AVENTICS™

580 *PROFIBUS*™ DP
Technical Manual

PROFI®
PROCESS FIELD BUS
BUS

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Conditions for use of this product

AVENTICS™ 580 Manifold ("the PRODUCT") SHALL NOT BE USED IN CONDITIONS where any problem, fault or failure occurring in the PRODUCT may lead to any incident resulting in damage to property, serious injury or loss of life and where the end user does not have appropriate external backups and fail-safe measures incorporated within the systems that the PRODUCT is used.

The PRODUCT has been designed and manufactured for use in general industries. Therefore, the PRODUCT and related document(s) are not for use in any nuclear and/or medical related applications.

For avoidance of doubt, AVENTICS and its affiliated companies 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 documentation including any 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

The *CAUTION* symbol indicates a possible hazard which may cause injury or equipment damage. Please review and take appropriate action.

NOTE!

The *NOTE* symbol indicates important information regarding equipment installation and setup. Please review and take appropriate action.

Electrical Installation And Operational Guidelines

CAUTION

- AVENTICS valve systems with integrated fieldbus communications must only be connected to a Class 2 power source.

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

- All AVENTICS 580 Electronics Products must only be installed or wired in accordance with ASCO AVENTICS published instructions and applicable electrical codes.

- When using MULTIPLE CLASS 2 POWER SOURCES all sources shall be Listed and rated suitable for parallel interconnection.

- All field wiring shall be suitable for Class 1, Electric Light and Power, or if Class 2, 3 wirings, such wirings shall be routed separately and secured to maintain electrical and physical separation between Class 2 wiring and all other class wiring and limited energy circuit conductors from unlimited energy circuit conductors.

- When using Class 2 Device Wiring Only, you SHALL 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) utilized.

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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 580 PROFIBUS™ DP Node 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.

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   580 PROFIBUS™ DP Node 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
Address Setting options	Via Software (with Profibus-DP Class 2 Master) or graphic display
Supported Versions	DP-V0 and DP-V1

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. 580 PROFIBUS^{TM} DP Introduction

The 580 PROFIBUS^{TM} DP Node is an electronic interface that features an integrated graphic display for simple commissioning and displaying of diagnostic information. The 580 PROFIBUS^{TM} DP Node mates to a variety of valve series including, the 501, 502, and 503. The 580 PROFIBUS^{TM} DP Node is capable of addressing a total of (128) coil outputs, with diagnostic functionality built in. With proper assembly and termination the 580 PROFIBUS^{TM} DP Node has an IP65 rating.

This manual details specific information for configuring and commissioning the Aventics 580 PROFIBUS^{TM} DP Node. For more information relating to pneumatic valving and valve manifold assemblies, please refer to the Aventics *501, 502 and 503 Series catalogs* at www.asco.com.
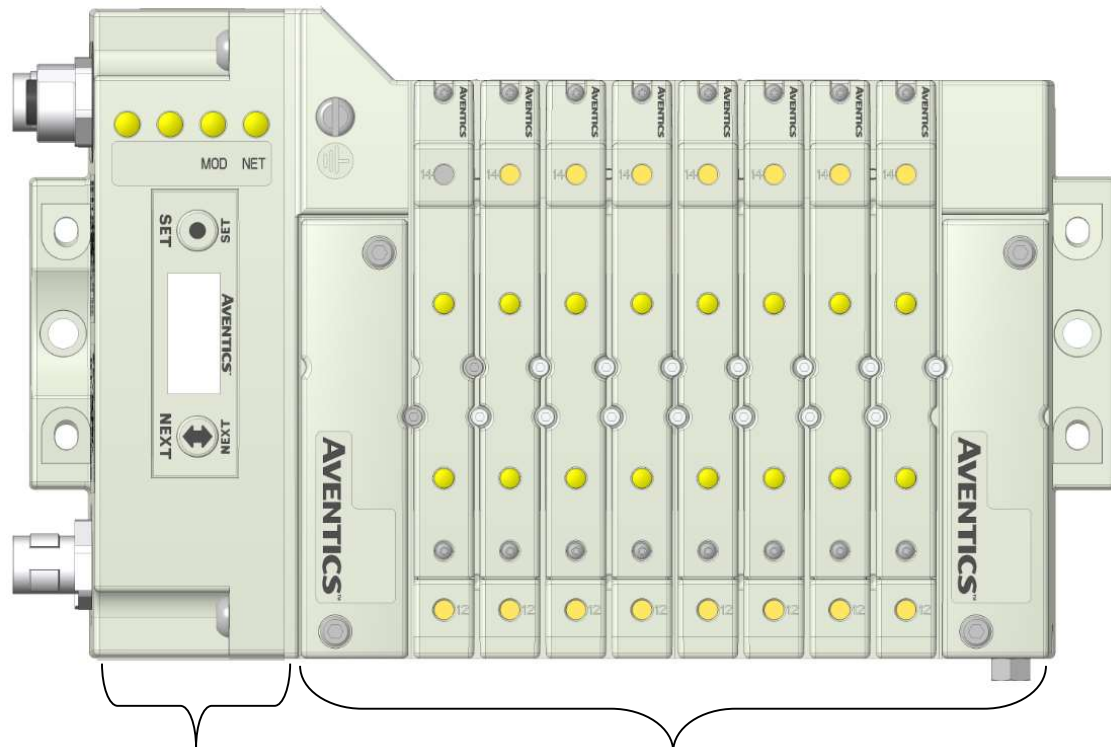
580 PROFIBUS DP Node   **Valve Side**
Drives up to 128 coils

2.1   Pneumatic Valve Manifold – 501 Series shown

The pneumatic valve manifold with internal circuit board technology is 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.
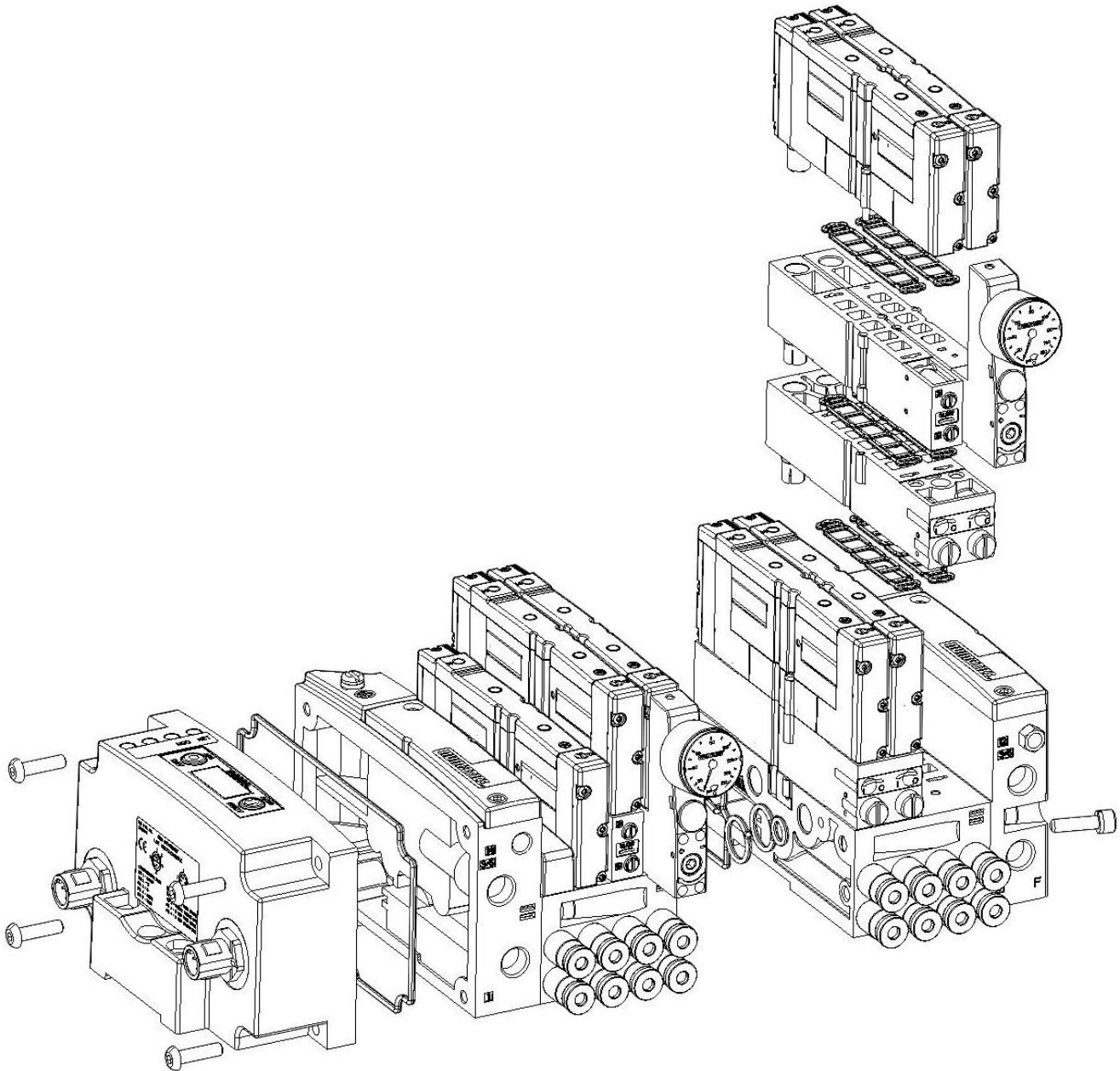
2.2   Manifold Connectors

Solenoid Coil Connections using Z-Board™ Technology for 501/502/503 valve series

Z-Board™ plug together technology connects all valve solenoids to the valve coil output drivers, located in the 580 Node. There is a maximum of 128 coil outputs available on the complete manifold assemblies. The 128 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.

Manifold Z-Boards™

580 Node Connection to Z-Boards™

Not Used,
Pin No. 3

14 Solenoid,
Pin No. 1

Common,
Pin No. 4
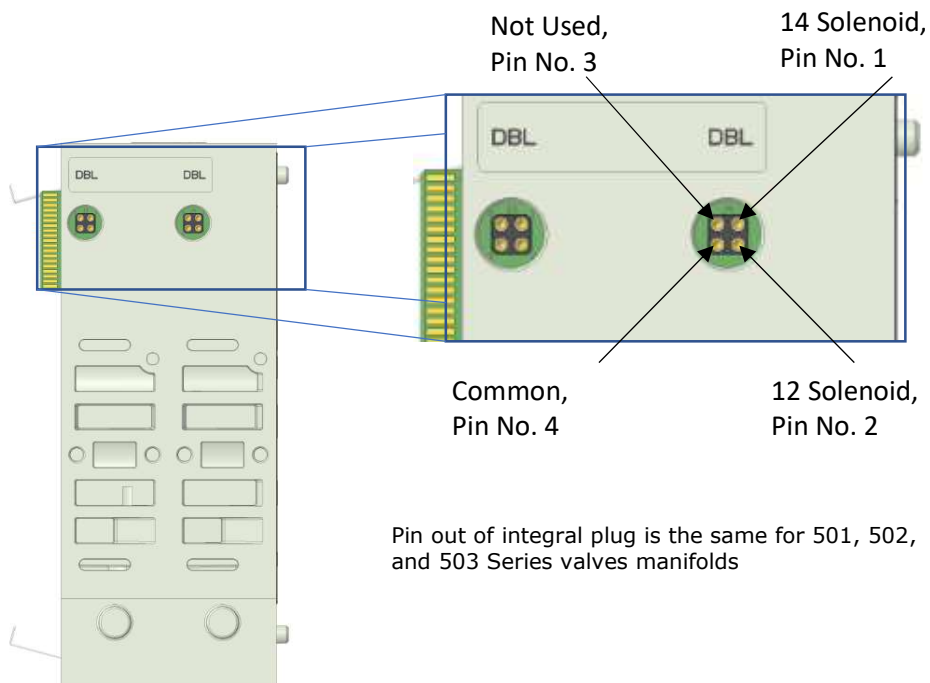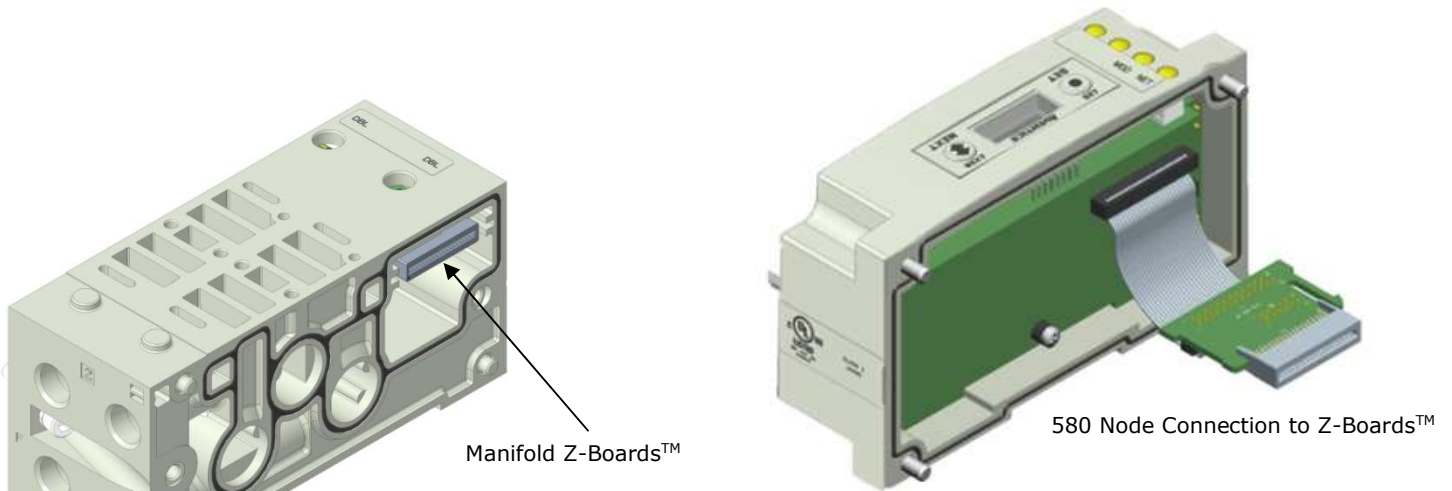
12 Solenoid,
Pin No. 2

Pin out of integral plug is the same for 501, 502, and 503 Series valves manifolds

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

2.3   Z-Board™ Connectors

The 501/502/503 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. The 501 Z-Board™ is either (3) stations or (4) stations, the 502 and 503 Z-Board™ is minimum (2) stations.

501 Series	502 Series
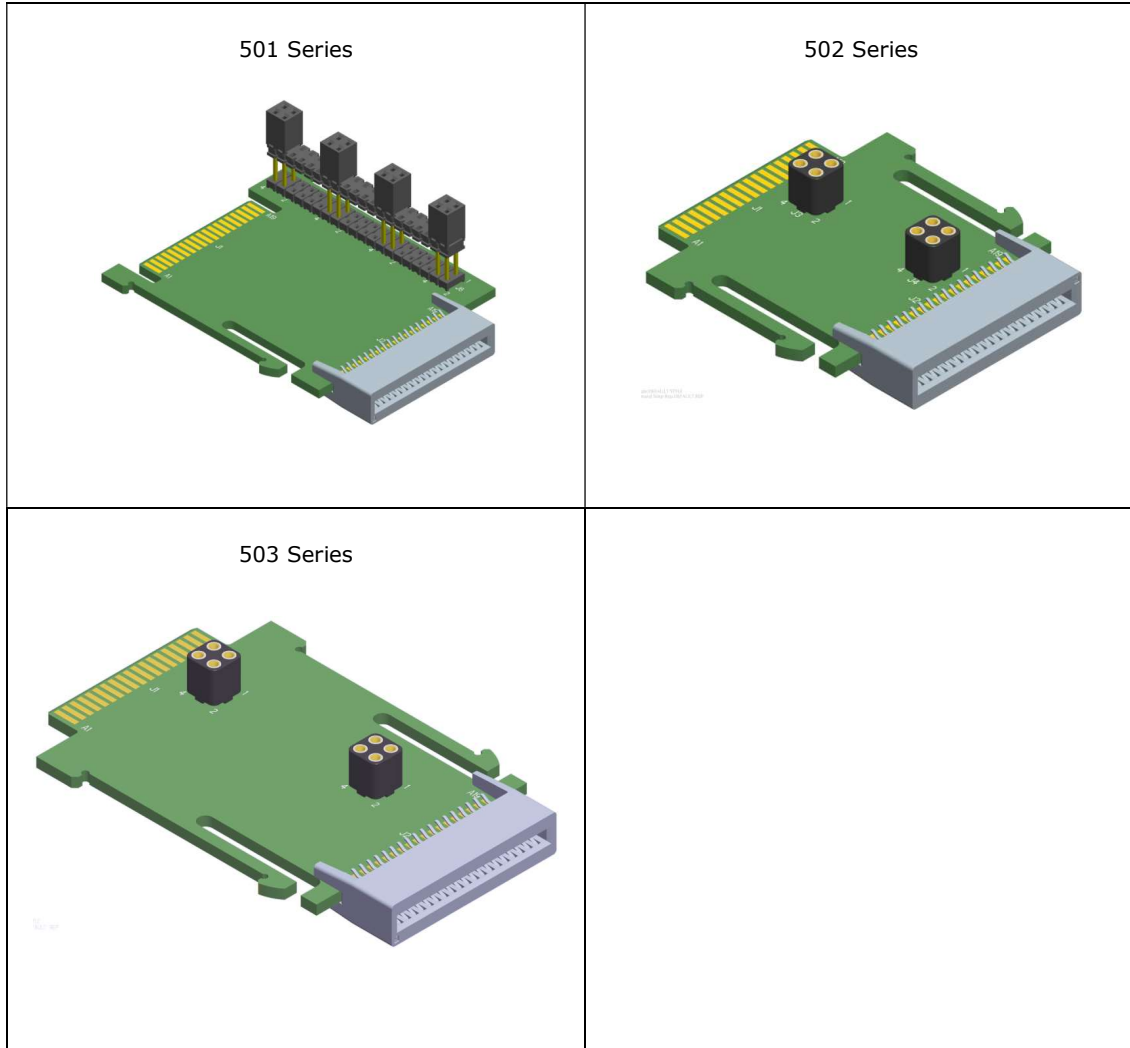
503 Series

NOTE! Each series Z-Board™ can be selected in either SINGLE or DOUBLE output (coil) versions. The SINGLE and DOUBLE output function cannot be mixed on the Z-Boards™

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.
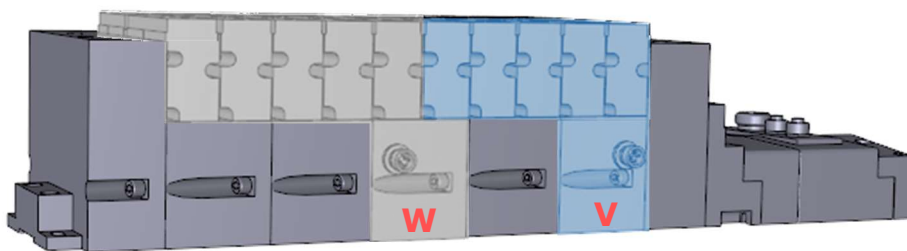
V Wiring Option

W & V Connector Pin Out

PIN 4 +24V DC

PIN 1 - NOT USED

PIN 2 - NOT USED

PIN 3 - NOT USED
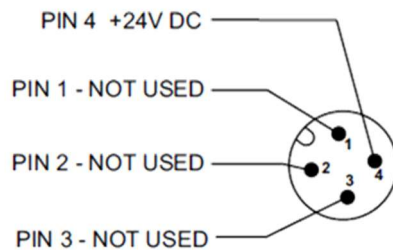
W Wiring Option

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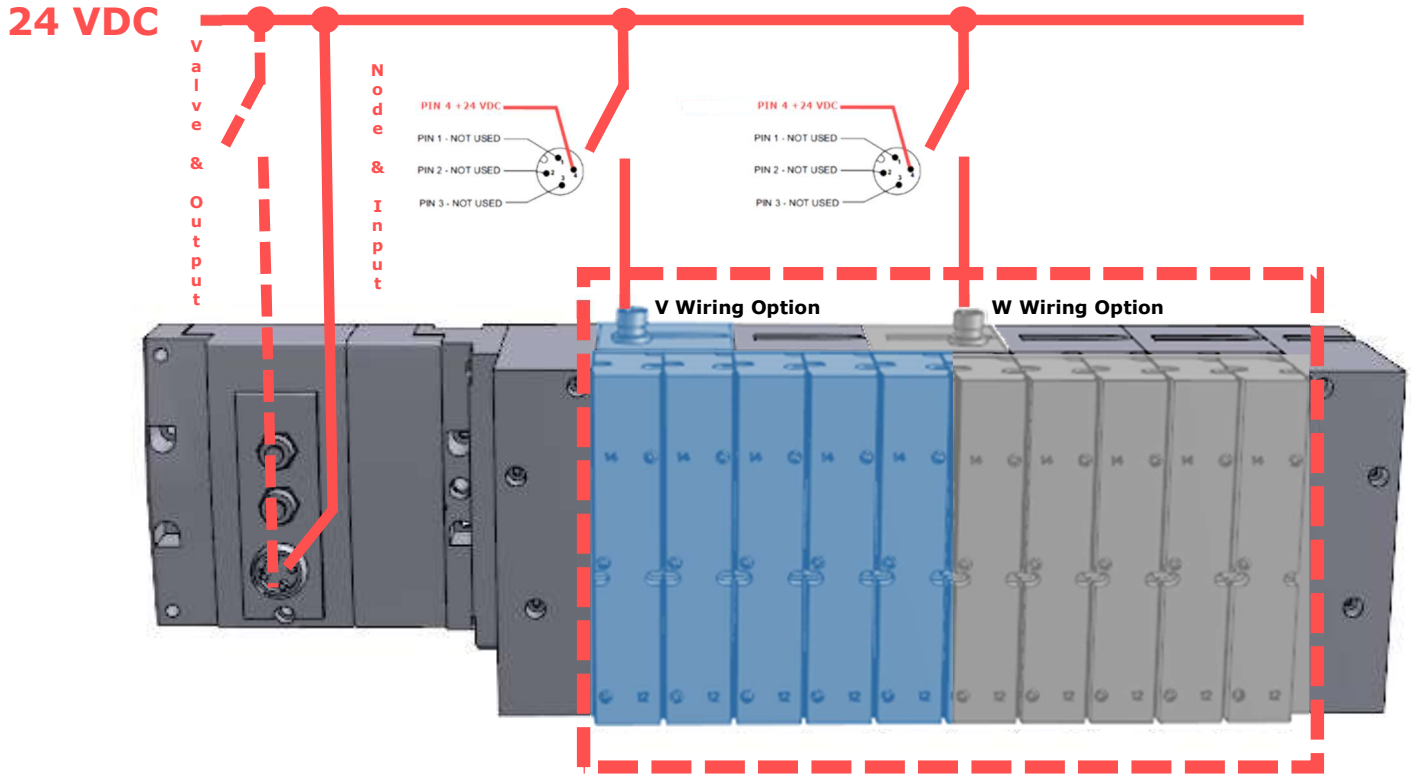
The 0 VDC reference for the +24 VDC applied to Pin 4 of the M12 connector MUST be the same as the one used on G3/580/Terminal Strip/25 or 37 Pin Sub-D/19 or 26 Pin Round Connector. If multiple 24 VDC power supplies are used the 0 VDC references of each supply MUST be common.

4. Communication Module

4.1 580 PROFIBUS™ DP 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 the graphic display or via software (Class 2 Master required).

The Aventics 580 PROFIBUS™ DP node is tested by the Profibus™ Interface Center to ensure compatibility and interoperability.

Communication Interface	Part Number
580 PROFIBUS™ DP Node	P580AEPT1010A00
580 PROFIBUS™ DP Node w/DIN Rail	P580AEPT1010DRM
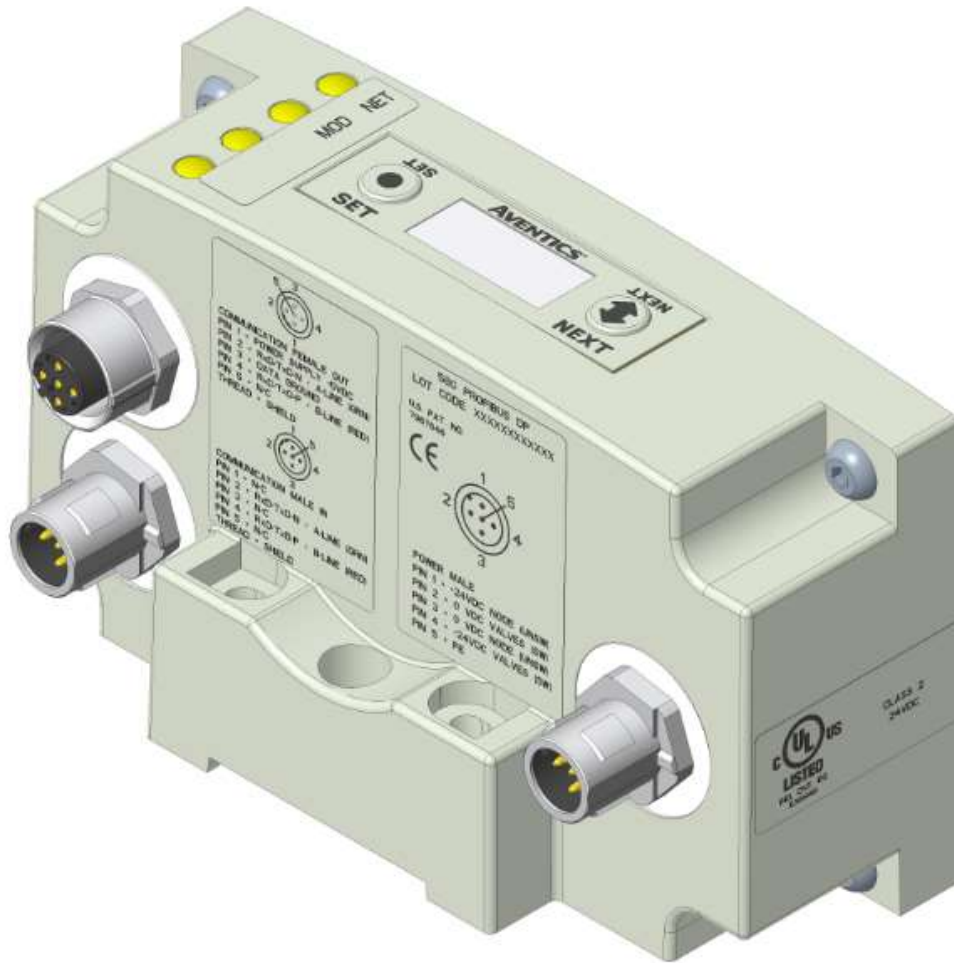
4.2　580 Node Description

Detail No.	Description
1	5 Pin M12 Male Communication Connector per PTO specification
2	5 Pin M12 Female Communication Connector per PTO specification
3	Mounting Hole
4	5 Pin M12 Male Power Connector
5	Module Status LED
6	Network Status LED
7	SET Button – used to navigate through user menus and to set parameters
8	Graphic Display – used to display parameter information
9	NEXT Button – used to navigate through user menus and to set parameters
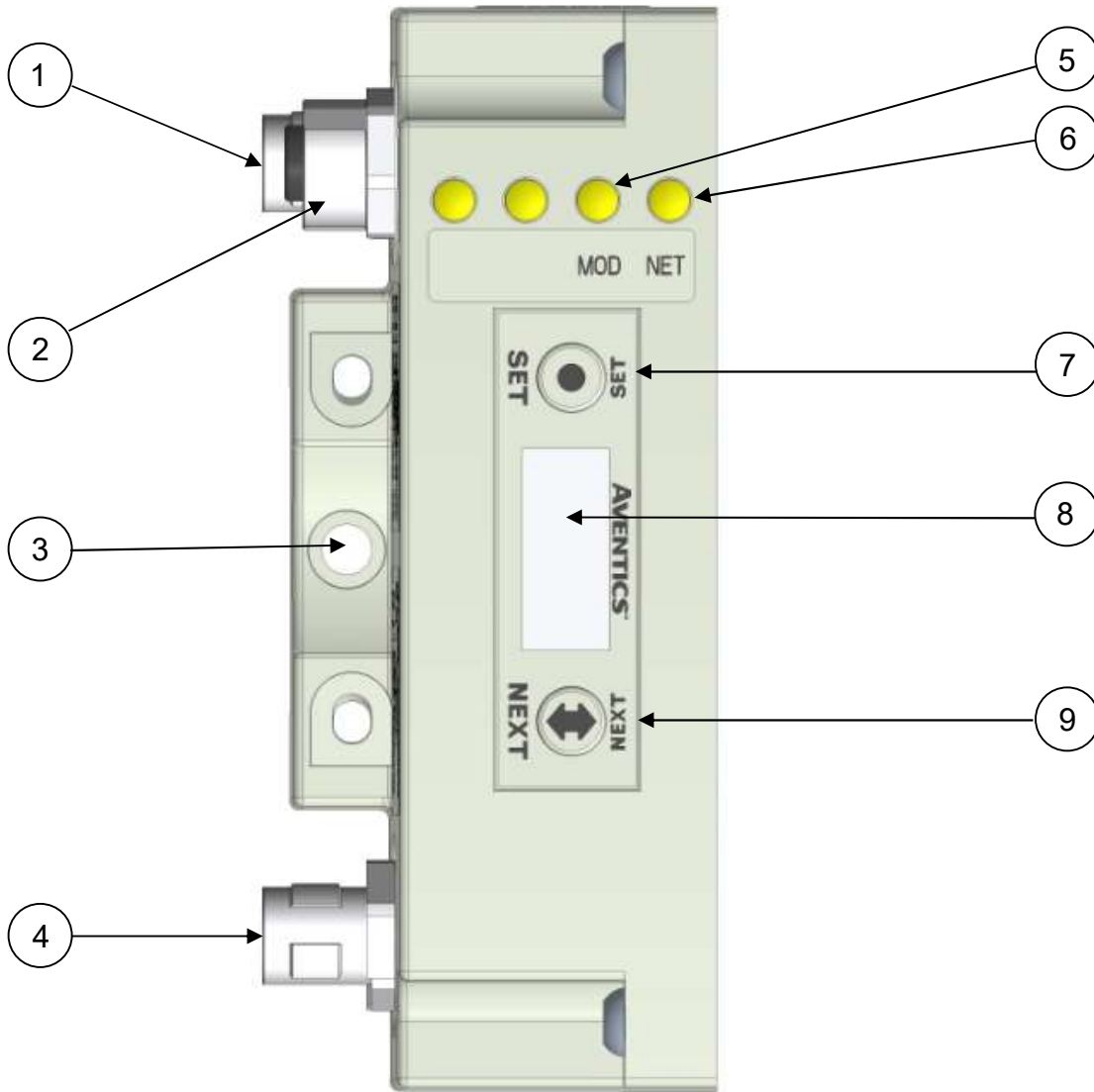
4.3   Connector Pin-Outs

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 an M12 5 pin male connector.

PROFIBUS™ Communication Connector Pin-Out

Pin No.	Function	Description (FEMALE) BUS OUT	Description (MALE) BUS IN
1	+5 VDC	+5 V output from node, used for termination of network or auxiliary devices.	Not Connected
2	Data Line A	RxD/TxD-N A-Line (Green)	RxD/TxD-N A-Line (Green)
3	0VDC Common	Data Ground	Not Connected
4	Data Line B	RxD/TxD-P B-Line (Red)	RxD/TxD-P B-Line (Red)
5	N/C	Not Connected	Not Connected
Shell	Shield	Internally connected to Data Ground	Internally connected to Data Ground

Power Connector Pin-Out

Pin No.	Function	Description
1	+24 VDC (Node)	Voltage used to power node electronics UNSW
2	0 VDC Common (Valves)	0 VDC Voltage used to power outputs (Valves) SW
3	0 VDC Common (Node)	0 VDC Voltage used to power node electronics UNSW
4	+24 VDC (Valves)	Voltage used to outputs (Valves) SW
5	FE	Functional Earth

COMMUNICATION FEMALE OUT
PIN 1 = POWER SUPPLY +5VDC
PIN 2 = RxD/TxD-N / A-LINE (GRN)
PIN 3 = DATA GROUND
PIN 4 = RxD/TxD-P / B-LINE (RED)
PIN 5 = N/C
THREAD = SHIELD

COMMUNICATION MALE IN
PIN 1 = N/C
PIN 2 = RxD/TxD-N / A-LINE (GRN)
PIN 3 = N/C
PIN 4 = RxD/TxD-P / B-LINE (RED)
PIN 5 = N/C
THREAD = SHIELD

580 PROFIBUS DP
LOT: XXXXXXXXXXXX
U.S. PAT. NO.
7967646

POWER MALE
PIN 1 = +24VDC NODE (UNSW)
PIN 2 = 0 VDC VALVES (SW)
PIN 3 = 0 VDC NODE (UNSW)
PIN 4 = +24VDC VALVES (SW)
PIN 5 = FE

ATTENTION
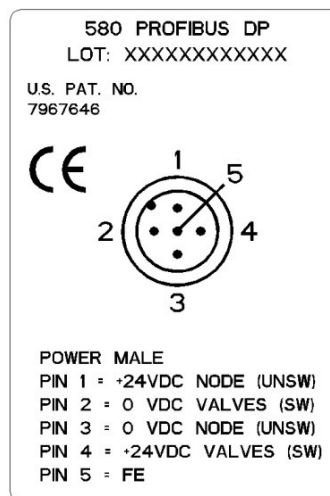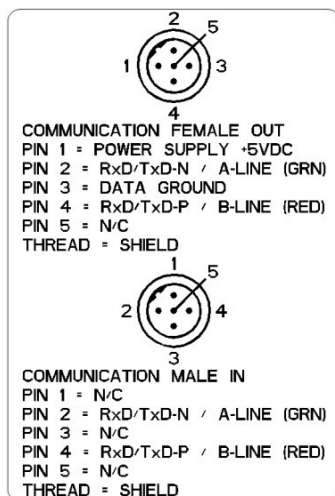
- *Power common (0 VDC) pins 2 and 3 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.*
- *The draw of the +24VDC Valves (Pin 4) and +24VDC Node (Pin 1), pins cannot exceed 4 Amps, at any given moment in time.*
- *The Node pins supplies power to the node electronics. These pins must be powered at all times for communication node to be functional.*
- *To be connected to Class 2 power source only*

4.4   Electrical Connections

Standard Power Connector Wiring Diagram Examples

Single Power Supply Example (Non-isolated commons)
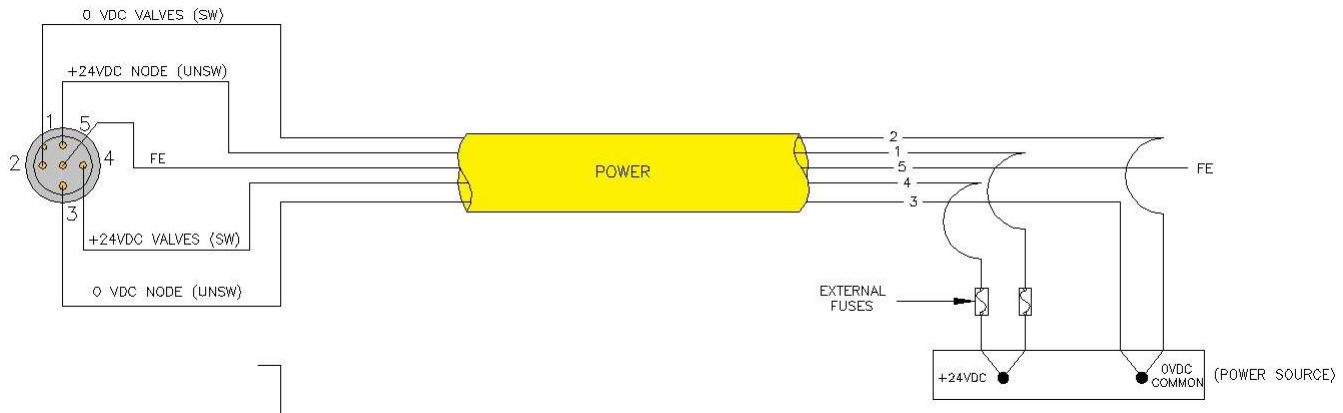
Separate Power Supply Example (Isolated commons)
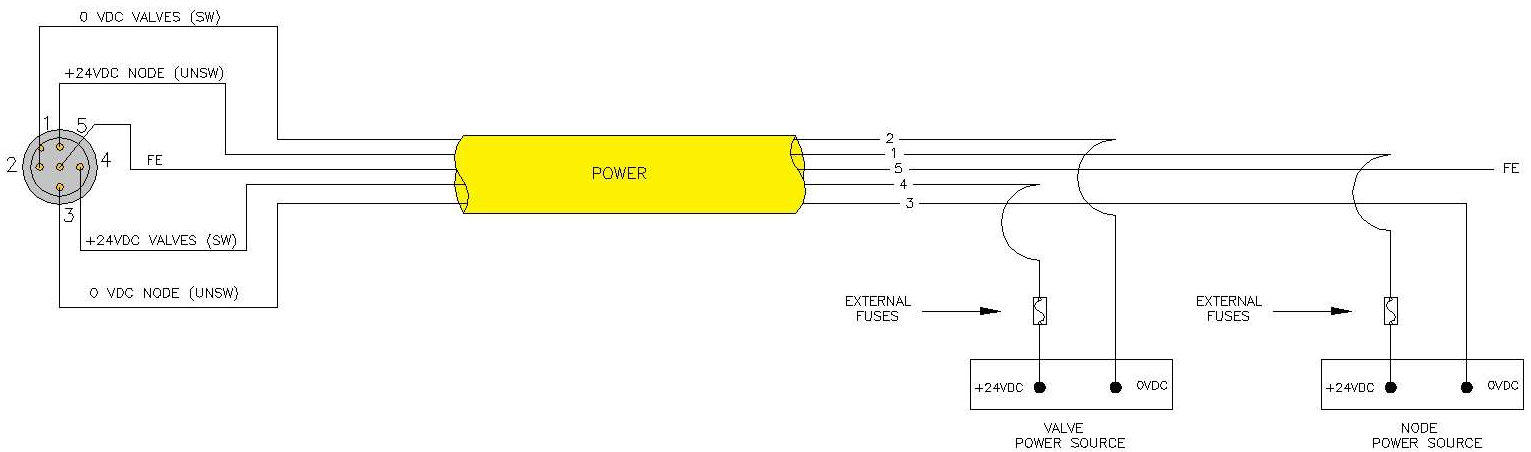
⚠ **ATTENTION**	• *Please see page 4-18 for external fuse sizing guide.* • *When using molded connector power cables, <u>Do Not</u> rely on wire colors for Pin-Out. <u>Always use pin number references.</u>* • *To be connected to a Class 2 power source only* • *Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.* • *Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.* • CLASS 2 WIRING: All filed wiring shall be suitable for class 1, Electric Light and Power, or Class 2, Class 3 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. • MULTIPLE CLASS 2 POWER SOURCES: when interconnects, Class 2 sources shall be listed and rated suitable for parallel interconnection.

4.5   Chassis Ground

All Aventics manifolds should be grounded for safety. Grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.

CHASSIS GROUND CONNECTION POINT,
501 VALVES
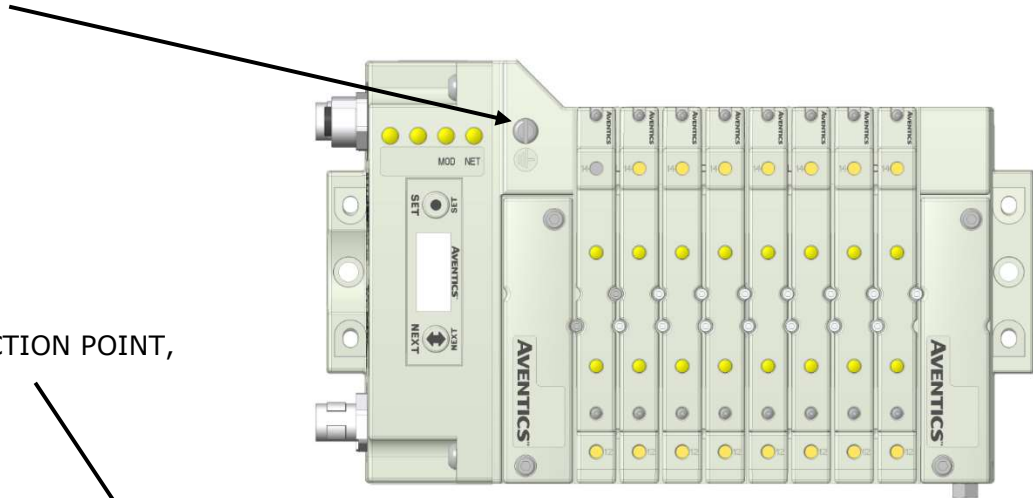
CHASSIS GROUND CONNECTION POINT,
502 & 503 VALVES

⚠️ **ATTENTION**

- *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	+24 VDC (Node)	Voltage used to power node electronics UNSW
2	0 VDC Common (Valves)	0 VDC Voltage used to power outputs (Valves) SW
3	0 VDC Common (Node)	0 VDC Voltage used to power node electronics UNSW
4	+24 VDC (Valves)	Voltage used to outputs (Valves) SW
5	FE	Functional Earth

Power Rating

- The maximum system current capability is <u>4 Amps</u>. Care should be taken not to exceed 4 Amp draw through the power connector pins.

Component	Voltage	Tolerance	+24VDC (Valve) Pins 2 and 4		+24VDC (Node) Pins 1 and 3	
			Current	Power	Current	Power
Solenoid Valve Coil 501 (Each)	24 VDC	+10%/-15%	0.03 Amps	0.8 Watts	NA	NA
Solenoid Valve Coil 502 (Each)	24 VDC	+10%/-15%	0.054 Amps	1.0 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 Amps	1.7 Watts	NA	NA
580 PROFIBUS™ DP Node	24 VDC	+/- 10%	NA	NA	0.080 Amps	1.92 Watts

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			
Description			*Current*
Number of Solenoid Valve Coils Energized Simultaneously			
___ X 0.03 A (501 Series)	=		_____Amps
___ X 0.054 A (502 Series)	=		_____Amps
___ X 0.07 A (503 Series)	=		_____Amps
Total:			_____Amps
Surge Compensation:	X	1.25	
Suggested External +24 VDC (Valves) Fuse Value:			_____Amps
Power Consumption – Power Connector Pin for NODE			
Description			*Current*
Communication Node Power Consumption	=		0.080 Amps
Surge Compensation:	X	1.25	
Suggested External Pin +24 VDC (Node) Fuse Value:			0.10 Amps

NOTE!
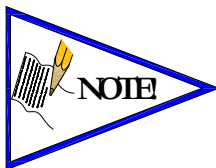
- *The Node Power pins supply power to the node electronics. These pins must be powered at all times for the communication node to be functional. See page 4-14 for reference.*
- *Reverse polarity protection is provided.*

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4.8   Diagnostics – 580 PROFIBUS™ DP Node LED Functions

Upon power up, the Module and Network Status LEDs indicate the state of the unit. There are two LEDs on the 580 PROFIBUS™ DP node. The LEDs functions are described in the table below.
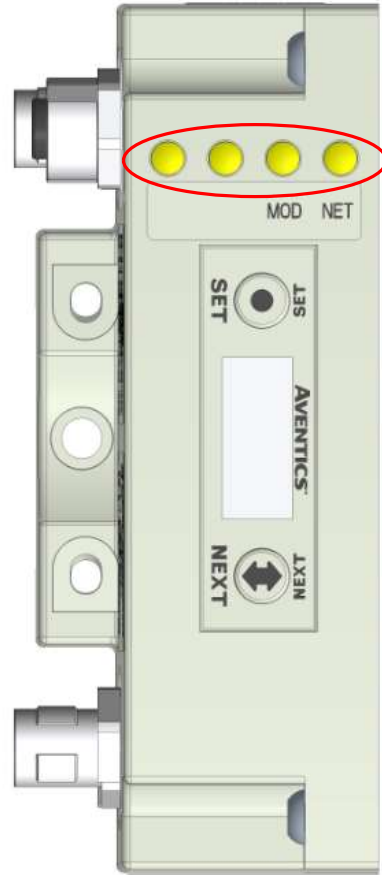
LED Name	Color		Status	Description
NETWORK STATUS	Red		ON	Bus Error. Bus Connection failed or off-line; Invalid parameterization, configuration, or bus address
			FLASHING	The module configuration in the user application is different than the physical configuration of the manifold.
	Green		ON	Normal 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.   Extended Coil Capability

The Extended Coil manifolds must be connected to a 580 Electronics Node to operate. Not all 580 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	P580AEPT1010A00	Rev 2.0 Build 43053
Communication Module	P580AEPT1010DRM	Rev 2.0 Build 43053

Module firmware revision levels can be confirmed in the integrated graphic display. See pg. 6-32 for more information.

5.1   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 6-28.

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

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5.2 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

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5.3   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.
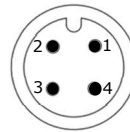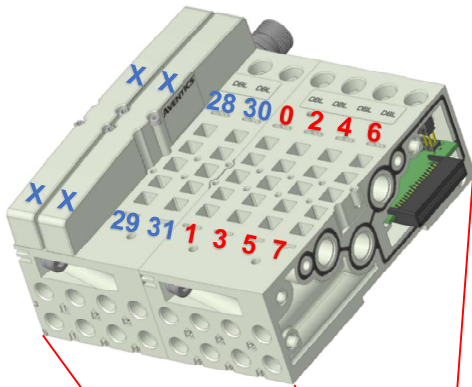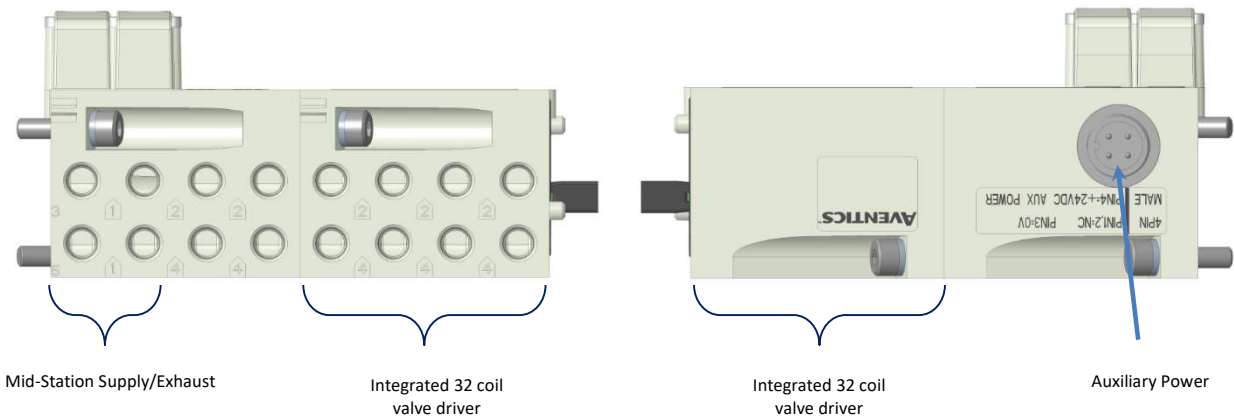- Only to be used on assemblies where additional power, supply and/or exhaust capacity is not required

Integrated 32 coil valve driver

Solenoids 1-32   Solenoids 33-64

Byte X   Byte X+1   Byte X+2   Byte X+3   Byte X+4   Byte X+5   Byte X+6   Byte X+7
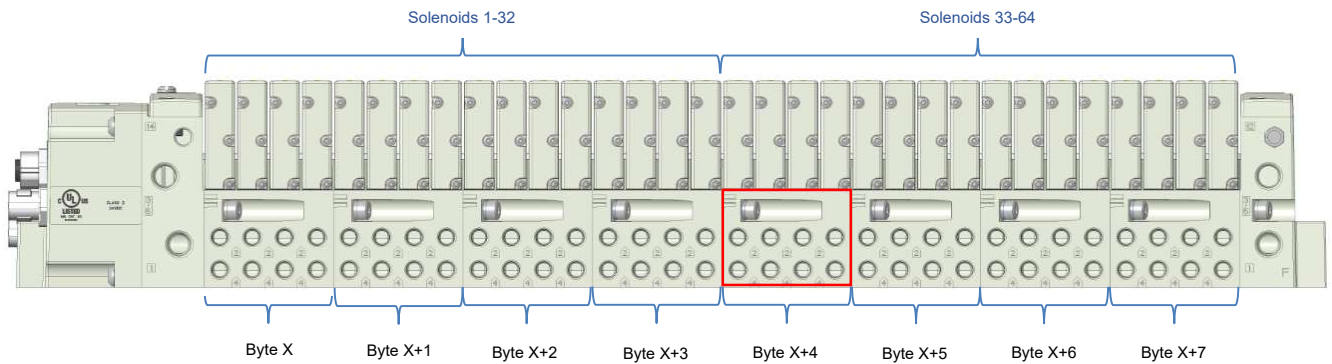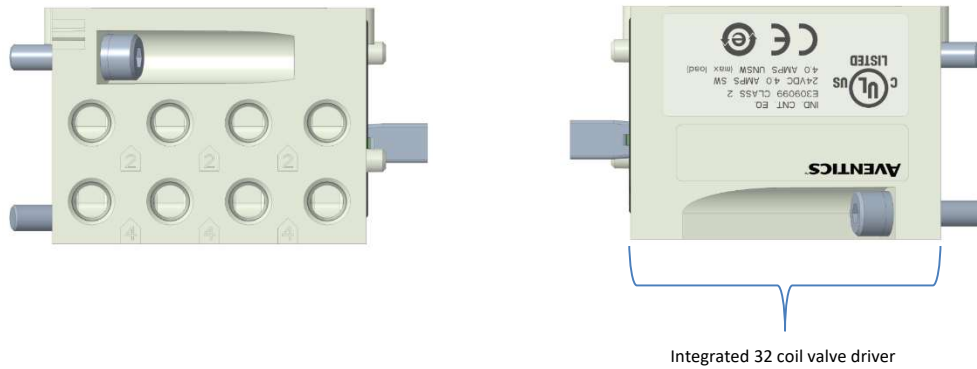
5.4   501 Series, up to 128 solenoid coils

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 a M12 power connector to supplement the main power connection on the 580 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.

| Mid-Station Supply/Exhaust | Integrated 32 coil valve driver | Integrated 32 coil valve driver | Auxiliary Power |

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

Solenoids 1-32   Solenoids 33-64   Solenoids 65-96   Solenoids 97-128

Byte X   X+1   X+2   X+3   X+4   X+5   X+6   X+7   X+8   X+9   X+10   X+11   X+12   X+13   X+14   X+15

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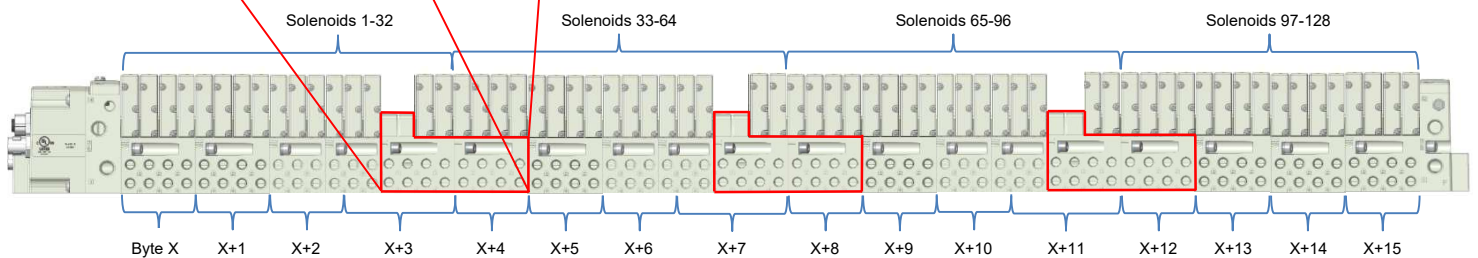
5.5   502 and 503 Series, up to 80 coils

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.

Integrated 16 coil valve driver   Mid-Station Supply/Exhaust   Integrated 16 coil valve driver   Auxiliary Power

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

Solenoids 1-32   Solenoids 33-48   Solenoids 49-64   Solenoids 65-80

Byte X   Byte X+1   Byte X+2   Byte X+3   Byte X+4   Byte X+5   Byte X+6   Byte X+7   Byte X+8   Byte X+9

Recommended blank station plates to achieve maximum number of coils with least number of stations
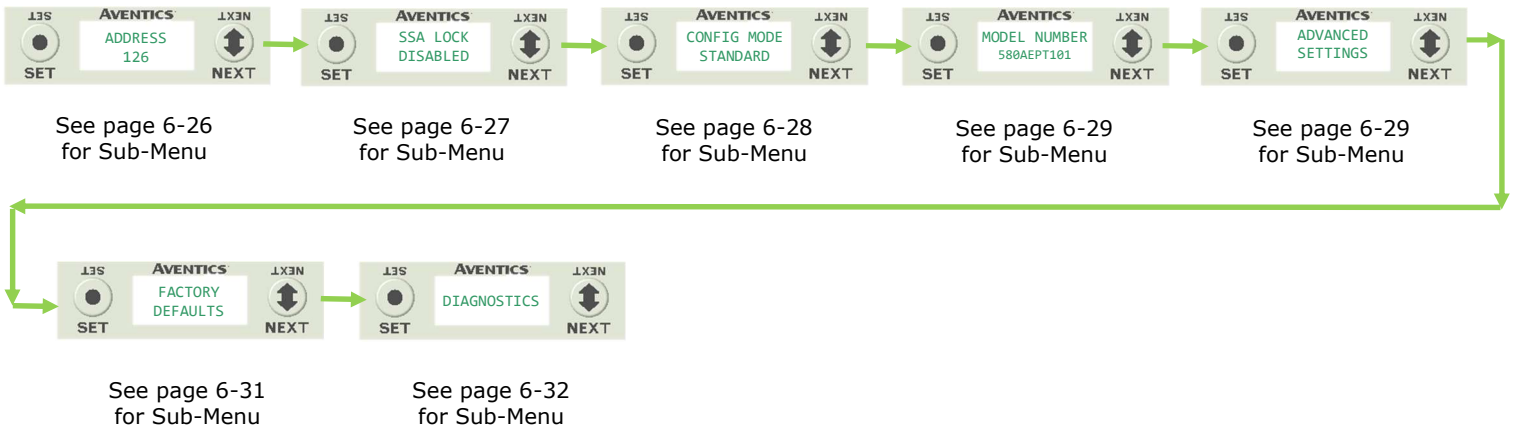
6. 580 PROFIBUS™ DP Node Graphic Display
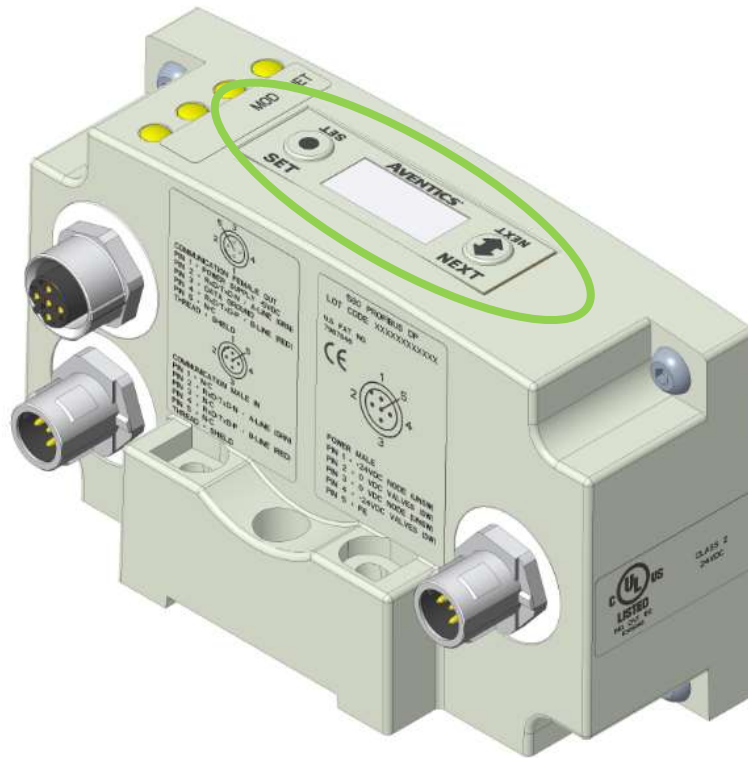
The following graphic displays represent the main menu selections of the 580 PROFIBUS™ DP communication (node). Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus. *NOTE: WHEN A NETWORK I/O CONNECTION IS ESTABLISHED, MANUAL CHANGES TO NODE PARAMETERS ARE NOT ALLOWED!*

Home Screen

| See page 6-26 for Sub-Menu | See page 6-27 for Sub-Menu | See page 6-28 for Sub-Menu | See page 6-29 for Sub-Menu | See page 6-29 for Sub-Menu |

| See page 6-31 for Sub-Menu | See page 6-32 for Sub-Menu |

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6.1   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.

NOTE!
- *Only addresses 0-126 are valid.*
- *Address 126 is the factory Default node address*

6.2   Set Slave Address Lock Sub-Menu

Steps to Set SSA LOCK

1.   Press the **SET** button to enter the SSA Lock sub-menu.
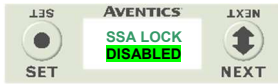
2.   Press the **NEXT** button to enable / disable the SSA Lock
     a.   ENABLE- allows the address to be set only through the 580 graphic display
     b.   DISABLE (Default)- allows the address to be set through either the 580 graphic display or software (Class 2 PROFIBUS Master)
     c.   RETURN (this 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.

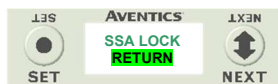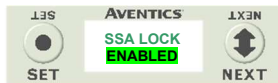   Press the **SET** button to confirm your choice.

6.3 500 Series Extended Coil Capability
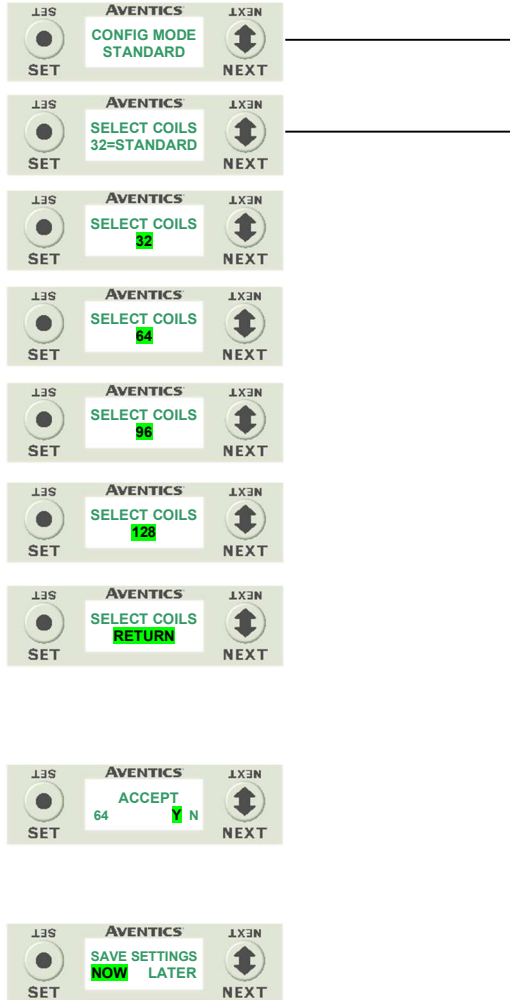
Steps to Set Coil Configuration

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

2. 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.

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 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

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.

6.4 Model Number
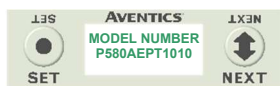
Model Number

1. The Model Number is reference only.

6.5 Advanced Settings – Flip Display

Flip Display Settings

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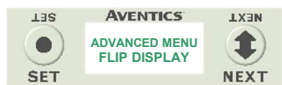
2. Press the **NEXT** button to scroll to the ADVANCED MENU /FLIP DISPLAY.
   Press the **SET** button to enter the ADVANCED MENU / FLIP DISPLAY.

3. Press the **NEXT** button to scroll the choices for flipping the LCD display for the Node 180 Degrees.

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

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

6.6 Advanced Settings - Parameters

Parameter Steps

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

2. Press the **NEXT** button to scroll to the ADVANCED MENU / PARAMETERS.

3. Press the **SET** button to enter the PARAMETERS sub menu.

4. 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

5. 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

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

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6.7 Factory Defaults

Factory Default Settings

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

2. Press the **NEXT** button to select Yes or No.
   a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
   c. After selecting Yes or No, you will be asked to confirm.

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

FACTORY DEFAULT SETTINGS	
Description	*Default*
Node Address	126
Set Slave Address Lock	Disabled
Config Mode	32 Coils
Parameters	Unlocked

6.9   Diagnostics
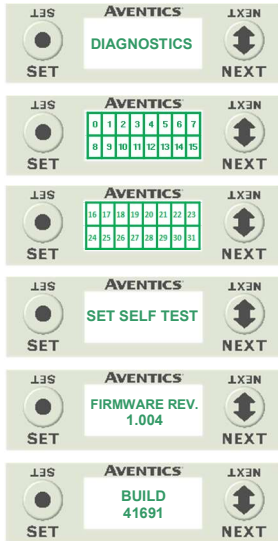
1. All diagnostic information is read only

2. Press the **SET** button to enter DIAGNOSTICS sub-menu.

3. Press the **NEXT** button to scroll through the main diagnostic menu choices.

    a. OUTPUT INDICATION
       -Displays the coils actuated. Press NEXT to view the second word of data.

    b. SET SELF TEST
       - Please see following page for description

    c. FIRMWARE REV.
       - For service personnel

    d. BUILD
       - For service personnel

6.10 Diagnostics - Self Test Mode

An internal diagnostic tool can be enabled on the 580 (node) using the graphic display. This tool allows the user to confirm that all of the outputs (coils), on the manifold are fully functional without needing a network connection or controller. There are two test modes that the user can choose. The "OUTPUTS" test mode tests all the outputs by sequentially turning them ON and OFF for approximately .5 seconds. The "MANUAL" test mode will allow the user to manually select one or multiple output (coils) to be energized individually or simultaneously. It will remain energized until the selected output is changed, or the SELF TEST MODE is ended. Cycling power to the Node in either test mode will end the SELF TEST MODE function.

To use the SELF TEST MODE, the user must first set some initial conditions. Follow these steps to initiate the SELF TEST MODE for either "OUTPUTS", or "MANUAL".

1) Disconnect Air and Communication from the manifold!
2) Connect power to the manifold.
3) Select the desired test mode using the graphic display. (See example below)
4) Starting at the Home Screen, navigate the menus by selecting the NEXT button until the DIAGNOSTICS menu is shown.
5) Select the SET button to access the DIAGNOSTICS menu and then again to access the SELF TEST MODE menu.
6) Push NEXT to navigate to the desired test mode: "OUTPUTS" or "MANUAL".
7) Push SET to select the desired test mode.
8) A message will appear: DISCONNECT AIR HOLD SET BUTTON
9) 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.
10) When the display stops flashing, the SELF TEST MODE will run and the Module Status LED will flash Red/Green while the display identifies the chosen test mode running.

Returns to the Diagnostic tab Sub-Menu.

HOLD FOR 10 SECONDS TO INITIATE EITHER MODE

"OUTPUTS"   "MANUAL"
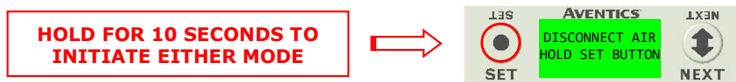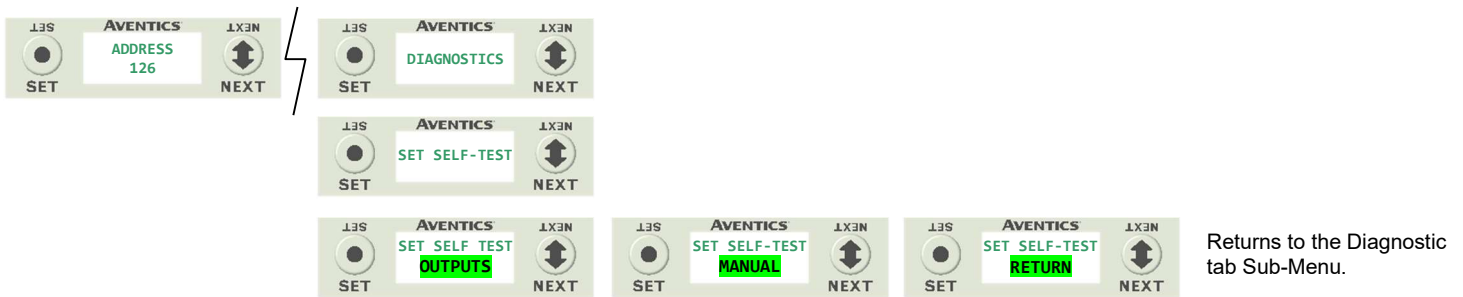
The connected outputs will cycle every 0.5 seconds.

Push to Energize flashing coil output

Push again to De-energize

NOTE! A Power Cycle is required to Deactivate SELF TEST MODE

The first (16) available coils (outputs) will appear. There are a total of (32) coils that can be individually or simultaneously energized. If less than 32 coils are present, there will be some delay before the next cycle.

Press NEXT button to advance to the desired coil to be actuated. The desired coil indicator will **flash**. Press the SET button to turn on the coil, the indicator will flash until the cursor is moved and then it will remain solid to indicate an actuated coil. Pressing the SET button again will turn the coil off. If you choose to leave the coil actuated, press the next button and move to the next desired coil. You have the ability to actuate all 32 coils manually. Moving to any coil that is actuated and pressing the SET button will deactivate the coil. Cycling power to the unit will deactivate the SELF TEST MODE.

The user can advance quickly through the available coils by pressing and holding the NEXT button for at least 3 seconds.

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6.11 Error Messages

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

SHORTED COIL NO. X	Displayed when a short circuit condition is detected on a valve coil
OPEN COIL NO. X	Displayed when an open circuit condition is detected on a valve coil
VALVE POWER OFF	Displayed when +24 VDC between Pin No. 2 and No. 4 (Valves) is not present on Power Connector

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7.   PROFIBUS™ DP Configuration and Mapping

7.1   GSD File

The GSD file contains configuration information required to establish communication to a node on a PROFIBUS™ DP network.   The GSD file is available on the Aventics website at www.asco.com/g3.

7.2   User Configurable Device Parameters

The Aventics 580 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.

Parameter Name	Description	Settable Via	
		Display	Software
Address	Node address	√	√
Fail Safe Mode	Determines the state of outputs during a communication failure	X	√
SSA Lock	Determines how the network address may be set	√	X

7.3   Fail Safe Mode Parameter

This parameter is used to set the behaviors of coil output points (bits) during a communication fault. The parameter shown below is used to determine what state the outputs will have during a "Fault" event. It will allow control of all valves on the manifold.
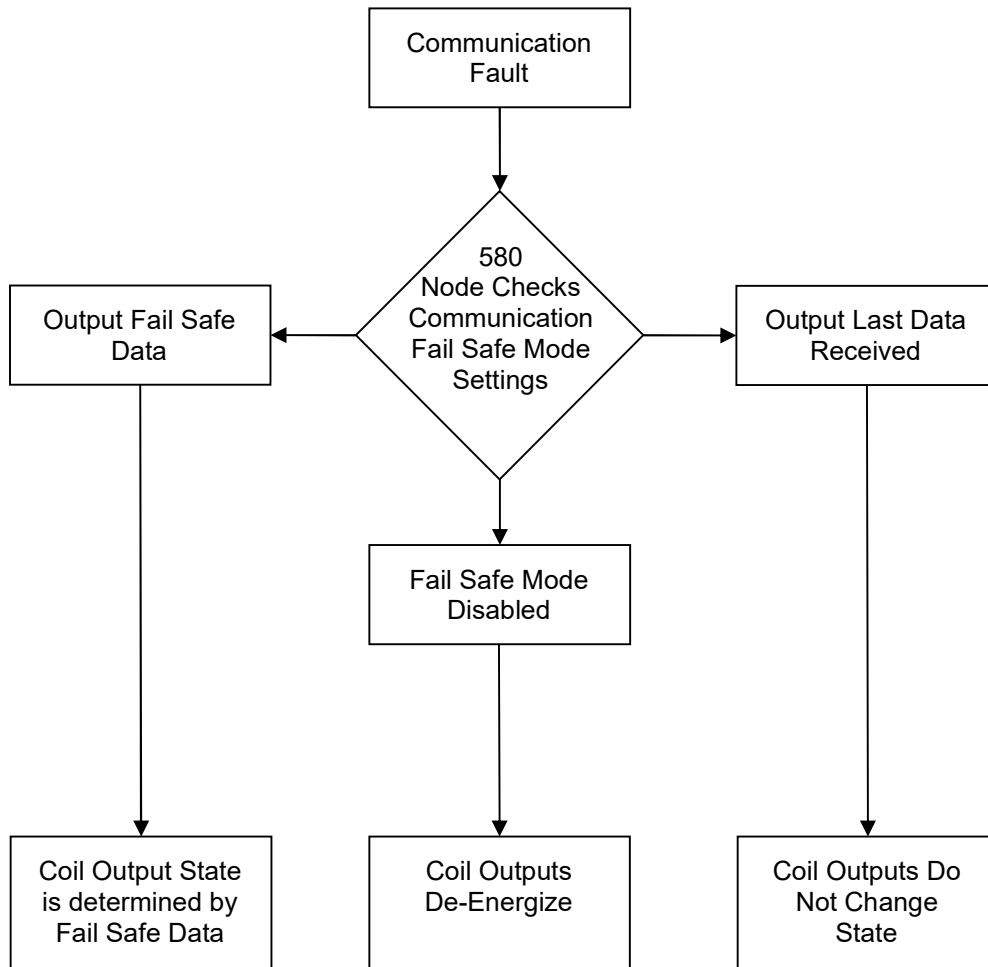
The user, through the software, can determine how the coil outputs behave when a communication fault occurs. These settings are non-volatile and thus will not change upon loss of power.

The three behavior options are:

1.   Output Fail Safe Data
2.   Output Last Data Received
3.   Fail Safe Mode Disabled

Fail Safe Mode Sequence

The Fail Safe Mode parameter determines the output state if the device encounters a communication fault. A Communication Fault is defined as an inability for the master node to communicate with a slave node on a network.

```
                          ┌─────────────────┐
                          │  Communication  │
                          │     Fault       │
                          └─────────────────┘
                                   │
                                   ▼
                               ╱  580  ╲
  ┌──────────────┐           ╱ Node Checks ╲           ┌──────────────┐
  │ Output Fail  │ ◄───────  Communication  ───────►   │ Output Last  │
  │ Safe Data    │           ╲ Fail Safe Mode ╱        │ Data Received│
  └──────────────┘             ╲ Settings ╱            └──────────────┘
         │                          │                         │
         │                          ▼                         │
         │                  ┌──────────────┐                  │
         │                  │ Fail Safe    │                  │
         │                  │ Mode Disabled│                  │
         │                  └──────────────┘                  │
         ▼                          ▼                         ▼
  ┌──────────────┐           ┌──────────────┐          ┌──────────────┐
  │ Coil Output  │           │ Coil Outputs │          │Coil Outputs Do│
  │ State is     │           │ De-Energize  │          │ Not Change   │
  │ determined by│           │              │          │ State        │
  │ Fail Safe Data│          └──────────────┘          └──────────────┘
  └──────────────┘
```

7.4   Commissioning 580 Profibus™ with Siemens TIA Portal Software

Follow your Siemens software help guide to install the 580 PROFIBUS™ DP GSD file (Latest GSD files are available at www.asco.com/g3). Once the GSD file is installed select the various components to assemble your 580 node and manifold configuration and I/O map.
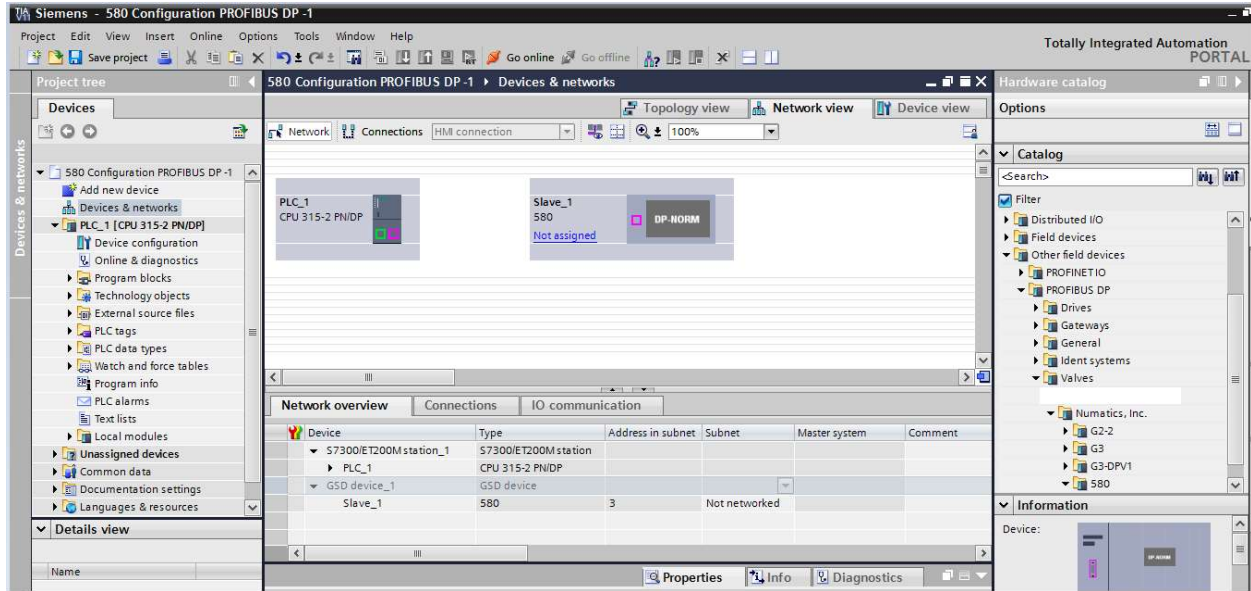
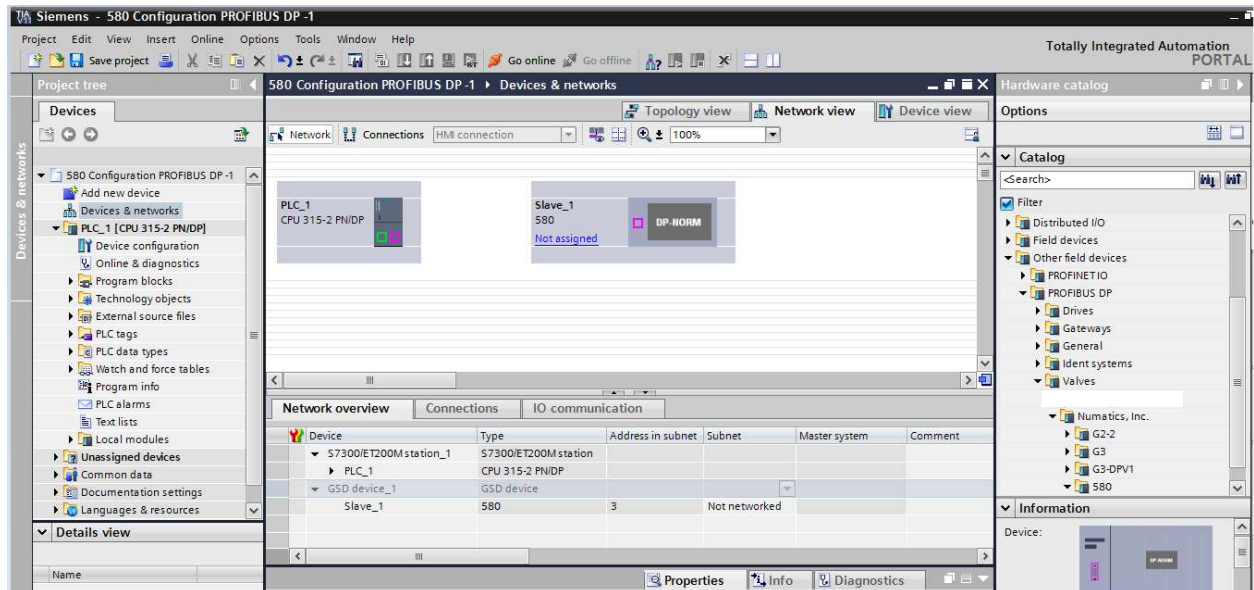1. From the "Project Tree" (left panel) double click "Devices and networks".
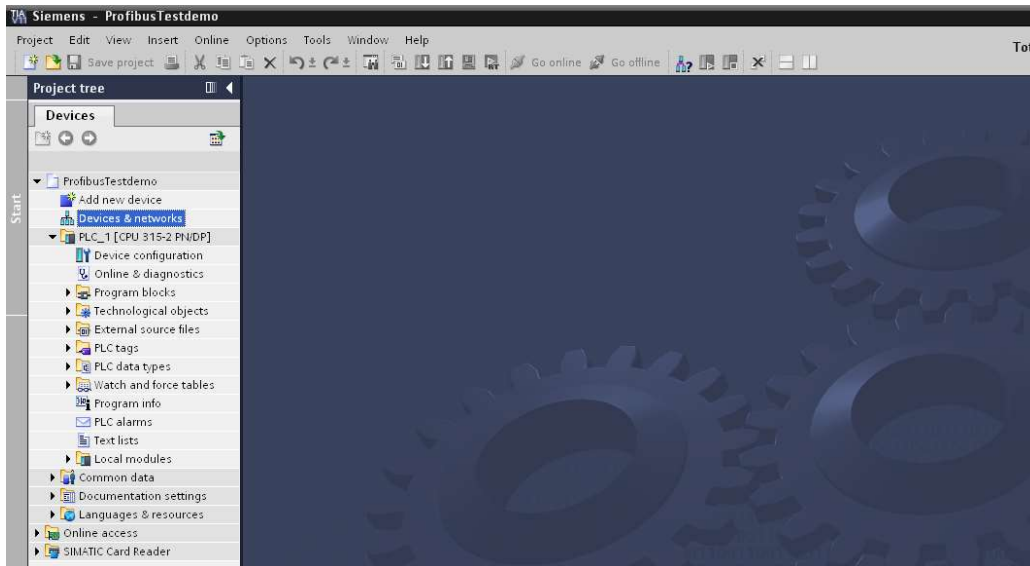
2. From the "Hardware catalog" (right panel), select the other field devices.
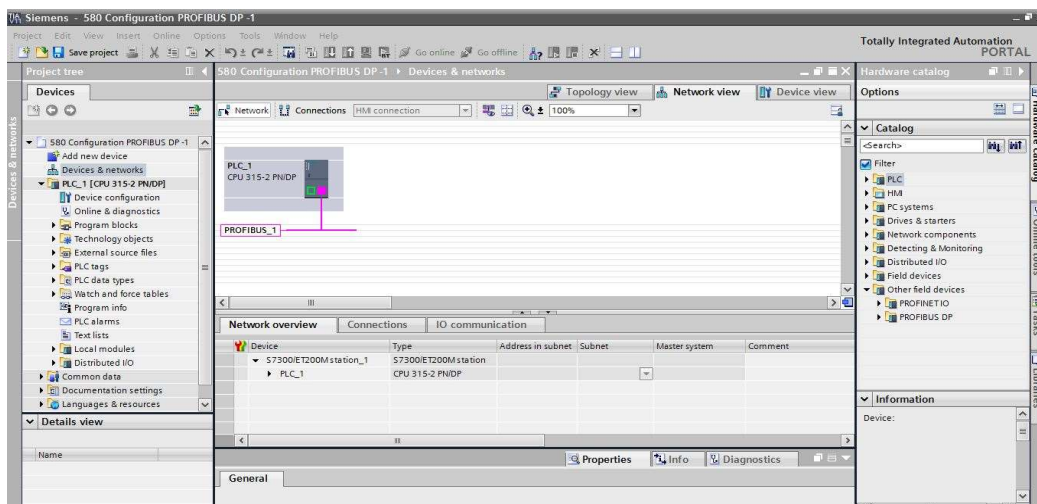
3. From the "Hardware catalog" other field devices expand;
Profibus™ DP\Valves\Numatics Inc.\580. Then double click 580

4. The Slave_1 580 node and manifold is added to the "Devices and networks" configuration

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5. Select the Profibus™ port of the PLC then drag a line to Profibus™ port of the Slave_1 580 node and manifold.
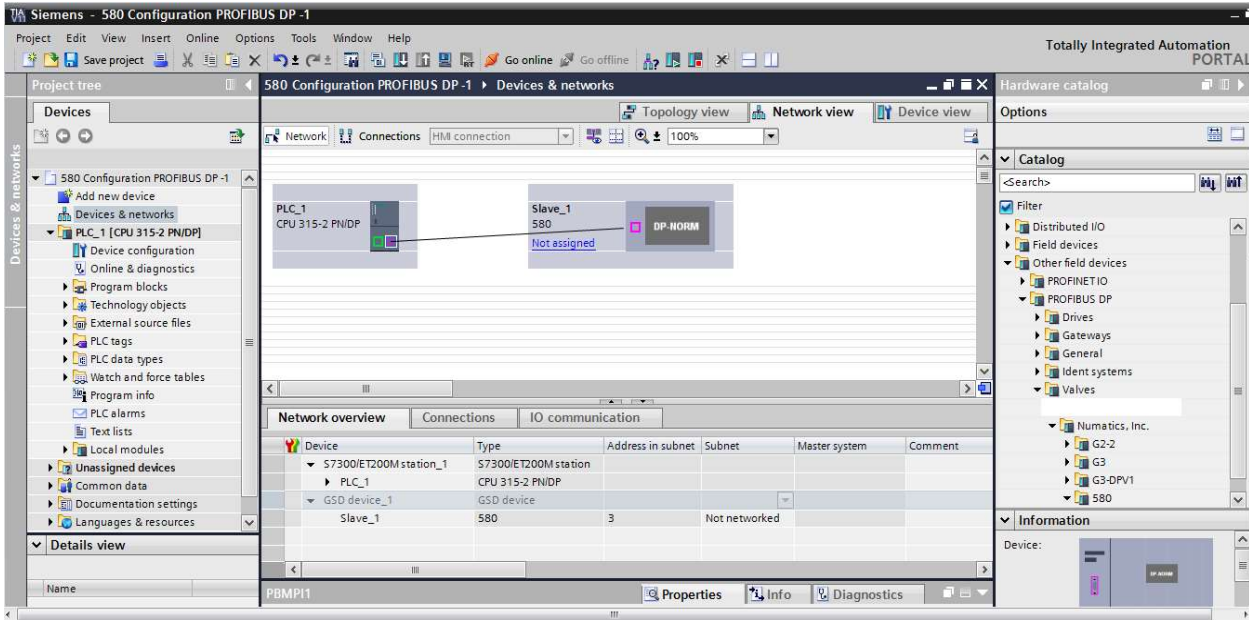
6. The Slave_1 580 node and manifold is connected and assigned to PLC_1. Double click the Slave_1 580 node and manifold to begin I/O configuration.
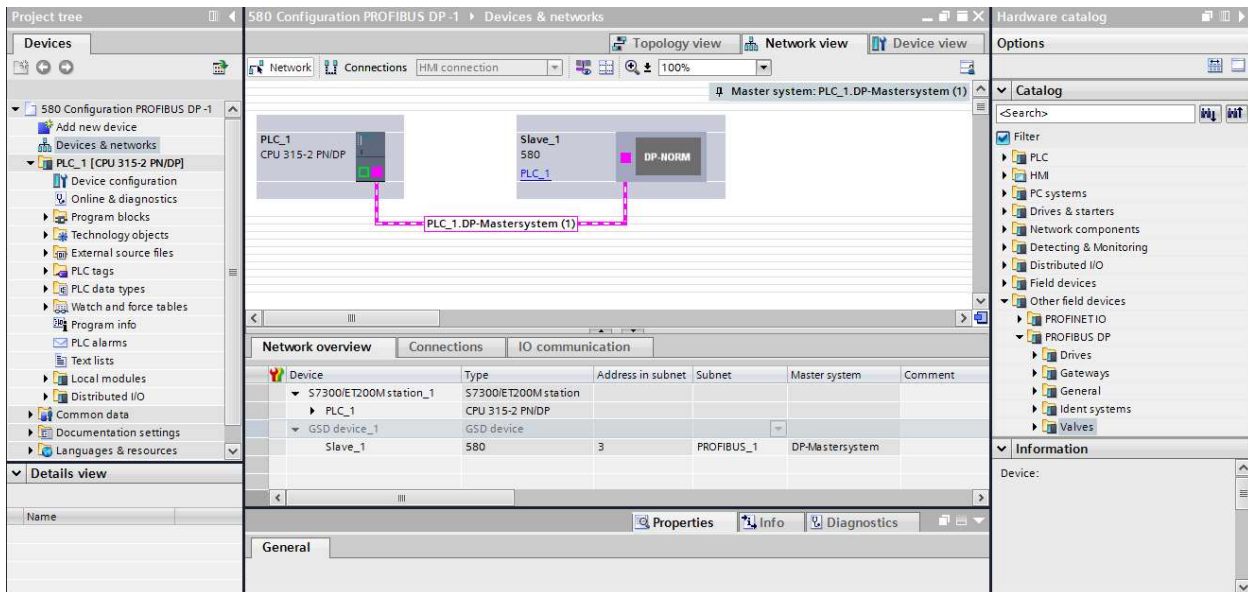
7. The Slave_1 580 node and manifold is expanded to show the I/O map. Select "1-32 Coils" from the hardware catalog (right tab) to match the required I/O configuration. Once the I/O configuration is chosen, it is then downloaded to the PLC.

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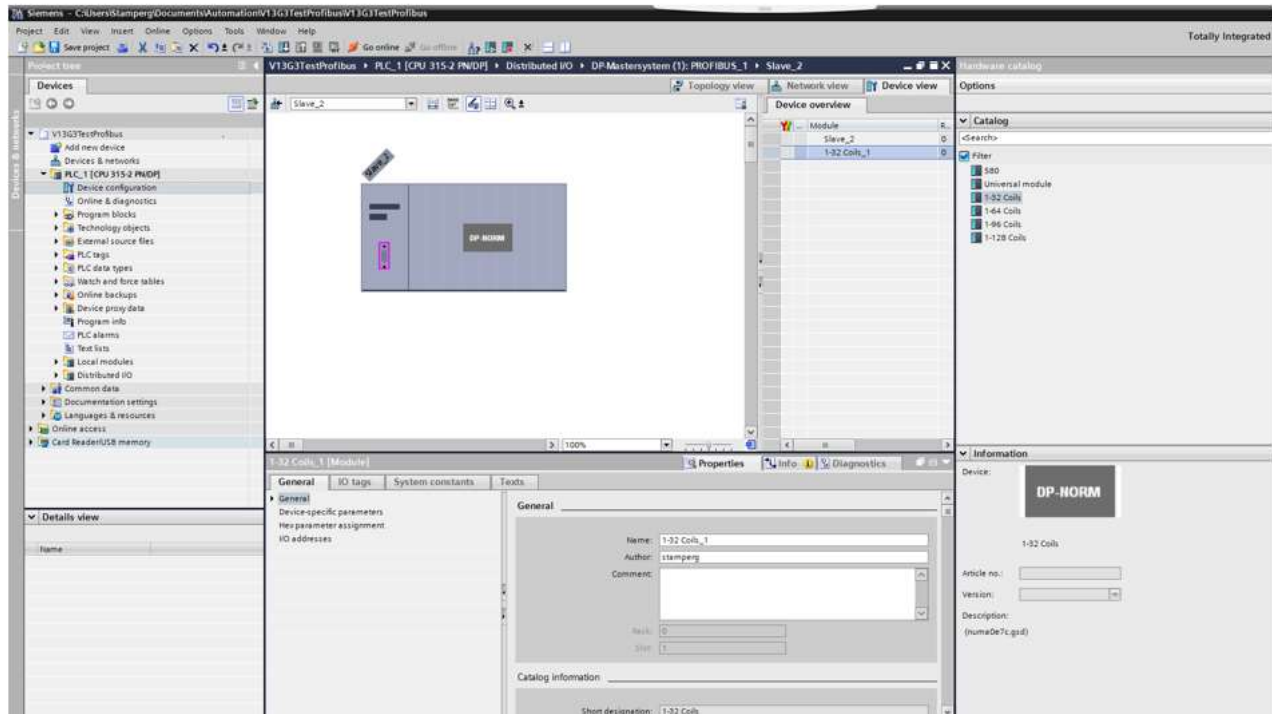
8.   PROFIBUS™ DP Mapping

8.1   I/O Sizes

Outputs (Valves)

Outputs are defined as any valve solenoid coil attached. The valves size is set at (32) bits, 4 bytes of output data from the factory. It will allow up to 128 bits in the 501 Series and 80 bits in the 502/503 Series.

8.2   Bit Mapping Rules

The bit mapping for a 580 PROFIBUS™ DP manifold remains similar, the only variation depends on whether a single of a double solenoid valve is used. The following is a breakdown of the bit mapping rules associated with the Aventics 580 Valve Manifold.

1) Solenoid coil outputs are connected to the valve coils using the Z-Boards™.

2) The valve size is set from the factory at 4 bytes (32 coils). You can adjust the valve size up to 16 bytes (128 coils) for 501 Series and up 10 bytes (80 coils) for the 502 and 503 Series.

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). Per station selection is limited based on the fact that 502 and 503 manifolds are a minimum of two stations, and the 501 is a minimum of four stations.

> **NOTE!**
>
> *Single solenoid valves can be used with double Z-Boards™. However, one of the two available outputs will remain unused. Refer to the Mapping Examples on the following pages.*
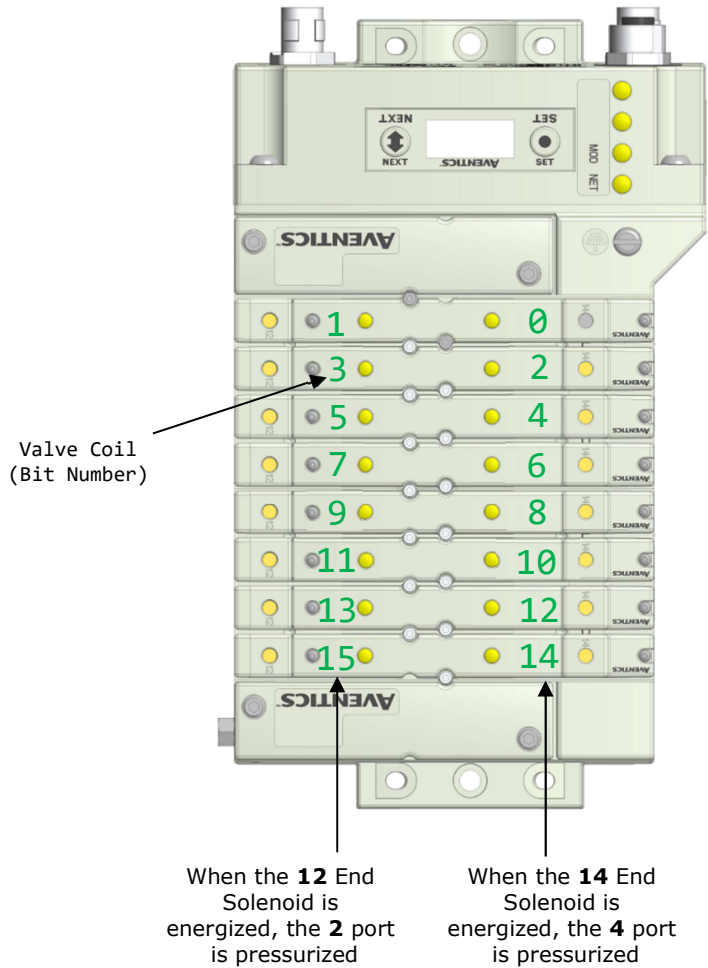
8.3 Mapping Example No.1

Assumed Settings

- Double Z-Boards™, stations 1-8
- 32 coils (4 Bytes) allocated

Manifold I/O Configuration

Description	In	Out
	Bytes	
Local Valve Size:	0	4
Total:	0	4

How to Order

Qty	Part Number
1	8501AV8H100VA00
4	R501A2B40MA00F1
1	H501AMM4BMA0010
4	R501A2B40MA00F1
1	H501AMM4BMA0010
1	P580AEPT1010A00
	ASSEMBLED

Valve Coil
(Bit Number)

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

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

		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	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
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

8.4   Mapping Example No.2
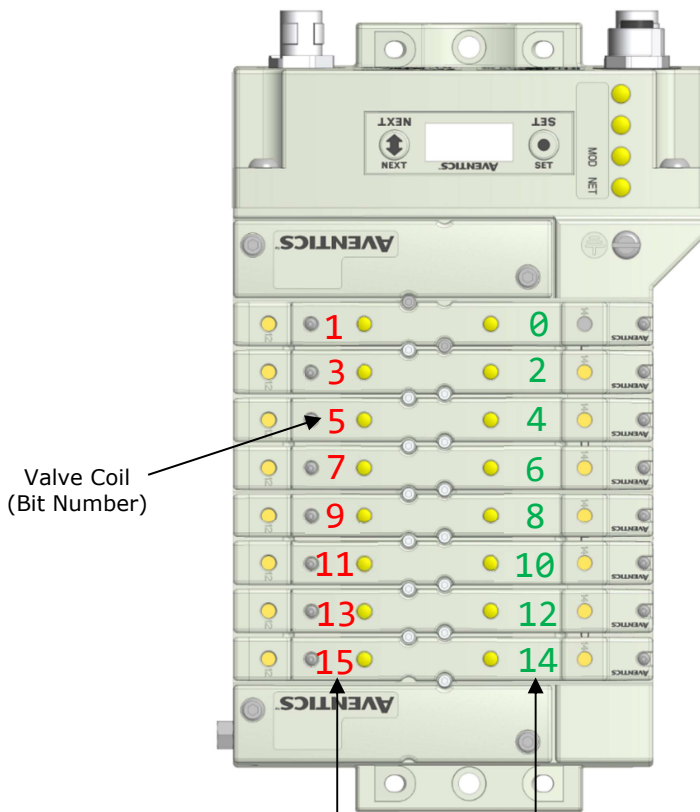
Assumed Settings

- All single solenoid valves
- Double Z-Boards™, stations 1-8
- 32 coils (4 Bytes) allocated

Manifold I/O Configuration

Description	In	Out
	Bytes	
Local Valve Size:	0	4
Total:	0	4

How to Order

Qty	Part Number
1	8501AV8H100VA00
4	R501A2B10MA00F1
1	H501AMM4BMA0010
4	R501A2B10MA00F1
1	H501AMM4BMA0010
1	P580AEPT1010A00
	ASSEMBLED

> **NOTE!**
> *Coils identified in RED are allocated and reserved; refer to mapping table below.*

Valve Coil (Bit Number)

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

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

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Allocated and Reserved	Valve Coil No. 6	Allocated and Reserved	Valve Coil No. 4	Allocated and Reserved	Valve Coil No. 2	Allocated and Reserved	Valve Coil No. 0
1	Allocated and Reserved	Valve Coil No. 14	Allocated and Reserved	Valve Coil No. 12	Allocated and Reserved	Valve Coil No. 10	Allocated and Reserved	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

9. Appendix

9.1 System Specifications

ELECTRICAL	
Supply Voltage	Valves (501, 502, 503): 24 VDC ± 10% Node: 24 VDC ± 10%
Current	Total current on the Power Connector ("Valves" and "Node" Pins) must not exceed 4 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 580 electronics.
Recommended External Fuse	External fuses should be chosen by max. current draw which depends upon manifold configuration. Please refer to power consumption chart on page 4-18 for additional fuse sizing information.
Spike Suppression	Coil spike suppression is internally provided for valve outputs.
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)

9.2 Factory Default Settings

FACTORY DEFAULT SETTINGS	
Description	Default
Node Address	126
SSA Lock	Disabled
Configuration Mode	32 Coils

9.3 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. See page 8-41 for bit mapping rules.
Valve outputs do not energize.	Output power not present or connected improperly on Power connector.	Check for 24VDC on the +24 VDC (Valves) pin of the Power connector of the Communication module.

9.4 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 PLC/Scanner's 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).
DP-V0	Cyclic exchange of Data and Diagnostics
DP-V1	Acyclic and Cyclic Data exchange and Alarm handling
Ground	This term is used to indicate an earth ground.
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.

9.5 Technical Support

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

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