AVENTICS™

580 EtherNet/IP™ DLR Technical Manual

EtherNet/IP™

EtherNet/IP™ conformance tested

EMERSON™

Conditions For Use of This Product

AVENTICS™ G3 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.

Intended Use of This Product

AVENTICS valve systems or I/O stand-alone systems with integrated fieldbus communications are designed to be used on specific industrial control networks. Emerson recommends that industry best practices are followed for network segmentation and avoid exposing valve system or stand-alone systems with integrated fieldbus communication directly to the internet. If external connections are available on the control network or control system, an appropriate firewall should always be used.

Additionally, the following recommendations should be followed:

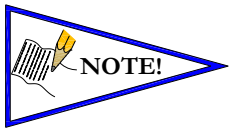
- Minimize internet and business network exposure for all control system devices and/or systems and ensure that they are not accessible from the Internet.
- Locate control system networks and remote devices behind firewalls and isolate them from the business network.
- If remote access is required, only use secure methods such as Virtual Private Networks (VPNs) and recognize that VPNs may have vulnerabilities and should always be updated to the most current version available. Also recognize that a VPN is only as secure as the connected devices it serves.
- **NETWORK SECURITY IS YOUR RESPONSIBILITY! It is the responsibility of every user to assess their own level of risk with regards to the specific aspects of each application and determining appropriate related action.**

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.



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 G3 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.

Table of Contents

1. About EtherNet/IP DLR™

1.1 Overview

EtherNet/IP™ is a communication protocol that uses the same network technology that can be found in commercial and domestic operations worldwide, but has added benefits/features toward manufacturing applications. It is a CIP (common industrial protocol) Network that follows the Open Systems Interconnection (OSI) model.

The ODVA (Open DeviceNet Vendor Association) is an independent organization that governs the EtherNet/IP™ specification and oversees conformance testing for products.

EtherNet/IP™ uses industrial M12 IP67-rated connectors. The protocol can transfer data at two interface speeds of 10 Mbps and 100 Mbps. Maximum network cabling distance is limited to 100m segments at 20º C.

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

Device level ring or DLR network technology for industrial applications takes advantage of embedded switch functionality within the associated EtherNet/IP™ communication modules. Unlike a network- or switch-level ring topology that provides resilience to the network infrastructure, DLR technology adds device-level network resilience to optimize machine operation. When a DLR network detects a break in the ring, it provides alternate routing of the data to help recover the network at extremely fast rates. Enhanced diagnostics built into DLR-enabled products identify the point of failure, helping to speed maintenance and reduce mean time to repair.

1.2 580 EtherNet/IP™ DLR Features

Features	*Description*
EtherNet/IP™ Spec. Supported	Designed to EtherNet/IP™ and DLR Specification
Bus Topology	Star and Multi-Star and Ring
Baud Rates Supported	10/100 Mbps and Autobaud
CE	CE Compliant
Address Setting	Via DHCP/BOOTP, Web Page Configuration, Graphical Display
Duplex	Half and Full supported
Conformance Tested	Tested by ODVA for conformance

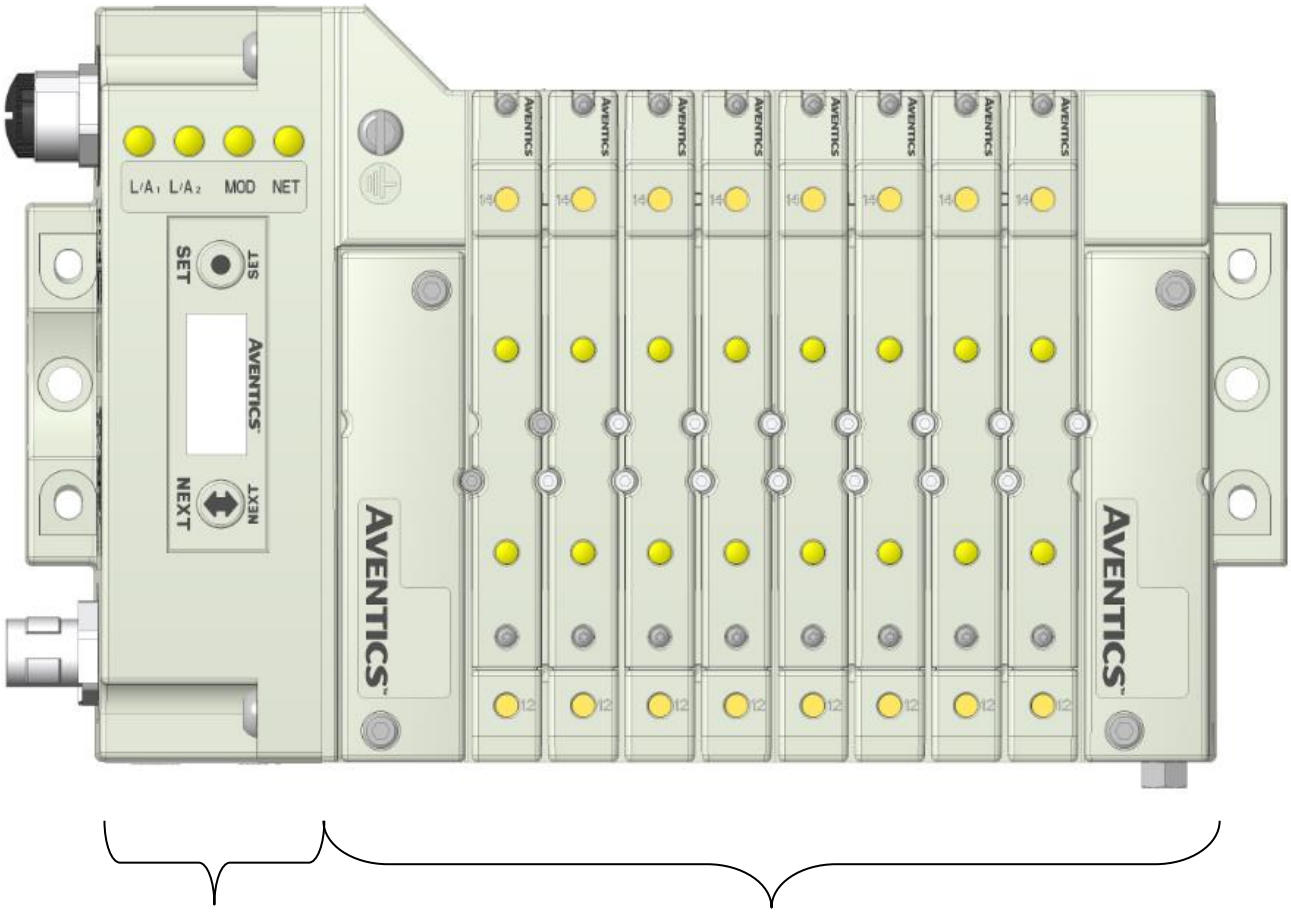
1.3 580 EtherNet/IP™ Performance Data

Features	*Description*
CIP Connections Consumed	1
CIP Connections Available	16
Packets Per Second (PPS)	10,000
RPI	≥5ms
Connection Type	Multicast, Unicast

2. 580 Introduction

The 580 EtherNet/IP DLR™ Node is an electronic interface that features an integrated graphic display for simple commissioning and displaying of diagnostic information. The 580 EtherNet/IP DLR™ Node mates to a variety of valve series including, the 501, 502, and 503. The 580 EtherNet/IP DLR™ Node can address up to (128) coil outputs, with diagnostic functionality built in. With proper assembly and termination, the 580 EtherNet/IP DLR™ Node has an IP65 rating.

This manual describes specific information for configuring and commissioning the Aventics 580 EtherNet/IP DLR™ Node. For more information relating to pneumatic valves and valve manifold assemblies, please refer to the Aventics *500 Series Catalog* at www.Emerson.com

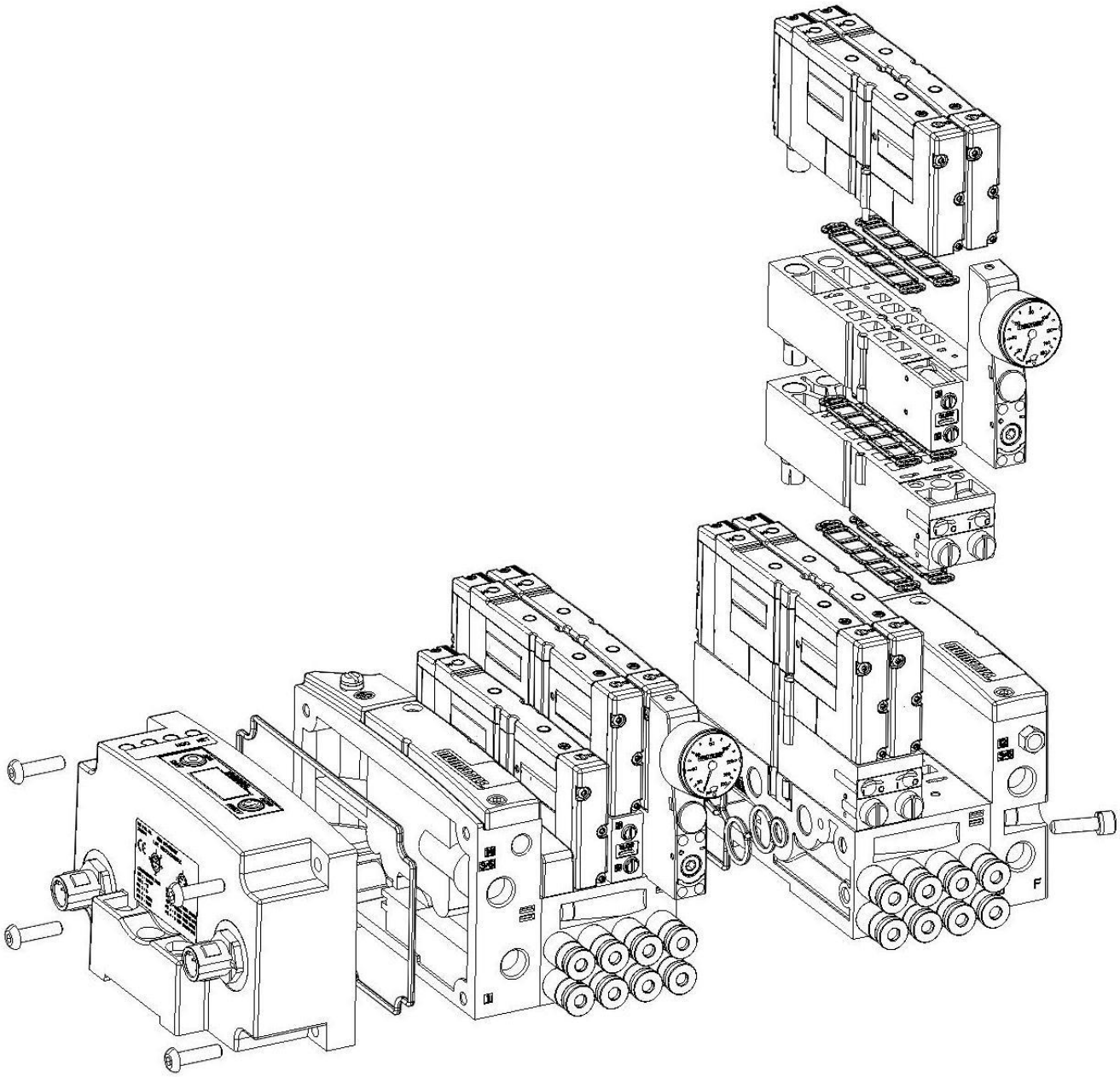


580 EtherNet/IP DLR™ Node

Valve Side
Drives up to 128 coils

2.1 Pneumatic Valve Manifold – 501 Series shown

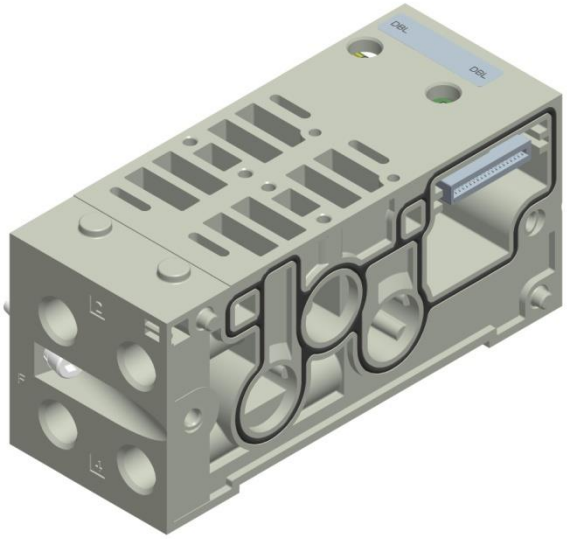
The pneumatic valve manifold with internal circuit board technology is modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards, which allow internal connections from solenoid coils to output drivers without the use of wires). This allows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

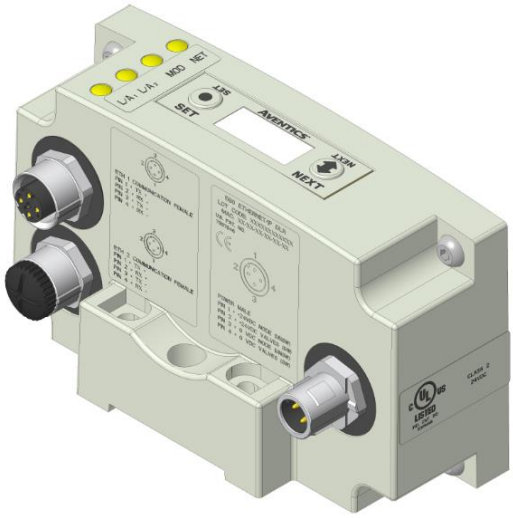


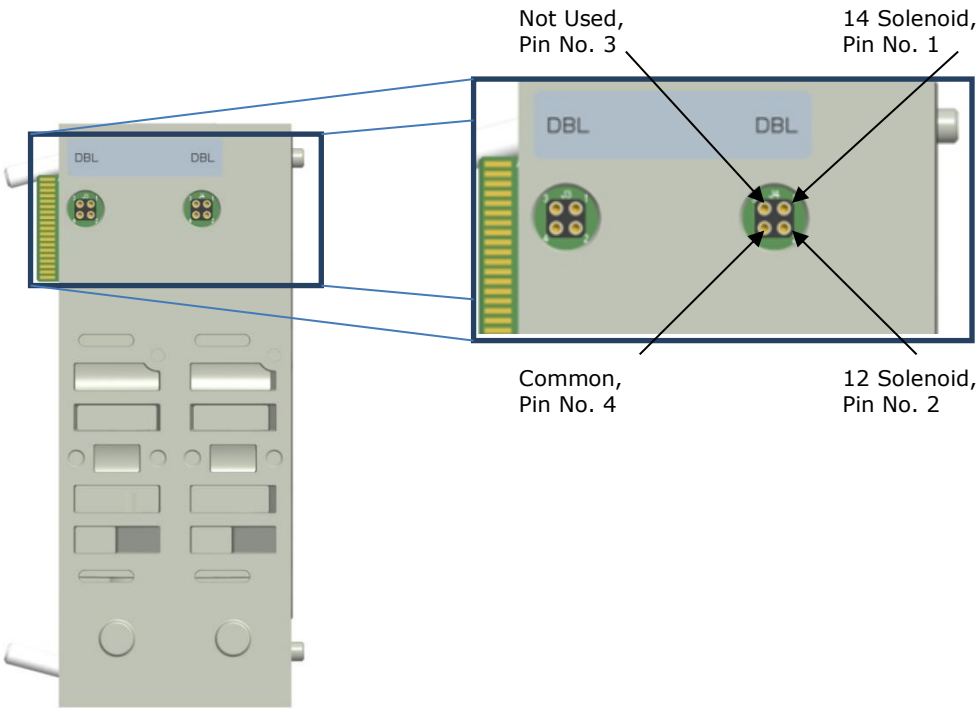
2.2 500 Series Manifold Stations

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

Z-Board™ plug together technology connects all valve solenoids to the valve coil output driver board, located in the valve adapter. There is a maximum of 128 coil outputs available on the complete manifold assemblies. The 128 available outputs are accessed on the 501 series valves utilizing 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.



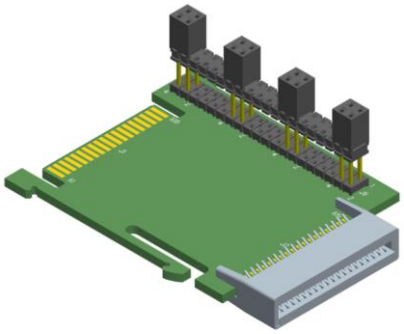




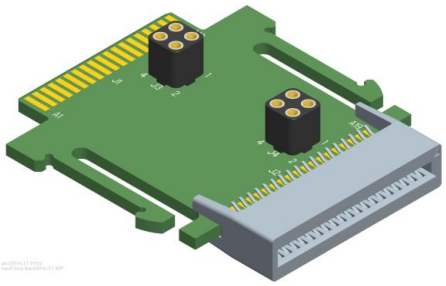
2.3 Z-Board™ Connectors

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 minimum (4) station, the 502 and 503 Z-Board™ is minimum (2) stations.

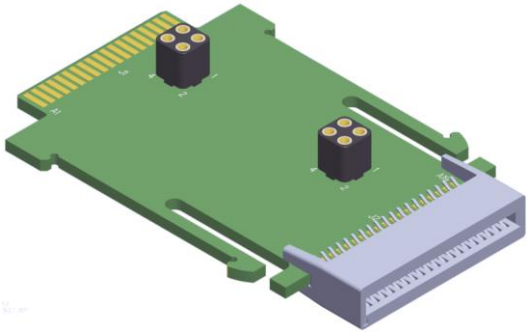
501 Series



502 Series



503 Series



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 Zoned Power Safety and 580 Electronics alternatives

Aventics 580 series electronics released as an alternative to allow immediate shipment of AVENTICS 580 series valve manifolds are not approved for Zoned power applications.

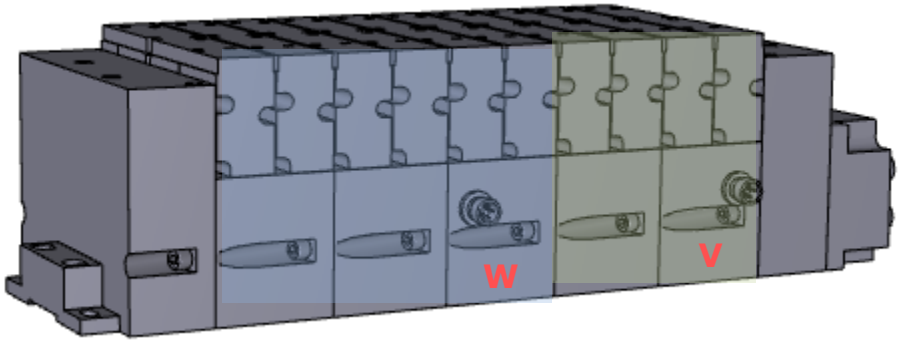
These new alternative valve drivers must not to be used in Zoned Power applications. Zoned Power applications, you must use only approved 580 series electronics.

The following table identifies 580 series electronics approved for Zoned Power applications.

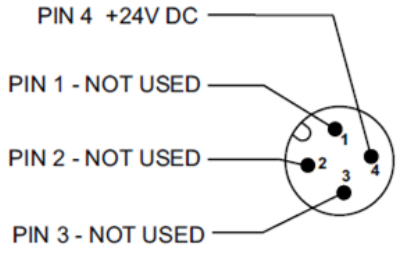
580 Series Electronics approved for Zoned Power Applications	Description
P580AEED1010A00	580 EtherNet/IP DLR Module
P580AEED1010DRM	580 EtherNet/IP DLR Module w/DIN Rail Clips

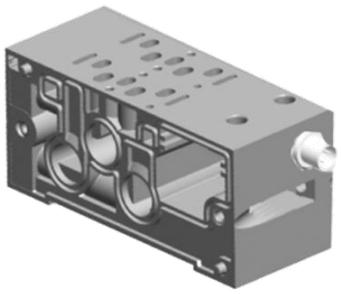
3.2 503 Series Zoned Power application

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.

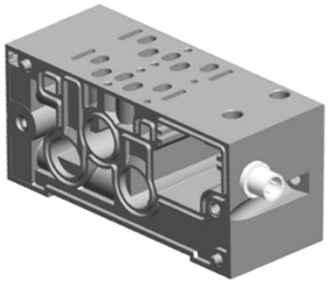


W & V Connector Pin Out





V Wiring Option



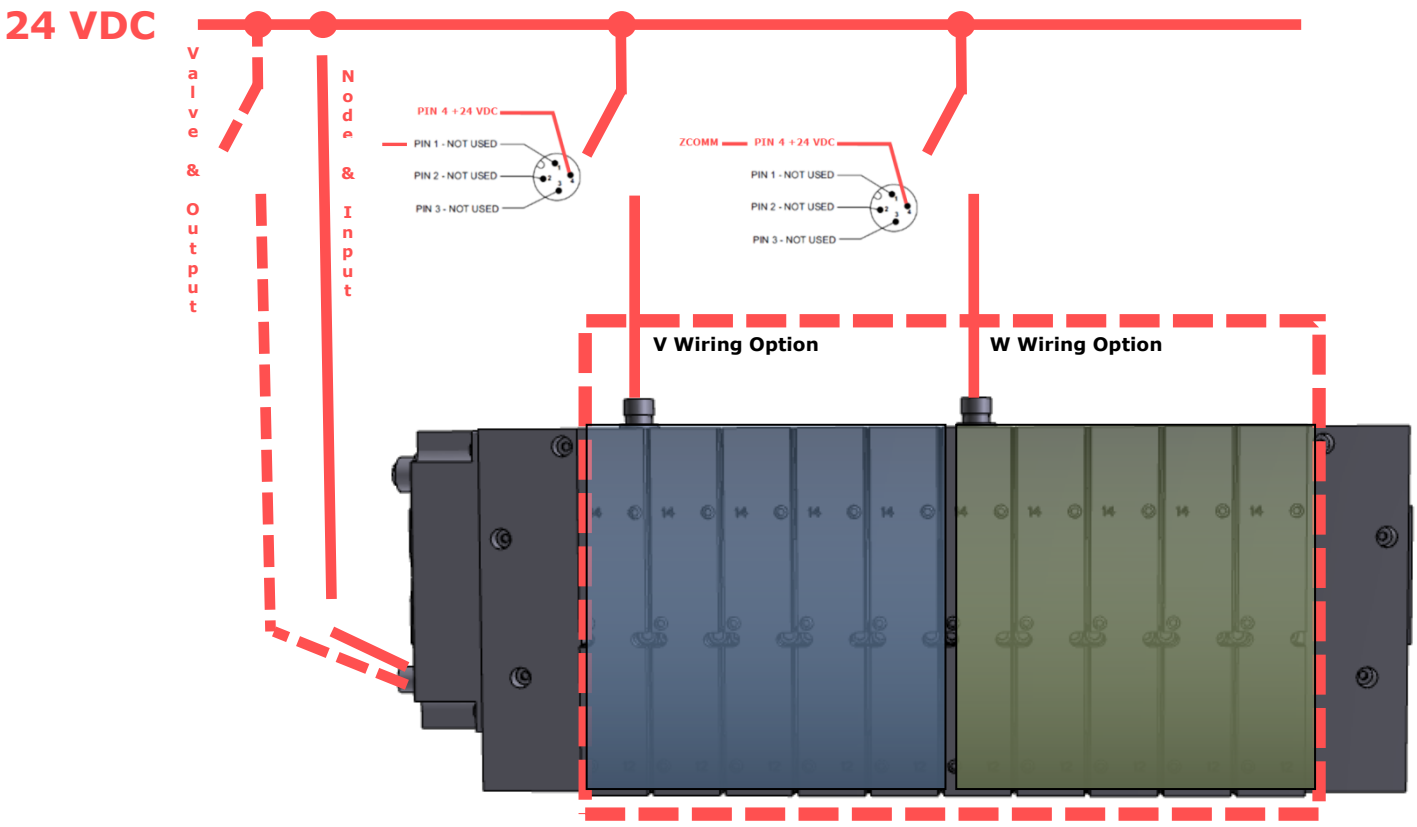
W Wiring Option

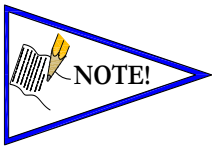
Technical Data

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)

3.3 503 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.





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.

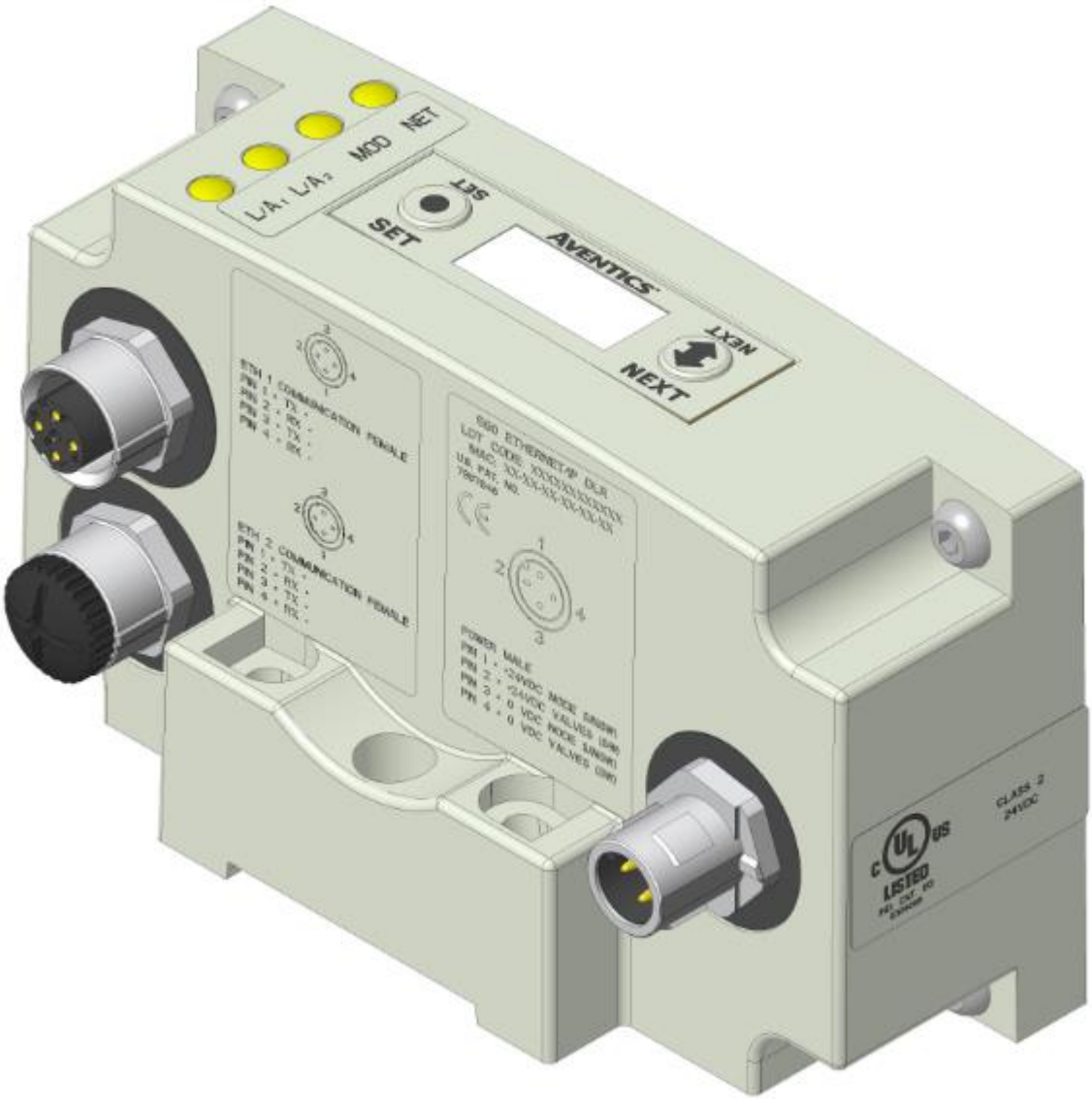
4. Communication Node

4.1 EtherNet/IP DLR™ Node

This module is the Communication Node 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.

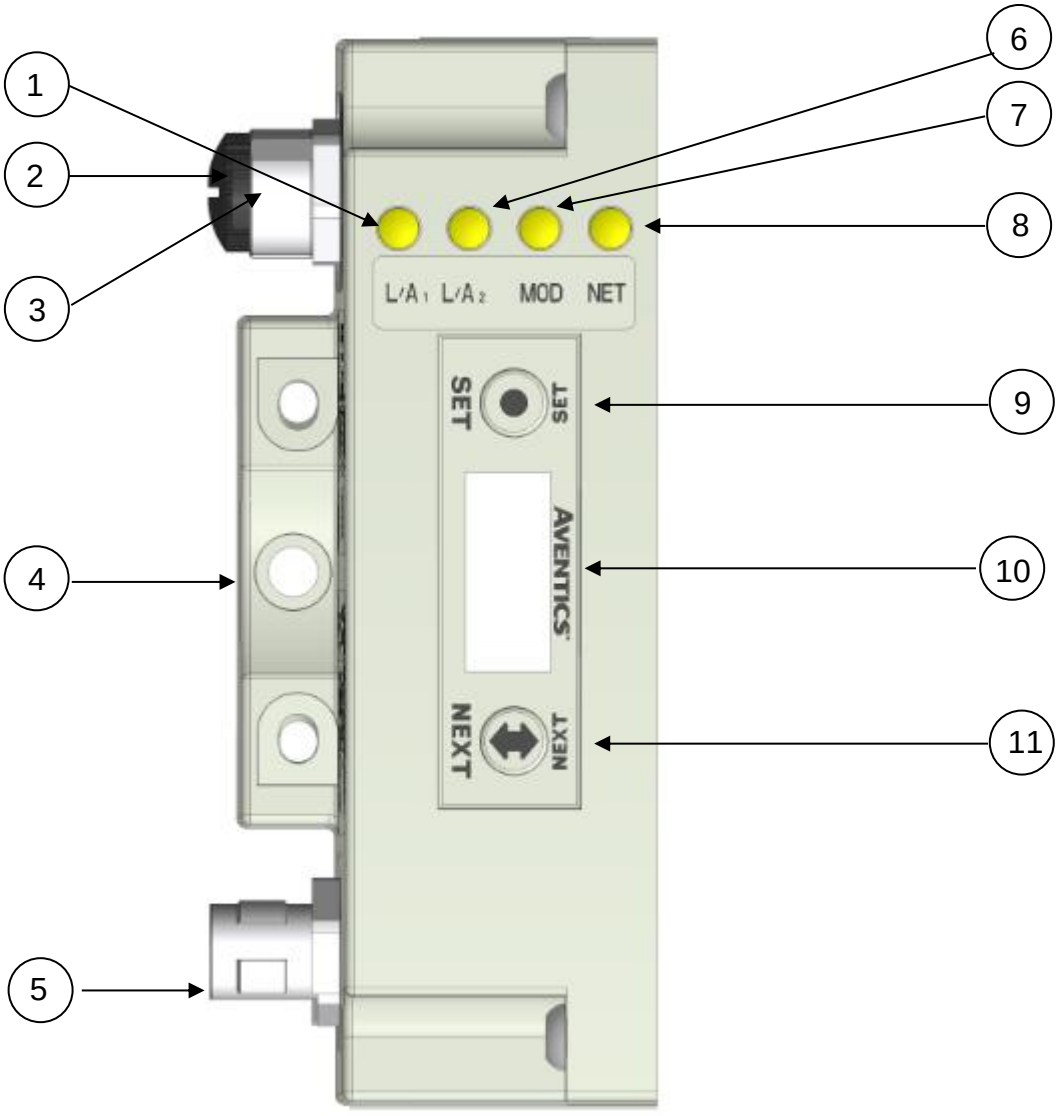
The Aventics 580 EtherNet/IP™ Node is tested by the ODVA to ensure compatibility and interoperability.

Communication Node	*Part Number*
580 EtherNet/IP DLR™ Node	P580AEED1010A00
580 EtherNet/IP DLR™ Node w/DIN Rail	P580AEED1010DRM



4.2 580 Node Description

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



4.3 Connector Pin-Outs

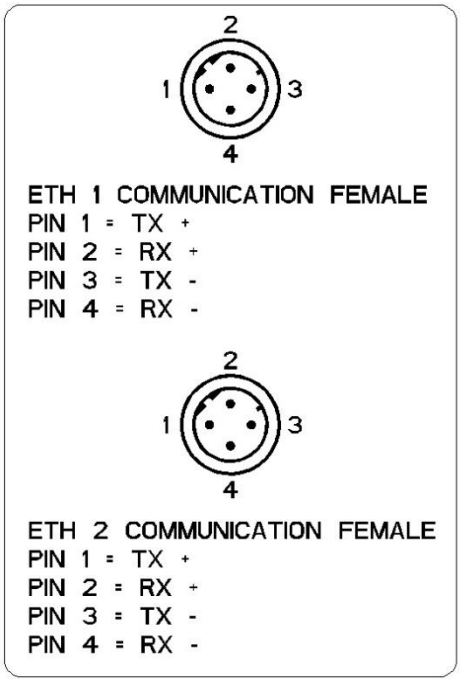
Industry standard M12 connectors are used for communication and power.
The EtherNet/IP™ communication connector is a D-Coded 4 pin female connector.
The Power connector is a single keyway 4 pin male connector.

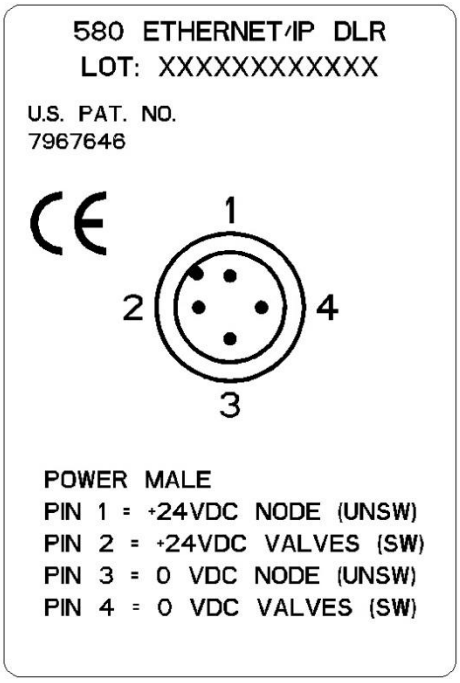
EtherNet/IP™ Communication Connector Pin-Out

Pin No.	*Function*	*Description*
1	TX+	Positive Transmit Line
2	RX+	Positive Receive Line
3	TX-	Negative Transmit Line
4	RX-	Negative Receive Line

Power Connector Pin-Out

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





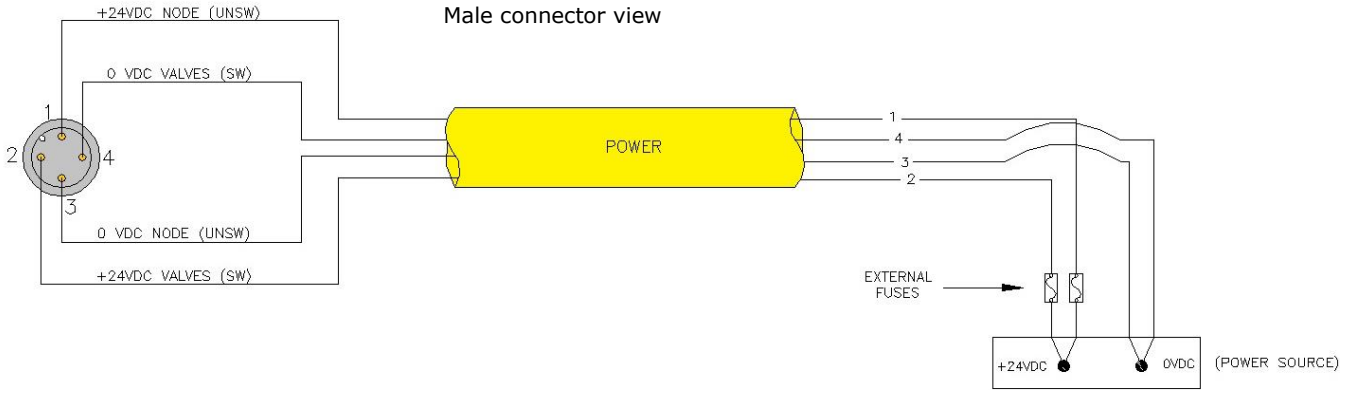
ATTENTION

- *Power common (0 VDC) pins 3 and 4 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.*
- *The draw of the +24VDC Valves and +24VDC Node 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*

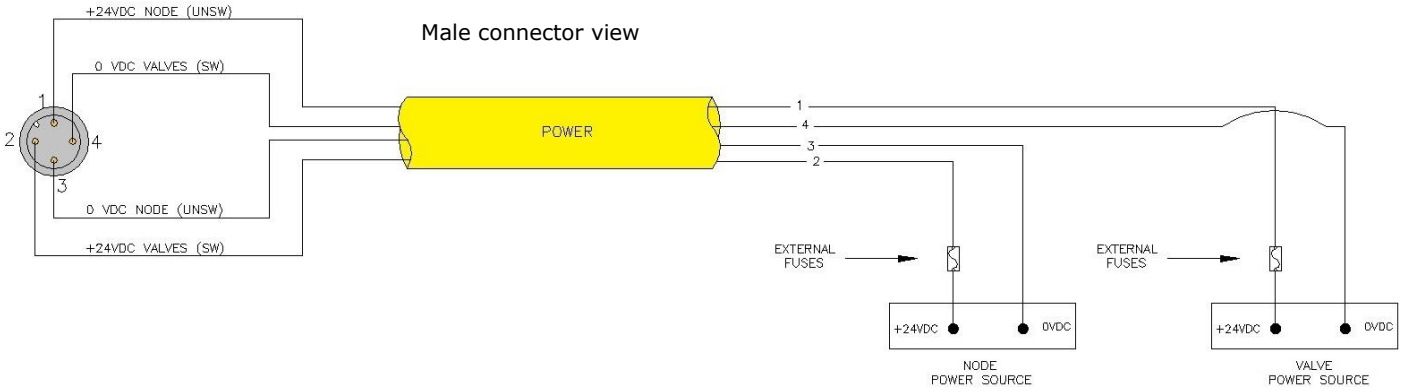
4.4 Electrical Connections

Power Connector Wiring Diagram Examples

Power Supply Example (Non-isolated commons)



Power Supply Example (Isolated commons)



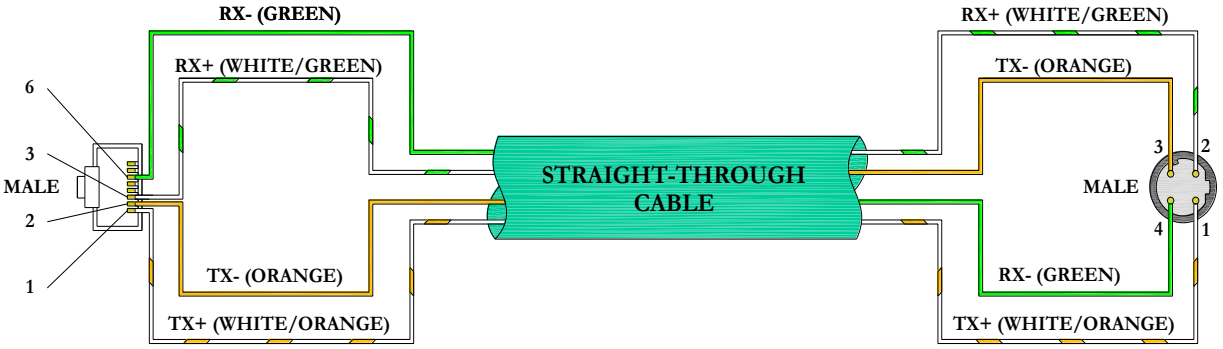
ATTENTION

- *Please see page 3-21 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.*
- *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.

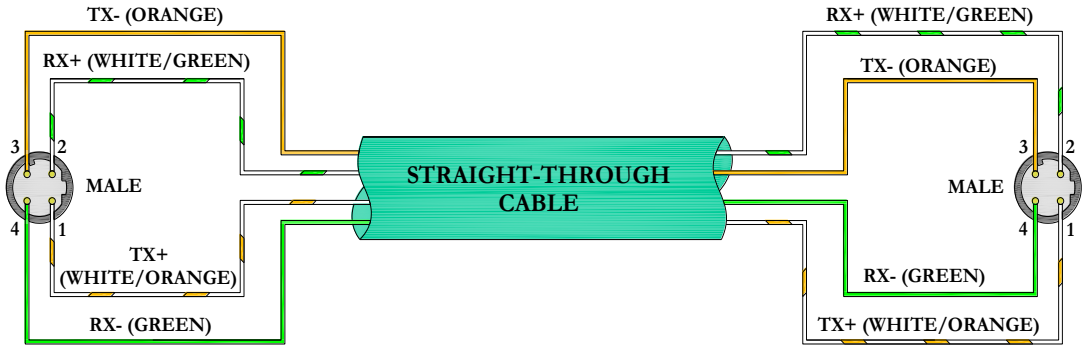
EtherNet/IP™ Straight-Through Cabling Diagrams

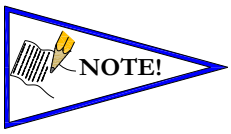
Straight-Through Ethernet cable is used when connecting an Ethernet node to a basic media component (router, switch, hub, etc.). Here are some basic wiring examples of Straight-Through cabling.

RJ45 to M12 D Coded Cable



M12 D Coded to M12 D Coded Cable



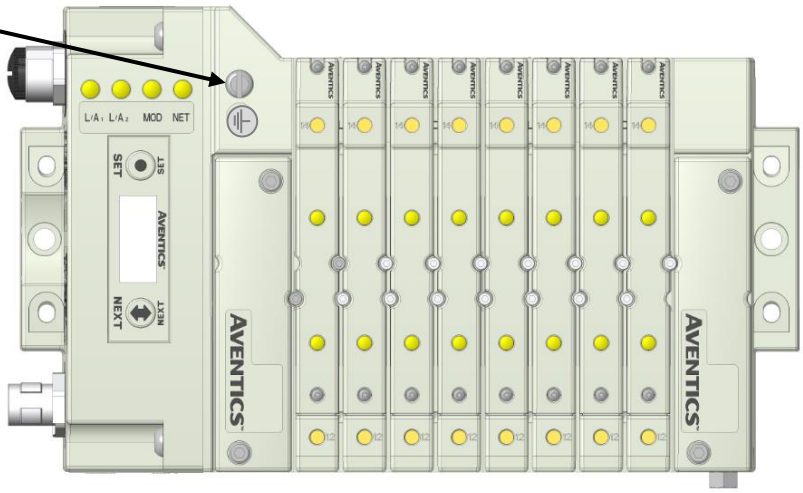


- These are examples only. For appropriate network cabling information, please see the ODVA document titled, "EtherNet/IP™: Media Planning and Installation Manual".

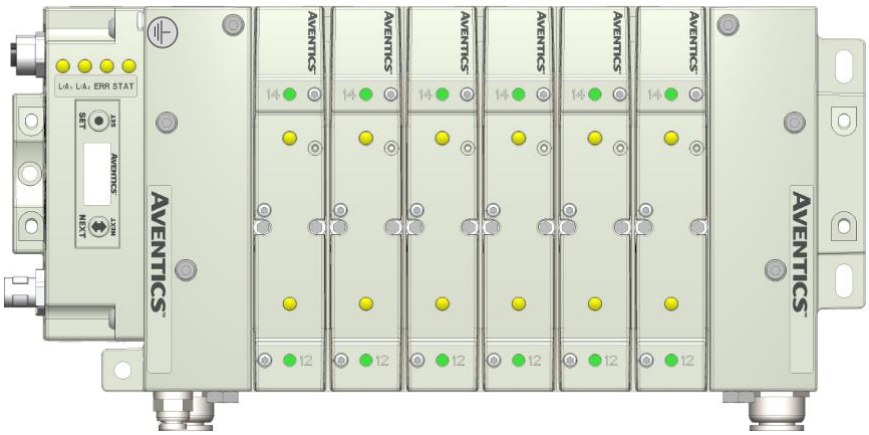
4.5 Chassis Ground

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



CAUTION

- *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	+24 VDC (Valve)	Voltage used to power outputs (valve) SW
3	0 VDC Common(Node)	0 VDC (-V) Voltage used to power node electronics UNSW
4	0 VDC Common(Valve)	0 VDC (-V) Voltage used to power outputs (valve) SW

Power Rating

- The maximum system current capability is 4 Amps. Care should be taken not to exceed 4 Amp draw through the M12 Power connector pins.

Component	*Voltage*	*Tolerance*	*+24VDC (Valve)*		*+24VDC (Node)*	
			Current Per Coil	*Power Per Coil*	*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%	0.04 Amps	1.0 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 Amps	1.7 Watts	NA	NA
580 EtherNet/IP DLR™ Node	24 VDC	+/- 10%	NA	NA	0.09 Amps	2.2 Watts

4.7 Recommended External Fuses

External fuses should be chosen based upon the physical manifold configuration. Please refer to table below for the external 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 0.04 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	=	0.09 Amps
Surge Compensation:	X	1.25
Suggested External Pin +24 VDC (Node) Fuse Value:	=	0.113 Amps

- *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.*
- *Reverse polarity protection is provided.*

4.8 Diagnostics – 580 EtherNet/IP DLR™ Node LED Functions

Upon power up, the Module and Network Status LEDs indicate the state of the unit. There are four LEDs on the 580 EtherNet/IP DLR™ Interface. The LEDs functions are described in the table below.

LED Name	*Color*	*Status*	*Description*
MOD MODULE STATUS	Off	OFF	No power applied to *+24V NODE/ IN*.
	Green	ON	Device operational. The module is operating correctly.
		FLASHING	Standby. The module has not been configured.
	Red	ON	Major fault. A major internal error has been detected.
		FLASHING	Minor fault. A minor recoverable fault has been detected. Self -Test Mode - An error has occurred in the initialization process.
	Green Red	FLASHING	Self -Test Mode.
NET NETWORK STATUS	Off	OFF	IP address has not been assigned to node or no power applied to *+24V NODE/ IN*.
	Green	ON	Connected. The module has established an EtherNet/IP™ connection.
		FLASHING	No connection. There are no EtherNet/IP™ connections established to the module.
	Red	ON	Duplicate IP address. The module has detected that its IP address is already being used elsewhere on the network
		FLASHING	EtherNet/IP™ connection has timed out. One or more of the connections for which this module is the target has timed out.
L/A_1 and L/A_2 ACTIVITY/LINK	Green	OFF	No EtherNet connection is detected
		ON	The module is connected to an EtherNet network
		FLASHING	The LED flashes each time a packet is received or transmitted.

4.9 Output / Short Circuit Protection Diagnostic Status Bits

Diagnostic Status Bit Action

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

5. Extended Coil Capability

Below is a list of the minimum firmware level that support the Extended Coil Manifolds.

Extended Solenoid Coil Capability requirements:		
Module	**Part Number**	**Firmware**
Communication Module	P580AEED1010A00	Rev 2.001 Build 42963

Module firmware revision levels can be confirmed in the integrated graphic display and the built-in web browser. See pg. 44 for more information.

5.1 500 Series Extended Coil Configurations

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 either the graphic display interface as shown on page 36 or using the integrated web server configuration page shown on page 25.

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

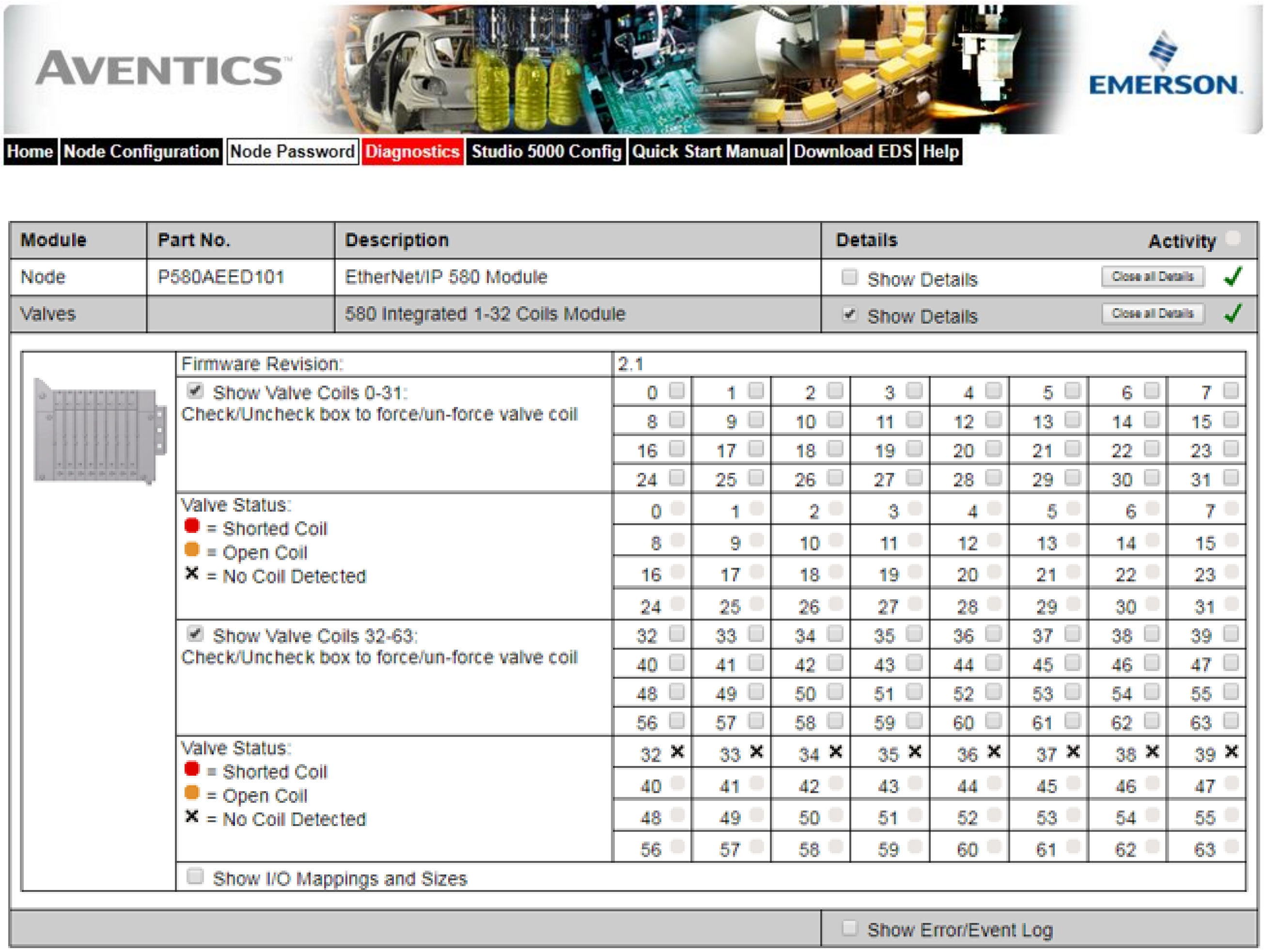
The following example of the 580-diagnostic webpage "Node Configuration" identifies the details of a manifold configured for 64 possible coils.

Node Configuration (Green selections denote Factory Default settings)	
DHCP:	Disabled
IP Address:	192.168.3.120
Subnet Mask:	255.255.255.0
Gateway IP Address:	
Web Server:	Enabled
Max Coils on Manifold (32 = Standard):	64
COMM Fault / Idle Mode:	Turn OFF All Outputs
Node Configuration Parameters:	Unlocked
Display Orientation:	Normal

Update Configuration

Number of Maximum Coils should only be adjusted if one or more additional extended coil valve driver(s) has been physically added.

The following is an example of the 580 webpage "Diagnostics" which identifies the details of the valve driver's control of 64 possible coils



5.2 500 Series Extended 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

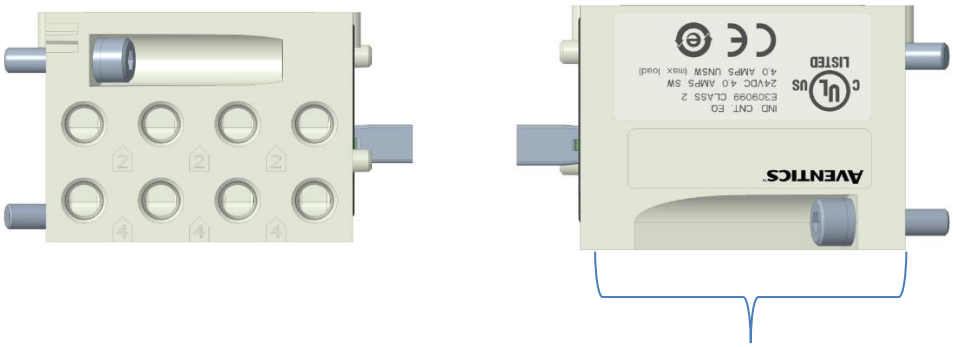
Mapping for each additional 502/503 series 16 coil valve driver added to the manifold assembly

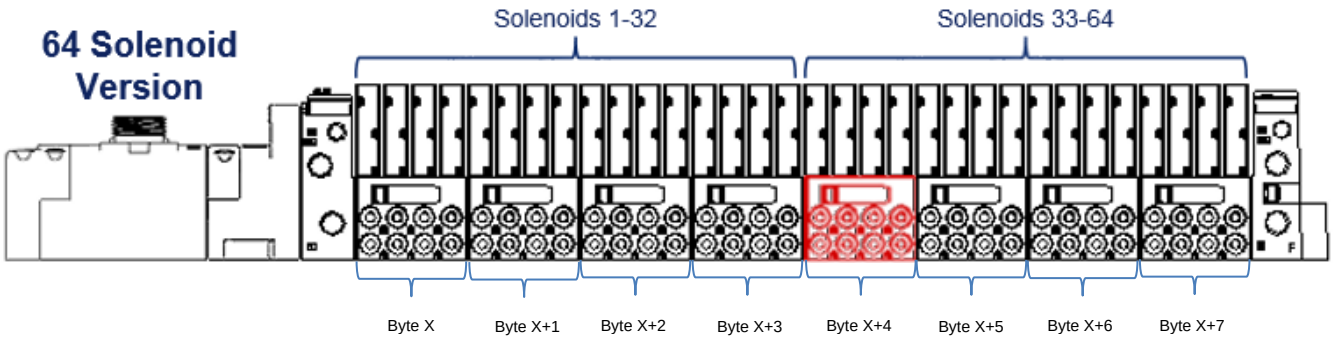
Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil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

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

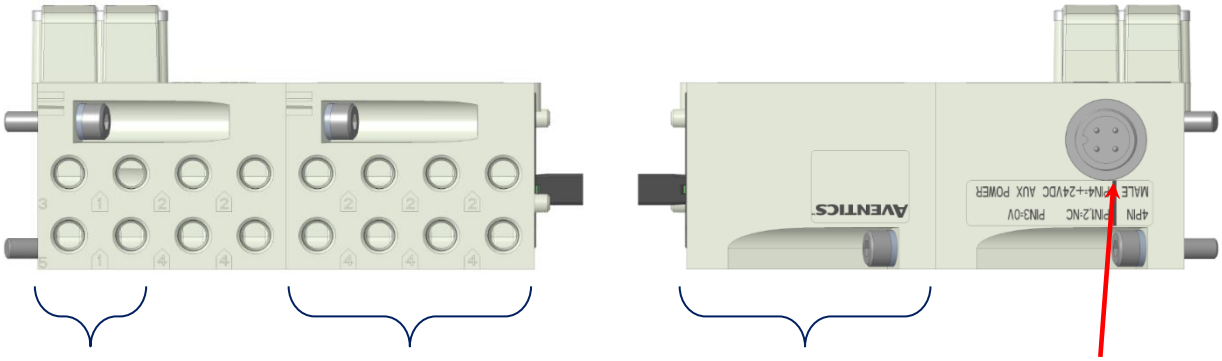


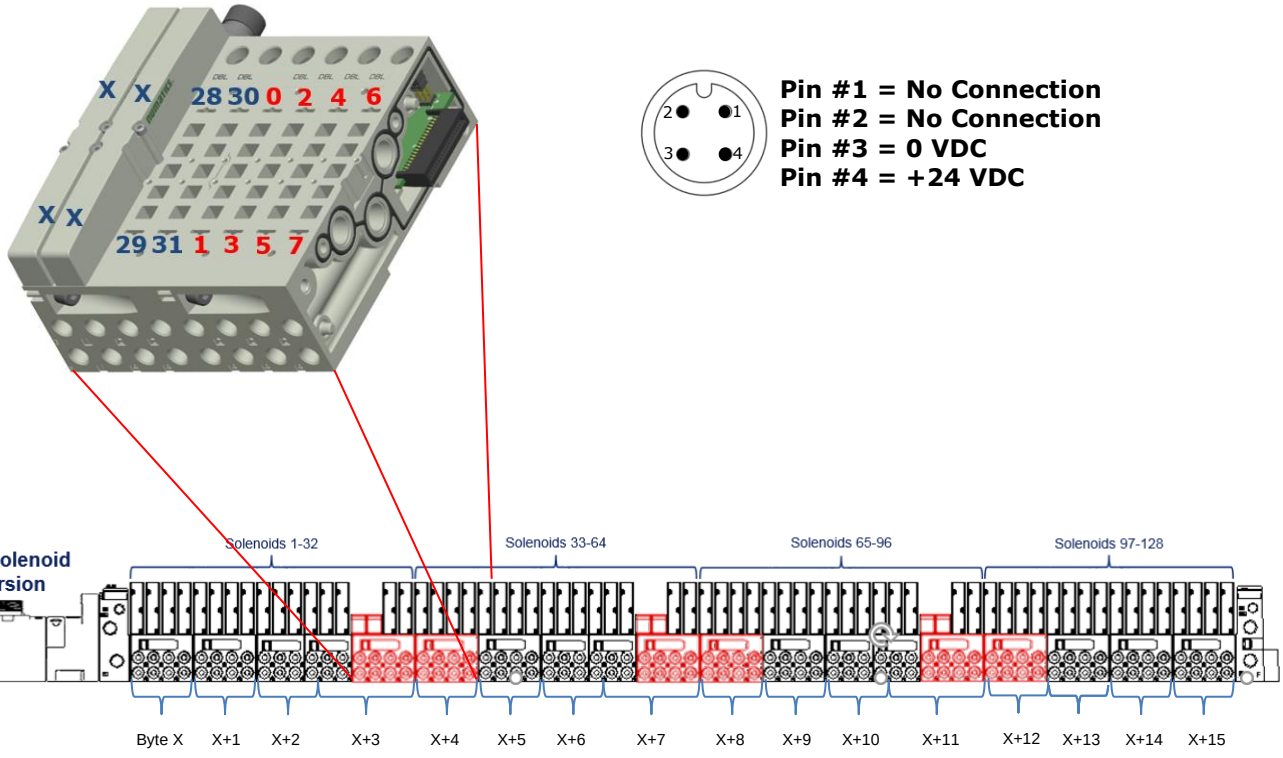


5.4 501 Series, up to 128 solenoid coils

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 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.

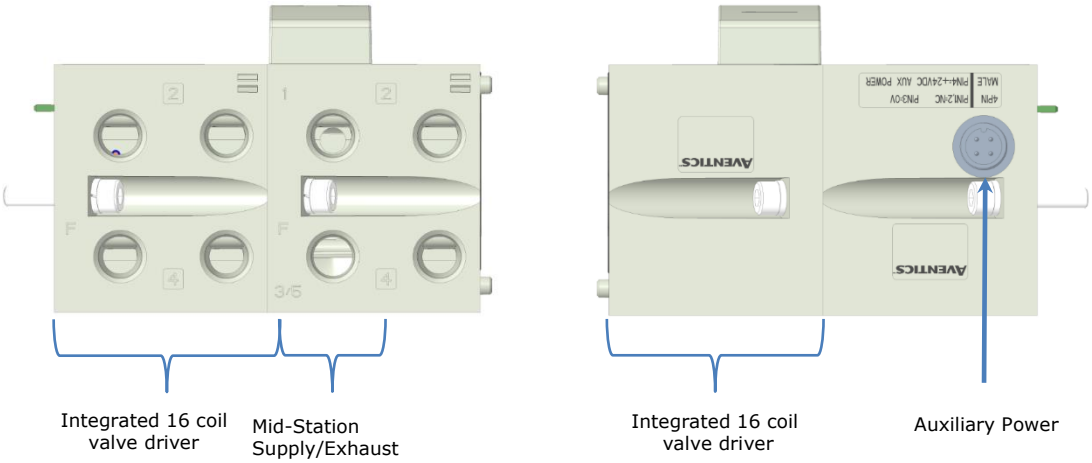


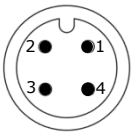


5.5 502 and 503 Series, up to 80 coils

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 a 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.



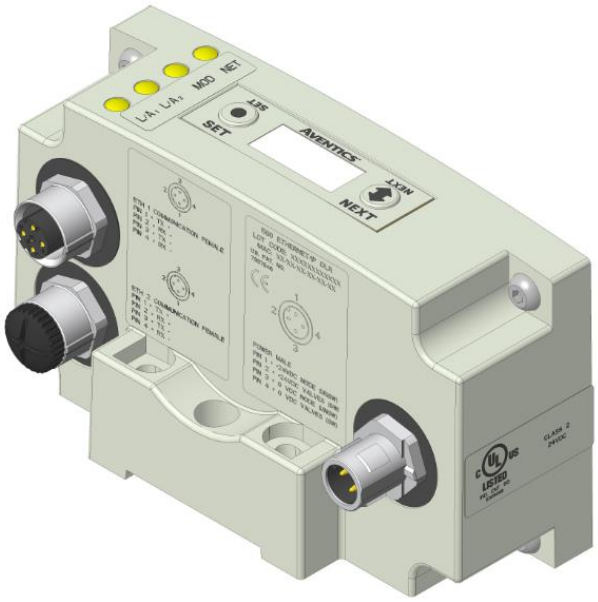


Pin #1 = No Connection
Pin #2 = No Connection
Pin #3 = 0 VDC
Pin #4 = +24 VDC

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

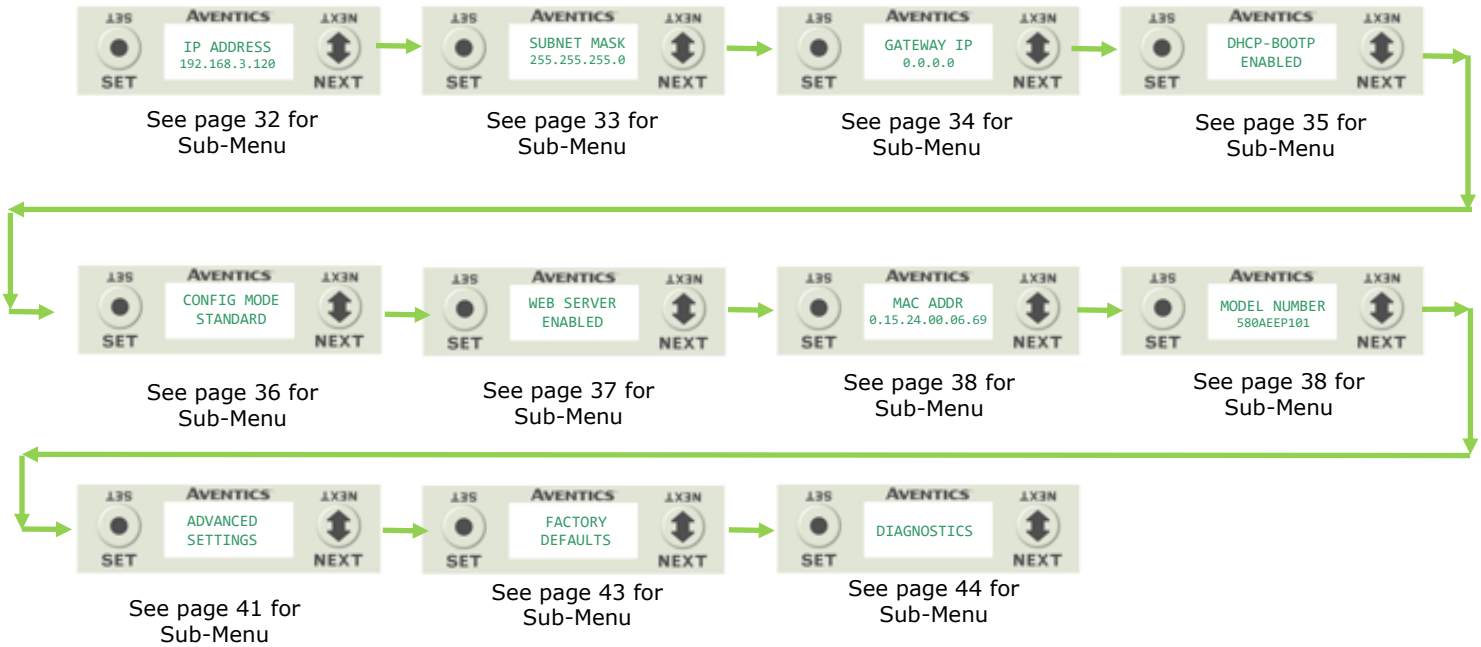
6. EtherNet/IP DLR™ Node Graphic Display

The 580 EtherNet/IP DLR™ Node has an integrated graphic display that may be used to configure the parameters of the Node as well as showing diagnostic information.

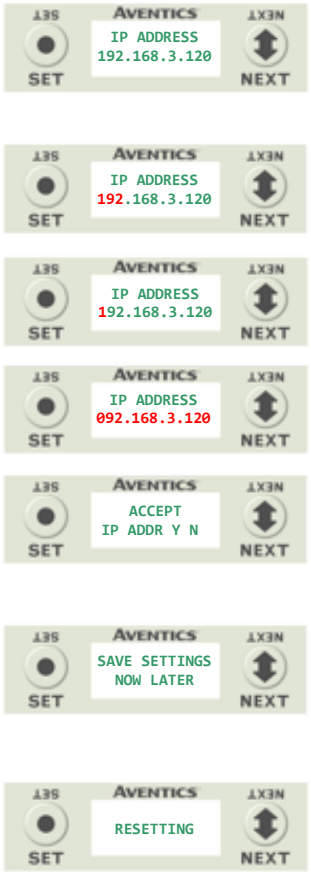


The following graphic displays represent the main menu selections of the 580 node. Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus. Note that many of these settings can also be adjusted via software with EDS file parameters. *NOTE: WHEN A NETWORK I/O CONNECTION IS ESTABLISHED MANUAL CHANGES TO NODE PARAMETERS ARE NOT ALLOWED!*

Home Screen



6.1 IP Address Sub-Menu



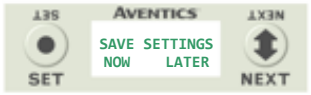
Steps to Set IP Address

1. Press the SET button to enter the IP ADDRESS sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octet to accept the entire IP Address
4. Press the SET button to input the address shown on the display,
5. Press the NEXT button to select **Y**es or **N**o to accept the IP 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
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 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.

- Factory default address is 192.168.3.120
- 0 and 255 are not valid for the fourth octet

6.2 Subnet Mask Sub-Menu

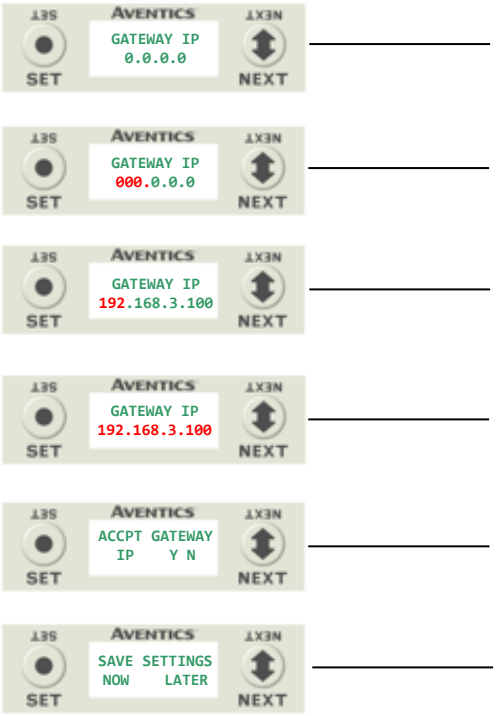


Steps to Set Subnet Mask

1. Press the SET button to enter the Subnet Mask sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octet to accept the entire Subnet Mask
4. Press the SET button to input the value shown on the display,
5. Press the NEXT button to select Yes or No to accept the Subnet Mask shown on the display.
   c. Selecting No will bring you back to the main Subnet Mask menu.
   d. Selecting Yes will take you to the following SAVE SETTINGS menu
6. Press the NEXT button to select either NOW or LATER.
   c. Selecting NOW will cause the node to reset and apply the new setting.
   d. 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.

- Factory default subnet mask is 255.255.255.0

5.4 Gateway IP



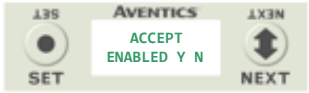
Steps to Set Gateway IP

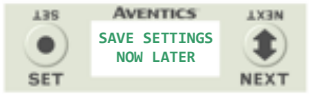
1. Press the SET button to enter the Gateway IP sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octet to accept the entire Subnet Mask
4. Press the SET button to input the value shown on the display,
5. Press the NEXT button to select Yes or No to accept the Subnet Mask shown on the display.
   e. Selecting No will bring you back to the main Subnet Mask menu.
   f. Selecting Yes will take you to the following SAVE SETTINGS menu
6. Press the NEXT button to select either NOW or LATER.
   e. Selecting NOW will cause the node to reset and apply the new setting.
   f. 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.

- Factory default Gateway IP is 0.0.0.0

6.4 DHCP/Boot-P Sub-Menu





DHCP-BOOTP Steps

1. Press the SET button to enter the DHCP-BOOTP sub-menu.

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

   Press the SET button to confirm your choice.

3. Press the NEXT button to select Yes or No to accept the selection.
   a. Selecting No will bring you back to the main menu.
   b. Selecting Yes will take you to the following apply changes menu.

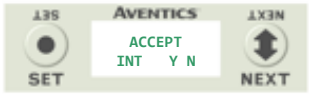
   Press the SET button to confirm your choice.

Apply Changes Steps

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

- Factory default setting for DHCP-BOOTP is enabled.

6.5 Config. Mode



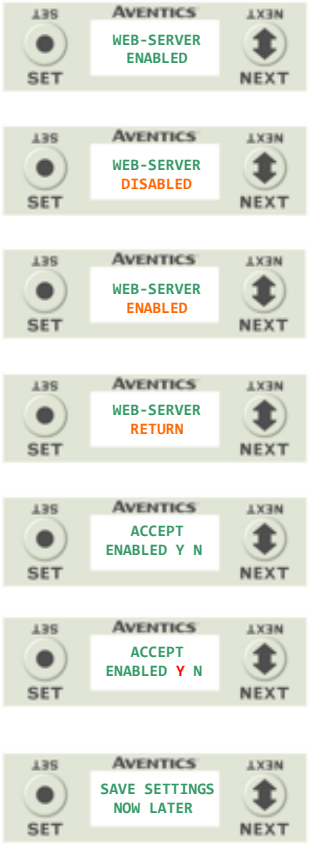
Config Mode Settings

1. Press the SET button to enter the Config Mode sub-menu.
2. Press the SET button to change this parameter to 32, 64, 96 or 128
3. Press the NEXT button to select Yes or No.
   a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
   c. Selecting RETURN will bring you back to the main FACTORY DEFAULS menu

   Press the SET button to confirm your choice.

6.6 Web Server Sub-Menu

This will allow the enabling/disabling of the G3 Web Server.



Web-Server Steps

1. Press the SET button to enter the Web-Server sub-menu.
2. Press the NEXT button to scroll through the choices to enable or disable the feature.
   d. ENABLED (Factory Default)
   e. DISABLED
   f. RETURN (this will return you to the main menu)

   Press the SET button to confirm your choice.
3. Press the NEXT button to select Yes or No to accept the selection.
   c. Selecting No will bring you back to the main menu.
   d. Selecting Yes will take you to the following apply changes menu.

   Press the SET button to confirm your choice.

Apply Changes Steps

4. Press the NEXT button to select either NOW or LATER.
   c. Selecting NOW will cause the node to reset and apply the new setting.
   d. 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.

- Factory default setting for WEB-SERVER is enabled.

6.7 MAC Address Sub-Menu

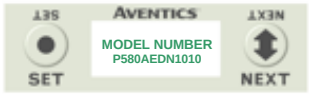
MAC (Machine Access Control) Address

1. The MAC Address is a fixed unique value that cannot be edited.

The actual MAC ADDR has an extra leading zero. The actual number in the example shown is 00-15-24-00-06-69

- The MAC address is for reference and cannot be modified.

6.8 Model Number Sub-Menu



Model Number

1. The Model Number is reference only.

6.9 Advanced Settings – Communication Fault

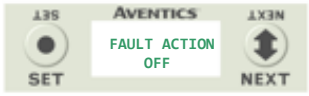
This will allow the enabling / disabling of the Fault Action parameter. The Fault Action parameter determines the behavior of the outputs during a communication fault.

Fault Action Settings

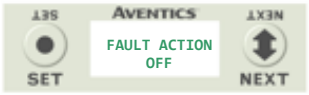
1. Press the SET button to enter the ADVANCED SETTINGS menu.

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

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

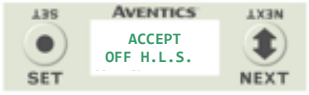


5. The current state of the parameter is shown



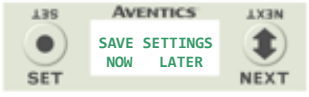
6. Press the SET button to change this parameter
   Press the NEXT button to scroll the choices for the desired output action during a fault state.
   a. OFF (Factory Default)
   b. HOLD LAST STATE
   c. RETURN (this will return you to the SET FAULT/IDLE menu)

   Press the SET button to confirm your choice.

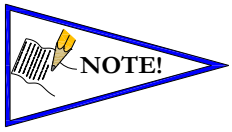


7. Press the NEXT button to select Yes or No to accept the selection
   Press the SET button to confirm your choice
   a. Selecting No will bring you back to the main SET FAULT/IDLE menu.
   b. Selecting Yes will take you to the following saved settings menu.

Save Settings Steps

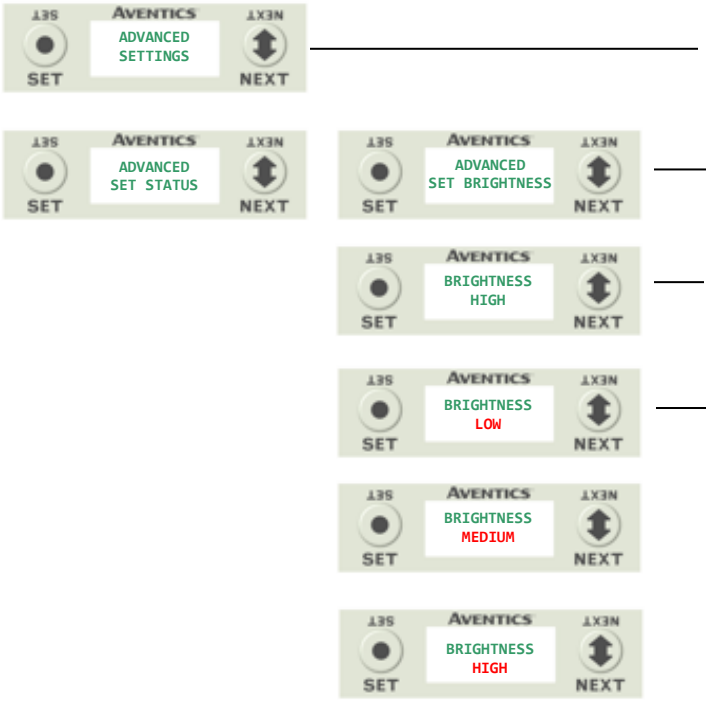


8. Press the NEXT button to select either NOW or LATER.
   Press the SET button to confirm your choice.
   a. Selecting NOW will cause the node to reset and apply the new setting
   b. Selecting LATER will cause the new FAULT ACTION selection to be saved in memory, you must Accept the saved changes before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



- Factory Default is ALL OFF, See page **Error! Bookmark not defined.** for more details

6.10 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.

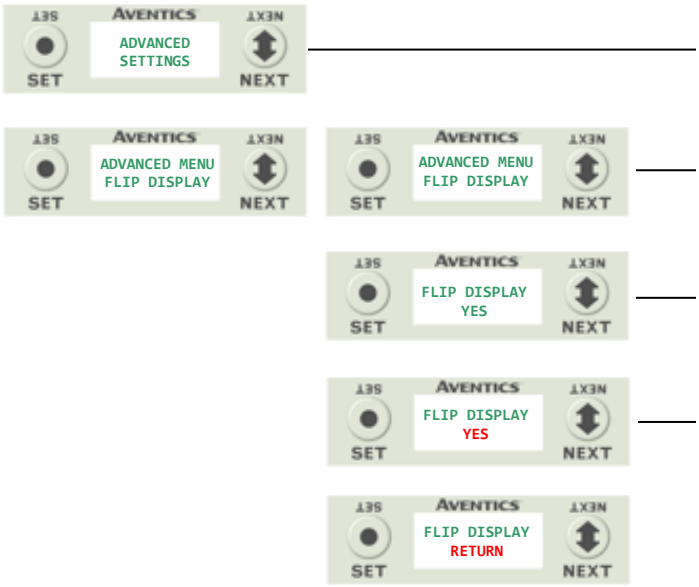
3. The current state of the parameter is shown

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

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

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

6.10 Advanced Settings – Flip Display



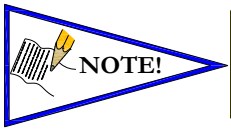
Flip Display Settings

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

   Press the SET button to enter the CONFIG MENU / FLIP DISPLAY.
3. The current state of the parameter is shown
4. Press the NEXT button to change this parameter

   a. YES
   b. RETURN

   Press the SET button to confirm your choice.



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

6.11 Advanced Settings – Parameters

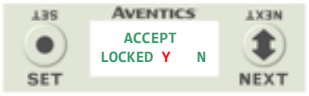
PARAMETER Steps

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.
    g. UNLOCKED (Factory Default)
    h. LOCKED
    i. RETURN (this will return you to the main menu)

   Press the SET button to confirm your choice.

   By choosing LOCKED, all settable parameters will be read only via the graphic display. UNLOCKED, the factory default, will allow all parameters to be settable through the graphic display.
   Please note that all parameters are read only, regardless of this setting, when an IO connection between the communication module and the controller (PLC) is present



3. Press the NEXT button to select Yes or No to accept the selection.
    e. Selecting No will bring you back to the main menu.
    f. Selecting Yes will take you to the following apply changes menu.

   Press the SET button to confirm your choice.

Apply Changes Steps

4. Press the NEXT button to select either NOW or LATER.
    e. Selecting NOW will cause the node to reset and apply the new setting.
    f. 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.

6.12 Factory Defaults Factory Defaults

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

5. Press the SET button to change this parameter

6. Press the NEXT button to select Yes or No.
   d. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
   e. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
   f. Selecting RETUTN will bring you back to the main FACTORY DEFAULS menu

   Press the SET button to confirm your choice.

Factory Default Settings

FACTORY DEFAULT SETTINGS	
Description	*Default*
IP Address	192.168.3.120
Sub Net Mask	255.255.255.0
DHCP Boot-P	Enabled
Web Server	Enabled
Diagnostic Word	Enabled
I/O Diagnostic Status	Enabled
Comm Fault – Fault Action	Off
Brightness	High
Comm. Format	SINT
Params Lock	Unlocked
Config Lock	Unlocked
Quick Connect	Disabled
Compatibility Mode	Disabled
Config Mode	32

6.13 Diagnostics

All diagnostic information is read only

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

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

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

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

c. FIRMWARE REV.
   i.- For service personnel.

d. FIRMWARE BUILD
   i.- For service personnel.

e. LOAD FIRMWARE
   i.- For service personnel.

f. BOOTCODE REV.
   i.- For service personnel.

g. BOOTCODE BUILD
   i.- For service personnel.

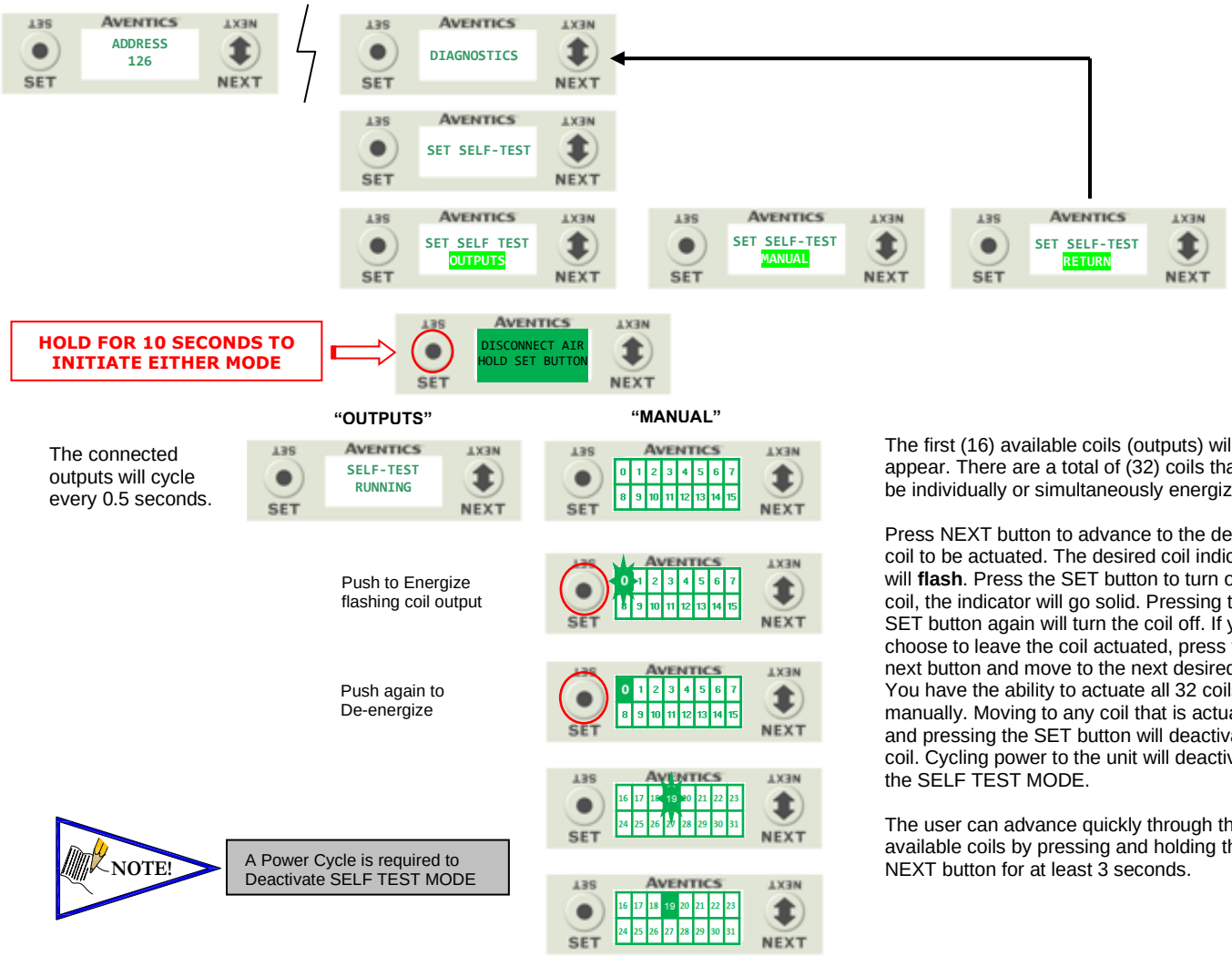
6.14 Diagnostics Self-Test

An internal diagnostic tool can be enabled on the 580 (node) using the graphic display. This tool allows the user to confirm that the manifold outputs (coils) are fully functional without 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 the steps to initiate the SELF TEST MODE for either "OUTPUTS", or "MANUAL".

Diagnostics - Self Test Mode (continued)

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 MODE menu.
5) Push NEXT to navigate to the desired test mode: "OUTPUTS" or "MANUAL".
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 identifies the chosen test mode running.



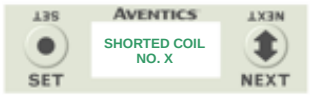
The first (16) available coils (outputs) will appear. There are a total of (32) coils that can be individually or simultaneously energized.

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 go solid. 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.

6.15 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 a valve coil.

Displayed when +24 VDC on Pin No. 2 Valves (SW) and Pin No. 4 Valves (SW) is not present.

Displayed when an open circuit condition is detected on a valve coil.

7. EtherNet/IP™ Configuration and Mapping

7.1 EDS File

The EDS file contains configuration information about the Aventics valve manifold. EDS files are available on the Aventics website at https://fieldbus.asco.com/

7.2 Connecting to a 580 EtherNet/IP™ DLR Node

This section will discuss how to connect a computer to a 580 EtherNet/IP™ DLR node. There are multiple ways to complete this task, so only two will be discussed.

1. Connect a 24VDC power supply to the valve manifold. The power pin-out can be found on the side of the EtherNet/IP™ DLR node or on page 15 of this document. (Note: 24VDC only needs to be applied to the "+24VDC (NODE)" pins to power the node.)

2. Connect a crossover cable directly from the manifold to the computer -OR- Connect a straight-through cable from the manifold to a router, hub, or switch. Next, connect a straight-through cable from the computer to the router, hub, or switch. (Network lights should appear on the router, hub, or switch if the correct cables are used).

3. Turn on the computer. Also, make sure the manifold and the router, hub, or switch has power.

4. To communicate with an EtherNet/IP™ DLR manifold, the IP address of your computer must be known.

5. Once the IP address for the computer is known, you can set the IP address of the Aventics manifold using one of the methods described on page 54 .

6. Open a web browser on the computer and type in the IP address of the manifold.
   Ex. http://192.168.3.120

EtherNet/IP EtherNet/IP conformance tested

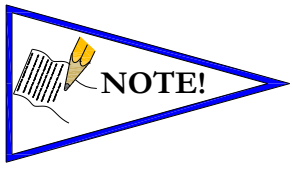
7. You have successfully connected a computer to a Aventics EtherNet/IP™ manifold.

7.3 Using the Functionality of the 580 EtherNet/IP™ DLR Web Server

This section will discuss the functionality of the built in Ethernet server. Every Aventics EtherNet/IP™ DLR node has this feature. Through this server you can configure the node, force outputs (valves), check diagnostics, etc. Each Aventics' web page will be explained.

Home

To get to the Aventics "Home" page, open a web browser. In the URL line, type in the IP address of the manifold and press "Enter". The Aventics "Home" page will appear. This page shows a picture of the Aventics EtherNet/IP™ DLR manifold(s). From this page, the user can navigate the entire built-in web server.



- *The 1st three octets of the IP address of the computer MUST match the IP address of the node.*

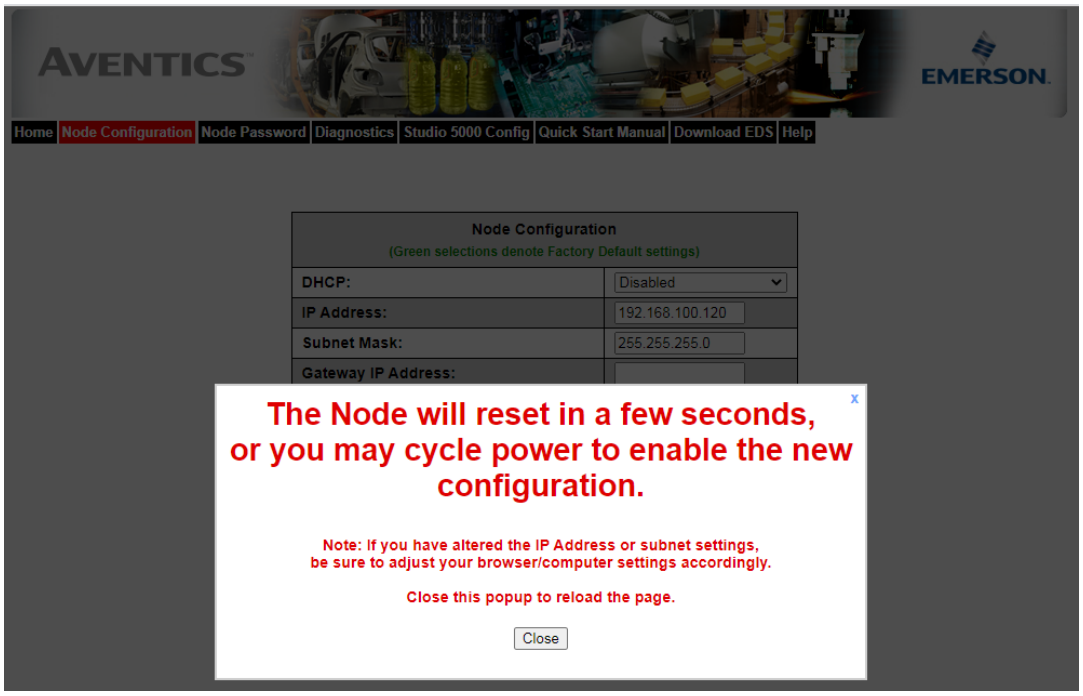
Node Configuration

The "Node Configuration" window can be used to control different parameters within the manifold. These parameters include, "IP Address", "Subnet Mask", "Gateway Address", "SMTP Server", "DHCP/BOOTP enabled", "MAC Address", and "COMM Fault/Idle Mode". "DHCP/BOOTP enabled" is controlled by a single check mark box. "COMM Fault/Idle Mode" has two options that can be chosen: "Hold last Output State" and "Turn OFF All Outputs".

Node Configuration (Green selections denote Factory Default settings)	
DHCP:	Disabled
IP Address:	192.168.100.120
Subnet Mask:	255.255.255.0
Gateway IP Address:	
Web Server:	Enabled
Max Coils on Manifold (32 = Standard):	32
COMM Fault / Idle Mode:	Turn OFF All Outputs
Node Configuration Parameters:	Unlocked
Display Orientation:	Normal

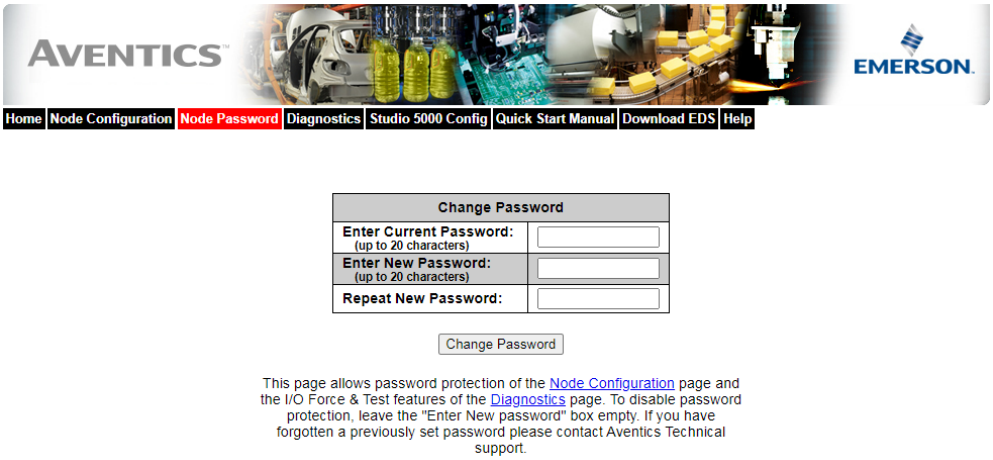
Update Configuration

Once the changes have been made, left click on the "Update Configuration" button. The following window will appear. The Ethernet/IP™ node will reset in a few seconds, or the user may cycle power to enable the new configuration.

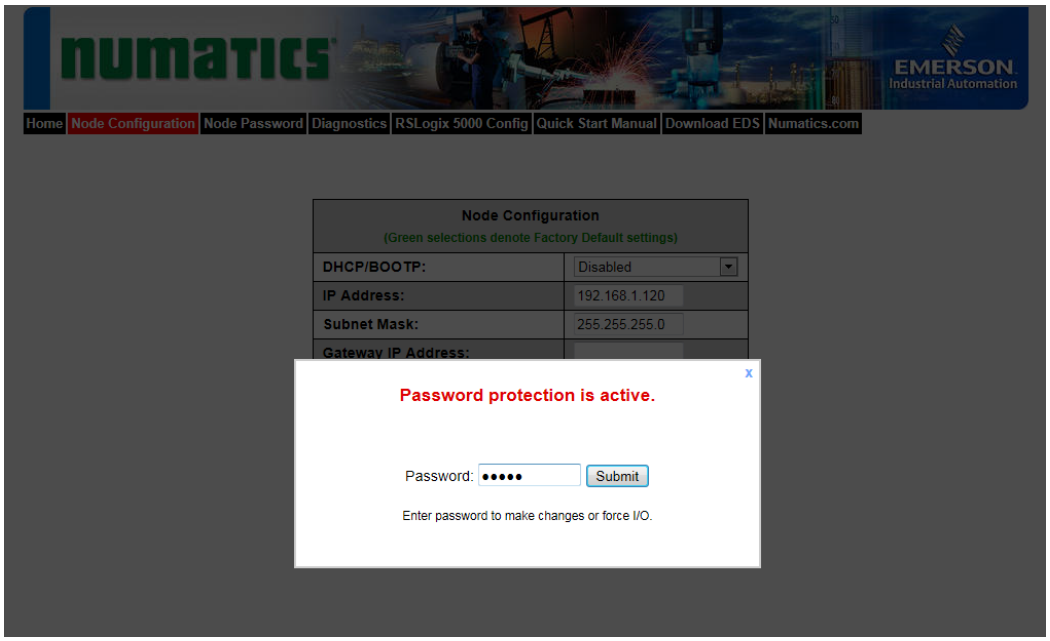


Node Password

The "Node Password" window allows the user to set a password that will prevent unwanted access to the I/O Force and Test feature of the Diagnostic window, and the Node Configuration window. The password comes disabled from the factory. To set the initial password, leave the "Enter Current Password" field blank and type in the password in the "Enter New Password" field.



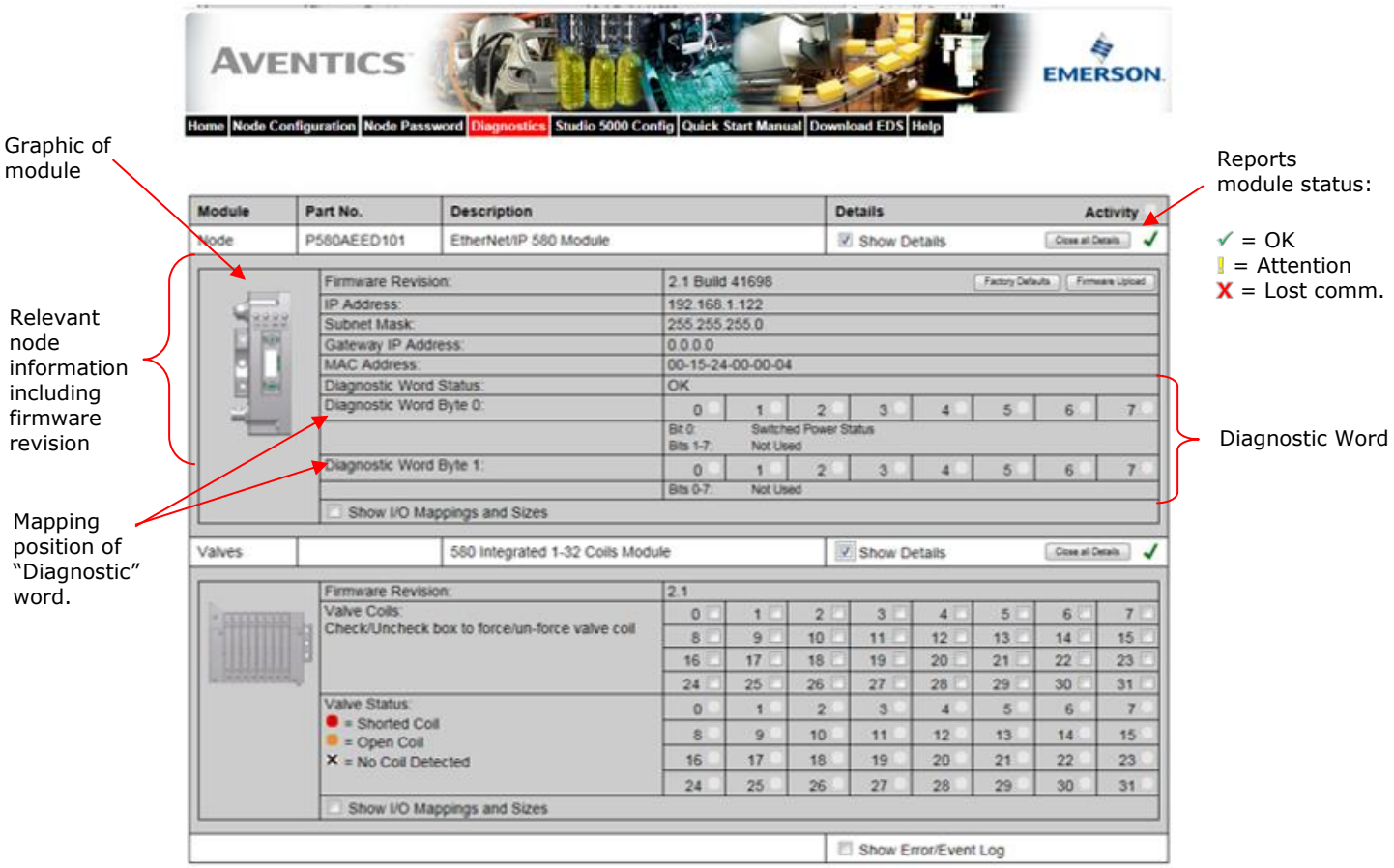
Once a Password has been set, the security check screen will appear when trying to enable outputs on the DIAGNOSTIC window (Valve Outputs), as well as trying to change parameters on the NODE CONFIGURATION window.



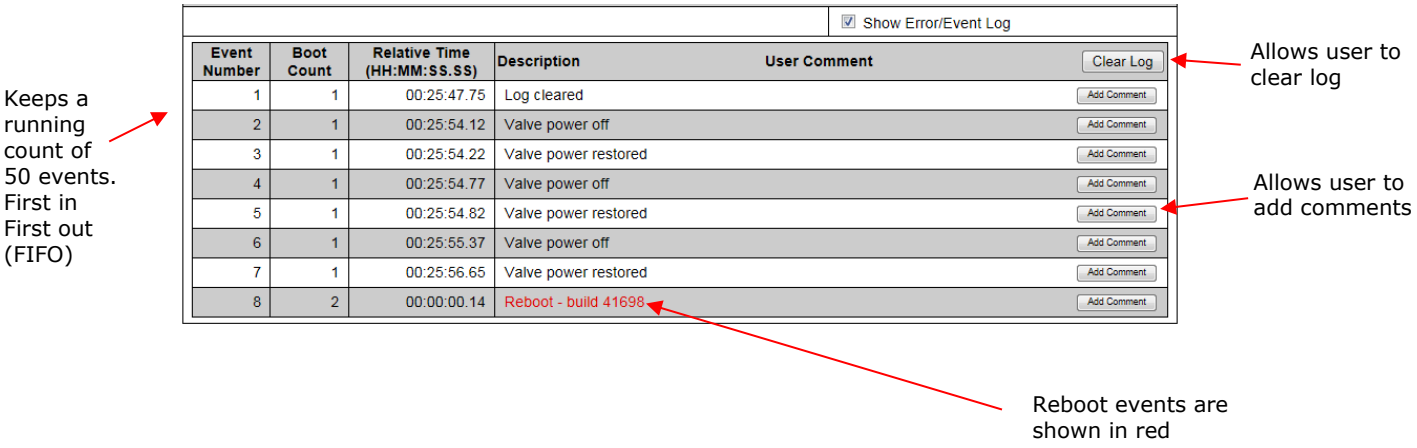
- *If the password has been lost or forgotten, go through the process of changing the password. Enter the last 6 digits of the MAC Address in the current password field and then enter the desired password in the new password field.*

Diagnostics

The "Diagnostics" window allows the user to monitor different values. These values include, "MAC Address", "Serial Number", "Firmware Revision", and "Valve Diagnostic Table". The "Valve Diagnostic Table" enables the user to check the status of the valve side outputs.



Error / Event Log:



Studio 5000 Config.

The “Studio 5000” config. tab provides the necessary information that is needed when adding a module to the configuration in Studio 5000

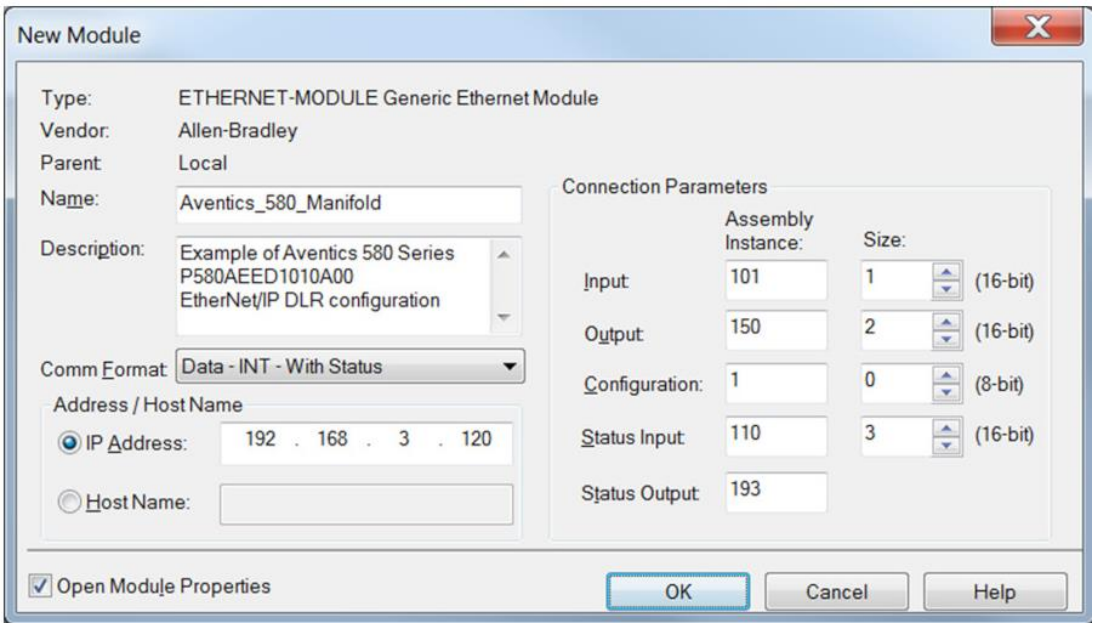
Configuration with Studio 5000

When commissioning your EtherNet/IP network, specific values must be entered into the "Module Properties" window for the nodes. The "Connection Parameters" section requires user supplied data for "Input Size", "Output Size", and "Configuration". The table below details all pertinent information and is also dynamic, thus the "***Size***" data is based on the current/actual configuration of the manifold. It contains the appropriate values for the module's *Connection Parameters* selections.

The sample screenshot is taken from Rockwell Automation's Studio 5000 programming software. It shows where the appropriate values for the IP Address, Assembly Instance, Size, and Configuration must be entered.

Module Properties Based on Actual Configuration

Connection Parameters				
Description	***Assembly Instance Value***	***Comm Format***	***Size***	***Notes***
Input	101 (Decimal)	Data-SINT With Status (8 bit)	1	The ***Size*** values are determined from the number and type of I/O modules that are installed on the manifold (actual physical configuration). These values are shown in the ***Size*** column on the left and are for the specific ***Comm Format*** selected. This is a minimum value. Larger values may be specified but may affect overall network throughput.
		Data-INT With Status (16 bit)	1	
		Data-DINT With Status (32 bit)	1	
Output	150 (Decimal)	Data-SINT With Status (8 bit)	4	
		Data-INT With Status (16 bit)	2	
		Data-DINT With Status (32 bit)	1	
Configuration	1 (Decimal)	ALL	0	
Status Input	110 (Decimal)	Data-SINT With Status (8 bit)	6	
		Data-INT With Status (16 bit)	3	
		Data-DINT With Status (32 bit)	2	
Status Output	193 (Decimal)	ALL	N/A	



Quick Start Manual

The Quick Start Manual tab accesses the embedded Quick Start Manual in the node. This is a condensed version of the complete Technical Manual that can be downloaded from **www.Emerson.com**. It provides the basic information for the user to connect and configure the 580 EtherNet/IP™ DLR Node and Manifold.

Download EDS

The "Download EDS" tab provides a link to download either the embedded EDS file in the node or the EDS file available on the Aventics website.

Aventics.com

The "Aventics.com" tab is a quick link to Aventics website. The computer must have internet access for this tab to be functional.

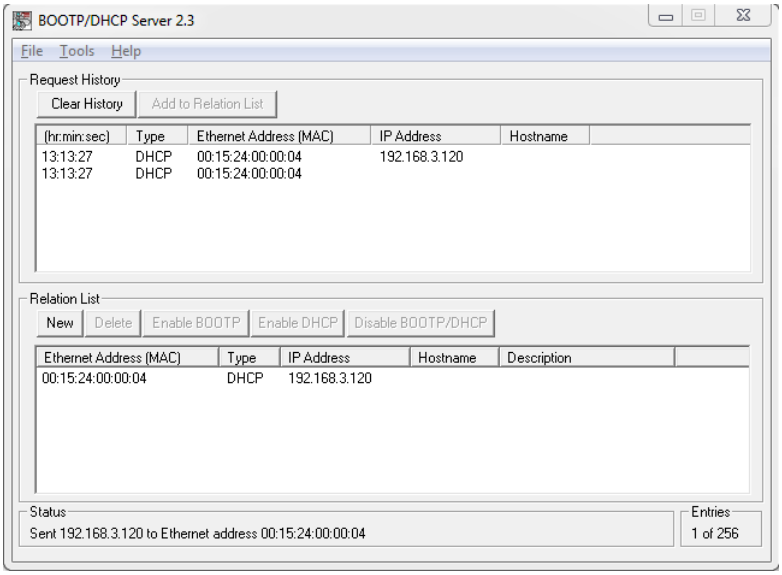
7.4 IP Address Configuration

The IP address of the Aventics G3 EtherNet/IP™ node may be configured via several different methods:

- DHCP/BOOTP
- Integrated Web Page Configuration
- Graphical display

DHCP / BOOTP

The node is shipped from the factory with the DHCP/BOOTP feature enabled. This allows a DHCP server to automatically set the IP address to the node when connected to the network, or a BOOTP server to establish communication to the node and set the IP address. These addressing methods require that the unique MAC ADDRESS of the node is known. The MAC ADDRESS is displayed on the graphical display of the node. It will be different for every node. When DHCP/BOOTP is enabled and a DHCP server is found, the IP address, Subnet mask, and gateway are automatically configured by the DHCP server.



The DHCP/BOOTP setting can be enabled or disabled via the nodes integrated web server or graphical display.

Integrated Web Page Configuration

The Aventics EtherNet/IP™ DLR node has an integrated web server. This server can be accessed via any standard web browser program. With the IP Address, the "Node Configuration" page for the node can be called up and the configuration parameters updated. Please note that the PC, where the web browser is installed, must be correctly configured for operation with the appropriate network IP ranges and Subnet settings that match the EtherNet/IP™ DLR node.

ATTENTION

- *Consult appropriate personnel before changing your computer's network settings and always record previous settings for later reversal before attempting changes.*

Below is a representation of the "Node Configuration" page which is stored in the EtherNet/IP™ DLR node. *IP address, Subnet Mask, and DHCP/BOOTP enabled* selections can all be configured from this page. These parameters will be programmed in the node's non-volatile FLASH memory once "Update Configuration" is clicked, and power to the node is cycled.

Node Configuration (Green selections denote Factory Default settings)	
DHCP:	Disabled
IP Address:	192.168.100.120
Subnet Mask:	255.255.255.0
Gateway IP Address:	
Web Server:	Enabled
Max Coils on Manifold (32 = Standard):	32
COMM Fault / Idle Mode:	Turn OFF All Outputs
Node Configuration Parameters:	Unlocked
Display Orientation:	Normal

Update Configuration

Graphic Display

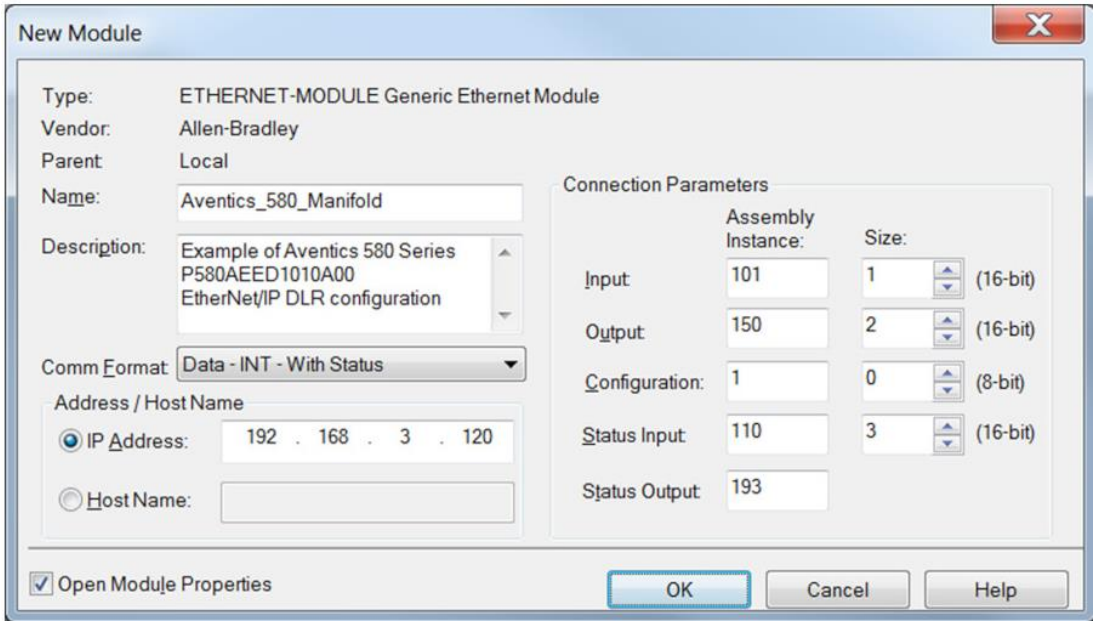
Please see page 32 for graphical display settings

ATTENTION

- *The Ethernet/IP™ DLR node will reset in a few seconds, or the user may cycle power to enable the new configuration.*

7.5 Configuration with Studio 5000

When commissioning your EtherNet/IP™ DLR network, specific values must be entered into the "Connection Parameters" section of the "Assembly Instance" and "Size" column. Below is a sample screenshot taken from Allen Bradley's Studio 5000 programming software. It shows where the appropriate values for the *IP Address, Assembly Instance, Size,* and *Configuration* must be entered.



Module Properties

Connection Parameters

Comm. Format	*Description*	*Assembly Instance*	*Size 32 Coils*	*Size 64 Coils*	*Size 96 Coils*	*Size 128 Coils*
Data – DINT - With Status	Input	101	1	1	1	1
	Output	150	1	2	3	4
	Configuration	1	0	0	0	0
	Status Input	110	2	3	4	5
	Status Output	193	-	-	-	-
Data – INT - With Status	Input	101	1	1	1	1
	Output	150	2	4	6	8
	Configuration	1	0	0	0	0
	Status Input	110	3	5	7	9
	Status Output	193	-	-	-	-
Data – SINT - With Status	Input	101	1	1	1	1
	Output	150	4	8	12	16
	Configuration	1	0	0	0	0
	Status Input	110	6	10	14	18
	Status Output	193	-	-	-	-

7.6 User Configurable Device Parameters

The Aventics 580 EtherNet/IP™ DLR Node allows the user to set many user options which define how the manifold behaves in certain instances. The following are descriptions of these device parameters. All of these configurable parameters can be adjusted using the built-in web server and graphic display

Name	*Description*	*Display*	*Web Server*
IP Address	Node address	√	√
DHCP Boot-P	Enables / Disables DHCP/Boot-P functionality	√	√
Web Server	Web Server Enabled	√	√
Comm. Format	Sets Comm. format of I/O data	√	√
Output Comm Fault Action	Determines whether to use idle value attribute or hold last state	√	√

7.7 Communication Fault/Idle Mode Parameter (Sec 4.8)

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

The user, through the graphic display or software, can determine how the outputs (coils) 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:

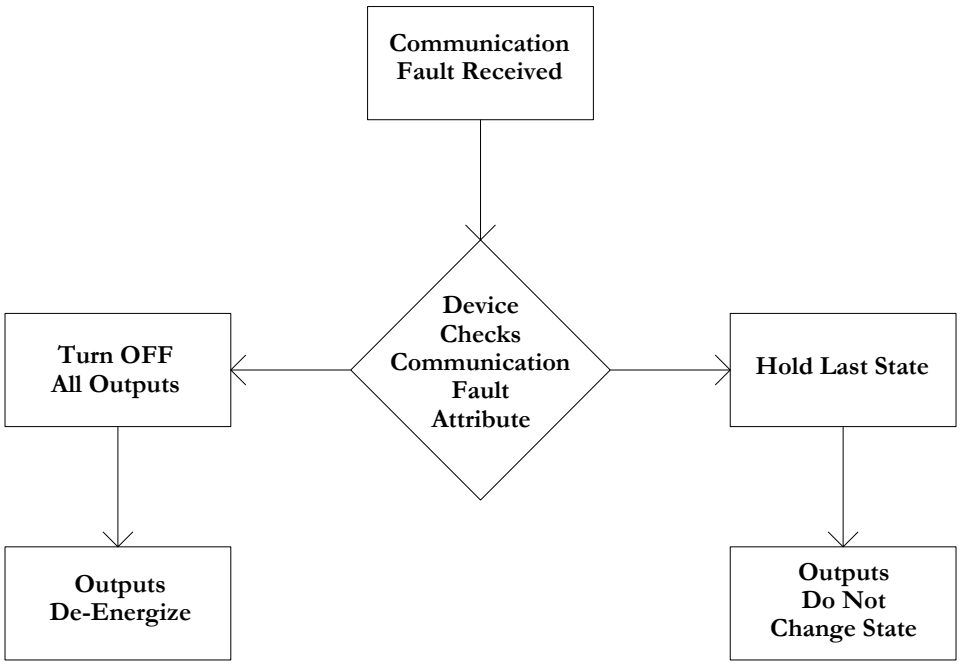
1. Hold Last State of Outputs
2. Turn Off All Outputs

7.8 Communication Fault/Idle Mode Sequence

The Communication Fault/Idle Mode parameter determines the output state/action if the device encounters a communication fault and/or idle condition. 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 (coils) will turn off (Factory Default Setting).
4. If the attribute is set to hold last state, all of the outputs (coils) will hold their last state.



8. EtherNet/IP DLR™ Mapping

8.1 I/O Sizes - Rx/Tx

Outputs (Valves)

Outputs are defined as any valve solenoid coil attached. The valve size is set at (32) bits, 4 bytes of output data and is non-settable.

Inputs (Status)

Inputs are defined as status bits (i.e. status input bits produced by output (valve) drivers, and Diagnostic Word information). Therefore, the input size represents only Status information. Both the Status Inputs and the Diagnostic Word data are non-settable. Please reference the following pages for a detailed mapping.

Total I/O Size

The total I/O size of the 580 DeviceNet Node is fixed: Rx = 6, Tx = 4.

8.2 Bit Mapping Rules

There is not much variation in the bit mapping for a 580 manifold, the only difference 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 can be configured as 32,64,96 or 128 coils
3) Each solenoid coil output has an associated status input bit (refer to the section labeled, "Output Short Circuit Protection".
4) Solenoid coil output addressing begins at the 1st manifold station nearest the node, using the "14" coil 1st and then, if applicable, the "12" coil, and continues in ascending order away from the communication node.
5) Each manifold station allocates 1 or 2 output bits. This is dependent on the Z-Board™ type installed. A single Z-Board™ allocates 1 output bit. A double Z-Board™ allocates 2 output bits.
6) Z-Boards™ can be used in any arrangement (all singles, all doubles, or any combination). Per station selection is limited by valve series; 502 and 503 manifolds are a minimum of two stations, and the 501 is a minimum of four stations.

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™ used with all valves
- Diagnostic Word is present (non-settable)
- 32 coils (4 Bytes) allocated (non-settable)

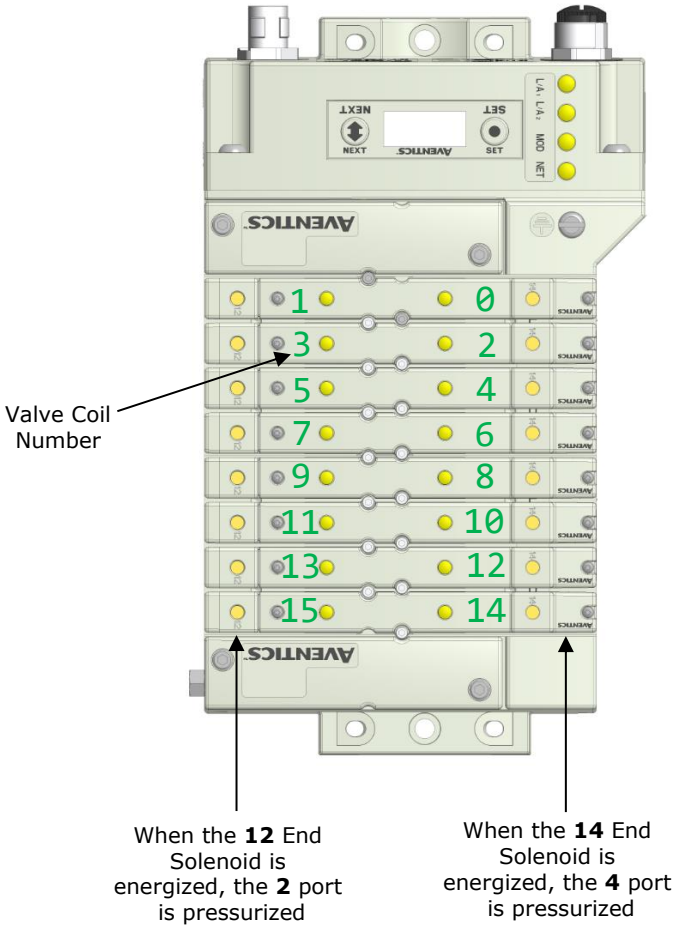
1

Manifold I/O Configuration

Description	In	Out
	Bytes	
Diagnostic Word	2	0
Local Valve Size:	4	4
Total:	6	4

How to Order

Qty	Part Number
1	8501AV8H100VA00
4	R501A2B40MA00F1
1	H501AMM4BMA0010
4	R501A2B40MA00F1
1	H501AMM4BMA0010
1	P580AEED1010A00
	ASSEMBLED



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

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

8.4 Mapping Example No. 2

Assumed Settings

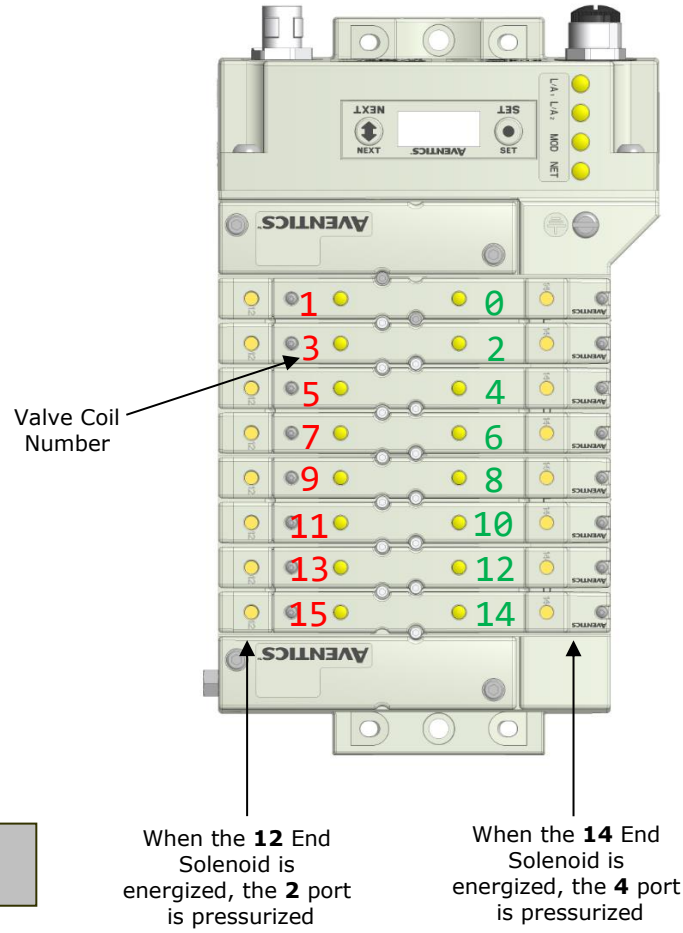
- Double Z-Boards™ used with all valves
- Diagnostic Word is present (non-settable)
- 32 coils (4 Bytes) allocated (non-settable)

Manifold I/O Configuration

Description	*In*	*Out*
	Bytes	
Diagnostic Word	2	0
Local Valve Size:	4	4
Total:	6	4

How to Order

Qty	*Part Number*
1	8501AV8H100VA00
4	R501A2B10MA00F1
1	H501AMM4BMA0010
4	R501A2B10MA00F1
1	H501AMM4BMA0010
1	P580AEED1010A00
	ASSEMBLED



NOTE!

Coils identified in RED are allocated and reserved; refer to mapping table below.

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

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

8.5 Diagnostic Word

Diagnostic Word Format								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Comm. Status)	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Switched Power Status (1=Error)
1 (Reserved)	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Byte 0 (Communication Status)

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

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.
Reverse Polarity	Reverse polarity is protection is provided on both Node and Valve power.
Recommended External Fuse	External fuses should be chosen depending upon manifold configuration. Please refer to power consumption chart on page 3-21 for additional fuse sizing information.
Spike Suppression	Output 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	-10 to 115°F (-23 to 46°C)

9.2 Factory Default Settings

FACTORY DEFAULT SETTINGS	
Description	*Default*
IP Address	192.168.3.120
Sub Net Mask	255.255.255.0
Gateway Address	0.0.0.0
Communication Fault	Reset to All Off
Flip Display	Normal
Parameters	Unlocked

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.
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 M12 Power connector of the 580 Node.

9.4 Glossary of Terms

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

Term	Description
Assembly parameter	A Aventics' term describing a user definable parameter that allows user to allocate the number of valve output drivers. A 0, 8, 16, 24, 32 option is available and is helpful if there are I/O memory constraints in the PLC.
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).
Comm. Fault	One or more of the I/O connections have timed out.
Cyclic	I/O message type in which data production is triggered by the expiration of the transmission timer.
EDS file	Electronic Data Sheet. A text file, which contains specific product information, definitions of product capabilities and configurable parameters necessary for operation on an EtherNet network.
Ground	This term is used to indicate an earth ground.
Idle	A zero (0) length poll message (i.e.: scanner in program mode).
MAC ID	Media Access Connection Identification (00-63) – Node (network drop) address.
NEMA	National Electrical Manufacturers Association.
ODVA	Open DeviceNet Vendor Association (www.odva.org)
RS NetWorx	Rockwell Automation's configuration software.
Rx/Tx	Rx = Consumed byte size; analogous to Input byte size. Tx = Produced byte size; analogous to Output byte size.
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive
SCP	Short Circuit Protection
Sourcing (PNP)	Method of connecting electrical circuits in which the positive side is switched and the common is zero (0) volts DC.
Status Input bit	A bit in the input table that reports the health of a corresponding output. Indicates short circuit or open coil (load) diagnostics
Word	2 Bytes (16 bits)
Z-Board™	Circuit board installed in the valve sub-base which electrically connects the valve solenoid to the electronic 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. products and support issues can be found on the Aventics. WEB site at www.Emerson.com