...	XX	Diagnostics for next I/O module in system if applicable

Diagnostic bits for outputs are as follows:

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

Diagnostic bits for inputs are as follows:

Input Type	*Input State*	*Fault Condition*	*Status Bit*
Input	N/A	No Fault	0
		Fault - Short Circuit on connector	1

Diagnostic Word Format								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1 (Comm. Status)	Reserved	Reserved	Reserved	Reserved	Reserved	Sub-Bus Error (1=Error)	UnSwitched Power Status (1=Error)	Switched Power Status (1=Error)
2 (Sub-Bus Status)	Error Code	Error Code	Error Code	Module Address	Module Address	Module Address	Module Address	Module Address

14.10 Diagnostic Telegram Example

Diagnostic Telegram Data for above manifold (Hexadecimal)

0C	00	00	2A	F0	FF	FF	00	00	00	00

0C	Total number of bytes in telegram
00	Diagnostic Word, byte 0 (00000000)
00	Diagnostic Word, byte 1 (00000000)
2A	First diagnostic byte of valve driver module. (01010100)
F0	Second diagnostic byte of valve driver module. (11110000)
FF	Third diagnostic byte of valve driver module. (11111111)
FF	Fourth diagnostic byte of valve driver module. (11111111)
00	Diagnostic byte for 16 pt. Input module (M12) (00000000)
F0	1st diagnostic byte of 4 pt. Analog Input module (11110000)
00	2nd diagnostic byte of 4 pt. Analog Input module (00000000)
F0	Diagnostic byte for 16 pt. Input module (terminal strip) (11110000)

15. Appendix

15.1 System Specifications

Electrical	
Supply Voltage	Valves (501, 502, 503, 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 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 4-24 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for both discrete and valve outputs.
Discrete Outputs	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)

15.2 Factory Default Settings

FACTORY DEFAULT SETTINGS	
Description	*Default*
Node Address	126
SSA Lock	Disabled
Brightness	High

15.3 Troubleshooting

Communication Node

Symptom	*Possible Cause*	*Solution*
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 14-140 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

Symptom	*Possible Cause*	*Solution*
Outputs remain on when communication is lost and/or PLC is in “Program” mode.	Communication Fault parameters are set incorrectly. See pages 13-115.	Check the communication fault/idle mode parameter setting to ensure that it is not set to “Hold Last Output State”.

15.4 Glossary of Terms

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

Term	Description
Auto-Baud	A technology that enables the communication node to automatically set its own baud rate to match the 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).
Discrete I / O	The Inputs / Outputs that are available via the "Discrete I/O" side of manifold.
Ground	This term is used to indicate an earth ground.
Group 2	Profibus message group applicable to Aventics' Serial/Bus products.
MCM	Manual Configuration Module. A module that allows MAC ID to be set manually via DIP switches. Not required if software configuration is used.
NEMA	National Electrical Manufacturers Association.
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.
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.

15.5 Technical Support

For technical support, contact your local Aventics distributor. If further information is required, please call the Technical Support Department at (248) 596-3337.

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 or Numatics products and support issues can be found on the Aventics web site at www.asco.com