

AVENTICS™

580 EtherCAT™ *Technical Manual*

EtherCAT®



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.

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 regard 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 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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1. About EtherCAT™

EtherCAT™ is a registered trademark and patented technology, licensed by Beckhoff Automation (GmbH, Germany).

1.1 Overview

EtherCAT™ is an Ethernet-based networking solution for automation but has added benefits/features toward manufacturing applications.

The EtherCAT™ Technology Group or ETG develops and promotes EtherCAT™ technology.

G3 EtherCAT™ uses industrial M12 IP67-rated connectors. The protocol transfers data at a fixed speed of 100 Mbps. The maximum network cabling distance is limited to 100m segments at 20° C.

More information about EtherCAT™ can be obtained at the web site <http://www.EtherCAT.org>.

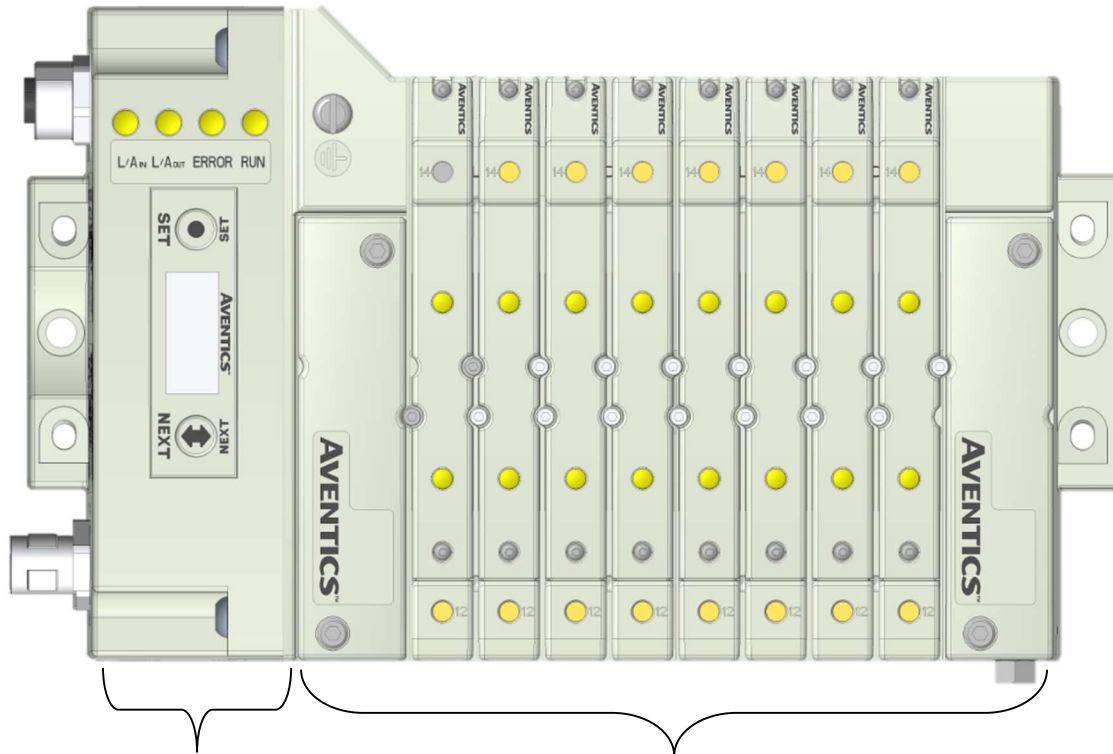
1.2 580 EtherCAT™ Node Features

<i>Features</i>	<i>Description</i>
Spec. Supported	Designed by the EtherCAT™ Technology Group (ETG)
Bus Topology	Star, Tree, Ring or Daisy Chain
Baud Rates Supported	100 Mbps
Duplicate Address Detection	If a duplicate address is detected on power up, duplicates will not progress to run mode
Address Setting options	Web Page Configuration, Graphical Display
Conformance Tested	ETG proof of conformity

2. 580 EtherCAT™ Introduction

The 580 EtherCAT™ Node is an electronic interface that features an integrated graphic display for simple commissioning and displaying of diagnostic information. The 580 EtherCAT™ node connects to Aventics 501, 502, and 503 series valves. The Node is capable of addressing a total of (128) coil outputs. With proper assembly and termination, the 580 EtherCAT™ Node has an IP65 rating.

This manual details specific information for configuring and commissioning the Aventics 580 EtherCAT™ Node. For more information relating to pneumatic valves and valve manifold assemblies, please refer to www.emerson.com.

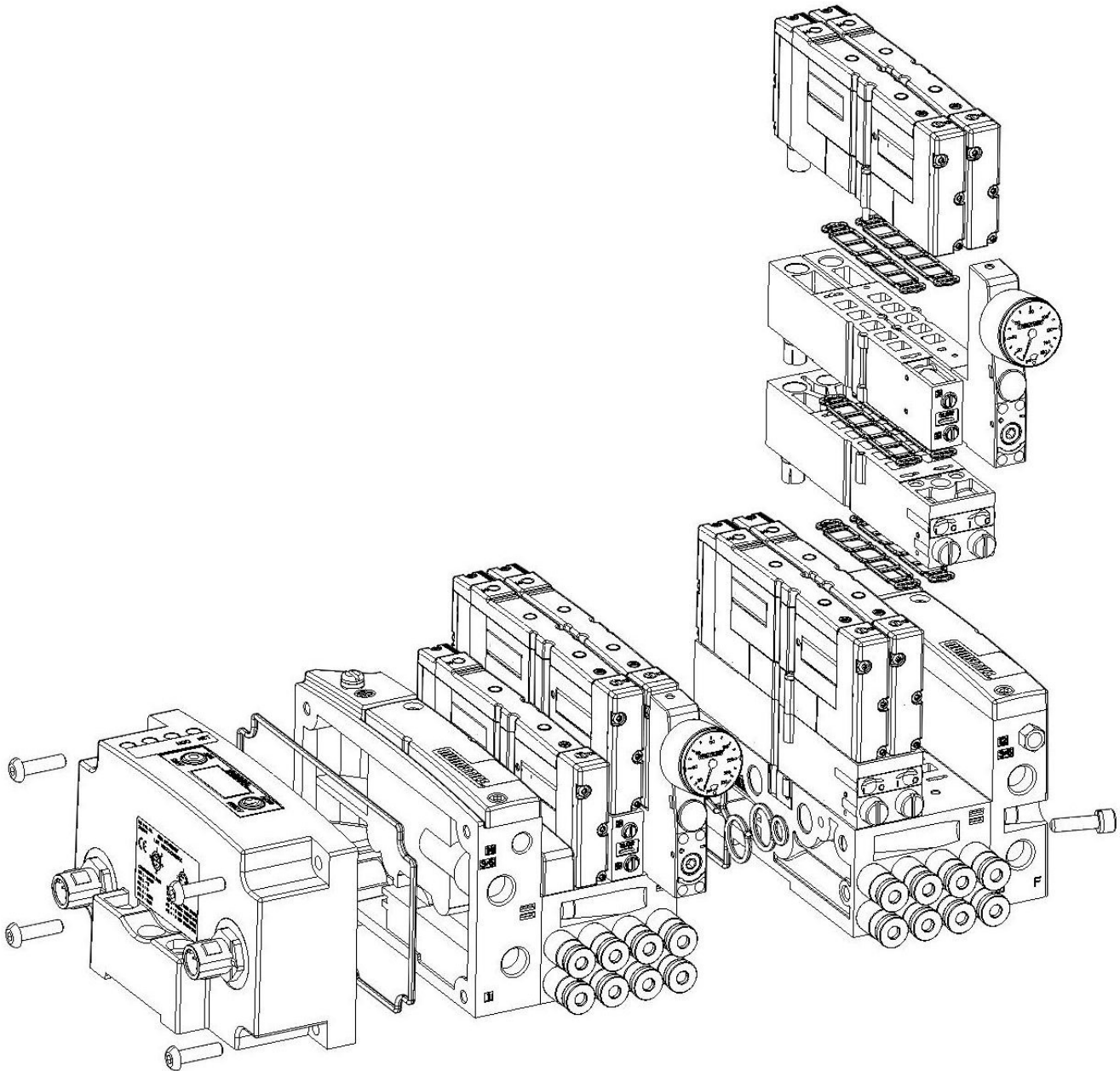


580 EtherCAT™ Node

Valve Side
Drives up to 128 coils

2.1 Pneumatic Valve Manifold – 501 Series shown

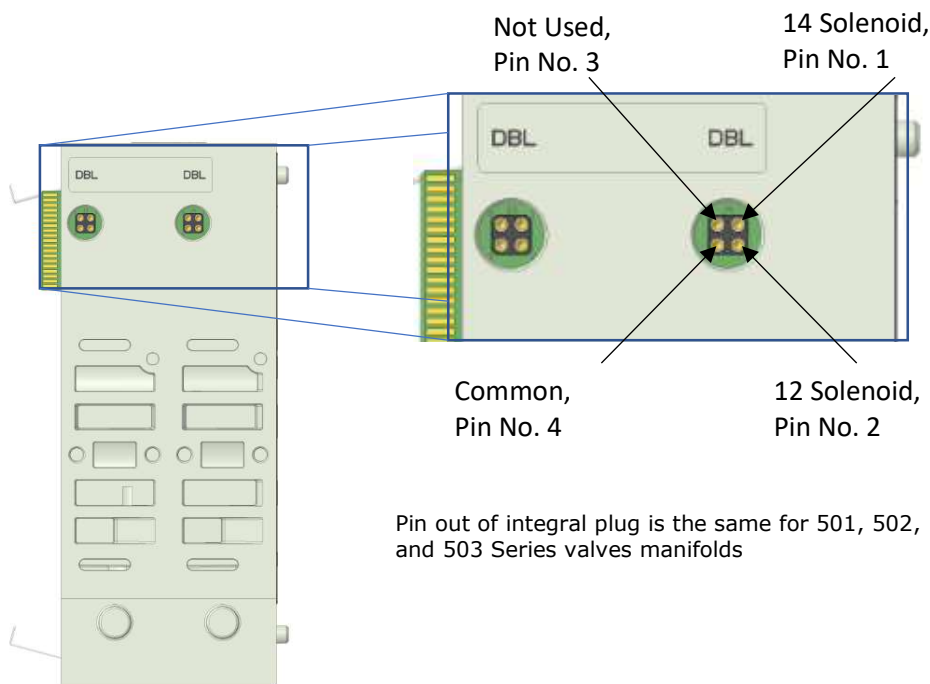
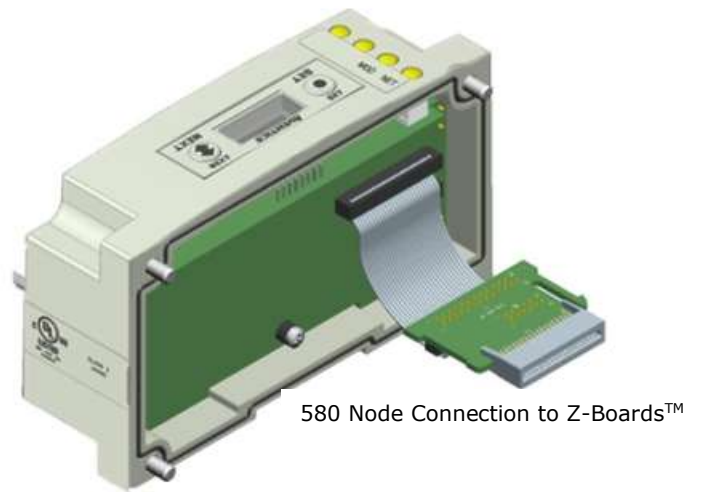
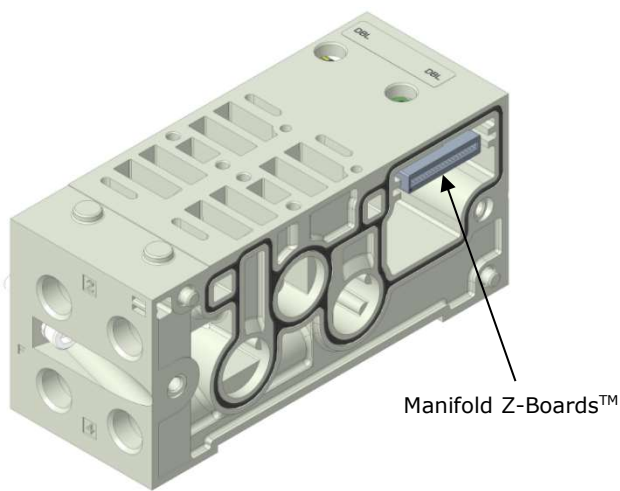
The pneumatic valve manifold with internal circuit board technology is modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards, which allow internal connection from solenoid coils to output drivers without the use of wires). This allows easy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



2.2 Manifold Connectors

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

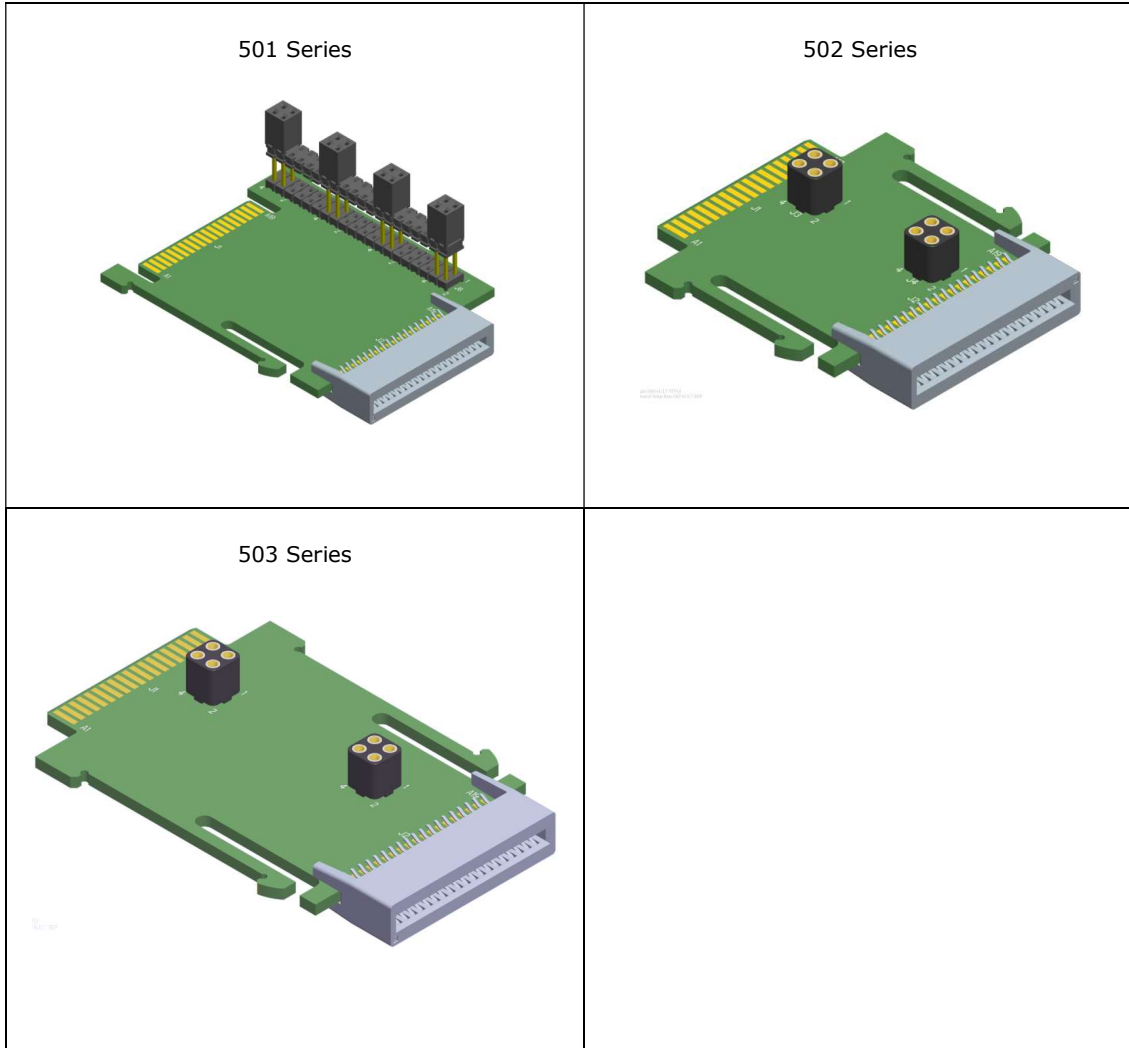
Z-Board™ plug together technology connects all valve solenoids to the valve coil output drivers, located in the 580 Node. There is a maximum of 128 coil outputs available on the complete manifold assemblies. The 128 available outputs are accessed on the 501 series valves utilizing 3 and 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.



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.

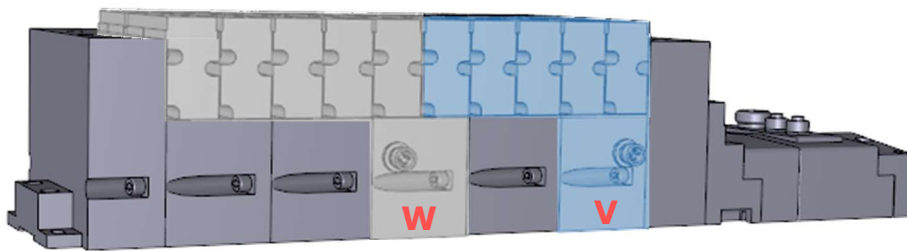


Each series Z-Board™ can be selected in either SINGLE or DOUBLE output (coil) versions. The SINGLE and DOUBLE output function cannot be mixed on the Z-Boards™

3. Zoned Power

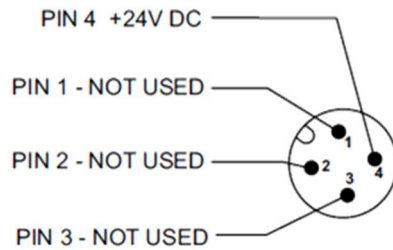
3.1 503 Series Zoned Power application

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



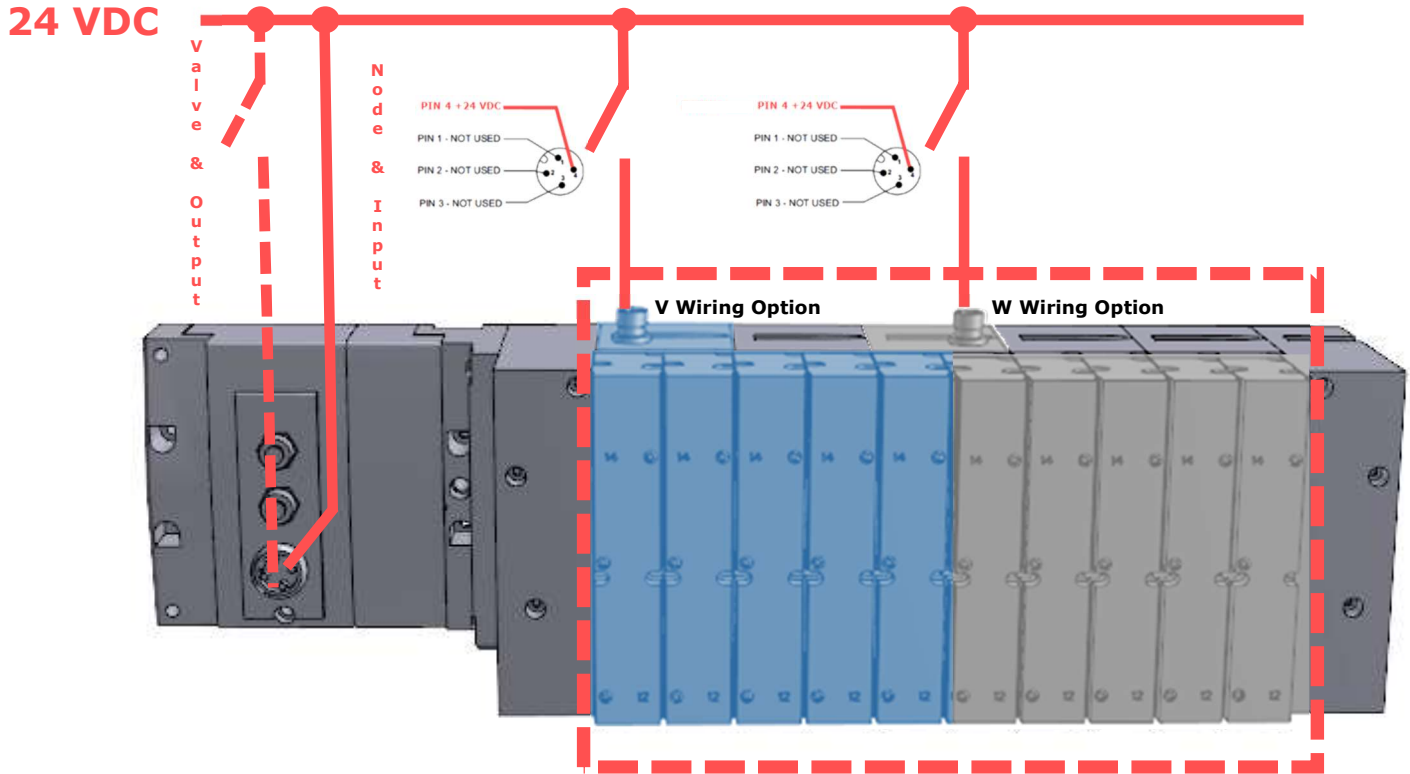
W Wiring Option

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



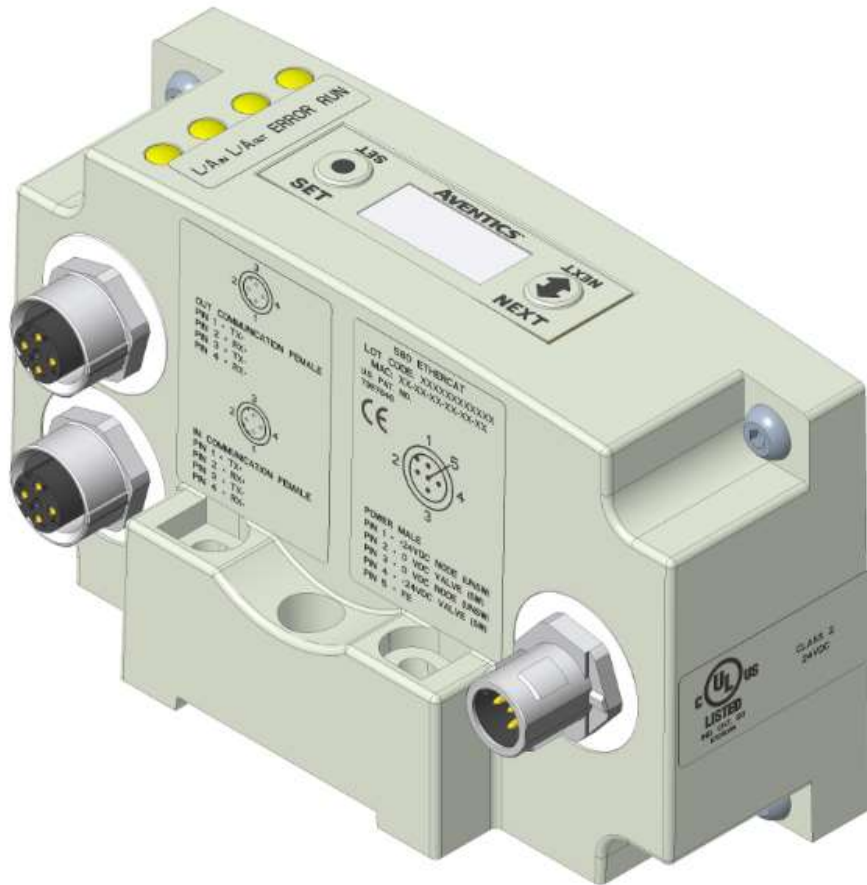
The 0 VDC reference for the +24 VDC applied to Pin 4 of the M12 connector **MUST** be the same as the one used on G3/580/Terminal Strip/25 or 37 Pin Sub-D/19 or 26 Pin Round Connector. If multiple 24 VDC power supplies are used the 0 VDC references of each supply **MUST** be common.

4. Communication Module

4.1 580 EtherCAT™ Node

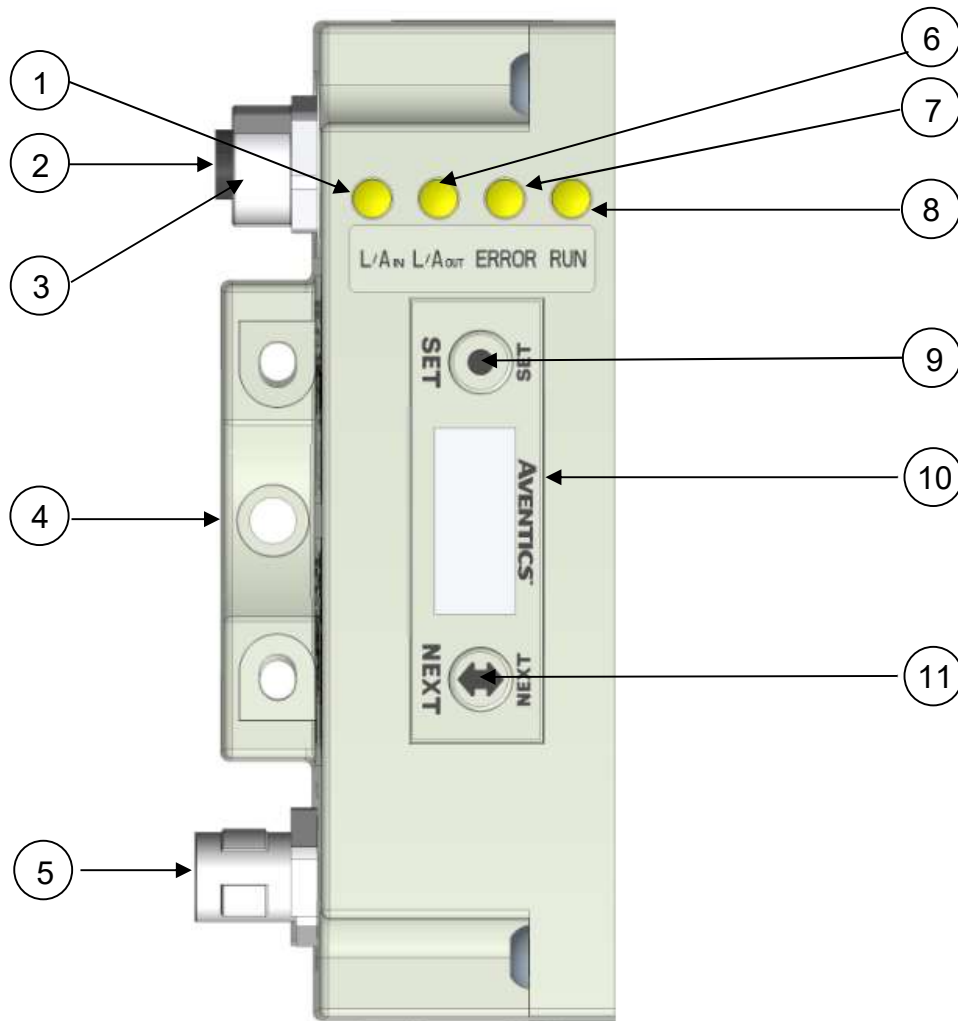
This module is the communication interface to the manifold. It contains communication electronics and internal short circuit protection for power. It can be configured via the graphic display or via the integrated webpage.

Communication Interface	Part Number
580 EtherCAT™ Node	P580AEEC1010A00
580 EtherCAT™ Node w/DIN Rail	P580AEEC1010DRM



4.2 580 EtherCAT™ 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	System Fault LED
8	Bus Fault 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

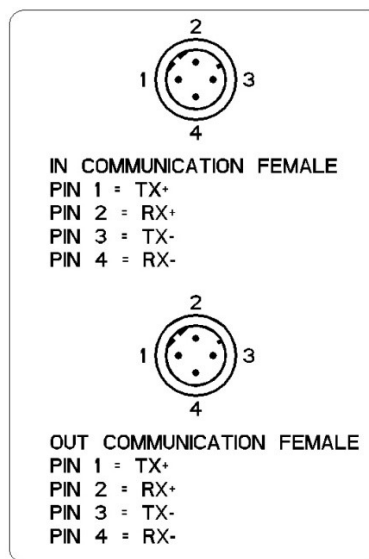
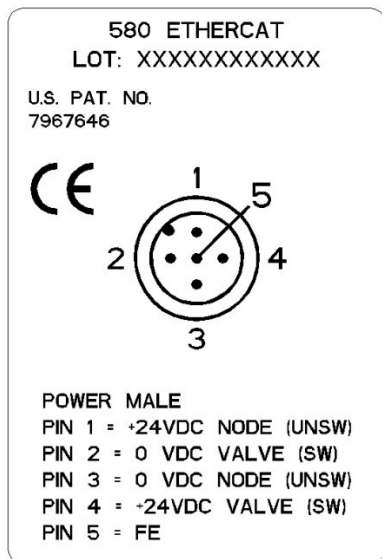
Industry standard M12 connectors are used for communication and power.
 The EtherCAT™ Communication connector is a D-Code 4 pin Female M12 connector.
 The Power connector is a M12 5 pin male connector.

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	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

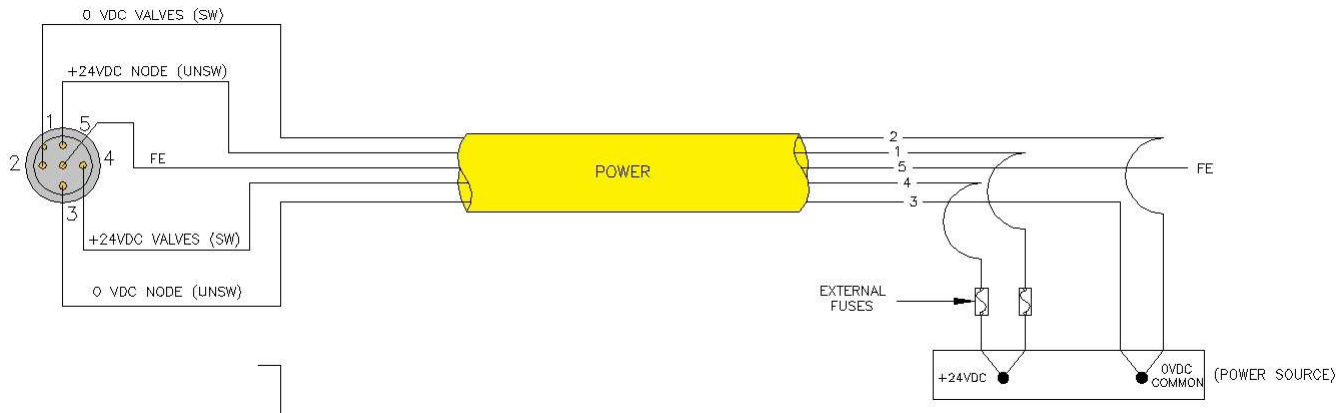


- Power common (0 VDC) pins 3 and 4 are isolated from each other to allow separate (isolated) power supply connection if required. However, they can be tied together if a single common, non-isolated, application is preferred.
- The draw of the +24VDC Valves and +24VDC Node pins must not exceed 4 Amps.
- 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

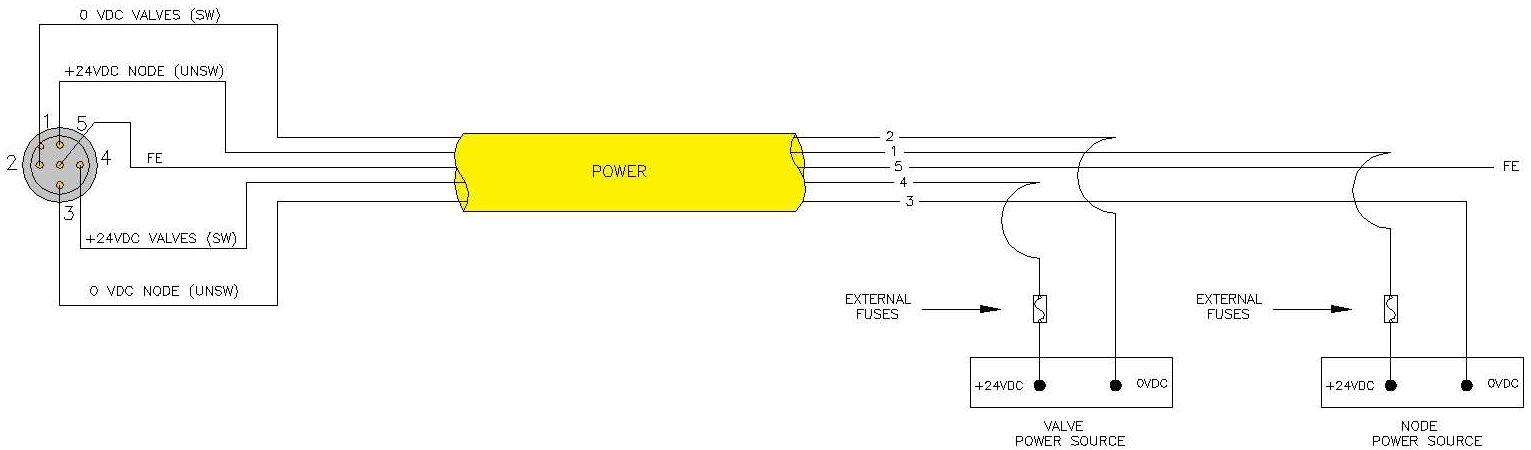
4.4 Electrical Connections

Standard Power Connector Wiring Diagram Examples

Single Power Supply Example (Non-isolated commons)



Separate Power Supply Example (Isolated commons)

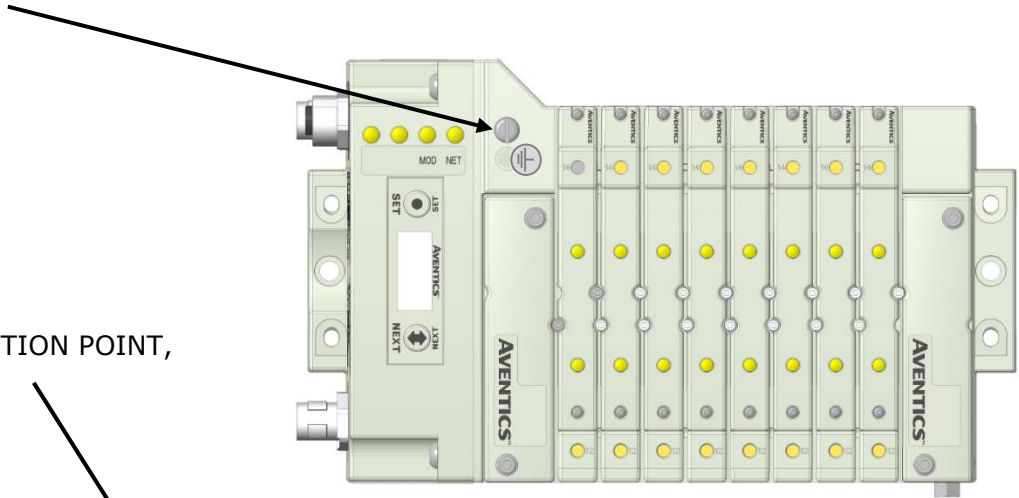


- Please see page 4-19 for external fuse sizing guide.
- When using molded connector power cables, **Do Not** rely on wire colors for Pin-Out. **Always use pin number references.**
- To be connected to a Class 2 power source only
- Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 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.

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



- 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 4 Amps. 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%	0.05 Amps	1.0 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 Amps	1.7 Watts	NA	NA
580 EtherCAT™ Node	24 VDC	+/- 10%	NA	NA	0.11 Amps	2.64 Watts



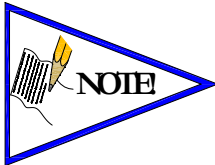
- Do not exceed 4 Amps of current through the M12 Power connector.

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

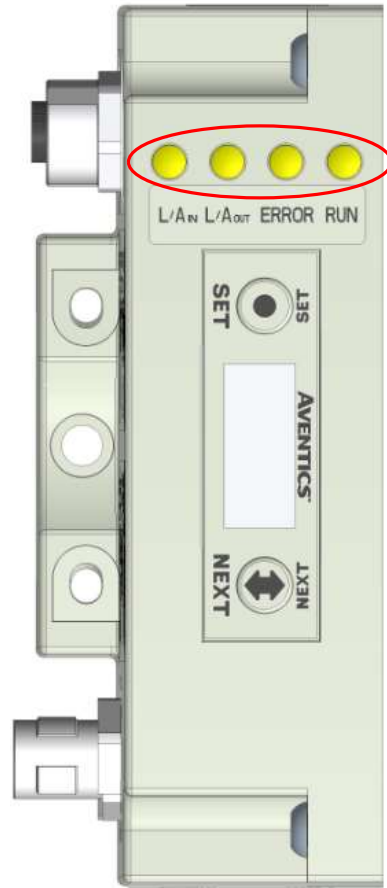
<i>Power Consumption - Power Connector Pin for VALVES</i>		
<u>Description</u>		<u>Current</u>
Number of Solenoid Valve Coils Energized Simultaneously		
___ X 0.03 A (501 Series)	=	_____ Amps
___ X 0.05 A (502 Series)	=	_____ Amps
___ X 0.07 A (503 Series)	=	_____ Amps
	Total:	_____ Amps
	Surge Compensation:	X 1.25
Suggested External +24 VDC (Valves) Fuse Value:		_____ Amps
<i>Power Consumption - Power Connector Pin for NODE</i>		
<u>Description</u>		<u>Current</u>
Communication Node Power Consumption	=	0.110 Amps
	Surge Compensation:	X 1.25
Suggested External Pin +24 VDC (Node) Fuse Value:	=	0.1375 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. See page 4-15 for reference.
- Reverse polarity protection is provided.

4.8 Diagnostics – 580 EtherCAT™ Node LED Functions

Upon power up, the Module and Network Status LEDs indicate the state of the unit. The LEDs functions are described in the table below.



LED Name	Color	Status	Description
RUN	Off	OFF	No power applied to +24V _{NODE/IN.}
	Green	ON	EtherCAT™ connected in "Operational Status"
		FLASHING	Active connection lost
	Red	ON	NA
ERROR	Off	OFF	No EtherCAT™ connection established
	Green	ON	The module has established a connection
		FLASHING	EtherCAT™ connected in "Operational Status"
	Red	ON	NA
L/A _{OUT}		FLASHING	NA
	Off	OFF	No EtherCAT™ connection established
	Green	ON	The module has established a connection
		FLASHING	EtherCAT™ connected in "Operational Status"
L/A _{IN}	Off	OFF	No EtherCAT™ connection established
	Green	ON	The module has established a connection
		FLASHING	EtherCAT™ connected in "Operational Status"

4.9 Output / Short Circuit Protection Diagnostic Status Bits

Diagnostic Status Bit Action

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

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:		
<u>Module</u>	<u>Part Number</u>	<u>Firmware</u>
Communication Module	P580AEEC1010A00	Rev 1.1 Build 42963
Communication Module	P580AEEC1010DRM	Rev 1.1 Build 42963

Module firmware revision levels can be confirmed in the integrated graphic display. See pg. 6-38 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 6-30.

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

5.2 Extended Coil Valve driver IO Mapping

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

<i>Input Mapping</i>								
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

<i>Output Mapping</i>								
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

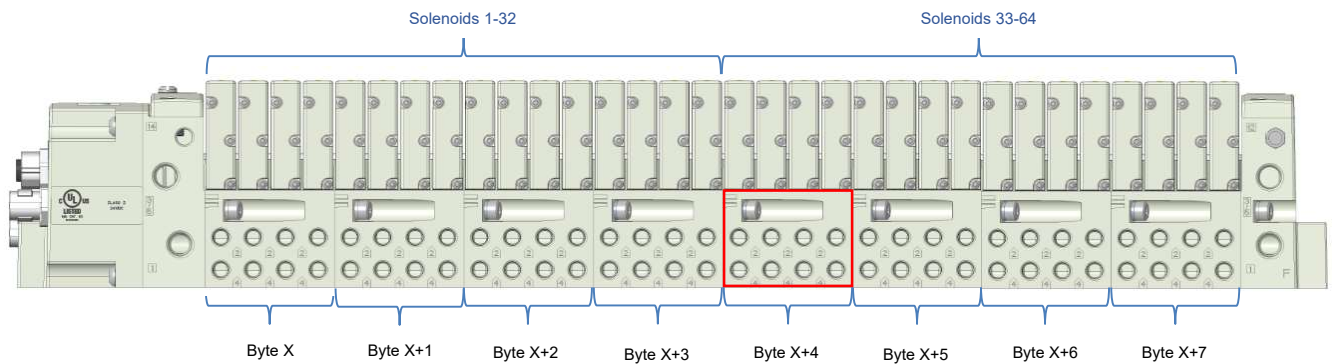
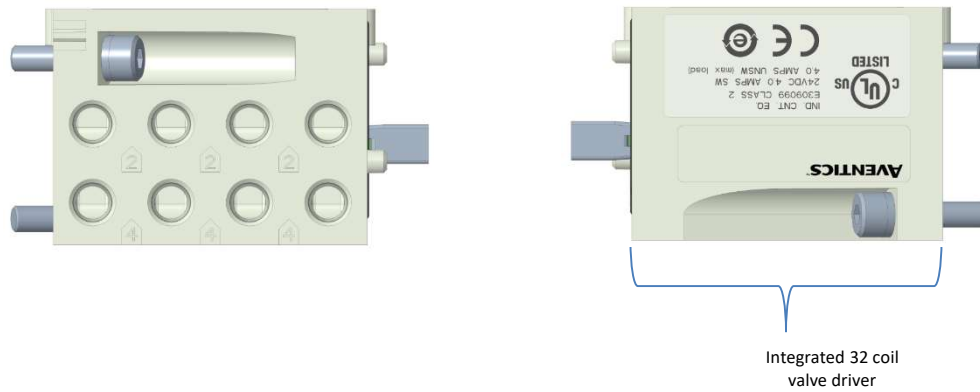
<i>Input Mapping</i>								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status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

<i>Output Mapping</i>								
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

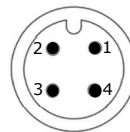
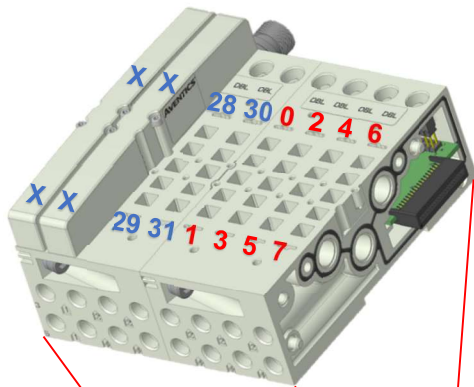
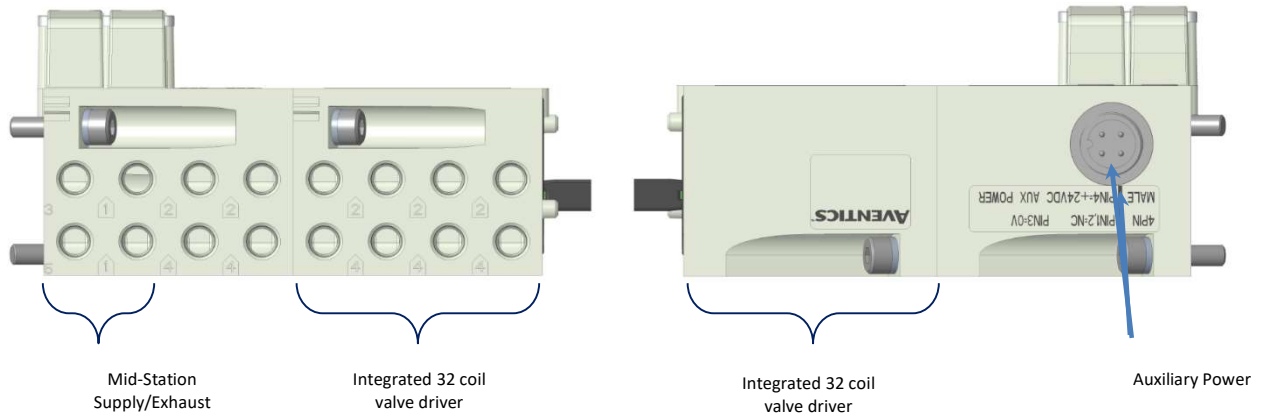
- To be used with 501 series valves on valve manifold assemblies with 33-64 coils.
- Only to be used on assemblies where additional power, supply and/or exhaust capacity is not required



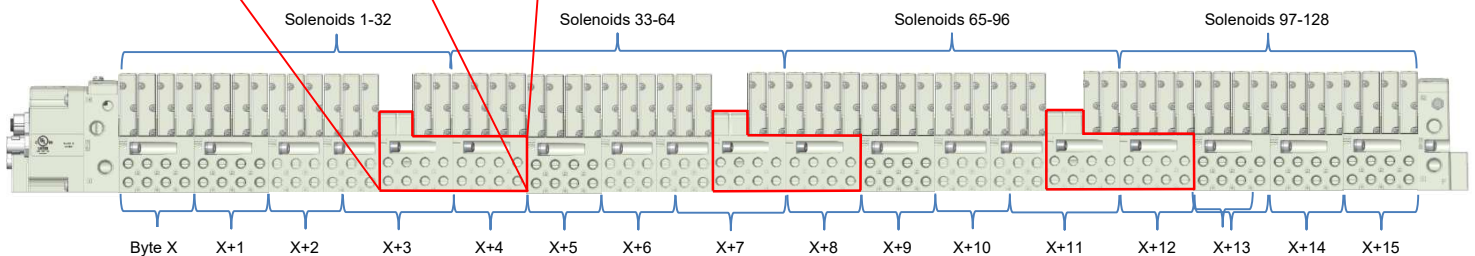
5.4 501 Series, up to 128 solenoid coils

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 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.



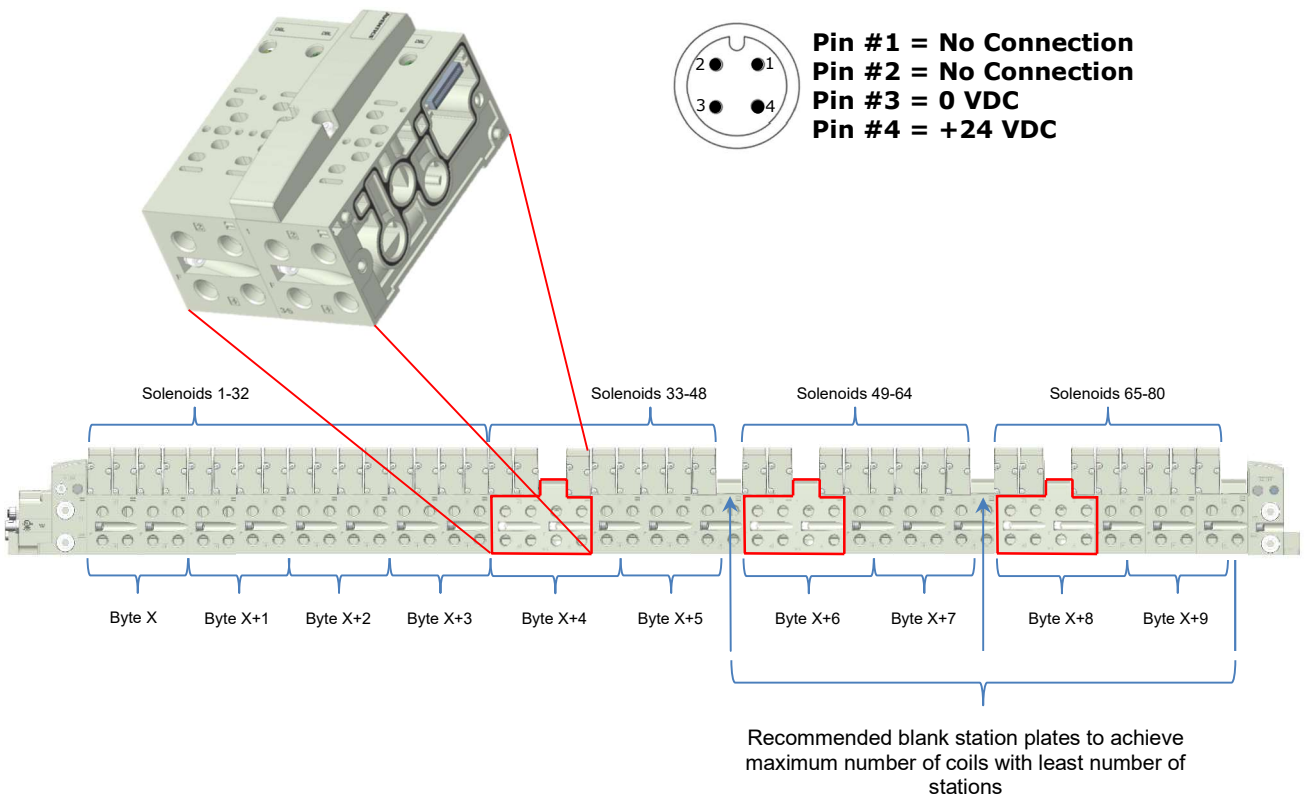
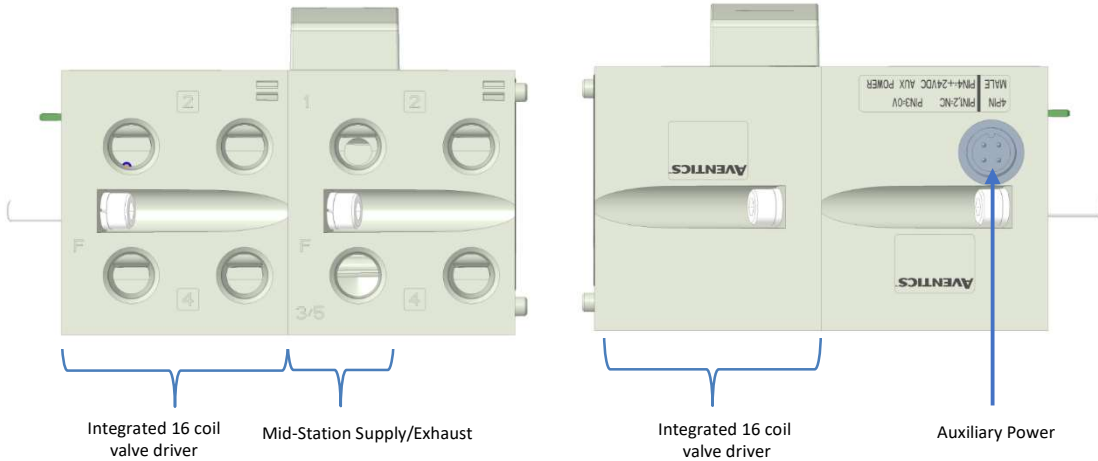
Pin #1 = No Connection
Pin #2 = No Connection
Pin #3 = 0 VDC
Pin #4 = +24 VDC



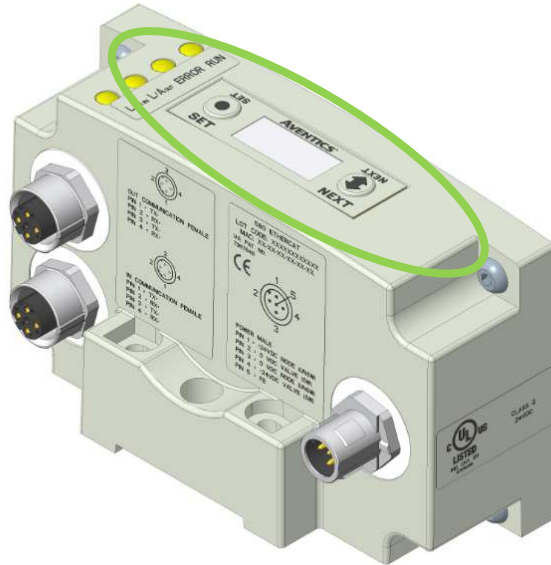
5.5 502 and 503 Series, up to 80 coils

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.

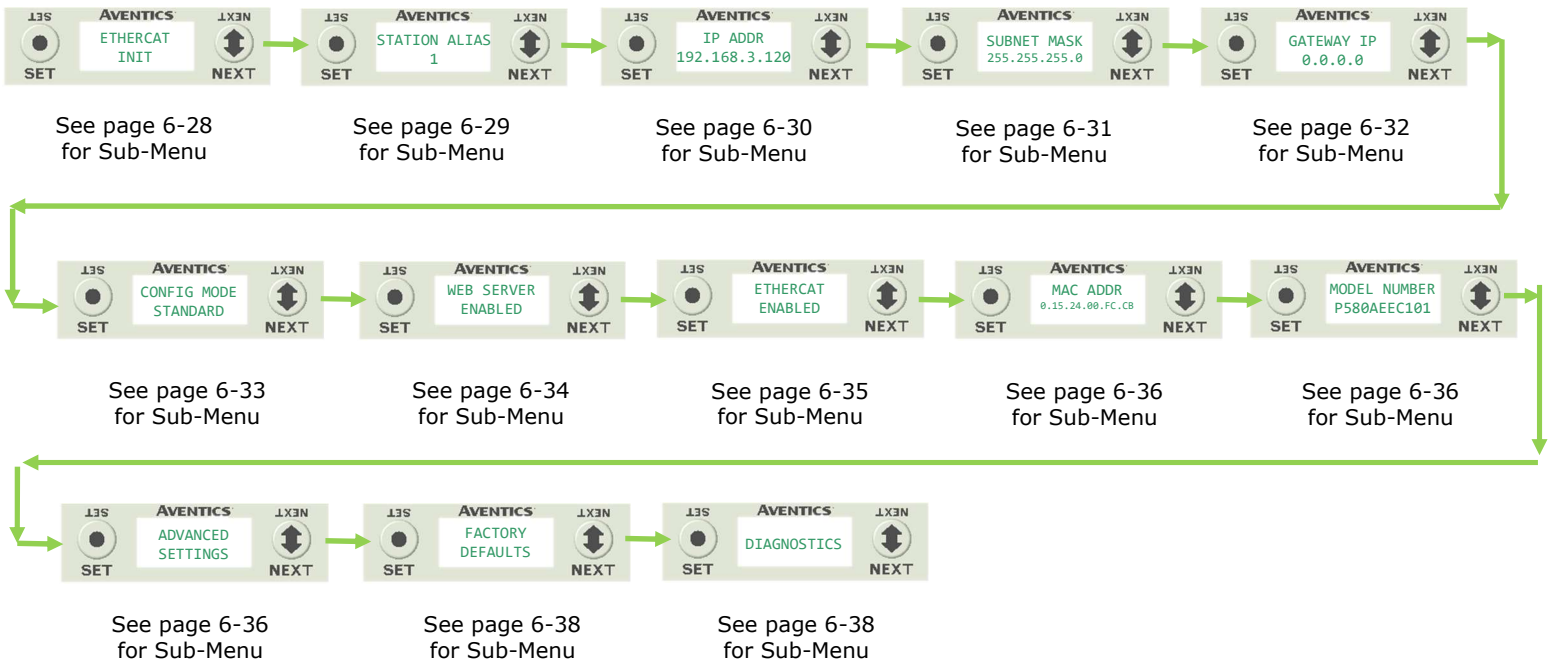


6. 580 EtherCAT™ Node Graphic Display

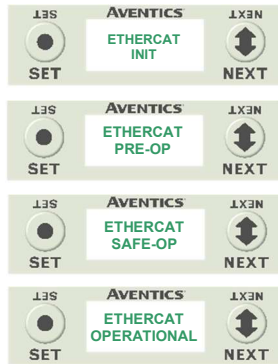


The following graphic displays represent the main menu selections of the 580 EtherCAT™ communication (node). Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below 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



6.1 EtherCAT™ Operational Status



EtherCAT™ Status (Display Only)

1. The EtherCAT™ operational status display is fixed and identifies the various states of the EtherCAT™ state machine.

For more information refer to:

EtherCAT.org – ETG.2200 EtherCAT™ Slave Implementation Guide V2.0.0

6.2 Station Alias Sub-Menu

Steps to Set Station Alias



1. Press the **SET** button to enter the "Station Alias" sub-menu.



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



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



4. Press the **NEXT** button to select either **YES** or **NO** to accept the address shown on the display.
 a. Selecting **NO** will bring you back to the main Address menu.
 b. Selecting **YES** will take you to the following **SAVE SETTINGS** menu.

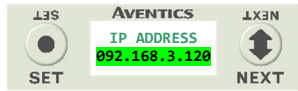
Press the **SET** button to confirm your choice.



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

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

6.3 IP Address Sub-Menu



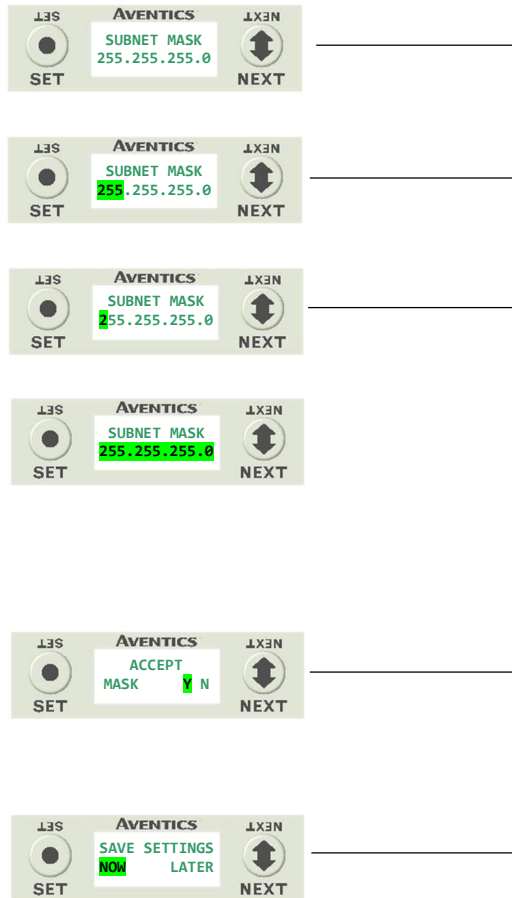
Steps to Set IP Address

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 **Yes** or **No** to accept the IP Address shown on the display.
 - a. Selecting **No** will bring you back to the main Address menu.
 - b. Selecting **Yes** will take you to the following *SAVE SETTINGS* menu
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.

6.4 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

Press the **SET** button to input the value shown on the display,
 4. Press the **NEXT** button to select **Yes** or **No** to accept the Subnet Mask shown on the display.
 - a. Selecting **No** will bring you back to the main Subnet Mask menu.
 - b. Selecting **Yes** will take you to the following *SAVE SETTINGS* menu
 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



- *Factory default subnet mask is 255.255.255.0*

6.5 Gateway IP Sub-Menu

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.

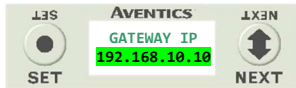


3. Press the **SET** button to scroll through the hundred, tens and ones digits of the octet.

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 past the fourth octet to accept the entire Gateway IP



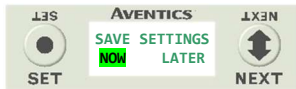
4. Press the **SET** button to input the value shown on the display,



5. Press the **NEXT** button to select **Yes** or **No** to accept the Gateway IP shown on the display.

Selecting **No** will bring you back to the main Gateway IP menu.

Selecting **Yes** will take you to the following SAVE SETTINGS menu



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

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.



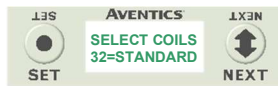
- *Factory default Gateway IP address is 0.0.0.0*

6.6 Config Mode (Extended Coil Capability Settings)

Steps to Set Coil Configuration



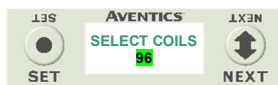
1. Press the **SET** button to enter the CONFIG MODE sub-menu.



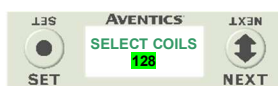
2. Press the **SET** button and the **NEXT** button to change the number of coils.



- 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 **Yes** or **No** to accept the setting
 - a. Selecting **No** will bring you back to the main CONFIG MODE menu.
 - b. Selecting **Yes** will take you to the following SAVE SETTINGS menu.



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



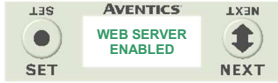
Saved Setting Steps

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



6.7 Web Server Sub-Menu

Web Server Steps



1. Press the **SET** button to enter 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



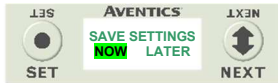
3. Press the **NEXT** button to select **Yes** or **No** to accept the selection.



- a. Selecting **No** will bring you back to the main menu
- b. Selecting **Yes** will take 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 temporary memory, you must accept the 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*

6.8 EtherCAT™ Sub-Menu

Disable EtherCAT™ Steps



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



2. Press the **NEXT** button to scroll to 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



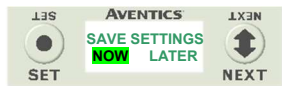
3. Press the **NEXT** button to select **Yes** or **No** to accept the selection.

- 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

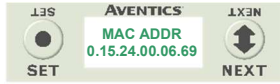


4. Press the **NEXT** button to select either NOW or LATER.

- 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 temporary memory, you must accept the changes before your next power cycle otherwise they will be lost.

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

6.9 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

6.10 Model Number Sub-Menu



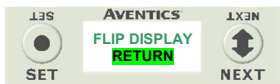
Model Number

1. The Model Number is for reference only.

6.11 Advanced Settings – Flip Display



Flip Display Settings

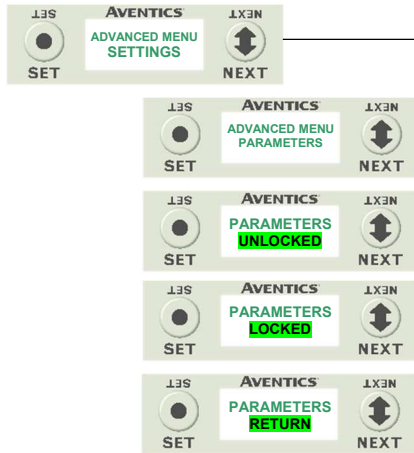


1. Press the **SET** button to enter the *ADVANCED SETTINGS* menu.
2. Press the **NEXT** button to scroll to the *ADVANCED MENU / FLIP DISPLAY*. Press the **SET** button to enter the *ADVANCED MENU / FLIP DISPLAY*.
3. Press the **NEXT** button to scroll through the choices for flipping the LCD display 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.

6.12 Advanced Settings - Parameters

Parameters Lock Steps



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

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

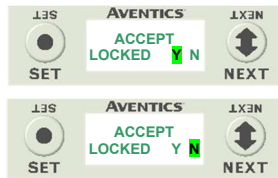
Press the **SET** button to enter the *ADVANCED MENU / PARAMETERS* sub-menu.

3. Press the **NEXT** button to scroll through the choices to enable or disable the feature.
- UNLOCKED*
 - LOCKED*
 - RETURN* (this will return you to the *ADVANCED 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.

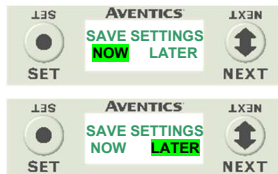
Please note that all parameters are read only, regardless of this setting, when an IO connection between the communication module and the controller (PLC) is present.



4. Press the **NEXT** button to select **Yes** or **No** to accept the selection.
- Selecting **No** will bring you back to the main menu
 - Selecting **Yes** will take you to the following apply changes menu.

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

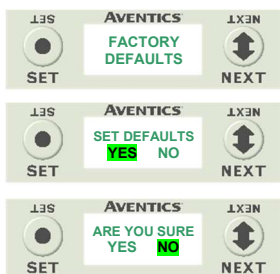
Apply Changes Steps:



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

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

6.13 Factory Defaults

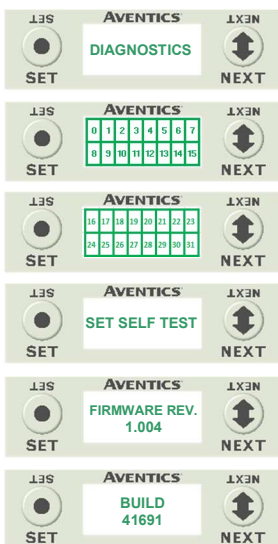


Factory Default Settings

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.

6.14 Diagnostics



Diagnostics

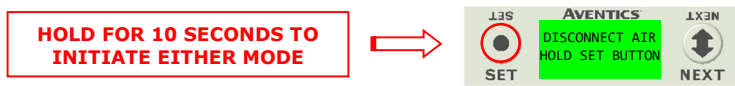
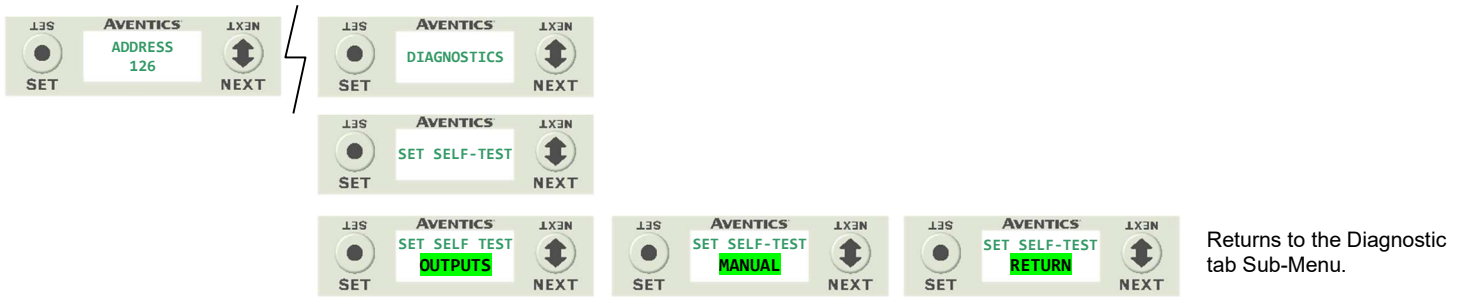
1. All diagnostic information is read only
2. Press the **SET** button to enter *DIAGNOSTICS* sub-menu.
3. Press the **NEXT** button to scroll through the main diagnostic menu choices.
 - a. **OUTPUT INDICATION**
-Displays the coils actuated. Press NEXT to view the second word of data.
 - b. **SET SELF TEST**
- Please see following page for description
 - c. **FIRMWARE REV.**
- For service personnel
 - d. **BUILD**
- For service personnel

6.15 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) 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 connected outputs will cycle every 0.5 seconds.



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.

Push to Energize flashing coil output



Push again to De-energize



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.



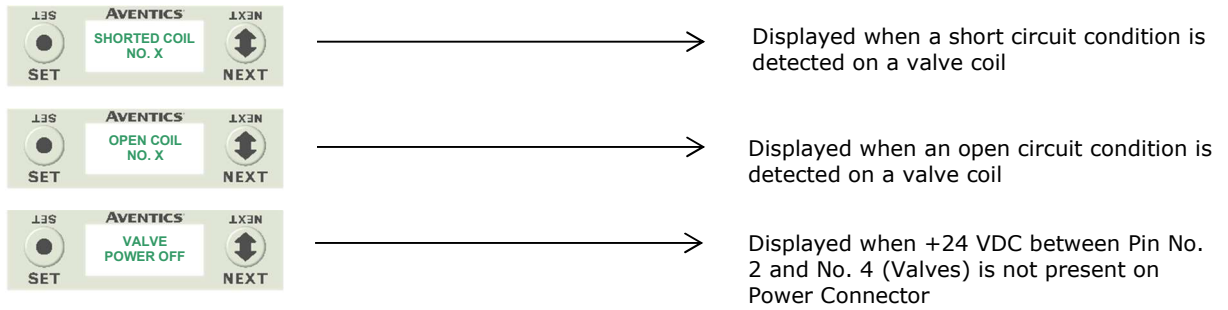
The user can advance quickly through the available coils by pressing and holding the NEXT button for at least 3 seconds.



A Power Cycle is required to Deactivate SELF TEST MODE

6.16 Error Messages

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

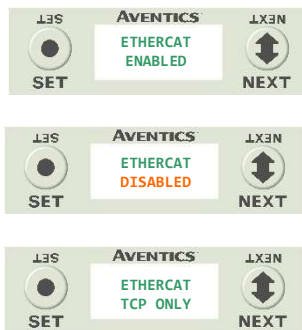


7. 580 EtherCat™ Integrated Web Server

Connecting to a 580 EtherCAT™ node

Note: To access the 580 node's diagnostic web page the 580 EtherCAT™ node must be set to EtherCAT™ disabled (TCP ONLY mode).

EtherCAT™ 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.
 - a. ENABLED (Factory Default)
 - b. DISABLED
 - c. RETURN (this will return you to the main menu)
1. Press the **SET** button to confirm your choice.

The status screen changes to;
ETHERCAT™
TCP ONLY



CAUTION

- *Disabling EtherCAT™ stops all communication with the EtherCAT™ master!*

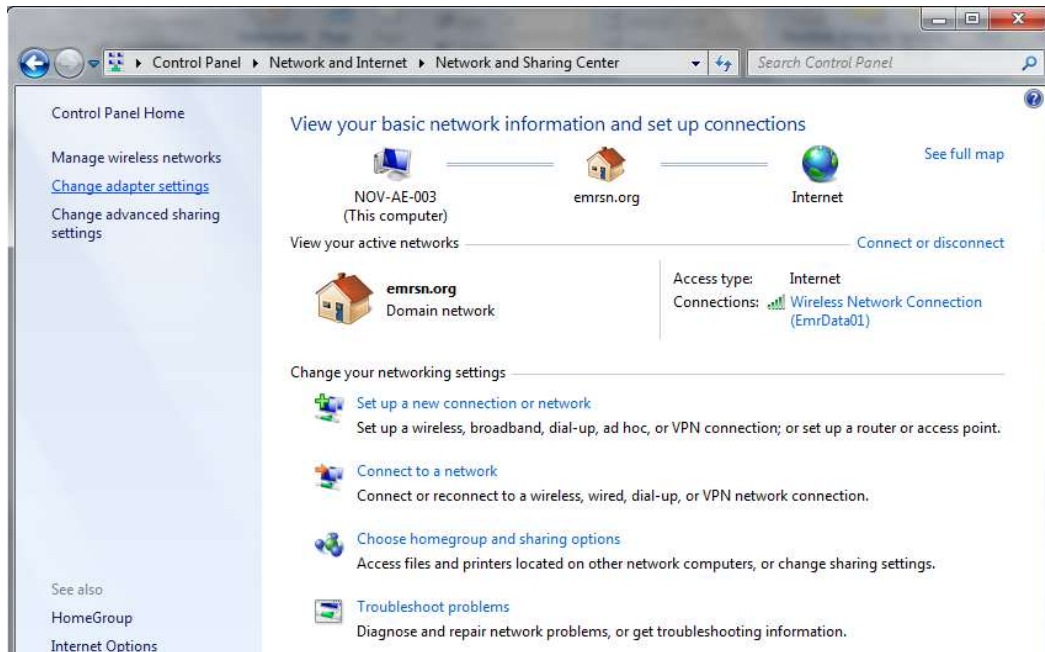
7.1 Connecting to a 580 Series EtherCAT™ Node (Windows 7)

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

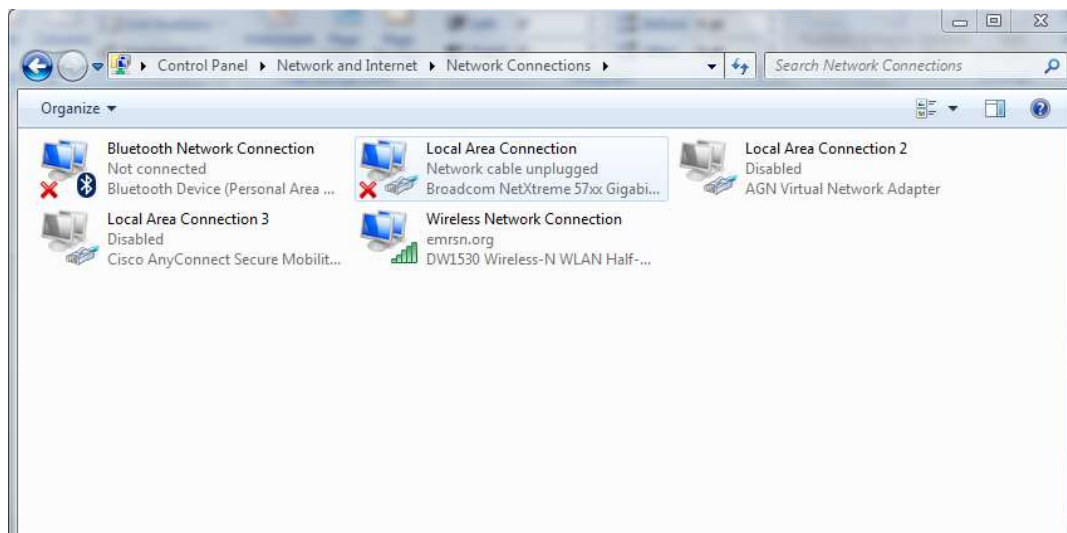
1. Connect a 24VDC power supply to the valve manifold. The connector pin-out can be found on the side of the EtherCAT™ node or on page 4-14 of this document. (Note: 24VDC only needs to be applied to the "+24VDC (NODE & INPUTS)" pin to power the node.)
2. Connect an Ethernet cable directly from the manifold to the computer -OR- Connect an Ethernet cable from the manifold to a router, hub, or switch. Connect a second Ethernet 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 EtherCAT™ manifold the IP address of your computer must be known. To start this process, left click on the "Start" button.
5. Left click on control panel, then left click view network status and tasks



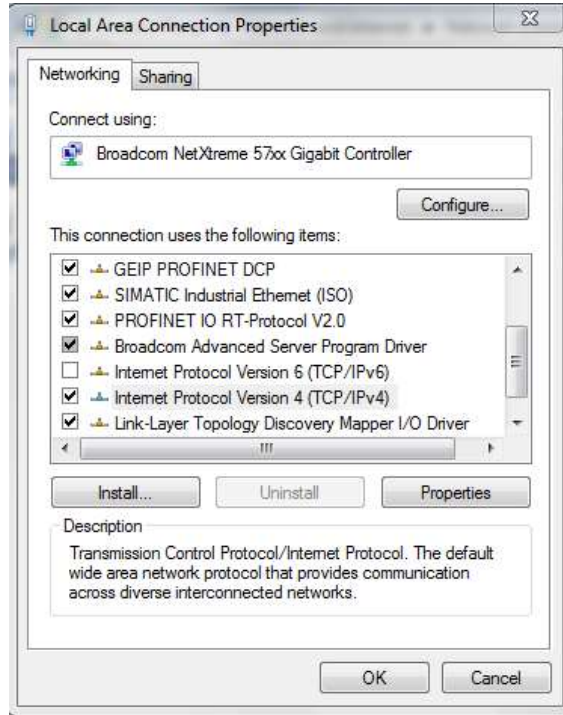
6. The "Network and Sharing Center" window will open. Double click on "Change adapter settings".



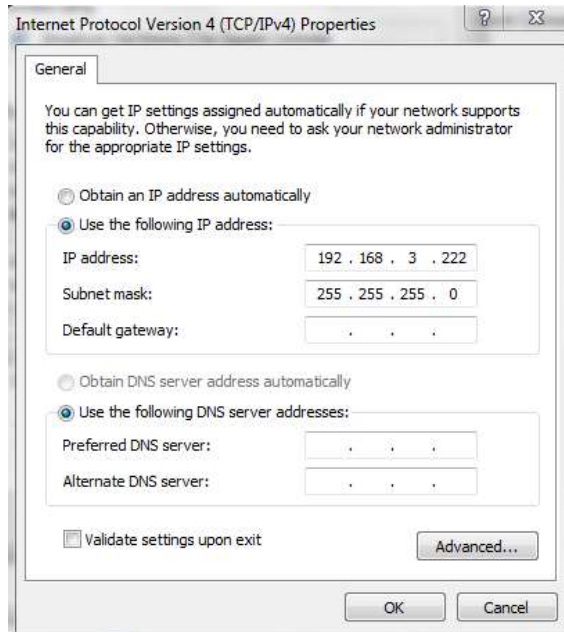
7. The "Network Connections" window opens. Double click the "Local Area Connection Icon"



8. Click on "Internet Protocol Version 4 (TCP/IPv4)" the properties window will open



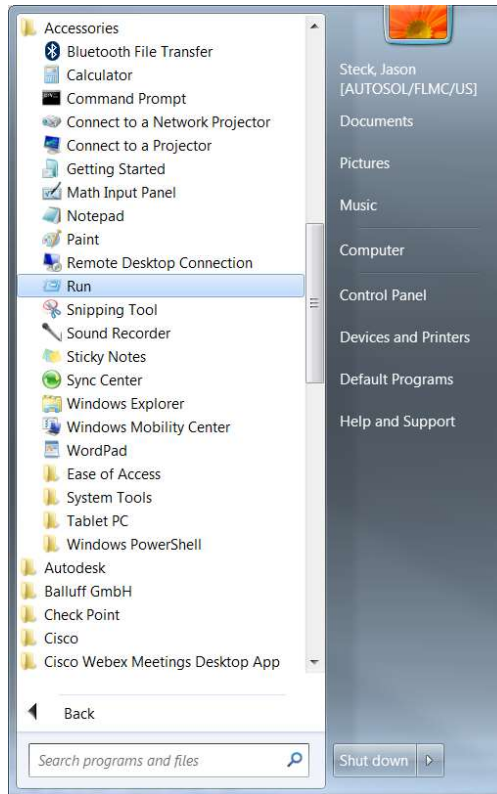
9. Choose the option marked "Use the following IP address" and type in an IP address that has the same first three octets as the address as you the manifold you are connected with. For the last octet you may choose any number from 0-255, just make sure that it is not the same number as the IP address that the manifold will have. Make sure your subnet mask is set to "255.255.255.0" (this value can be changed, but this value will be used for demonstration purposes).



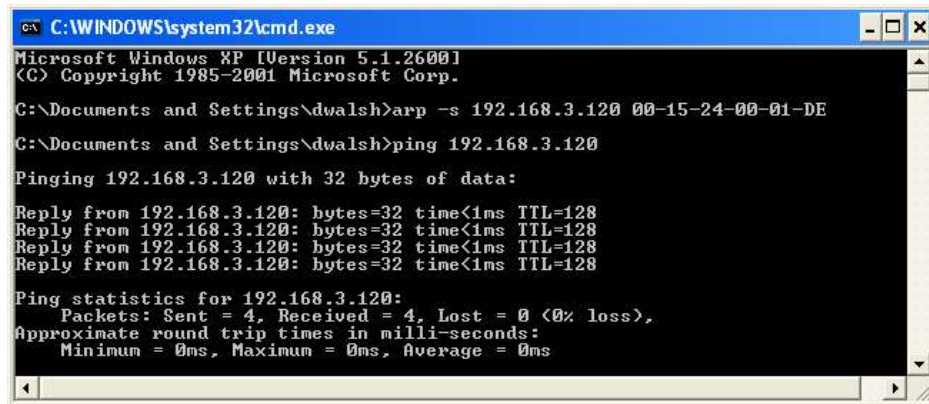
10. Left click "OK" in the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection" windows for the changes to take effect on the computer. Close out of any open windows.

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 6-30.

11. Click on "Start" then select "All Programs ->Accessories ->Run"



12. Type, "Ping, and then the IP address of the manifold, you can view the address on the graphical display. For example, if the IP address is 192.168.3.120, "ping 192.168.3.120" would be typed. You will get a message stating, "Reply from 192.168.3.120: bytes=32 time<1ms TTL=128", if the manifold responds.



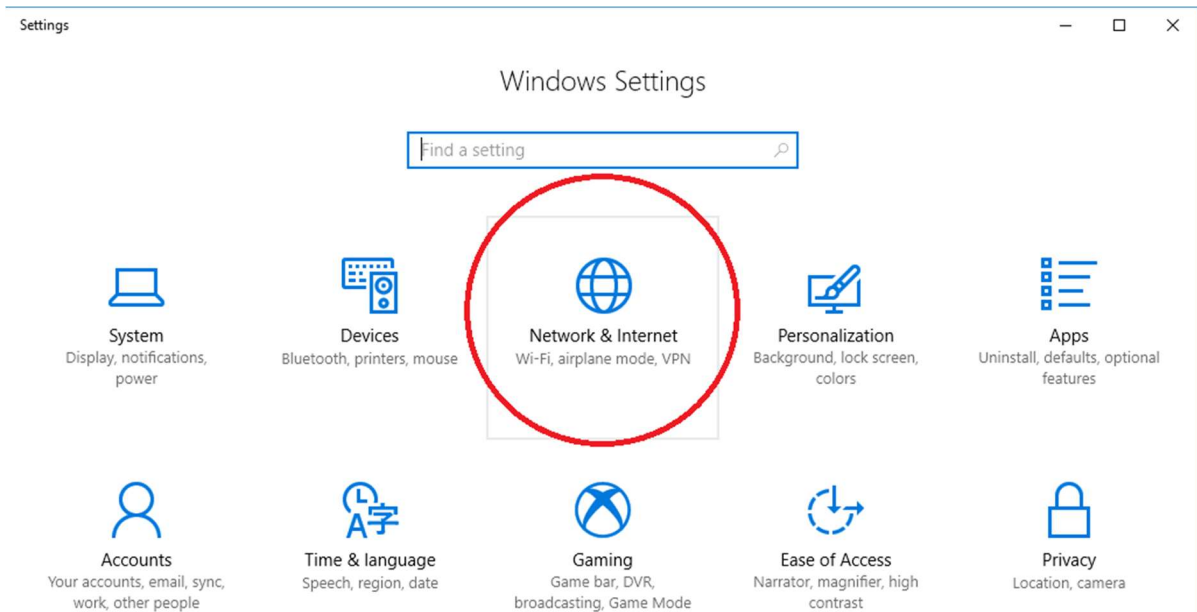
13. Open a web browser on the computer and type the IP address of the manifold.
Ex. <http://192.168.3.120>. The Aventics 580 webpage should load after several seconds.



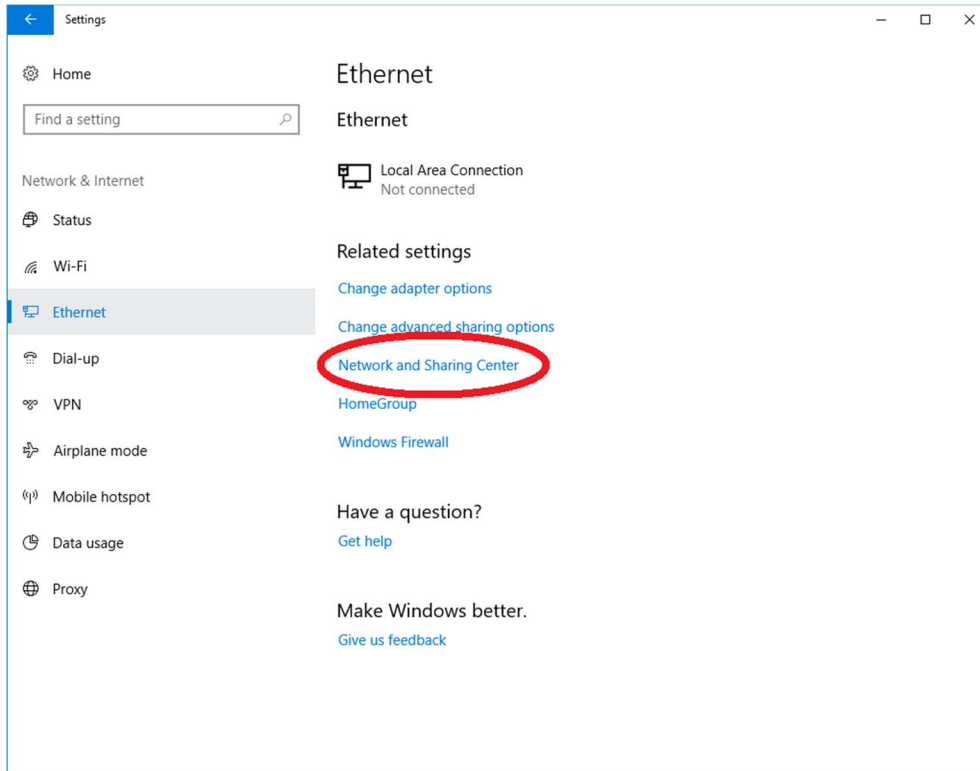
7.2 Connecting to a 580 Series EtherCAT™ Node (Windows 10)

This section will discuss how to connect a computer to a 580 Series EtherCAT™ node. There are multiple ways to complete this task, so only two will be discussed. All computer commands are shown in Windows 10.

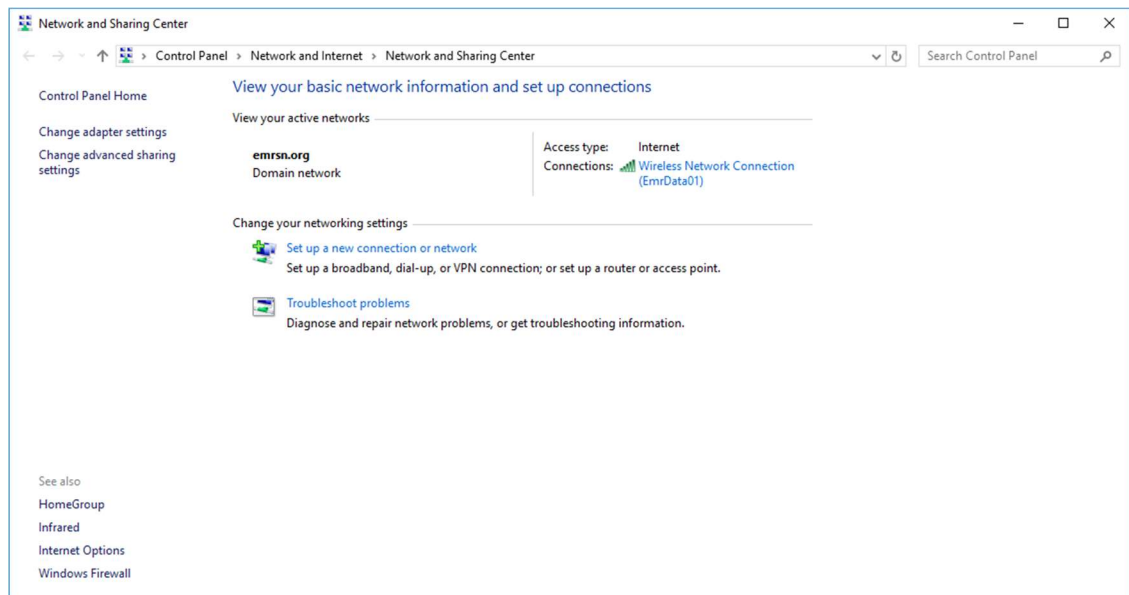
1. Connect a 24VDC power supply to the valve manifold. The connector pin-out can be found on the side of the EtherCAT™ node or on page 4-15 of this document. (Note: 24VDC only needs to be applied to the "+24VDC (NODE & INPUTS)" pin to power the node.)
2. Connect an Ethernet cable directly from the manifold to the computer -OR- Connect an Ethernet cable from the manifold to a router, hub, or switch. Connect a second Ethernet 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 EtherCAT™ manifold the IP address of your computer must be known. To start this process, left click on the "Windows" (Start) button.
5. Left click on Settings (gear icon), then on Network & Internet.



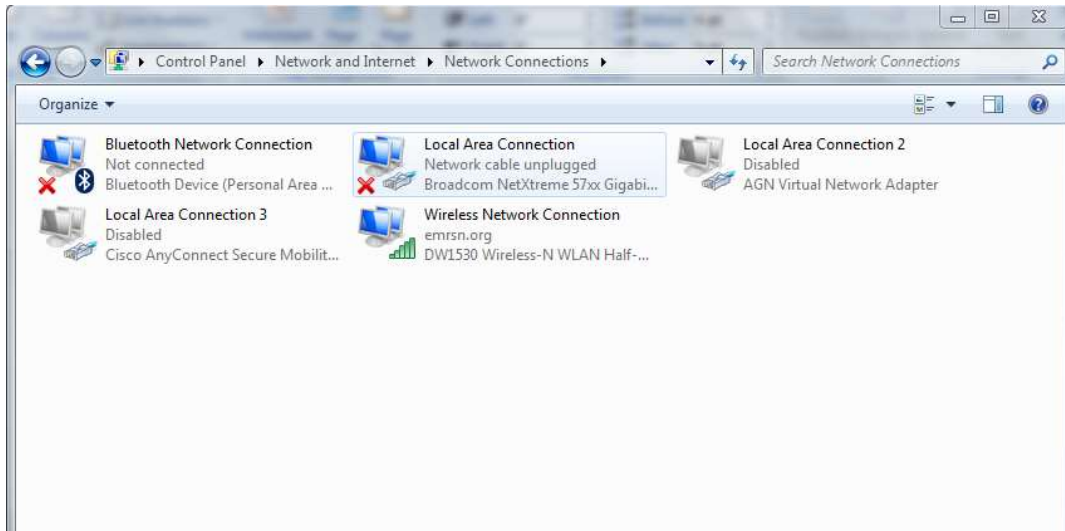
- Next, left click on "Ethernet" on the left-hand side of the window, and then "Network and Sharing Center".



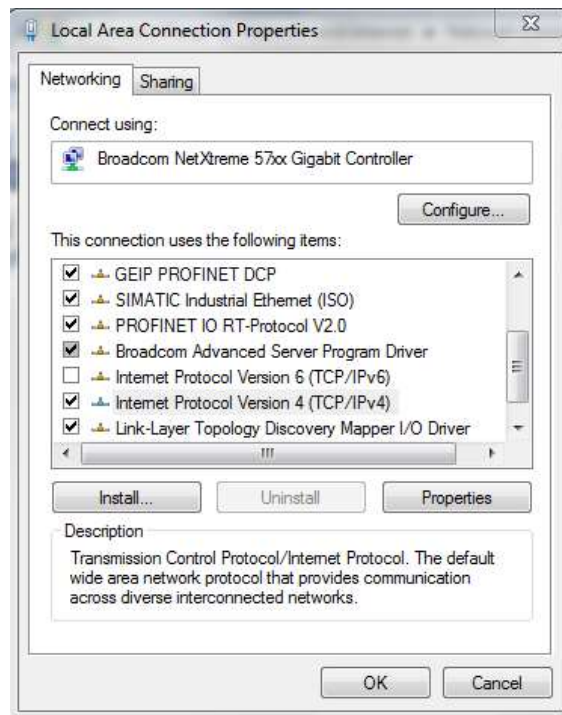
- The "Network and Sharing Center" window will open. Double click on "Change adapter settings".



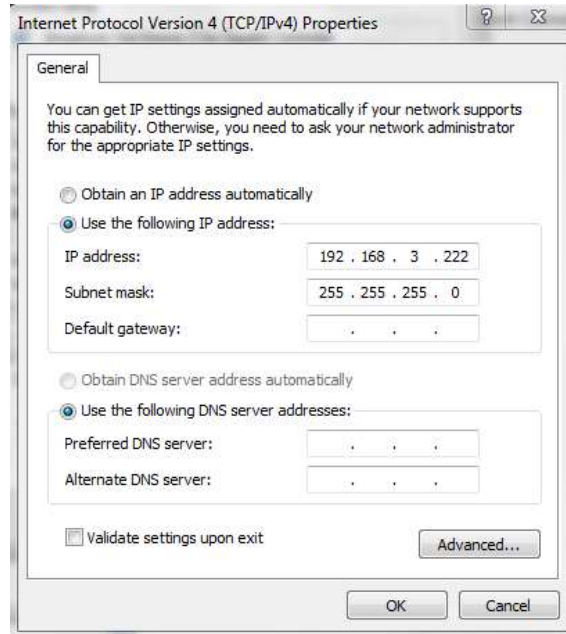
8. The “Network Connections” window opens. Double click the “Local Area Connection Icon”



9. Click on “Internet Protocol Version 4 (TCP/IPv4)” the properties window will open



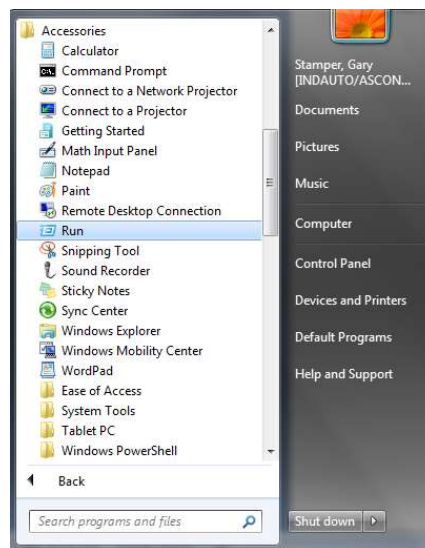
- Choose the option marked "Use the following IP address" and type in an IP address that has the same first three octets as the address that you will set the manifold to. For the last octet you may choose any number from 0-255, just make sure that it is not the same number as the IP address that the manifold will have. Make sure your subnet mask is set to "255.255.255.0" (this value can be changed, but this value will be used for demonstration purposes).



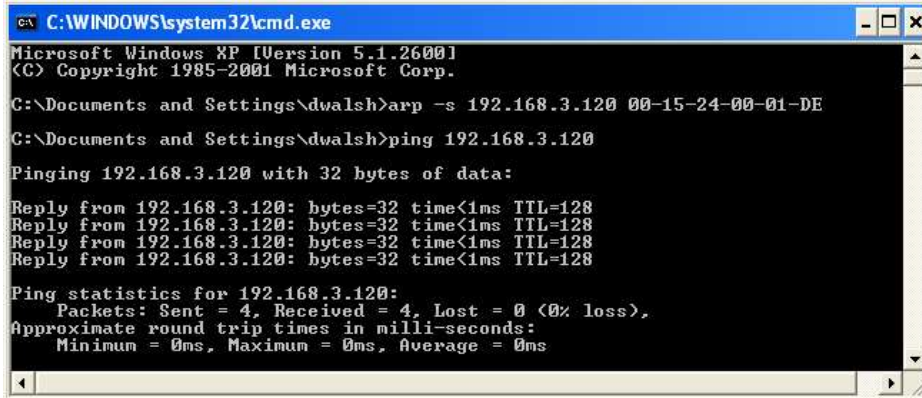
- Left click "OK" in the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection" windows for the changes to take effect on the computer. Close out of any open windows.

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 6-30.

- Click on "start" then select "All Programs->Accessories->Run".



13. Type, "Ping, and then the IP address of the manifold, you can view the address on the graphical display. For example, if the IP address is 192.168.3.120, "ping 192.168.3.120" would be typed. You will get a message stating, "Reply from 192.168.3.120: bytes=32 time<1ms TTL=128", if the manifold responds.



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\dwalsh>arp -s 192.168.3.120 00-15-24-00-01-DE
C:\Documents and Settings\dwalsh>ping 192.168.3.120

Pinging 192.168.3.120 with 32 bytes of data:

Reply from 192.168.3.120: bytes=32 time<1ms TTL=128
Reply from 192.168.3.120: bytes=32 time<1ms TTL=128
Reply from 192.168.3.120: bytes=32 time<1ms TTL=128
Reply from 192.168.3.120: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.3.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

14. Open a web browser on the computer and type the IP address of the manifold.
Ex. <http://192.168.3.120>. The Aventics 580 webpage should load after several seconds.



7.3 Using the Functionality of the 580 Series EtherCAT™ Web Server

This section will discuss the functionality of the built in Ethernet server. Every Aventics EtherCAT™ node has this feature. Through this server you can configure the node, force valve outputs, 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 EtherCAT™ manifold. From this page, the user can navigate the entire built-in web server.



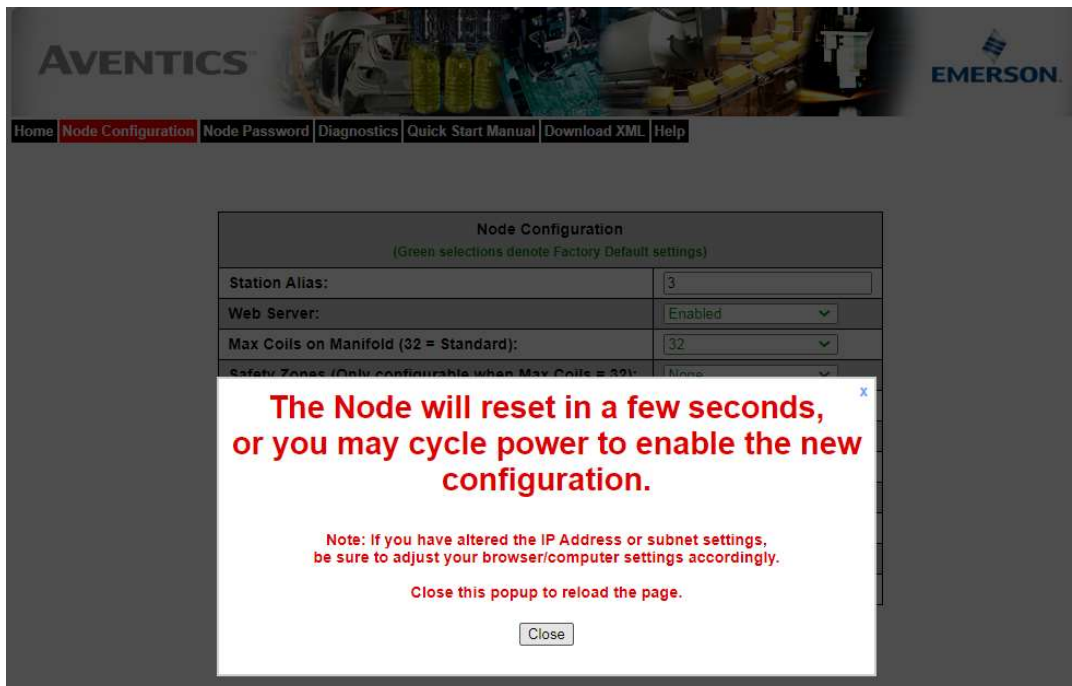
Node Configuration

The “Node Configuration” window can be used to control different parameters within the manifold. These parameters include, “Station Alias”, “Max Coils”, “Node Configuration Parameters (lock)” and “COMM Fault Idle Mode”.



Node Configuration	
(Green selections denote Factory Default settings)	
Station Alias:	<input type="text" value="0"/>
Web Server:	<input type="button" value="Enabled"/> ▼
Max Coils on Manifold (32 = Standard):	<input type="button" value="32"/> ▼
COMM Fault / Idle Mode:	<input type="button" value="Turn OFF All Outputs"/> ▼
Node Configuration Parameters:	<input type="button" value="Unlocked"/> ▼
Display Orientation:	<input type="button" value="Normal"/> ▼

Once the changes have been made, left click on the “Update Configuration” button. The “Configuration Successfully Updated” window will appear. The EtherCAT™ node will reset in a few seconds, or the user may cycle power to enable the new configuration.



Password

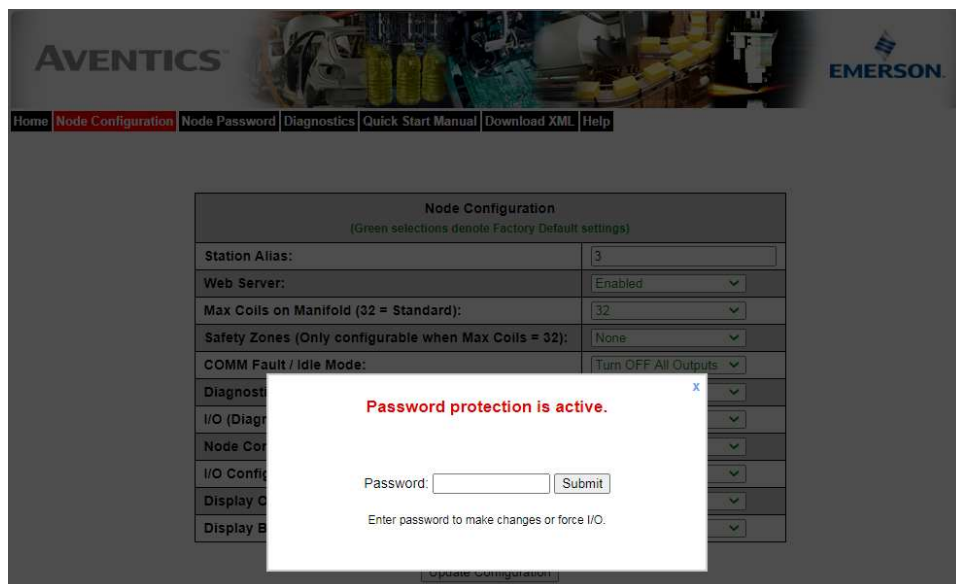
The "Password" window allows the user to set a password that will prevent unwanted access to the I/O Force and Test functionality. The password comes disabled from the factory. To set the initial password, leave the "Enter Current Password" field blank and type in the new password in the "Enter New Password"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



Change Password	
Enter Current Password: (up to 20 characters)	<input type="text"/>
Enter New Password: (up to 20 characters)	<input type="text"/>
Repeat New Password:	<input type="text"/>

This page allows password protection of the [Node Configuration](#) page and the I/O Force & Test features of the [Diagnostics](#) page. To disable password protection, leave the "Enter New password" box empty. If you have forgotten a previously set password please contact Aventics Technical support.

Once a Password has been set, the security check screen will appear when accessing Diagnostic or Node Configuration parameters.



- 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.



Actual Configuration of modules with part numbers and descriptions including distributed modules

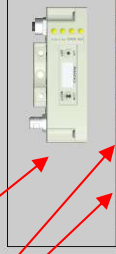
Part No.	Description	Details	Activity
P580AEEC101	EtherCAT 580 Module	<input type="checkbox"/> Show Details	!
	580 Integrated 1-32 Coils Module	<input type="checkbox"/> Show Details	!
		<input type="checkbox"/> Show Error/Event Log	

Reports module status:

- ✓ = OK
- ! = Attention
- ✗ = Lost comm.

Selects which module details will be shown, more than 1 can be selected simultaneously.




Module	Part No.	Description	Details	Activity																																							
Node	P580AEEC101	EtherCAT 580 Module	<input checked="" type="checkbox"/> Show Details	<input type="button" value="Close all Details"/>																																							
 <table border="1"> <tr> <td>Firmware Revision:</td> <td>1.1 Build 44022</td> <td><input type="button" value="Factory Defaults"/> <input type="button" value="Firmware Upload"/></td> </tr> <tr> <td>IP Address:</td> <td>192.168.1.120</td> <td></td> </tr> <tr> <td>Subnet Mask:</td> <td>255.255.255.0</td> <td></td> </tr> <tr> <td>Gateway IP Address:</td> <td>0.0.0.0</td> <td></td> </tr> <tr> <td>MAC Address:</td> <td>00-15-24-00-fc-cb</td> <td></td> </tr> <tr> <td>Active EtherCAT Connections:</td> <td>0</td> <td></td> </tr> <tr> <td>Diagnostic Word Status:</td> <td colspan="2">● Switched Power Fault</td> </tr> <tr> <td>Diagnostic Word Byte 0:</td> <td>0 ● 1 2 3 4 5 6 7</td> <td></td> </tr> <tr> <td></td> <td>Bit 0: Switched Power Status</td> <td></td> </tr> <tr> <td></td> <td>Bits 1-7: Not Used</td> <td></td> </tr> <tr> <td>Diagnostic Word Byte 1:</td> <td>0 1 2 3 4 5 6 7</td> <td></td> </tr> <tr> <td></td> <td>Bits 0-7: Not Used</td> <td></td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Show I/O Mappings and Sizes</td> </tr> </table>					Firmware Revision:	1.1 Build 44022	<input type="button" value="Factory Defaults"/> <input type="button" value="Firmware Upload"/>	IP Address:	192.168.1.120		Subnet Mask:	255.255.255.0		Gateway IP Address:	0.0.0.0		MAC Address:	00-15-24-00-fc-cb		Active EtherCAT Connections:	0		Diagnostic Word Status:	● Switched Power Fault		Diagnostic Word Byte 0:	0 ● 1 2 3 4 5 6 7			Bit 0: Switched Power Status			Bits 1-7: Not Used		Diagnostic Word Byte 1:	0 1 2 3 4 5 6 7			Bits 0-7: Not Used		<input type="checkbox"/> Show I/O Mappings and Sizes		
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	Bits 0-7: Not Used																																										
<input type="checkbox"/> Show I/O Mappings and Sizes																																											
Valves		580 Integrated 1-32 Coils Module	<input type="checkbox"/> Show Details	<input type="button" value="Close all Details"/>																																							
<input type="checkbox"/> Show Error/Event Log																																											

Relevant node information including firmware revision

Graphic of module

"Diagnostic word" data

Valves	580 Integrated 1-32 Coils Module	Details	Activity																																																																						
 <table border="1"> <tr> <td>Firmware Revision:</td> <td>1.1</td> <td></td> </tr> <tr> <td>Valve Coils 0-31:</td> <td colspan="7">0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/></td> </tr> <tr> <td>Check/Uncheck box to force/un-force valve coil</td> <td colspan="7">8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/></td> </tr> <tr> <td></td> <td colspan="7">16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/></td> </tr> <tr> <td></td> <td colspan="7">24 <input type="checkbox"/> 25 <input type="checkbox"/> 26 <input type="checkbox"/> 27 <input type="checkbox"/> 28 <input type="checkbox"/> 29 <input type="checkbox"/> 30 <input type="checkbox"/> 31 <input type="checkbox"/></td> </tr> <tr> <td>Valve Status:</td> <td colspan="7">0 1 2 3 4 5 6 7</td> </tr> <tr> <td>● = Shorted Coil</td> <td colspan="7">8 9 10 11 12 13 14 15</td> </tr> <tr> <td>○ = Open Coil</td> <td colspan="7">16 17 18 19 20 21 22 23</td> </tr> <tr> <td>✕ = No Coil Detected</td> <td colspan="7">24 25 26 27 28 29 30 31</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Show I/O Mappings and Sizes</td> </tr> </table>				Firmware Revision:	1.1		Valve Coils 0-31:	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/>							Check/Uncheck box to force/un-force valve coil	8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/>								16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/>								24 <input type="checkbox"/> 25 <input type="checkbox"/> 26 <input type="checkbox"/> 27 <input type="checkbox"/> 28 <input type="checkbox"/> 29 <input type="checkbox"/> 30 <input type="checkbox"/> 31 <input type="checkbox"/>							Valve Status:	0 1 2 3 4 5 6 7							● = Shorted Coil	8 9 10 11 12 13 14 15							○ = Open Coil	16 17 18 19 20 21 22 23							✕ = No Coil Detected	24 25 26 27 28 29 30 31							<input type="checkbox"/> Show I/O Mappings and Sizes		
Firmware Revision:	1.1																																																																								
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○ = Open Coil	16 17 18 19 20 21 22 23																																																																								
✕ = No Coil Detected	24 25 26 27 28 29 30 31																																																																								
<input type="checkbox"/> Show I/O Mappings and Sizes																																																																									
! Valve power is OFF																																																																									

Valve coil forcing capability. Can be disabled with password

Shows diagnostic status of whether coils are shorted or open.



- The 580 node must be switched to Pre-Operational mode via the Twincat system manager software to allow forcing output states from the 580 webpage. See next page

Error / Event Log:

Keeps a running count of 50 events. First in First out (FIFO)

Event Number	Boot Count	Relative Time (HH:MM:SS.SS)	Description	User Comment	Clear Log
1	1	00:00:00.49	Reboot - build 43227		Add Comment
2	2	00:00:00.85	Reboot - build 43227		Add Comment
3	2	00:00:01.78	I/O Configuration Changed		Add Comment
4	3	00:00:00.49	Reboot - build 43227		Add Comment
5	4	00:00:00.49	Reboot - build 43227		Add Comment
6	5	00:00:00.07	Reboot - build 43227		Add Comment
7	6	00:00:00.07	Firmware reload initiated		Add Comment
8	7	00:00:00.07	Reboot - build 43476		Add Comment
9	7	00:00:00.98	I/O Configuration Changed		Add Comment
10	7	00:01:10.10	Ethernet link lost (Port 0)		Add Comment

Allow user to clear log

Allows user to add comments

Reboot events are shown in red

Help:

The "Help" 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

EtherCAT™ fieldbus devices do not communicate using a standard IP address. The Aventics 580 node's IP address is only used to access the nodes integrated web server for configuration and diagnostic information via a personal computer's web browser.

The IP address of the Aventics 580 EtherCAT™ node may only be set once EtherCAT communication is disabled (See page 6-35).

Integrated Web Page Configuration

The Aventics EtherCAT™ node has an integrated web server. This server can be accessed via any standard web browser program through a properly configured EtherCAT™ master device. With the IP Address, the "Node Configuration" page for the node can be accessed and the configuration parameters changed. 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 EtherCAT™ master device configuration.



- 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 EtherCAT™ node. The IP address and Subnet Mask selections cannot be modified 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)	
Station Alias:	<input type="text" value="0"/>
Web Server:	<input type="text" value="Enabled"/> ▼
Max Coils on Manifold (32 = Standard):	<input type="text" value="32"/> ▼
COMM Fault / Idle Mode:	<input type="text" value="Turn OFF All Outputs"/> ▼
Node Configuration Parameters:	<input type="text" value="Unlocked"/> ▼
Display Orientation:	<input type="text" value="Normal"/> ▼

7.5 User Configurable Device Parameters

The Aventics' 580 EtherCAT™ node allows the user to set many user options which define how the manifold behaves in certain instances. The following is a description of these device parameters.

Name	Description	Settable Via	
		Display	Web Server
IP Address	Sets the IP address to access the node web page	X	X
Gateway IP	Set the Gateway IP address	X	X
Params Lock	Selects Parameters Locked/Unlocked	✓	✓
Config Lock	Selects I/O Configuration Locked/Unlocked	✓	✓
Diagnostic Word	Enables / Disables the diagnostic word	✓	X
I/O Diagnostic Status	Allocates I/O diagnostic status bits	✓	X
Output Fault Action	Determines whether to use idle value attribute or hold last state	✓	X

7.6 Parameters Lock

This parameter lock is used to lock out changes to all node configuration parameters (except parameter lock). Once the manifold is commissioned the Parameters lock should be set to "LOCKED" to ensure that parameters are not unintentionally modified.

7.7 Communication Fault Mode Parameter

This parameter is used to describe characteristics or behaviors of output points (bits). The parameter shown below is used to determine what state the outputs will have, during a "Fault" event. The Communication Fault Mode parameter will allow control of all output points on the manifold.

The user, through PLC configuration settings, can determine how the outputs behave when a communication fault action occurs. These settings are non-volatile and thus will not change upon loss of power.

The two behavior options are:

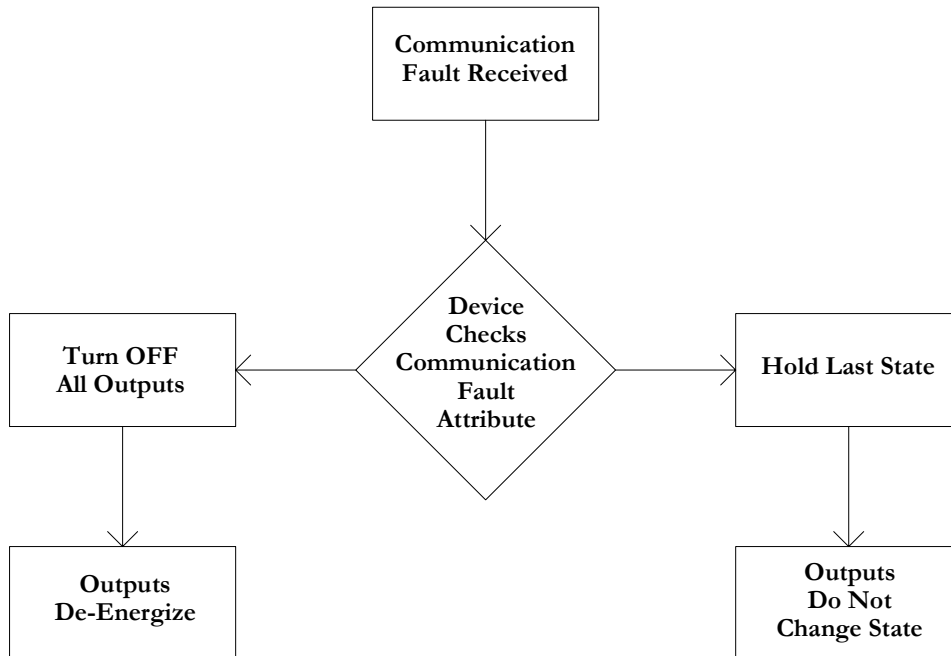
1. Turn Off All Outputs
2. Maintain Last Output State

7.8 Fault Action Parameter

The "Fault Action" parameter is used to control outputs during a communication failure. The user can determine how the states of the outputs are affected when a communication fault occurs. The Fault Action parameter is set through the graphic display advanced settings menu or the integrated webpage's node configuration page. The options are:

- 3. Hold Last State of Outputs
- 4. Turn Off All Outputs

Fault Action Sequence Flowchart

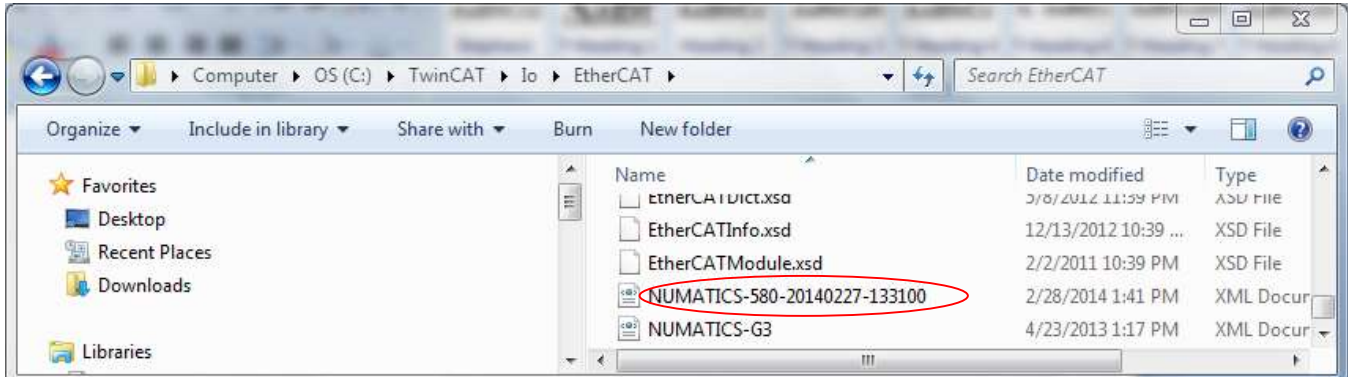


8. 580 EtherCAT™ Configuration and Mapping

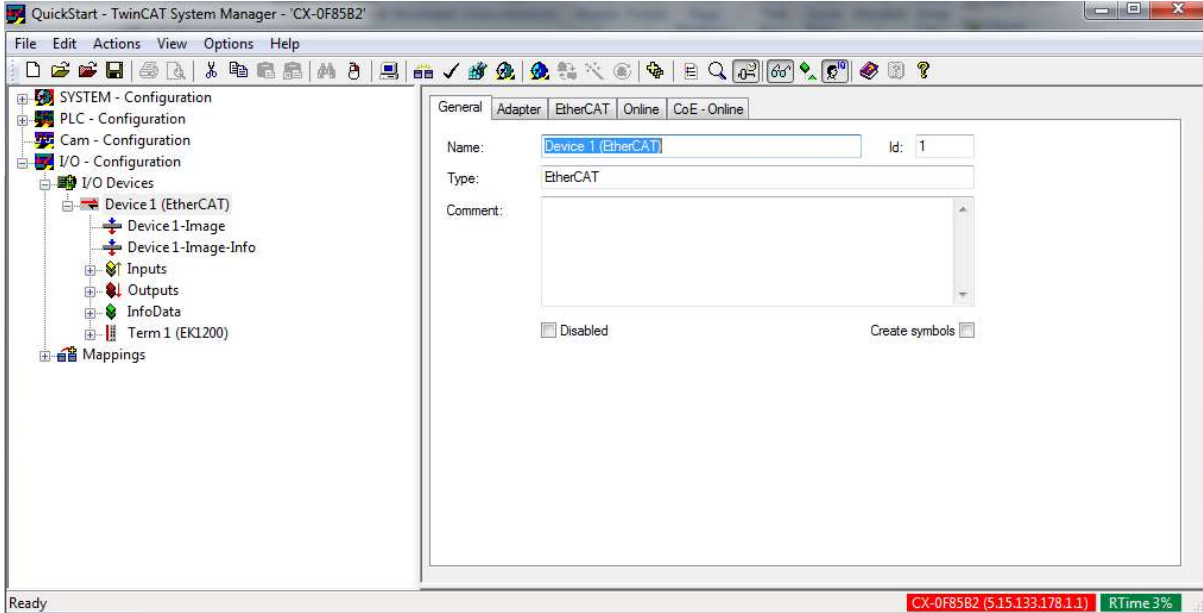
8.1 Aventics 580 EtherCAT configuration (Beckhoff PLC)

The XML file contains configuration information about the Aventics valve manifold. XML files are available on the Aventics website at: www.emerson.com.

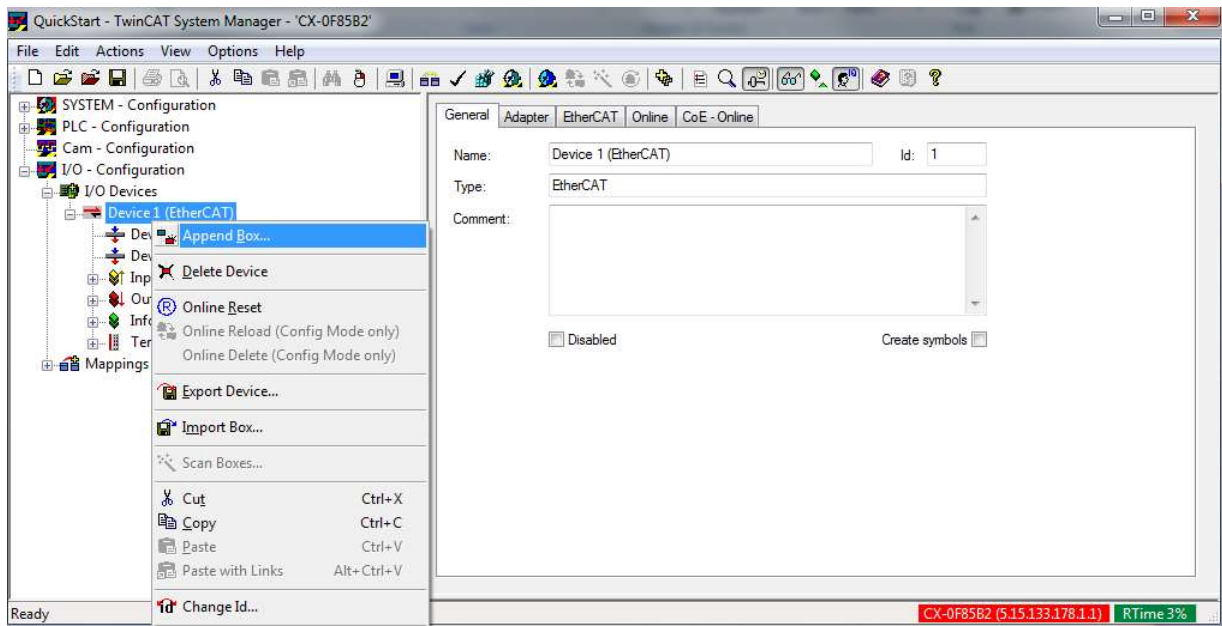
Copy the current "Aventics-580.XML" file to the following directory; C:\TwinCAT\IO\EtherCAT



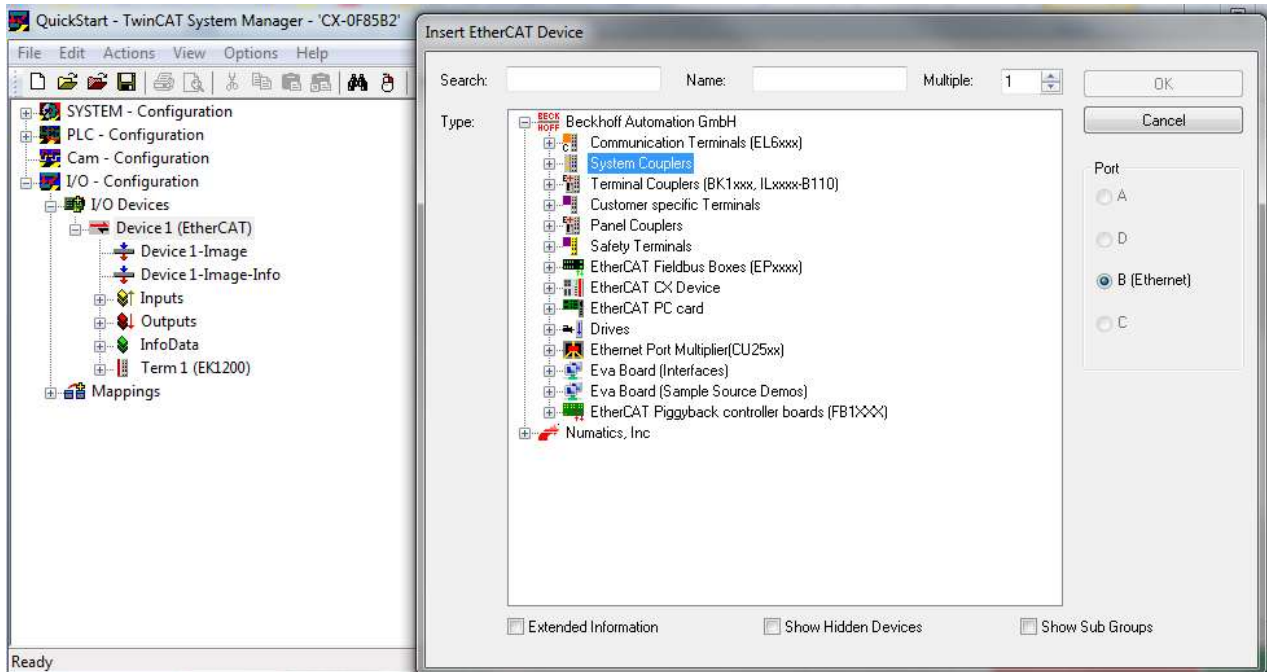
- Add the 580 EtherCAT® node
- Launch TwinCat System Manager
- Select I/O Configuration
- Expand I/O Devices



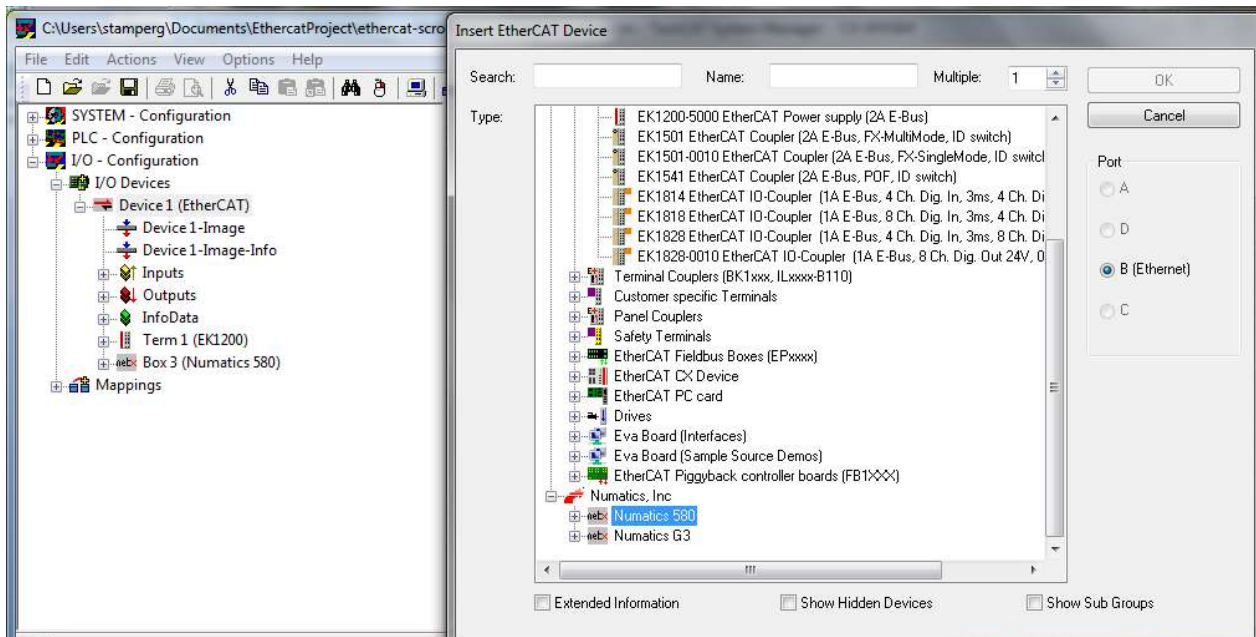
- Right Click I/O Devices
- Select Append Box



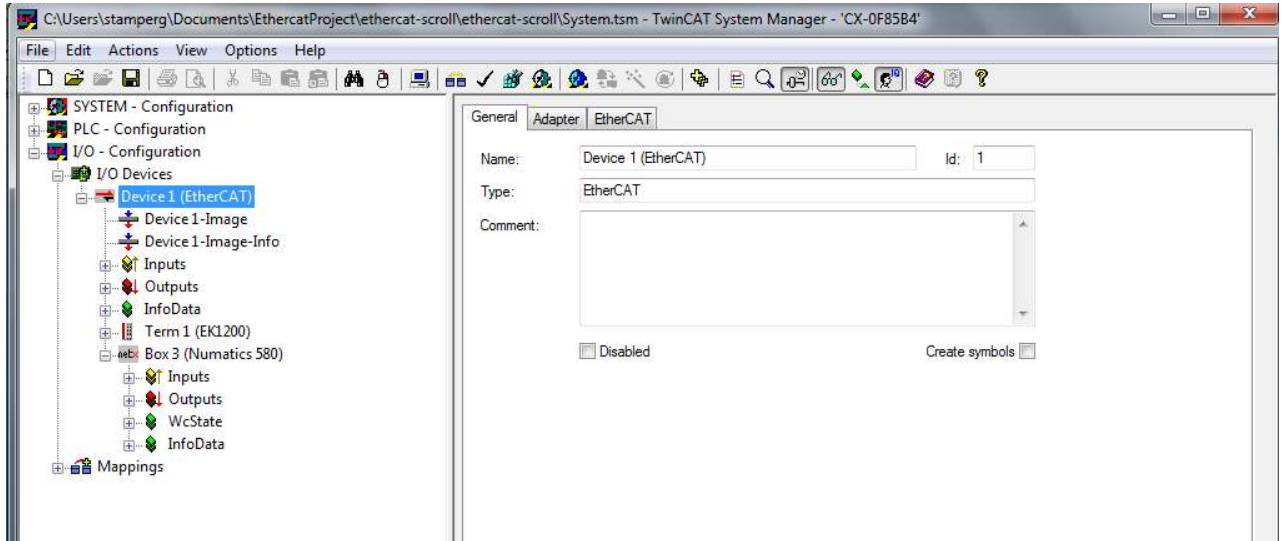
The insert EtherCAT® Device Dialogue Box Appears
Select the "Numatics Inc." Device Folder



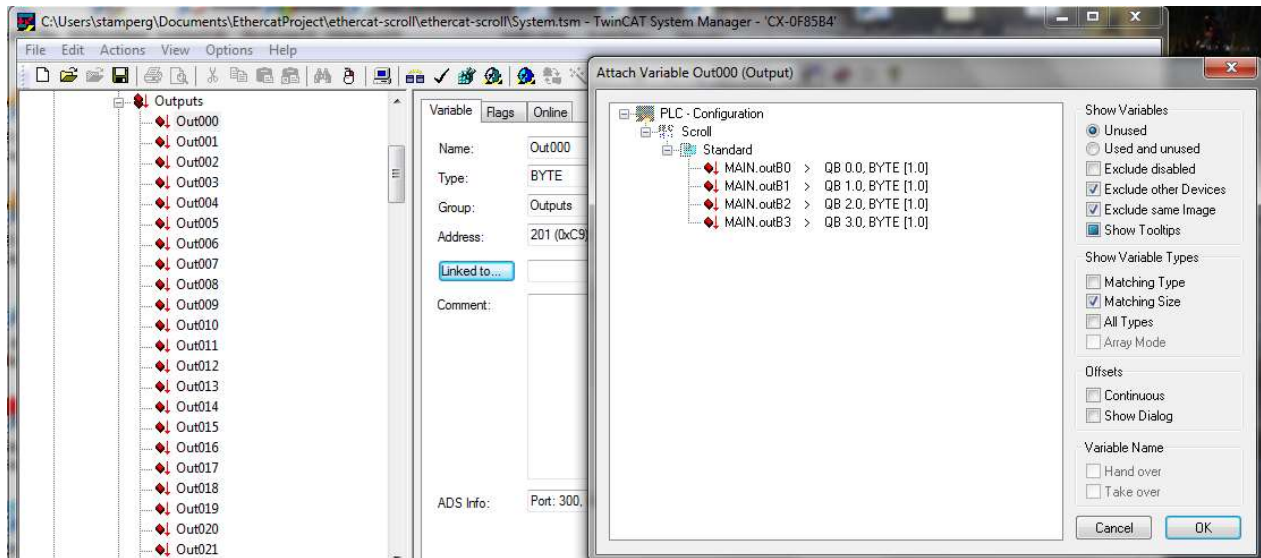
Double Click Numatics 580



Create the 580 I/O mapping
Expand the “Numatics G580” Box (device)



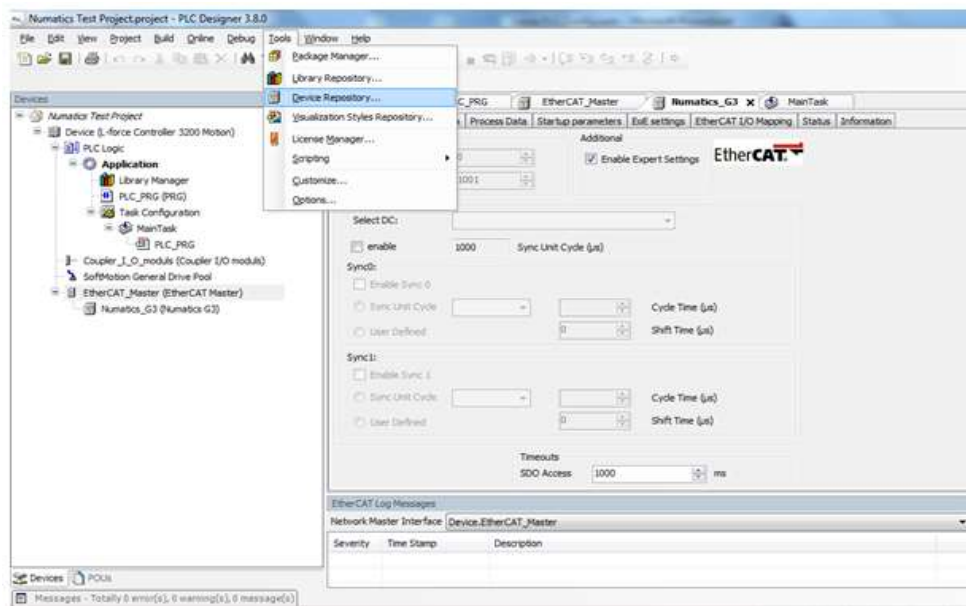
- Expand the Numatics 580 Output list
- Select an output byte from the Numatics 580 to map
- Press the "Linked to" button
- Select the Variable tag(s) from the PLC program to associate with the 580 Output Byte(s)
- Save and Activate the new configuration in TwinCAT®



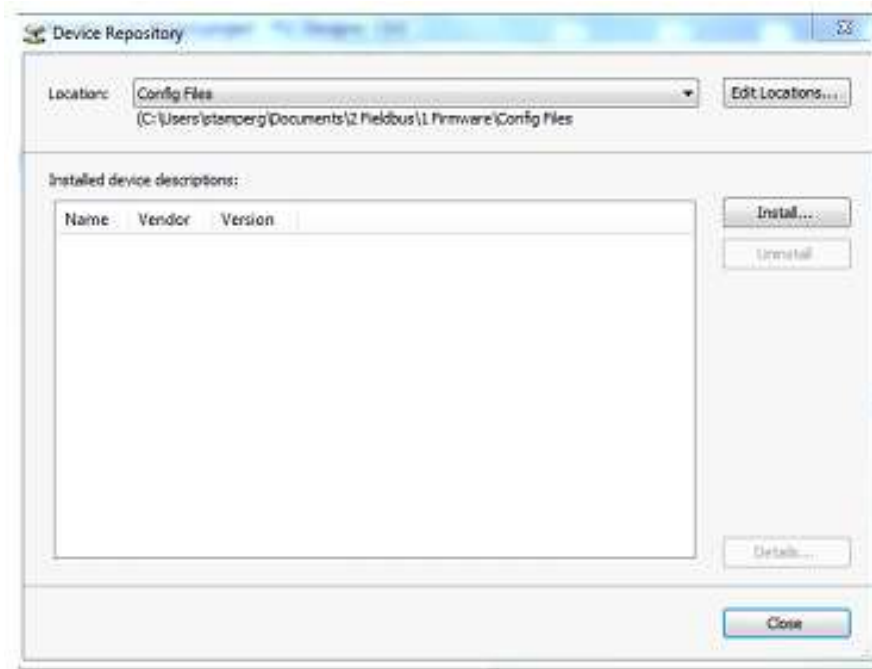
8.3 Aventics 580 EtherCAT™ configuration (Lenze PLC)

The following example illustrates the necessary steps to add an Aventics 580 EtherCAT™ Manifold to an existing Lenze PLC configuration. This includes how to install the Aventics EtherCAT™ XML file and how to select the various software components to configure a 580 Manifold (XML files are available www.emerson.com). The following examples assume an existing configuration based on Lenze PLC Designer V3.8 programming software.

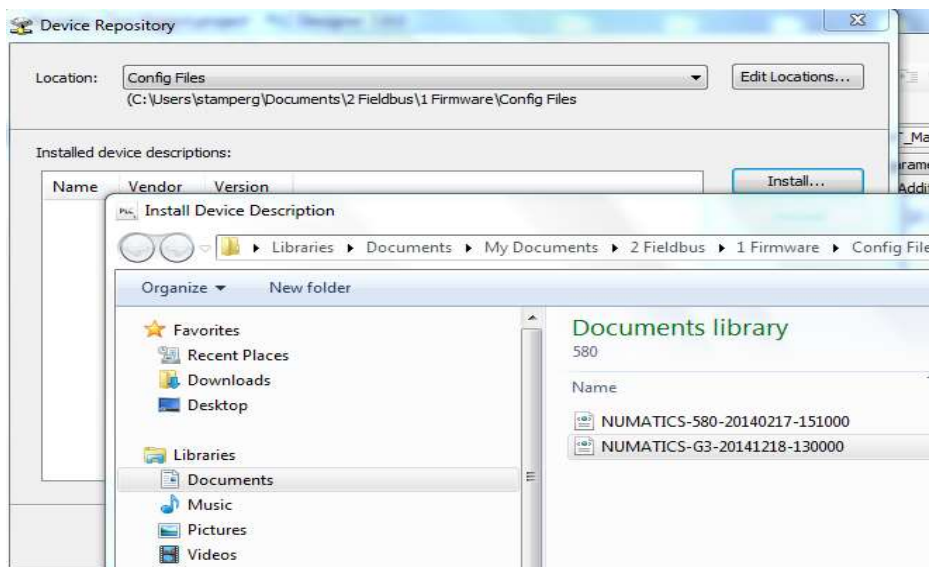
- Install the Aventics 580 XML file
- Launch PLC Designer V3.8 and
- Select Tools from the main menu
- Select Device Repository



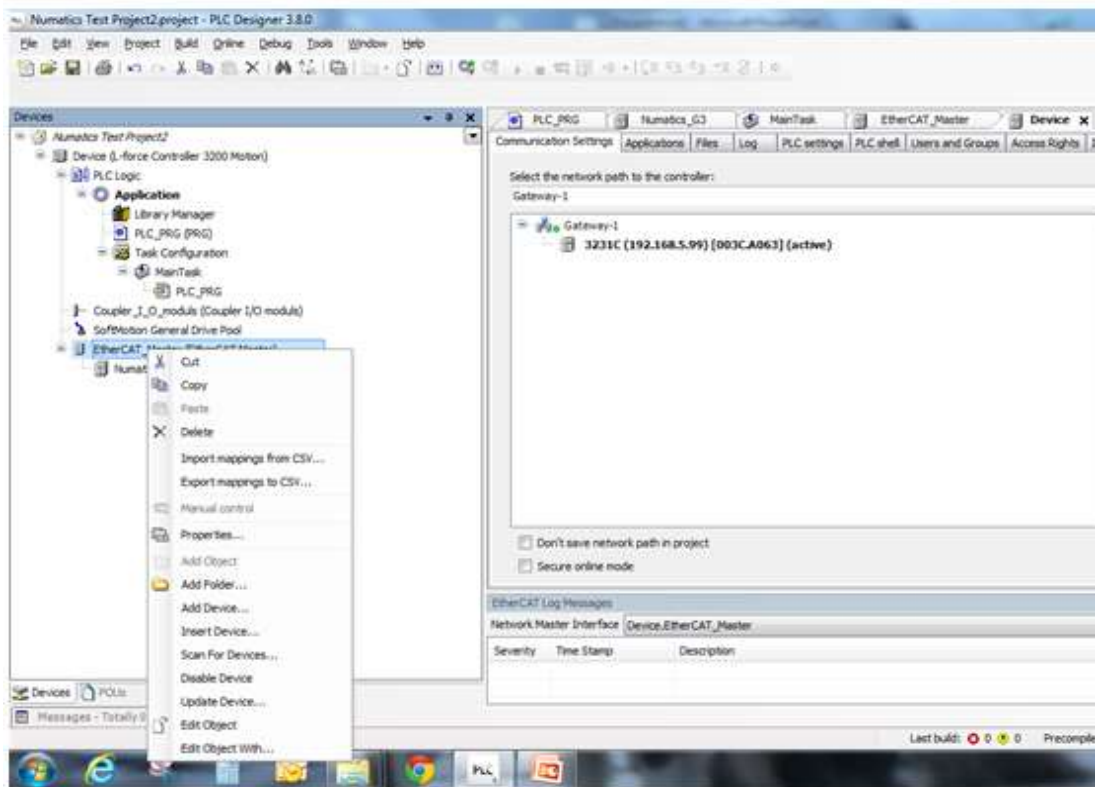
Configure the location of the 580 Aventics XML file
Select Install



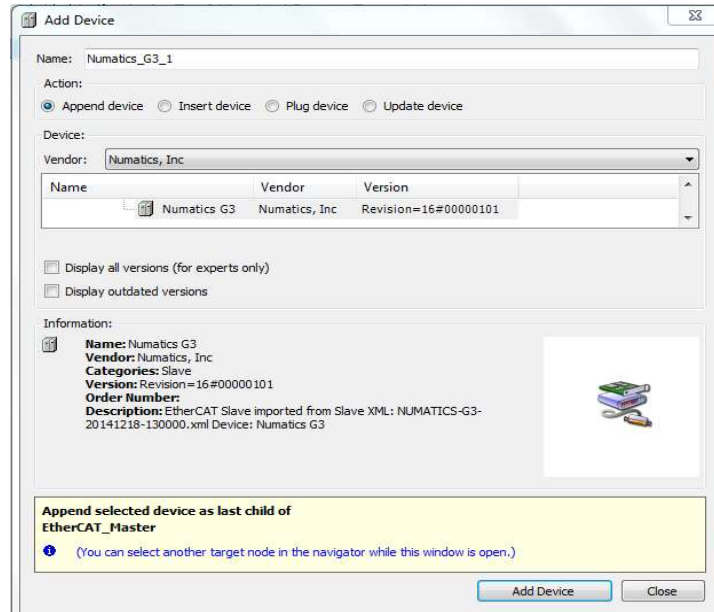
Select the XML file



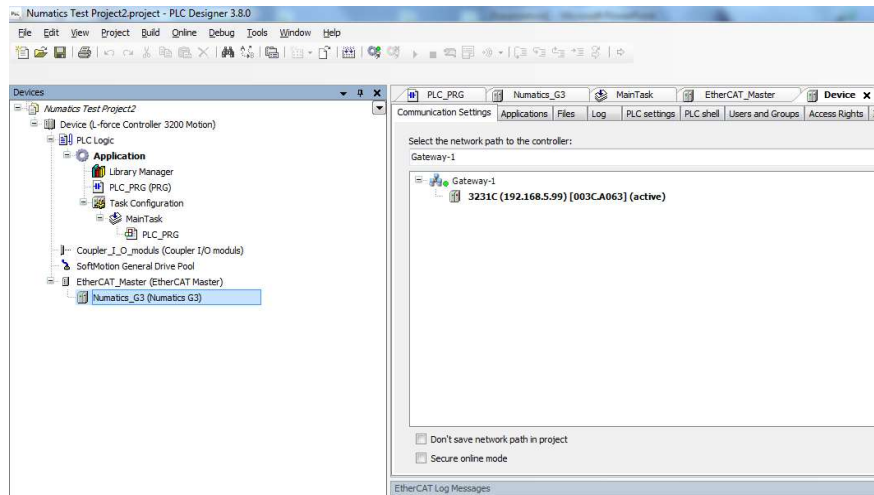
Add the 580 EtherCAT node
PLC Designer V3.8
Select the EtherCAT Master from the Project Tree
Right Click and Select Add Device



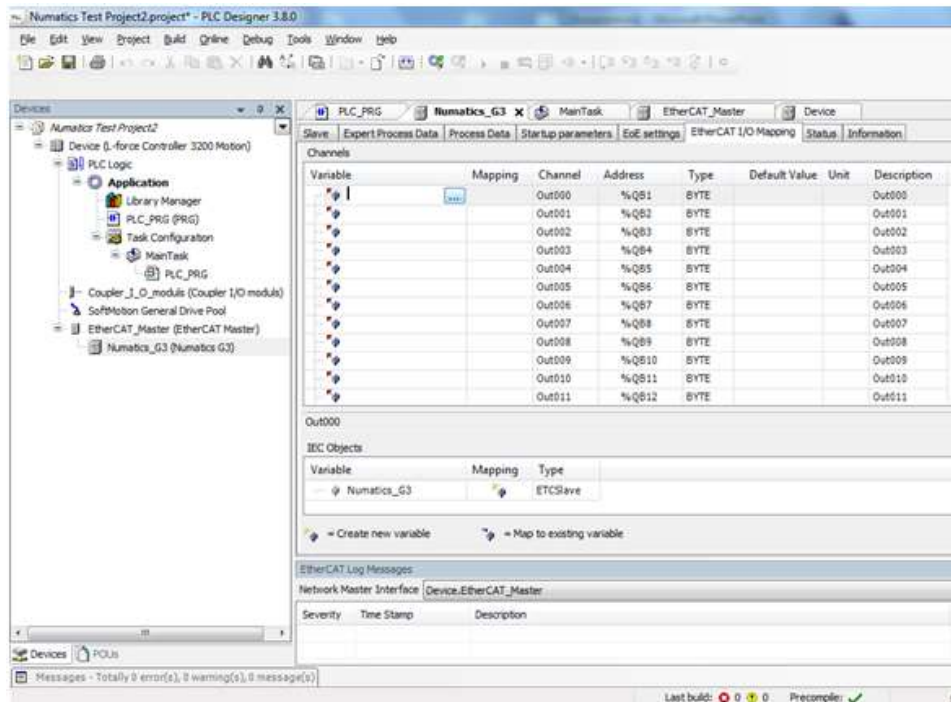
Select the Numatics 580
Select Add Device



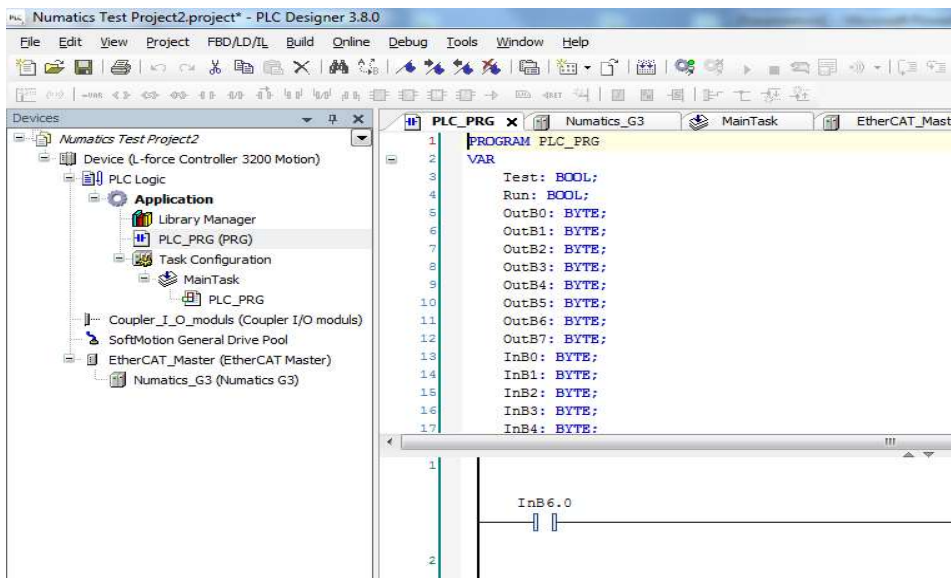
Double Click Numatics 580



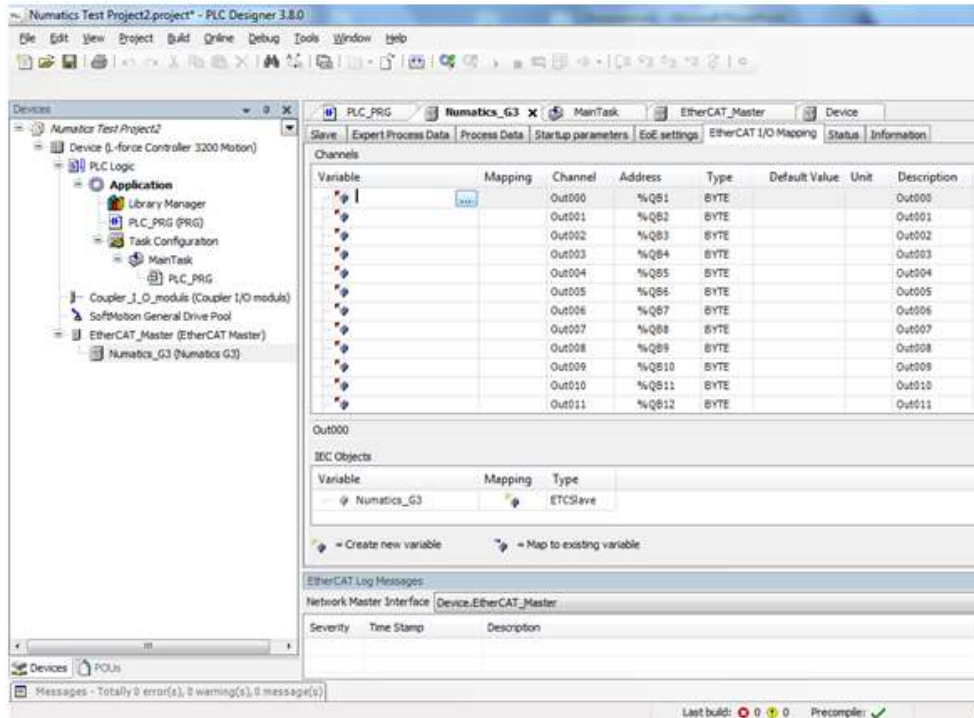
Select the PLC Program Tab



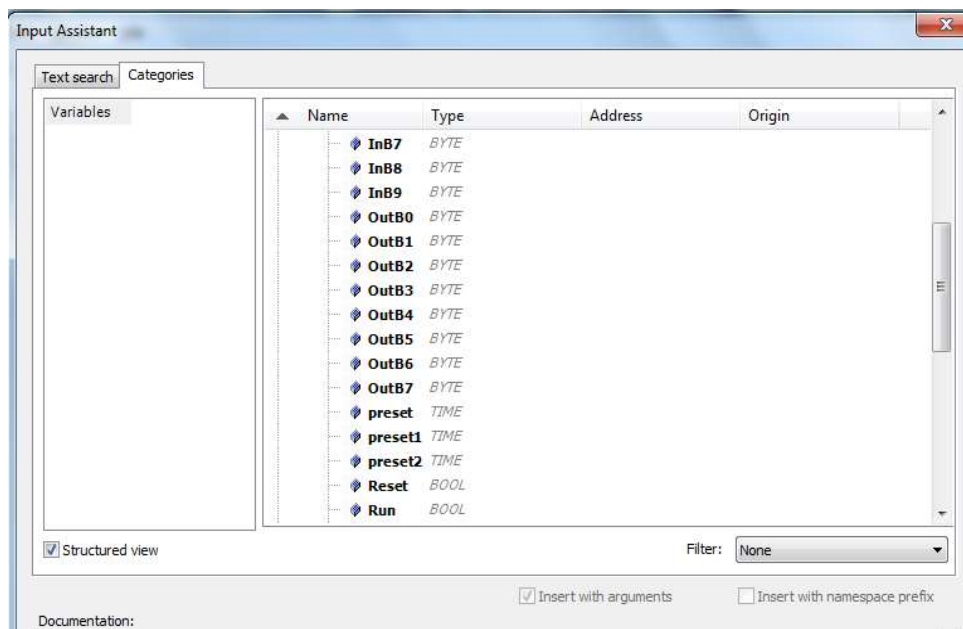
Create the 580 I/O Program (Byte) Variables that will connect to the 580 I/O map
 Example Outputs – OutB0, OutB1, OutB2 etc.
 Example Inputs – InB0, InB1, InB2 etc.



Map the 580 I/O data to program variables
 Select the Mapping reference for %QB0 (byte 0 Output data)
 Press the Radio button to launch the Input Assistant (PLC variables table)



Select the Variable that will reference Byte 0 of 580 Outputs



Complete Mapping all necessary 580 Output Data to PLC variables

The screenshot shows the 'EtherCAT I/O Mapping' window for 'Numatics_G3'. The 'Channels' table is as follows:

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Application.PLC_PRG.OutB0		Out000	%QB1	BYTE			Out000
Application.PLC_PRG.OutB1		Out001	%QB2	BYTE			Out001
Application.PLC_PRG.OutB2		Out002	%QB3	BYTE			Out002
Application.PLC_PRG.OutB3		Out003	%QB4	BYTE			Out003
Application.PLC_PRG.OutB4		Out004	%QB5	BYTE			Out004
		Out005	%QB6	BYTE			Out005
		Out006	%QB7	BYTE			Out006
		Out007	%QB8	BYTE			Out007
		Out008	%QB9	BYTE			Out008
		Out009	%QB10	BYTE			Out009
		Out010	%QB11	BYTE			Out010
		Out011	%QB12	BYTE			Out011

The 'IEC Objects' table shows:

Variable	Mapping	Type
Numatics_G3		ETCSlave

Legend: = Create new variable, = Map to existing variable

Complete Mapping all necessary 580 Input Data to PLC variables

The screenshot shows the 'EtherCAT I/O Mapping' window for 'Numatics_G3'. The 'Channels' table is as follows:

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
		Out145	%QB146	BYTE			Out145
		Out146	%QB147	BYTE			Out146
		Out147	%QB148	BYTE			Out147
		Out148	%QB149	BYTE			Out148
		Out149	%QB150	BYTE			Out149
Application.PLC_PRG.InB0		In000	%IB8	BYTE	0		In000
Application.PLC_PRG.InB1		In001	%IB9	BYTE	0		In001
Application.PLC_PRG.InB2		In002	%IB10	BYTE	0		In002
		In003	%IB11	BYTE	0		In003
		In004	%IB12	BYTE	0		In004
		In005	%IB13	BYTE	0		In005
		In006	%IB14	BYTE	0		In006

The 'IEC Objects' table shows:

Variable	Mapping	Type
Numatics_G3		ETCSlave

Legend: = Create new variable, = Map to existing variable

8.5 Aventics 580 EtherCAT™ configuration (Omron PLC)

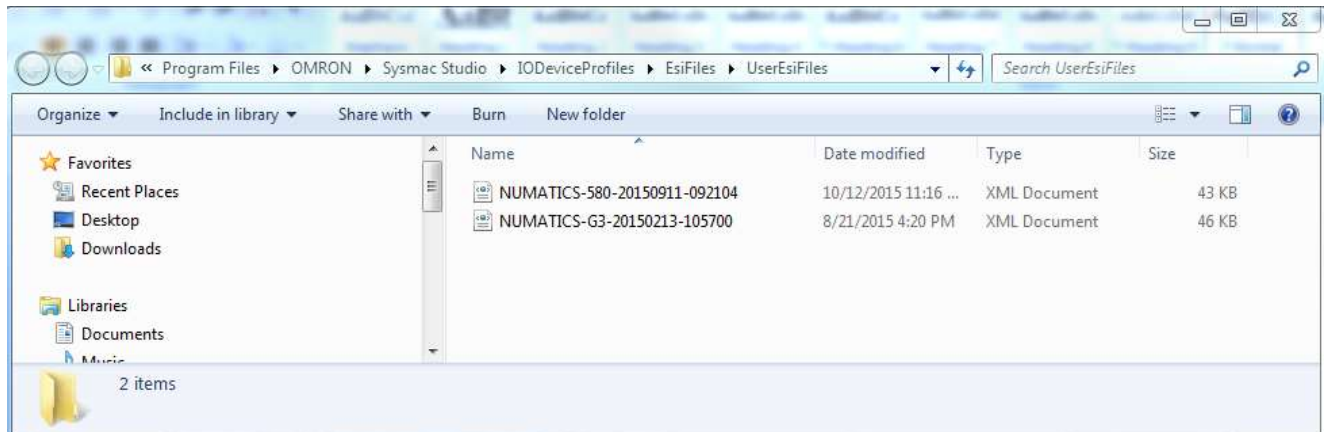
The following example illustrates the necessary steps to add an Aventics 580 EtherCAT™ Manifold to an existing Omron PLC configuration. This includes how to install the Aventics EtherCAT™ XML file and how to select the various software components to configure a 580 Manifold (XML files are available at www.emerson.com). The following examples assume an existing configuration based on Omron Sysmac Studio (V 1.13).

Install the Aventics 580 XML file

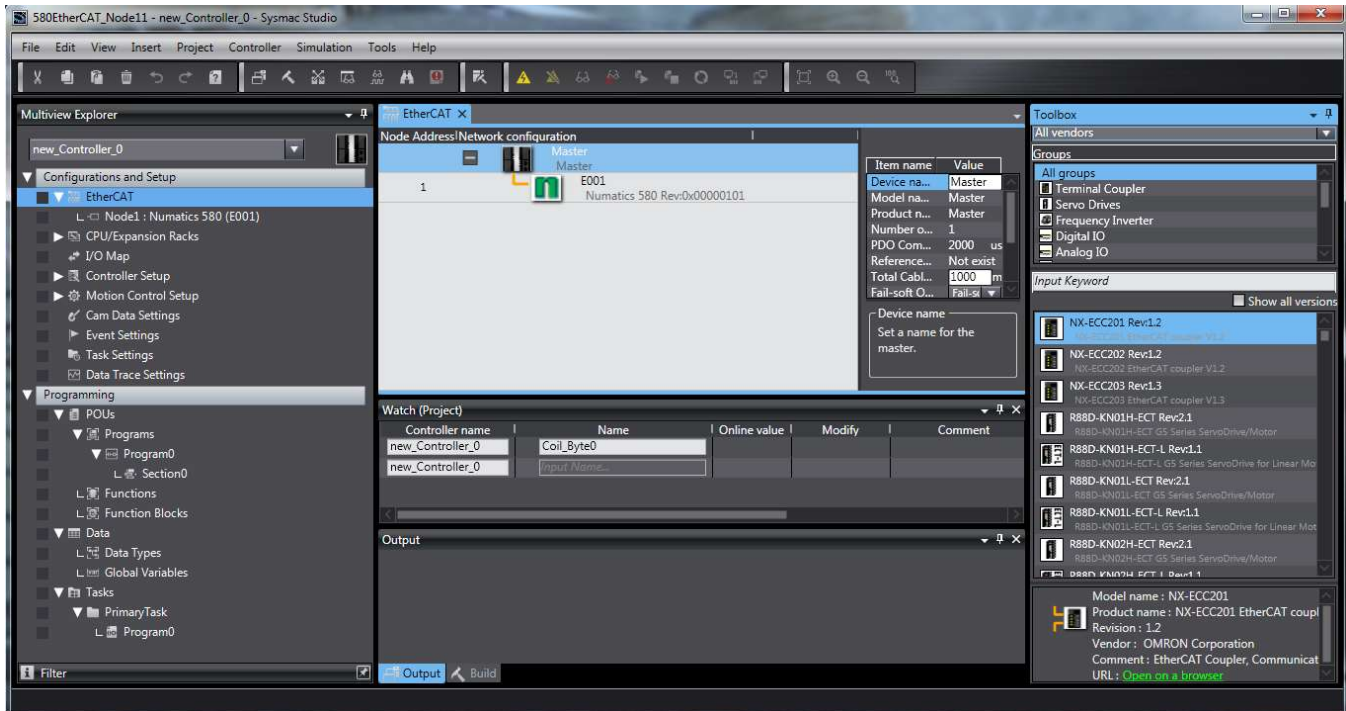
Copy the current Aventics XML file into the following Sysmac Studio directory.

Program Files\Omron\Sysmac Studio\IODeviceProfiles\EsiFiles\UserEsiFiles

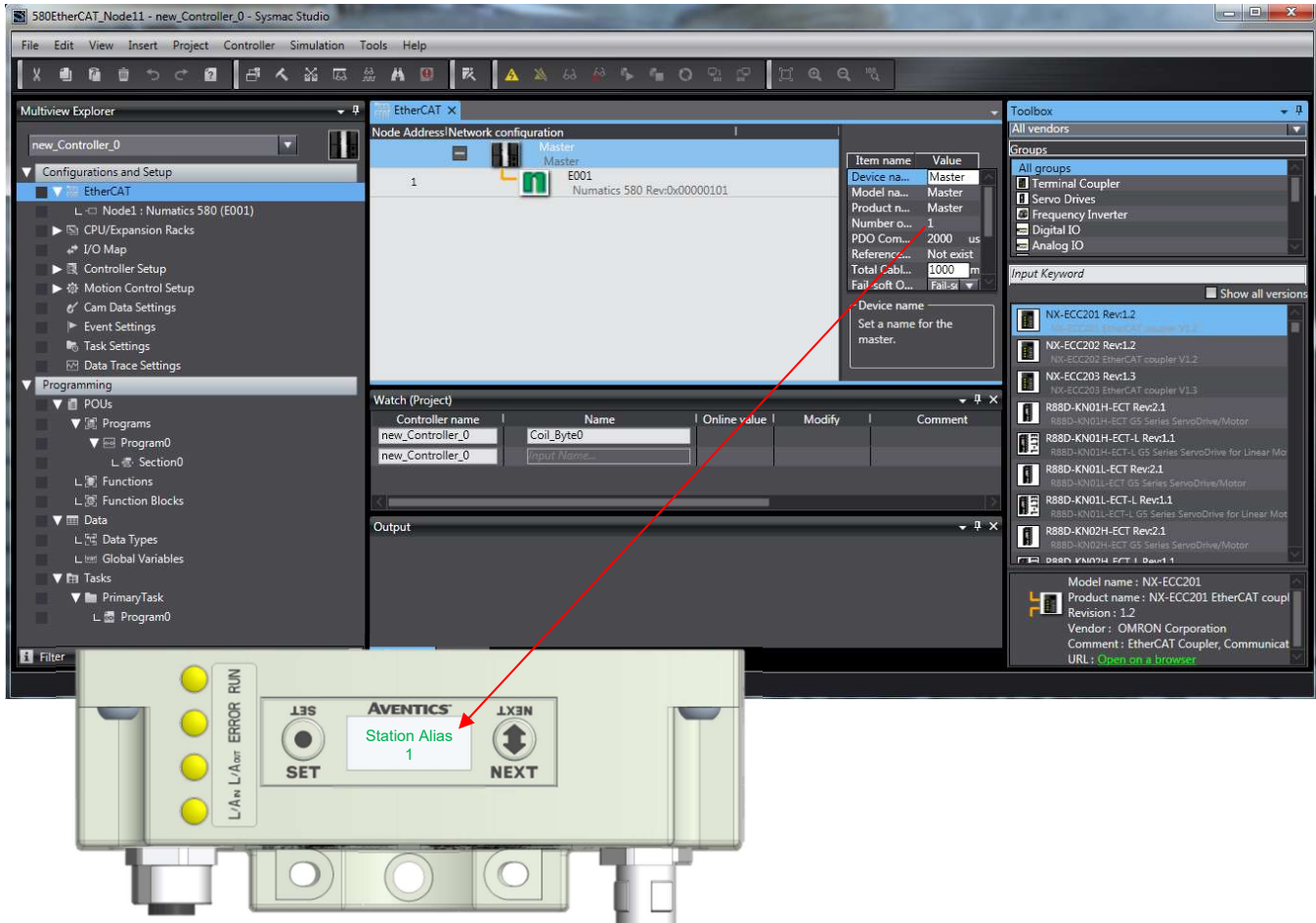
Launch Sysmac Studio



- Add the 580 EtherCAT node
- Open the Sysmac Studio project
- Double click EtherCAT
- Scroll through the devices under the toolbox list at the right to find the Numatics 580
- Drag the Numatics 580 to the EtherCat master



Configure the 580 EtherCat Node Address
 Set the 580 Station Alias to match the Omron Node Address setting
 For more information on setting Station Alias (see page 6-29)



Assign Variables to the 580 I/O map data for the PLC program
 Build the Controller project and Transfer to controller

Position	Port	Description	R/W	Data Type	Variable	Variable Comment	Variable Type
	▼ EtherCAT Network Configuration						
EtherCAT	Master						
Node1	▼ Numatics G3						
	Outputs0_Out000_2000_01		W	BYTE	G3_CoilByte_0	Coils 1-8 of Numatics Manifold	Global Variables
	Outputs0_Out001_2000_02		W	BYTE	G3_CoilByte_1	Coils 9-16 of Numatics Manifold	Global Variables
	Outputs0_Out002_2000_03		W	BYTE			
	Outputs0_Out003_2000_04		W	BYTE			
	Outputs0_Out004_2000_05		W	BYTE			
	Outputs0_Out005_2000_06		W	BYTE			

9. PROFIBUS™ DP Mapping

9.1 I/O Sizes – Rx/Tx

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.

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 is fixed. Please reference the following pages for a detailed mapping.

9.2 Bit Mapping Rules

The bit mapping for a 580 EtherCAT™ 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.



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.

9.3 Mapping Example No. 1

Assumed Settings

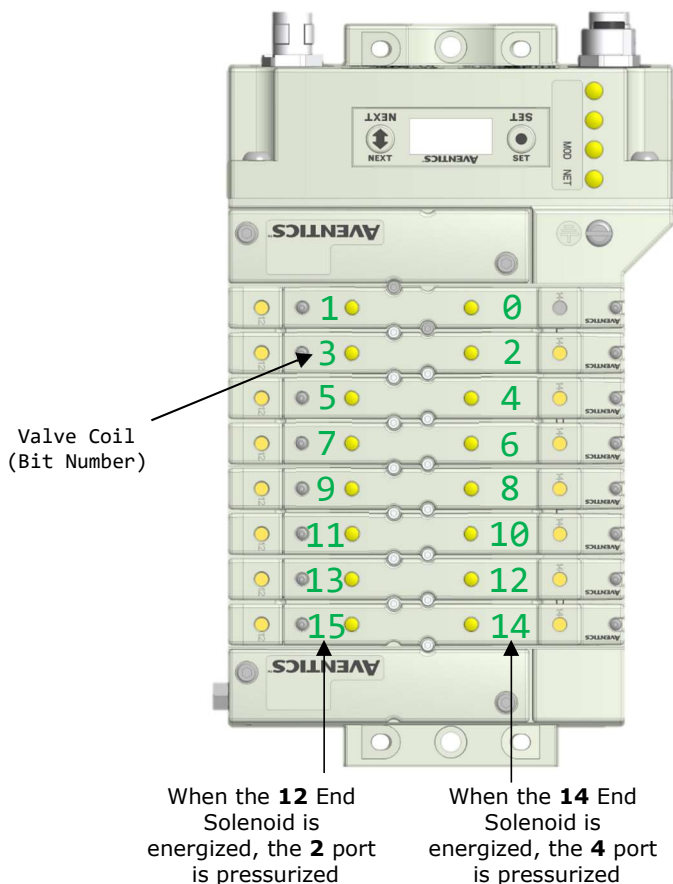
- Double Z-Boards™ used with all valves
- Diagnostic Word is present (non-settable)
- 32 coils (4 Bytes) allocated (non-settable)

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	P580AECC1010A00
	ASSEMBLED



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

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

9.4 Mapping Example No. 2

Assumed Settings

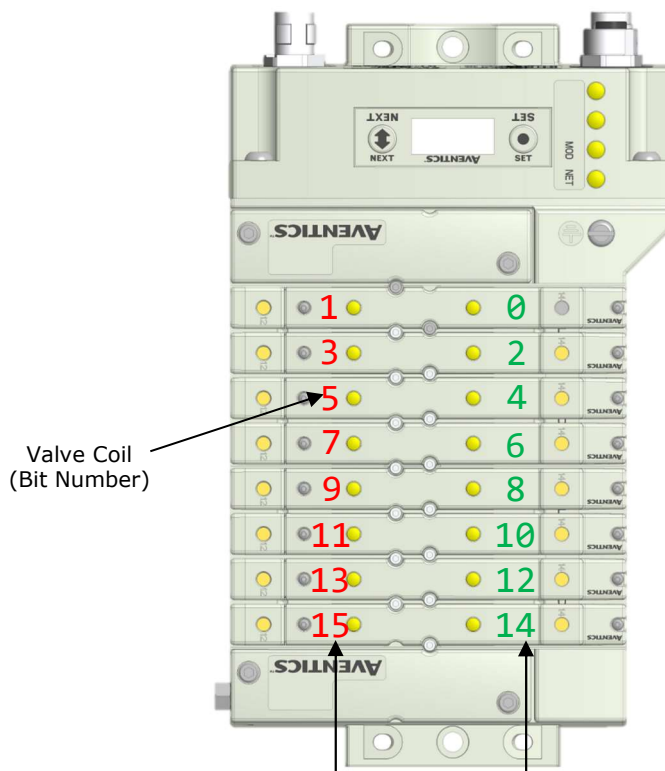
- Double Z-Boards™ used with all valves
- Diagnostic Word is present (non-settable)
- 32 coils (4 Bytes) allocated (non-settable)

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	P580AEEC1010A00
	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



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 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

9.5 Diagnostic Word

<i>Diagnostic Word Format</i>								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Power 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 (Power Status):

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

10. Appendix

10.1 System Specifications

<i>ELECTRICAL</i>	
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 4-19 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	-10 to 115°F (-23 to 46°C)

10.2 Factory Default Settings

<i>FACTORY DEFAULT SETTINGS</i>	
<i>Description</i>	<i>Default</i>
IP Address	192.168.3.120
Subnet Mask	255.255.255.0
Gateway IP	0.0.0.0
Web Server	Enabled
EtherCAT™	Enabled
Diagnostic Word	Enabled
I/O Status	Enabled
Fault Action	Reset to Off
Parameter Lock	Unlocked

10.3 Troubleshooting

Communication Node

<i>Symptom</i>	<i>Possible Cause</i>	<i>Solution</i>
The wrong valve solenoid coils are being energized.	Z-Board™ type mismatch. Single Z-Board™ present where Double Z-Board™ expected or vice versa.	Check that correct Z-Board™ types are installed. See page 9-77 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.

10.4 Glossary of Terms

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

Term	Description
Address Resolution Protocol (ARP)	A protocol used to set an IP address using a MAC Address hardware address. This can be done in the command prompt window.
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.
XDD File	XDD files are GSD files written in XML format. They describe the features of the ETHERCAT™ device model.
Explicit Messaging	Messaging that sends data to perform request/response functions.
Ground	This term is used to indicate an earth ground.
Idle	A zero (0) length poll message (i.e.: scanner in program mode)
IGMP Snooping	See Implicit Messaging
Implicit Messaging	A function that that can control I/O messaging to another I/O device.
Internet Group Management Protocol (IGMP)	A protocol used to keep local switches informed in a multicast group. Nodes that leave the group will no longer be sent packets of information from switches and routers.
Layer 2 (data link layer or level)	The data layer that physically refers to the frame format and addressing. A layer 2 address is an Ethernet address.
Layer 3 (network layer or level)	The data layer that refers to IP and the IP packet format. A layer 3 address is an IP address.
Link	A group of nodes with different MAC addresses. Segments connected by repeaters make a link. Links that are connected by routers make up a network.
MAC Address	Media Access Connection Address
Multicast	A transmission where a packet is sent to all possible nodes of a certain subset.
NEMA	National Electrical Manufacturers Association
Network	A group of nodes connected by a communication medium through repeaters, router, and gateways.
Node	A device on the network that contains a single MAC Address, which can communicate over a subnet.
Octet	8 bits of information. An IP address is made up of four octets.
Ping	A group of messages sent between a master and a slave that coordinates time.
Ping Request	A request to see if a device has received a message.
Ping Response	Response to a ping request.
Requested Packet Interval (RPI)	The frequency measure of the required transmission of data from the originating device to the target device.
Segment	Nodes connected to a continuous section of communication media.
Simple Network Management Protocol (SNMP)	A protocol used to monitor Ethernet devices, switches, routers, and networks connected by communication media.

Glossary of Terms Continued

Term	Description
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive
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
Subnet	Nodes using the same protocol and shared media access arbitration.
System	Contains one or more domains.
Time to Live (TTL)	A method used in best-effort delivery systems to negate endlessly looping packets.
Unicast	A transmission where a packet is sent to a single node.
Word	2 Bytes (16 bits)
Z-Board™	Circuit board installed in the valve manifold which electrically connects the valve solenoid to the electrical /electronics interface. Available in single or double solenoid versions.

10.5 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.emerson.com