

AVENTICS™

580 CHARM Technical Manual



Conditions For Use Of This Product

AVENTICS™ G3 Manifold ("the PRODUCT") SHALL NOT BE USED IN CONDITIONS where any problem, fault or failure occurring in the PRODUCT may lead to any incident resulting in damage to property, serious injury or loss of life and where the end user does not have appropriate external backups and fail-safe measures incorporated within the systems that the PRODUCT is used.

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

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

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.



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



- AVENTICS valve systems with integrated fieldbus communications must only be connected to a Class 2 power source.
- All AVENTICS communication nodes should be grounded during the installation process. Proper grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.
- All AVENTICS G3 Electronics Products must only be installed or wired in accordance with ASCO AVENTICS published instructions and applicable electrical codes.
- When using MULTIPLE CLASS 2 POWER SOURCES all sources shall be Listed and rated suitable for parallel interconnection.
- All field wiring shall be suitable for Class 1, Electric Light and Power, or if Class 2, 3 wirings, such wirings shall be routed separately and secured to maintain electrical and physical separation between Class 2 wiring and all other class wiring and limited energy circuit conductors from unlimited energy circuit conductors.
- When using Class 2 Device Wiring Only, you SHALL NOT Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.
- When using molded connector power cables, **DO NOT RELY ON WIRE COLORS FOR PIN-OUT;** Always use pin number references.
- Wire connections shall be rated suitable for the wire size (lead and building wiring) utilized.

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1. About CHARM Overview

Electronic Marshalling – part of Emerson Process Management’s “I/O on Demand” was developed to focus on the areas of commissioning process automation systems that are the most complex, involve many hours of labor, or that can disrupt a project the most. Electronic Marshalling offers some unique value propositions, which can help alleviate the pains previously discussed. As in wired marshalling, the multi core cables from the field still land on the right side of the terminal blocks in the marshalling cabinet, so there are no changes to the work done by technicians that wire up the multi core cables from the field. However, there are no cross-marshalling wires; all of the work, design, and engineering associated with cross-marshalling simply go away, because each individual I/O channel will be “Electronically Marshalled” to any controller in the system. This means that the I/O can be bound to specific controllers at any stage in the project. If late changes are made to I/O types, or new I/O is added, no adjustments to existing wiring or the cabinets must be made. New I/O can be added to the marshalling cabinets and Electronically Marshalled to the controllers that need the I/O.

Now an exciting technology from Aventics extends Electronic Marshalling, and for the first time allows integrated control of pneumatic valve manifolds on one network. The Aventics 580 CHARM node, attached to an Aventics 501/502/503 Series valve manifold, can interface directly with the DeltaV Characterization Module (CHARM) I/O card from Emerson.

1.1 580 CHARM Features

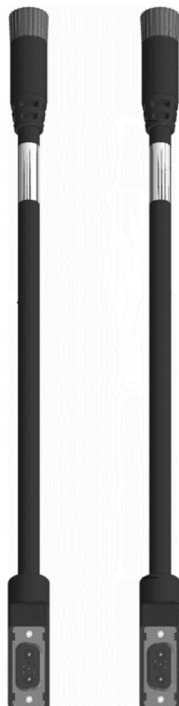
<i>Features</i>	<i>Description</i>
Termination Resistor	Terminating Resistor is built into the Aventics CHARM module
Conformance Tested	Tested by Emerson Process Management for conformance

1.2 Cabling

CHARM Power and Communication cables:

Part number: P599AF519387001 – 1.5M Length (set of 2 cables)

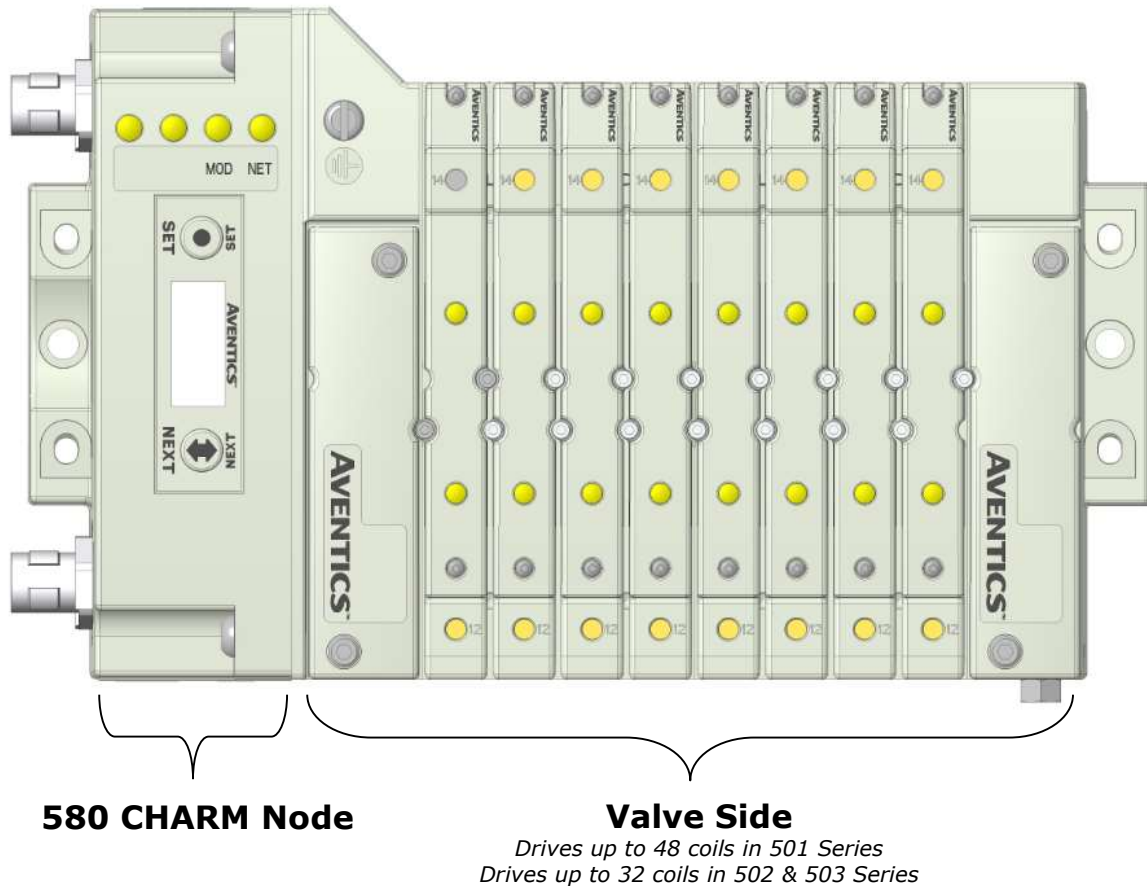
Part number: P599AF519387002 – 0.5M Length (set of 2 cables)



2. 580 CHARM Introduction

The 580 CHARM Node is an electronic interface that features an integrated graphic display for simple commissioning and displaying of diagnostic information. The 580 CHARM Node connects to a variety of valve series including, the 501, 502, and 503. The 580 CHARM Node is capable of addressing a total of (48) coil outputs in the 501 Series and (32) coil outputs in the 502 & 503 Series, with diagnostic functionality built in. With proper assembly and termination, the 580 CHARM Node has an IP65 rating.

This manual details specific information for configuring and commissioning the Aventics 580 CHARM Node. For more information relating to pneumatic valves and valve manifold assemblies, please refer to the Aventics *501, 502 & 503 Series Catalogs* at www.emerson.com.



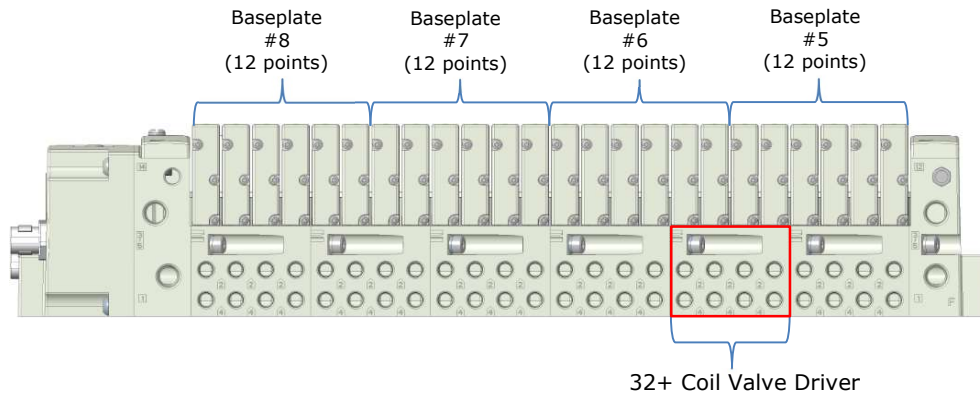
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2.1 Coil Capability

<u>Valve Series</u>	<u>Max. number of coils per manifold</u>
501	48*
502	32
503	32

* In order to achieve 48 coils using the CHARM module the user will be required to use a 24 Station (48 Coil) 501 Series manifold.

This manifold will utilize a special manifold block that includes another valve driver that is in addition to the driver in the 580 CHARM module.



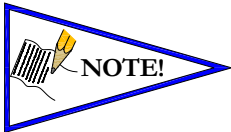
<u>Product Image</u>	<u>Description</u>	<u>Thread Type</u>	<u>Port Size</u>	<u>Part Number</u>
	501 32+ Solenoid 4-Station Manifold Block w/X32 Valve Drivers	Metric Thread	M7	H501AFM4BMA0010
		Push-in Fittings	1/4	K501AFM42MA0010
			6mm	K501AFM4FMA0010
			4mm (5/32)	K501AFM4DMA0010

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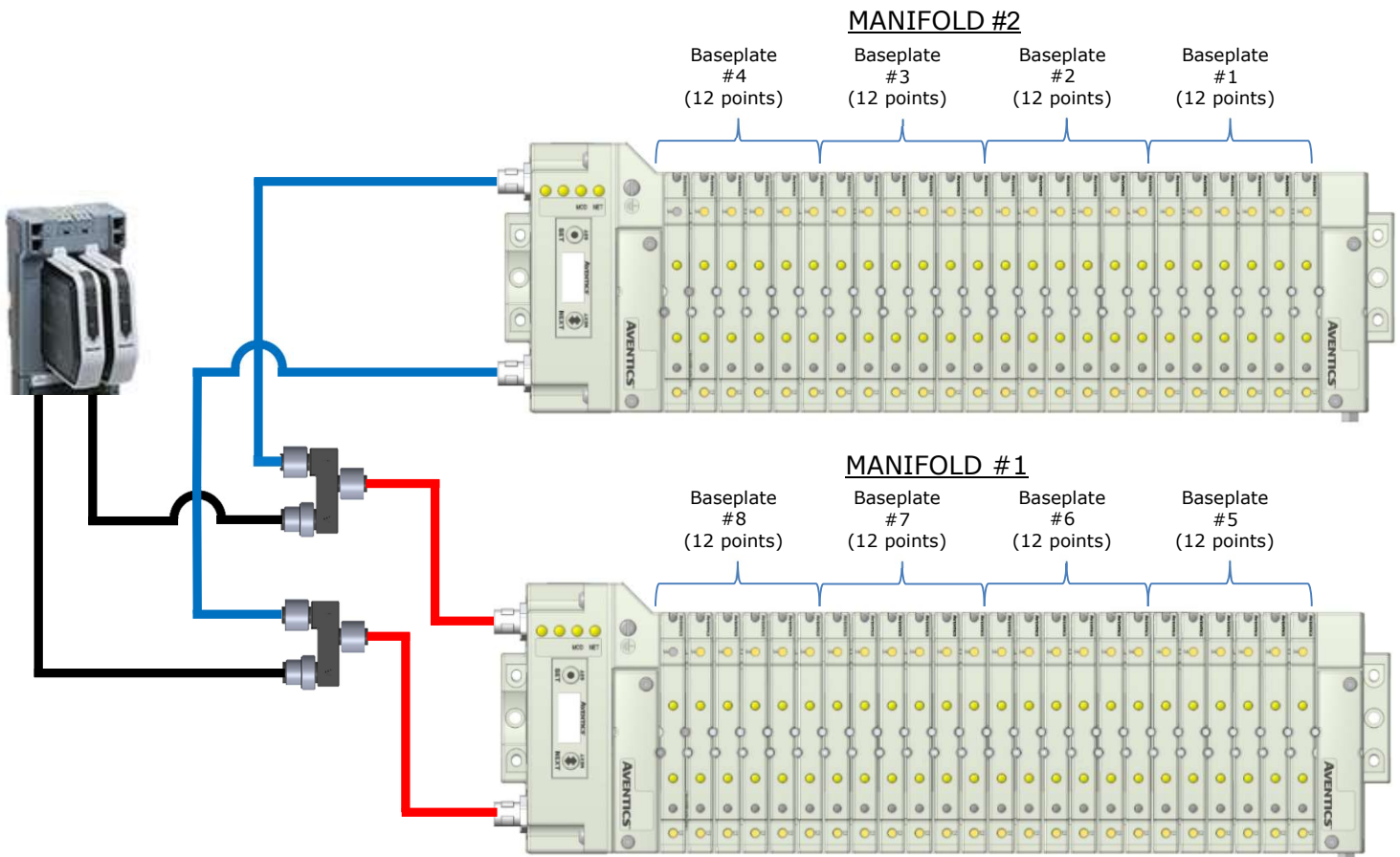
2.2 Maximum Coil Capability

If a user requires more coils than a single valve manifold can provide, multiple valve manifolds may be connected to a single CIOC when using the appropriate cable sets

- In order to achieve the maximum number of coils available using a single CIOC and the CHARM module the user will be required to use two valve manifolds in conjunction with each other.
- The first valve manifold will utilize base plates 8 through 5 and the second valve manifold will utilize base plates 4 through 1.



- 501 Series is capable of 96 coils max. (Uses two 501 24 station [48 Coil] manifolds).
- 502 & 503 Series are capable of 64 coils max. (Uses two 502 or 503 Series 16 or 32 station manifolds).



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2.3 Multiple manifold CHARM Cable Sets:

- In order to attach multiple manifolds to one CIOC, two separate cable kits must be used.

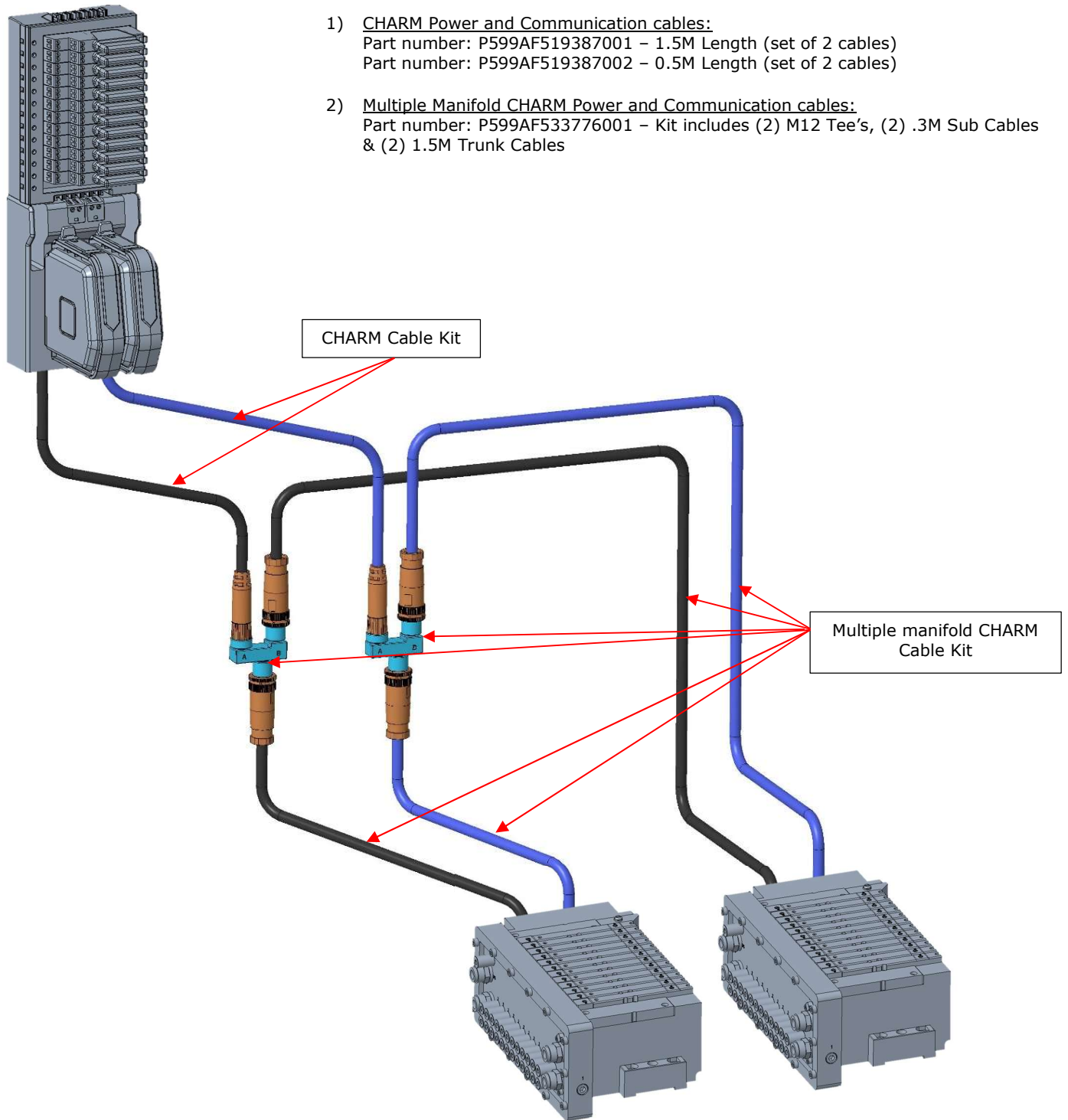
1) CHARM Power and Communication cables:

Part number: P599AF519387001 – 1.5M Length (set of 2 cables)

Part number: P599AF519387002 – 0.5M Length (set of 2 cables)

2) Multiple Manifold CHARM Power and Communication cables:

Part number: P599AF533776001 – Kit includes (2) M12 Tee's, (2) .3M Sub Cables & (2) 1.5M Trunk Cables

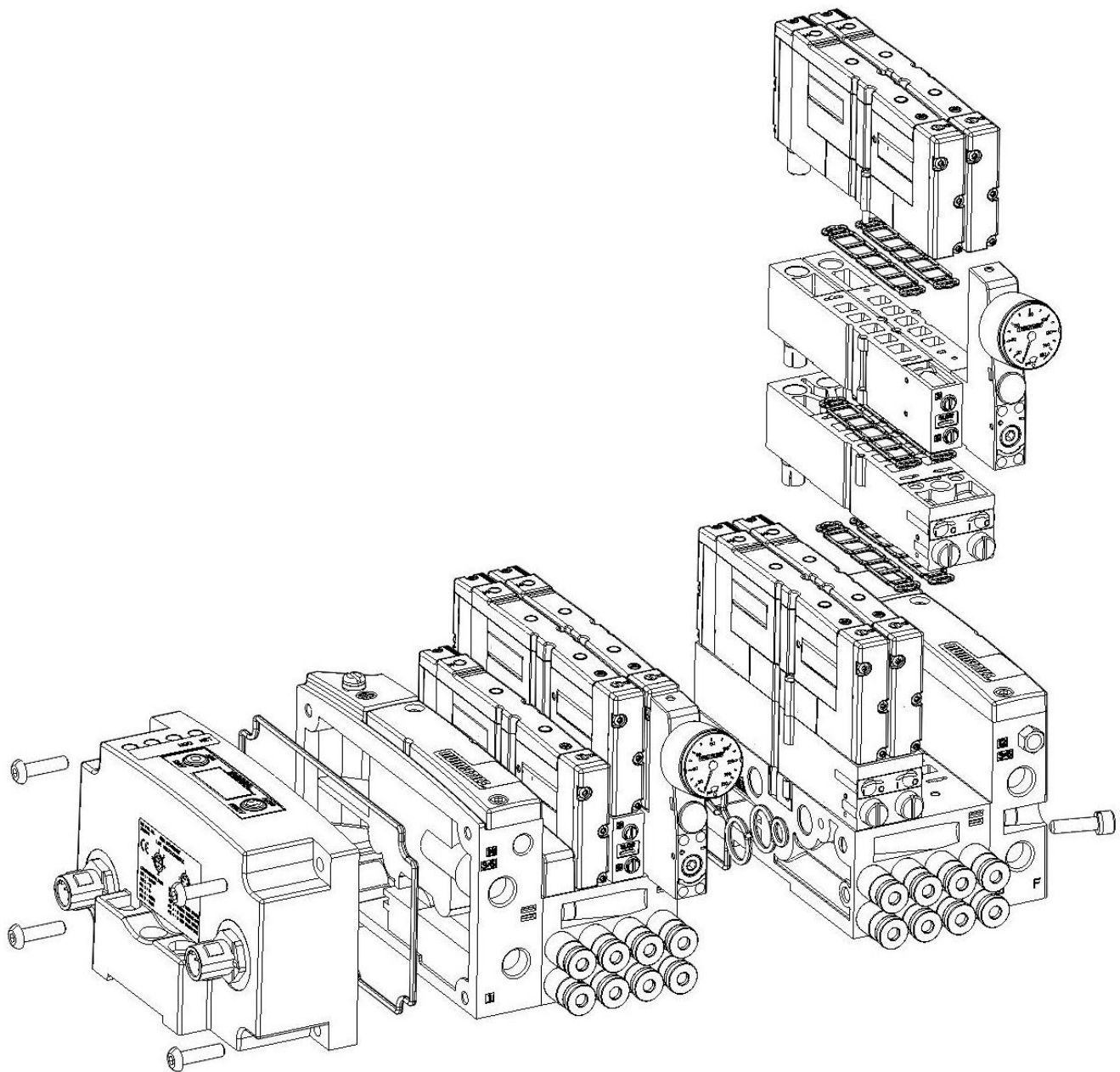


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2.4 Pneumatic Valve Manifold

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



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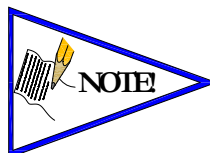
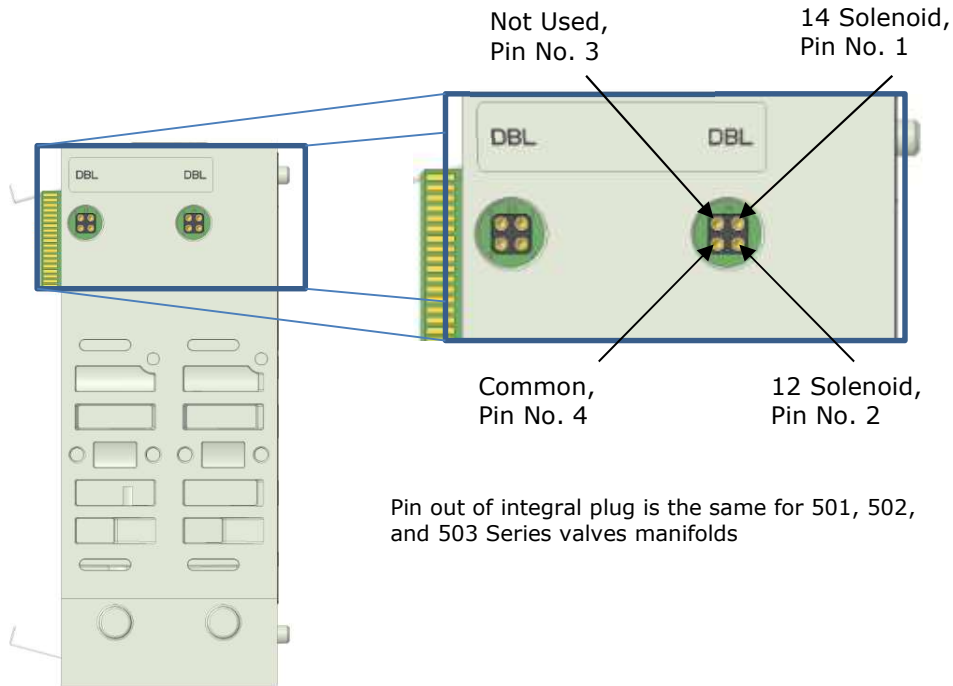
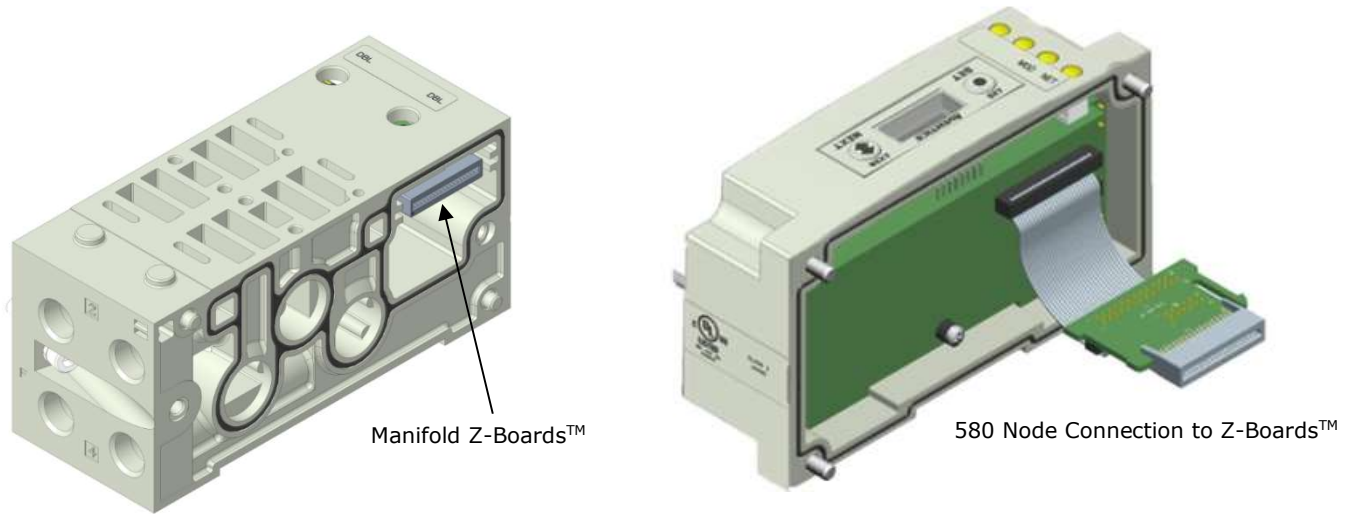
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2.5 Solenoid Coil Connections using Z-Board™ Technology

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 48 coil outputs available on the complete manifold assemblies. The 48 available outputs are accessed on the 501 series valves utilizing 3 or 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.

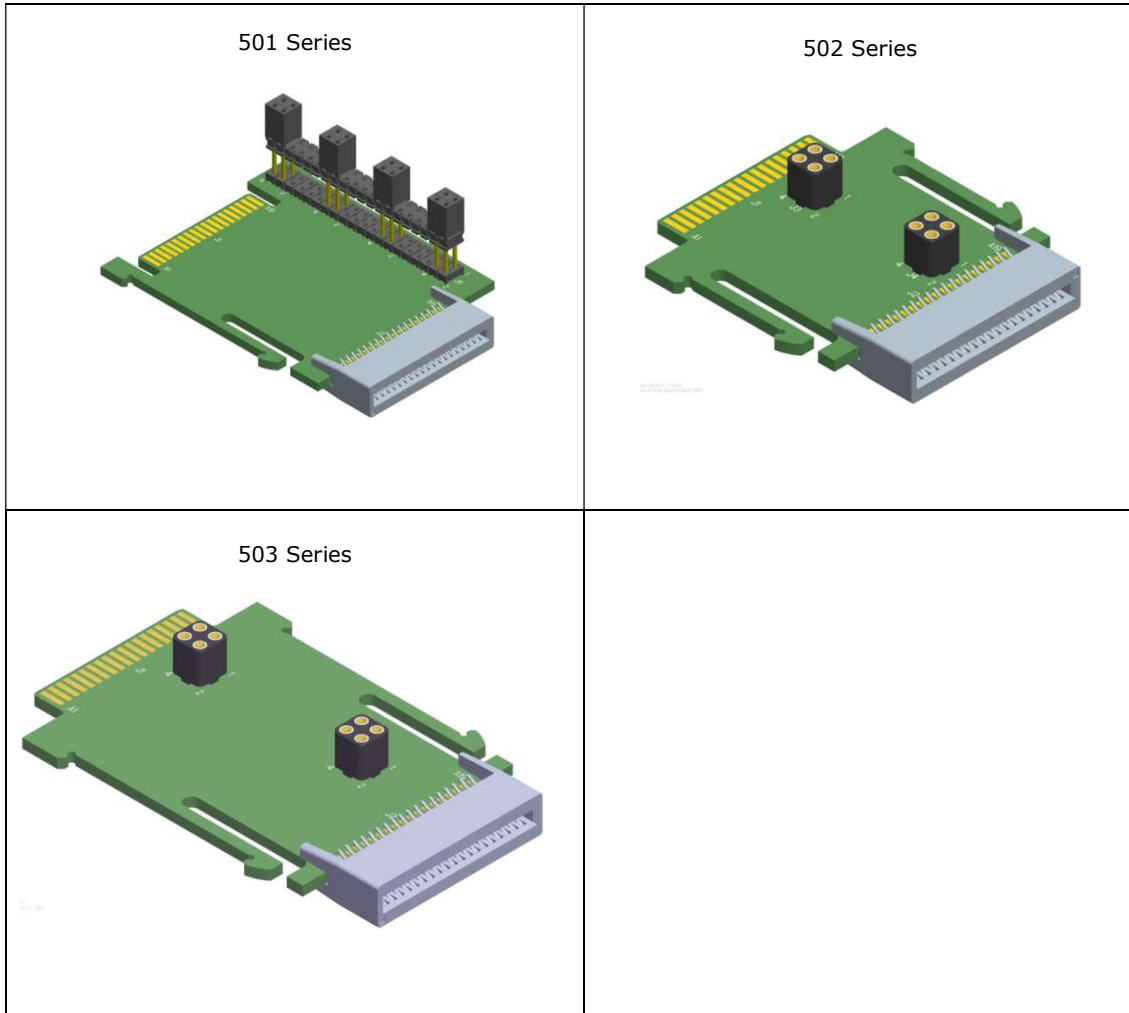


A single solenoid valve's coil is always on the "14" end of the valve.

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2.6 Z-Board™ Connectors

The 501/502/503 valve series utilize 3 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 48 single, 24 double, or various combinations of valve coil output capabilities. The 501 Z-Board™ is minimum (3) station, the 502 and 503 Z-Board™ is minimum (2) stations.

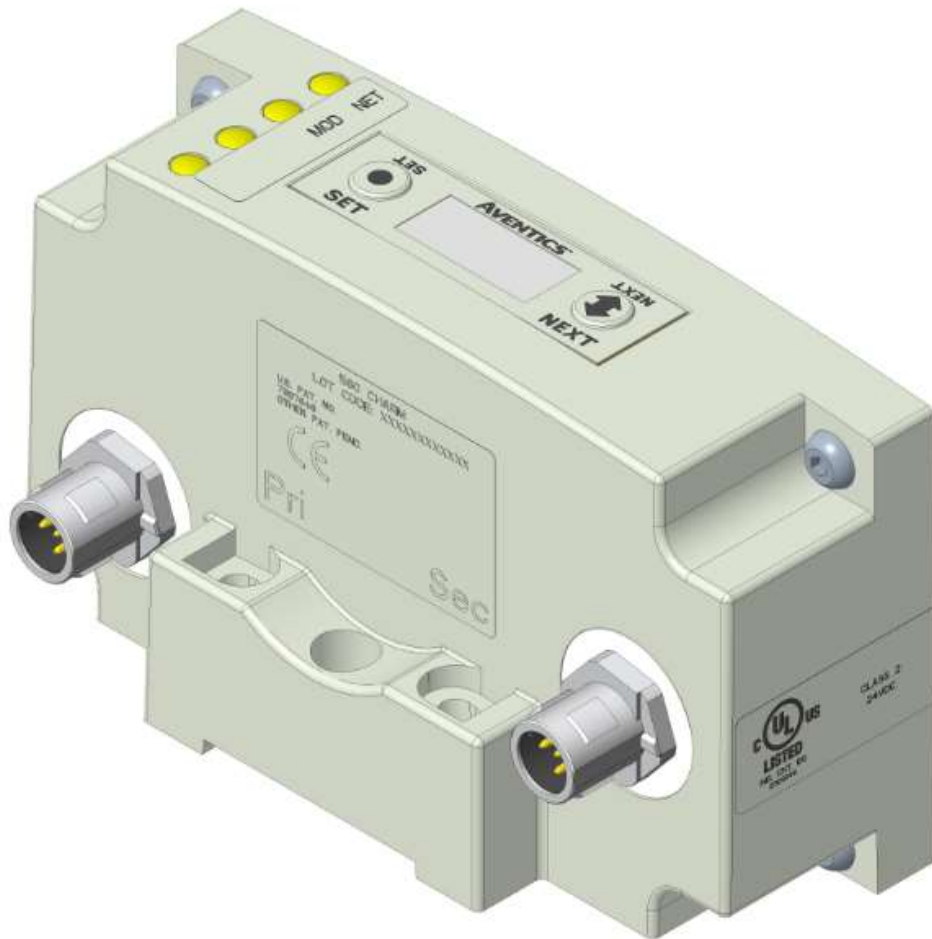


Each series Z-Board™ can be selected in either SINGLE or DOUBLE output (coil) versions. The SINGLE and DOUBLE output function cannot be mixed on the Z-Boards™

3. CHARM Communication Node

This module is the Communication Node to the manifold. It contains the communication electronics. It can be configured via the graphic display or via software (DeltaV).

Communication Node	Part Number
580 CHARM Node	P580AECH2010A00
580 CHARM Node w/DIN Rail	P580AECH2010DRM

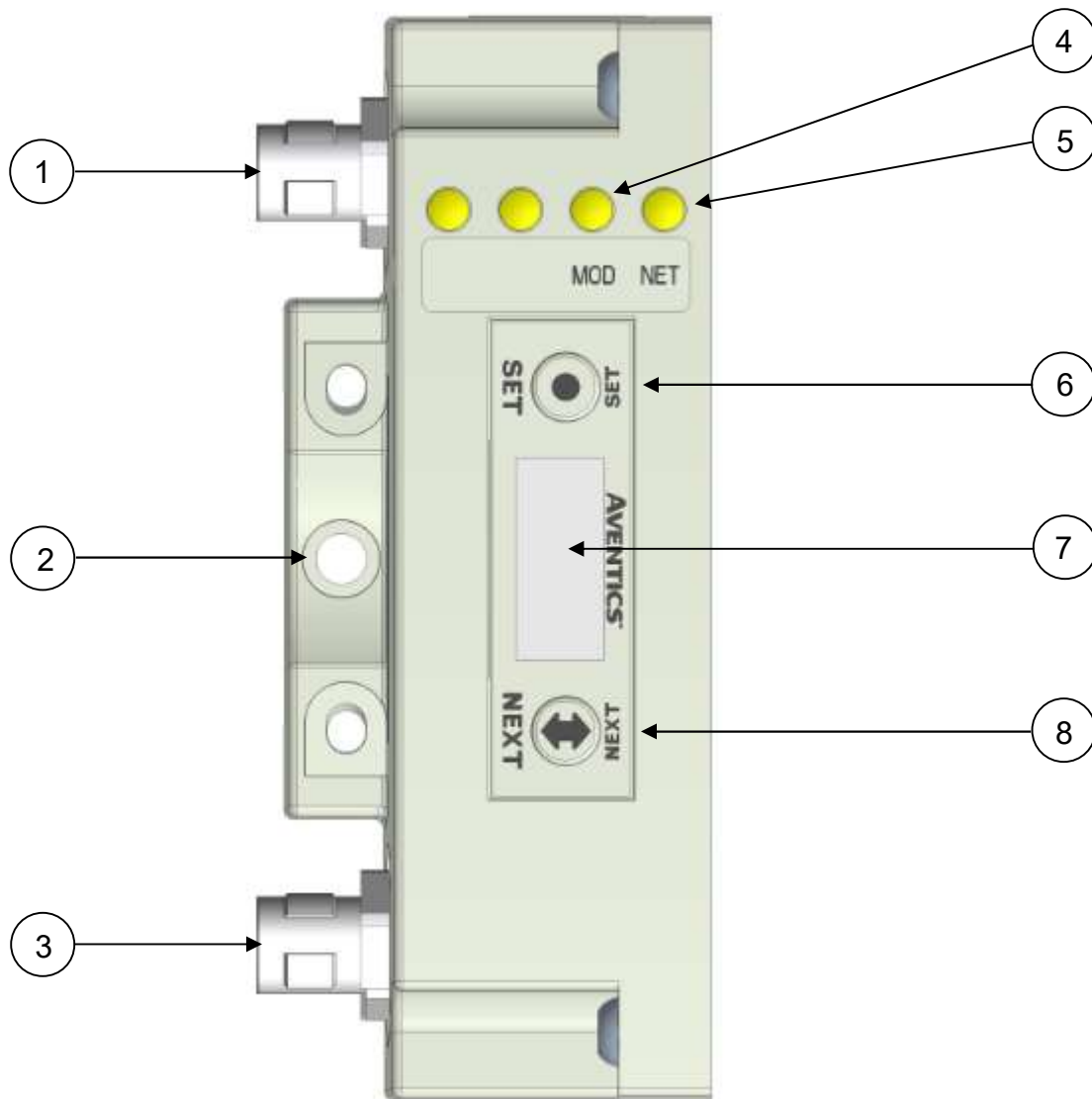


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3.1 CHARM Node Description

Detail No.	Description
1	5 Pin M12 Male Power & Communication (Primary)
2	Mounting Hole
3	5 Pin M12 Male Power & Communication (Secondary)
4	Module Status LED
5	Network Status LED
6	SET Button - used to navigate through user menus and to set parameters
7	Graphic Display - used to display parameter information
8	NEXT Button - used to navigate through user menus and to set parameters



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3.2 Connector Pinouts

Industry standard M12 connectors are used for communication and power.
The CHARM power & communication connector is a single keyway 5 pin male connector.

CHARM Power & Communication Connector Pin-Out (Primary and Secondary).

Pin No.	Function	Description
1	+24 VDC	Valve Power
2	+6.3 VDC	Node Power
3	Communication +	Communication +
4	Communication -	Communication -
5	0 V	Valve and Node Power Common (0 VDC)



- The draw of the +24VDC Valve pin cannot exceed 4 Amps, at any given moment in time.
- The Node Power pins supply power to the node electronics. These pins must be powered at all times for communication node to be functional.
- Connect to Class 2 power source only.

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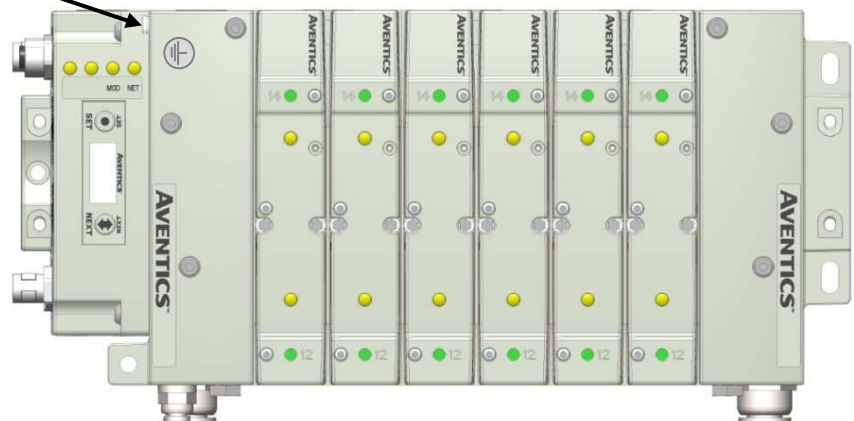
3.3 Chassis Ground

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

CHASSIS GROUND CONNECTION POINT,
501 VALVES



CHASSIS GROUND CONNECTION POINT,
502 & 503 VALVES



CAUTION

- When grounding to a machine frame, please ensure that the machine frame itself is already properly grounded.
- Better grounding can be achieved when larger diameter (lower gauge) wire is used.

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3.4 Power Consumption

Power Connection

Pin No.	Function	Description
1	+24 VDC	Valve Power
2	+6.3 VDC	Node Power
3	Communication +	Communication +
4	Communication -	Communication -
5	0 V	Valve and Node Power Common (0 VDC)

Power Rating

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

Component	Tolerance	+24VDC (Valve) Pins 1&5		+6.3VDC (Node) Pins 2&5	
		Current Per Coil	Power Per Coil	Current	Power
Solenoid Valve Coil 501 (Each)	+10%/-15%	0.03 Amps*	0.8 Watts	NA	NA
Solenoid Valve Coil 502 (Each)	+10%/-15%	0.05 Amps*	1.0 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	+10%/-15%	0.07 Amps*	1.7 Watts	NA	NA
580 CHARM Node	+/- 10%	0.025 Amps	0.6 Watts	0.10 Amps	0.63 Watts

*Current is based on PWM control



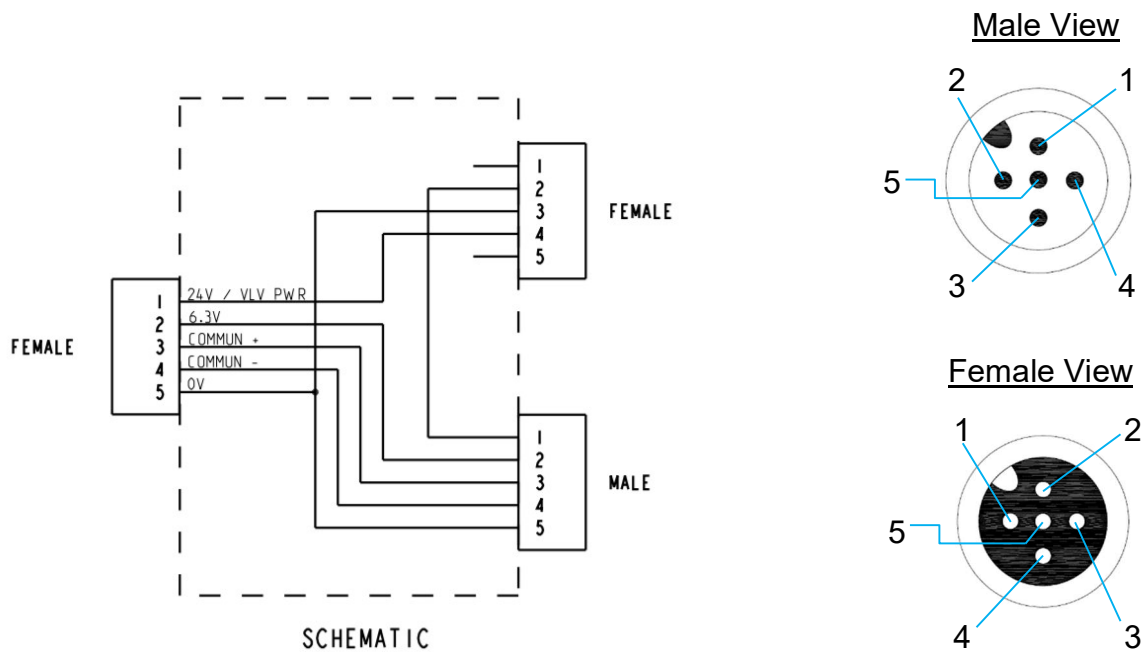
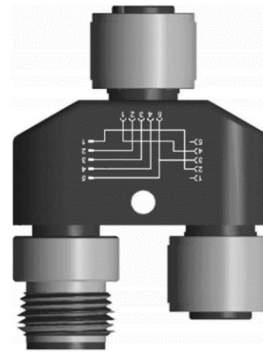
- The Node Power pins supply power to the node electronics. These pins must be powered at all times for the communication node to be functional. See page 3-15 for reference.
- Reverse polarity protection is provided.

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3.5 Valve Power Isolator

- The Valve Power Isolator allows the user to separate the 24VDC valve power and the 6.3VDC communication power.
- In a typical installation there would be an isolator used on each connector of the CHARM manifold due to redundancy.

Description	Part Number
Valve Power Isolator	P599AF516881001



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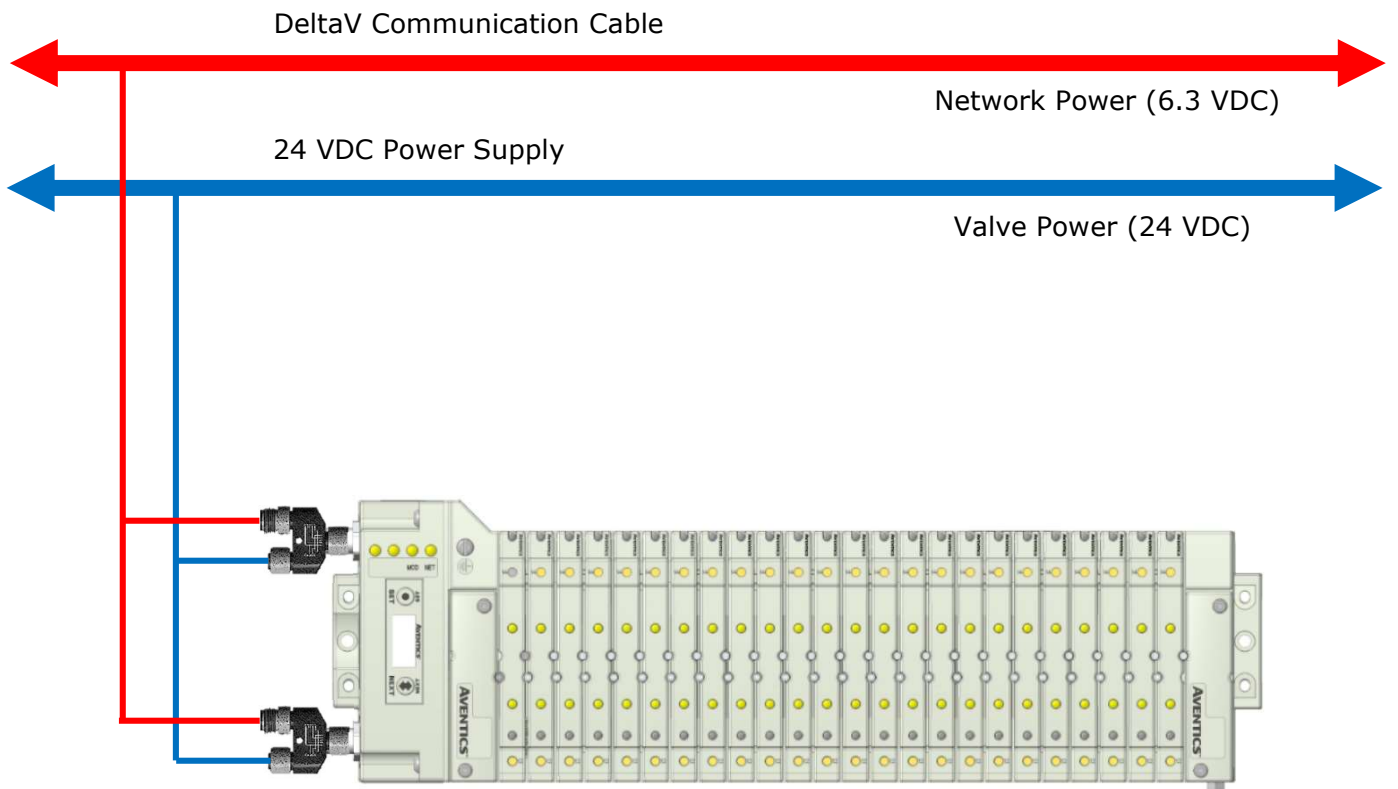


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Example layout using Valve Power Isolator



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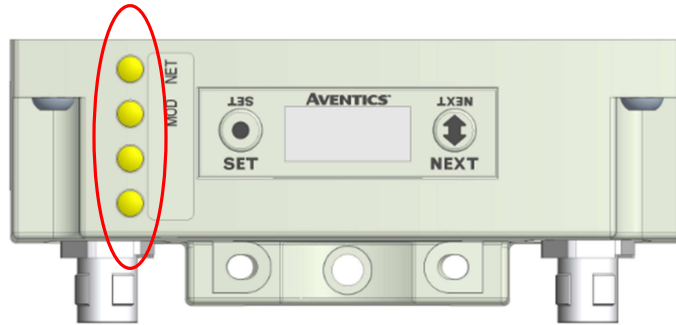
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3.6 580 CHARM Node LED Functions

Upon power up, the Module and Network Status LEDs indicate the state of the unit. There are two LEDs on the 580 CHARM Interface. The LEDs functions are described in the table below.



LED Name	Color	Pattern	Description
NET NETWORK STATUS	Off	OFF	CHARM is unpowered or non-functional.
	Green	ON	The CHARM status is good, and the CHARM is configured.
		Flashing twice per second	The CHARM is not configured. If DeltaV Diagnostics displays BAD status for this CHARM, a configuration error such as a configuration mismatch, has occurred. If DeltaV Diagnostics displays GOOD status for the CHARM, the CHARM has not been configured.
		Flashing 10 times per second	A user has issued an "Identify" command from DeltaV Explorer or DeltaV Diagnostics application. This is not a fault and no action is required.
	Red	ON	No Communications on the bus or no address.
		Flashing twice per second	Open/Shorted coil or field power missing.
		Flashing 10 times per second	Duplicate Address or CHARM cables swapped.
	Green Red	Alternating twice per second	The CHARM is being upgraded or is in upgrade mode (no coil control in this state).
		Green then red flashing four times per second	A CHARM fault (such as a bad address or a faulty CHARM bus) exists that does not affect the coil status
		Green then red flashing briefly once every 1.5 seconds	The CIOC has placed the CHARM is in fail safe state.
MOD MODULE STATUS	Off	OFF	Critical hardware fault. Microprocessor is not running.
	Red	ON	
	Green	ON	Normal operation. The device is operating properly.
	Green Red	FLASHING	Module is in coil self-test mode. Cycle power to end coil self-test mode.

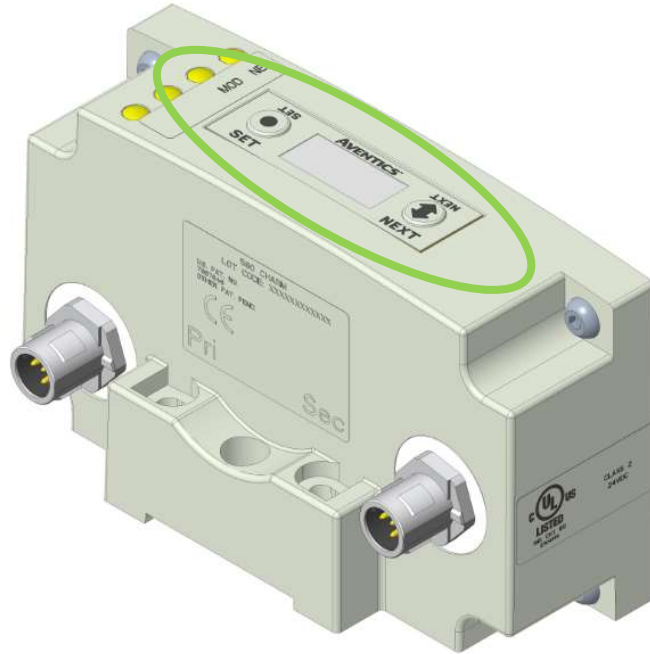
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3.7 Valve Coil Short Circuit / Open Load Protection

<i>Output Type</i>	<i>Output State</i>	<i>Fault Conditions Identified</i>
Valve Solenoid Coil Driver	ON	No Fault
		Fault - Short Circuit, Over Temp/Over Current
		Fault - Open Load
Valve Solenoid Coil Driver	OFF	No Fault
		Fault - Open Load

4. CHARM Node Graphic Display

The 580 CHARM Node has an integrated graphic display that may be used to configure the parameters of the Node as well as show diagnostic information.

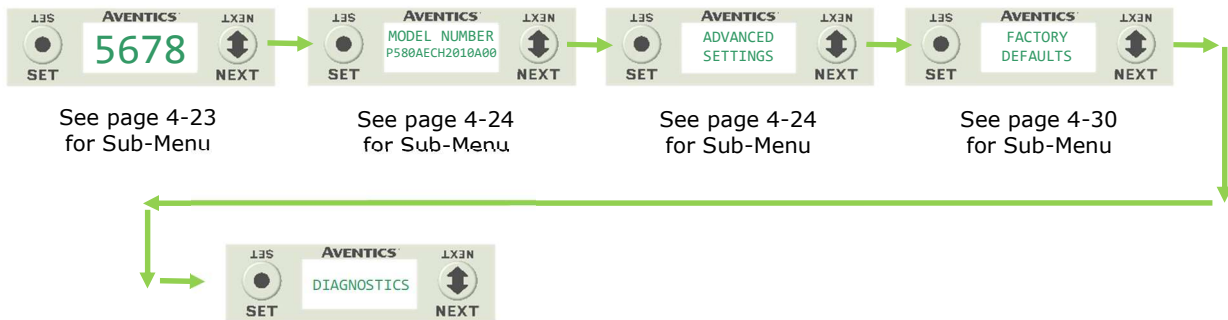


The following graphic displays represent the main menu selections of the 580 CHARM node. Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below for further details and descriptions of the Sub-Menus.



• WHEN CHARMS ARE ENABLED IN DELTAV EXPLORER, MANUAL CHANGES TO NODE PARAMETERS ARE NOT ALLOWED! TO DISABLE CHARMS SEE PAGE 6-47

Home Screen



See page 4-23 for Sub-Menu

See page 4-24 for Sub-Menu

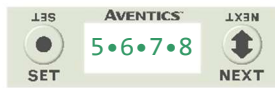
See page 4-24 for Sub-Menu

See page 4-30 for Sub-Menu

See page 4-30 for Sub-Menu

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4.1 Bank Address Sub-Menu



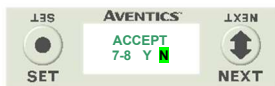
1. Press the **SET** button to enter the ADDRESS sub-menu.



2. Press the **NEXT** button to scroll through the choices for the Bank address/addresses of the node.

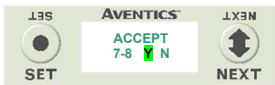


3. Press the **SET** button to select the appropriate address.

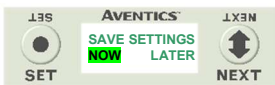


4. Press the **NEXT** button to select **Yes** or **No** to accept the address shown on the display,

- Selecting **No** will bring you back to the main Address menu.
- 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**.

- 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 and allow you to make additional parameter changes before the node is reset. However, you must **ACCEPT** the saved changes before your next power cycle otherwise they will be lost.

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



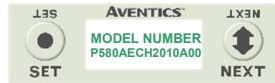
- Addresses 8, 7-8, 6-7-8 and 5-6-7-8 are valid for up to 48 coils. Addresses 4, 3-4, 2-3-4 and 1-2-3-4 are only valid if using more than 48 coils in 501 or 32 coils in 502/503.



- If bank address 8 is used in the address of the manifold it will automatically utilize a Terminating Resistor that is built into the module.
- The opposite is also true, if bank address 4 is used in the address of the manifold the internal terminator will automatically be disabled.

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4.2 Model Number



1. The Model Number is reference only.

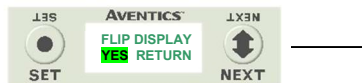
4.3 Advanced Settings Menu – Flip Display



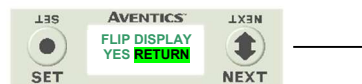
1. Press the **SET** button to enter the ADVANCED SETTINGS menu.



2. Press the **NEXT** button to advance to the ADVANCED MENU FLIP DISPLAY screen.



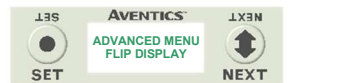
3. Press the **SET** button to enter the FLIP DISPLAY sub menu.



4. Press the **NEXT** button to change this selection.
 - a. YES
 - b. RETURN



5. Press the **SET** button to confirm your selection.



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4.4 Advanced Settings Menu – Addressing Scheme



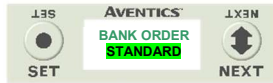
1. Press the **SET** button to enter the ADVANCED SETTINGS menu.



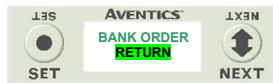
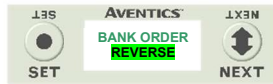
2. Press the **NEXT** button to advance to the ADVANCED MENU ADDR. SCHEME screen.



3. Press the **SET** button to enter the ADDR. SCHEME sub menu.

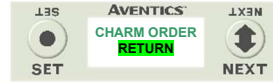
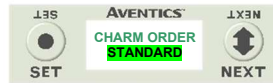
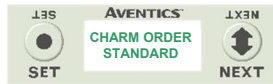


4. Press the **NEXT** button to change this selection.
 - a. BANK ORDER
 - b. CHARM ORDER
 - c. RETURN TO ADVANCED



Press the **SET** button to confirm selection

5. Press the **NEXT** button to select the appropriate option.
 - a. STANDARD, REVERSE or RETURN for BANK ORDER and CHARM ORDER.
 - b. DISABLED, ENABLED or RETURN for 36 COIL OPT.
 - c. Press the SET button to confirm choice and then press the SET button again when the screen prompts Y or N.
 - d. Press the SET button to confirm if you want to make the changes NOW or LATER.
 - e. Selecting LATER will cause the new Address to be saved in temporary memory and allow you to make additional parameter changes before the node is reset. However, you must ACCEPT the saved changes before your next power cycle otherwise they will be lost.



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

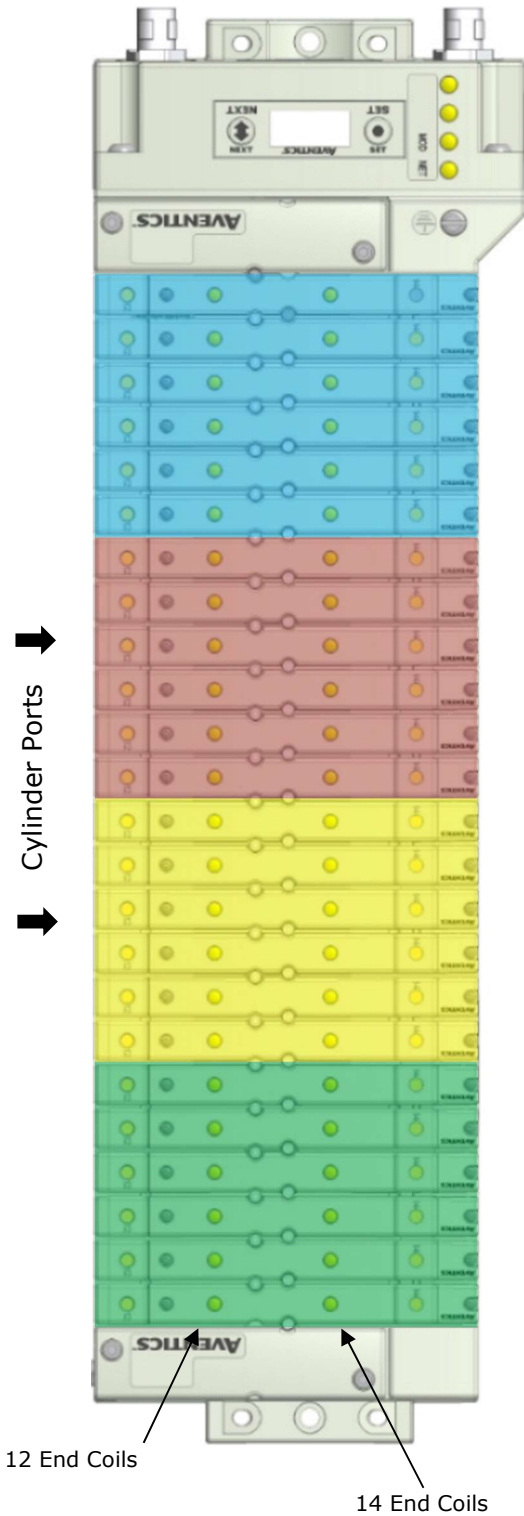


• The "36 COIL OPT." menus will only show if the address is set to 6-7-8 or 2-3-4.

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Example of Bank Order and CHARM Order mapping:

Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
8	5	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
7	6	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
6	7	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
5	8	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02

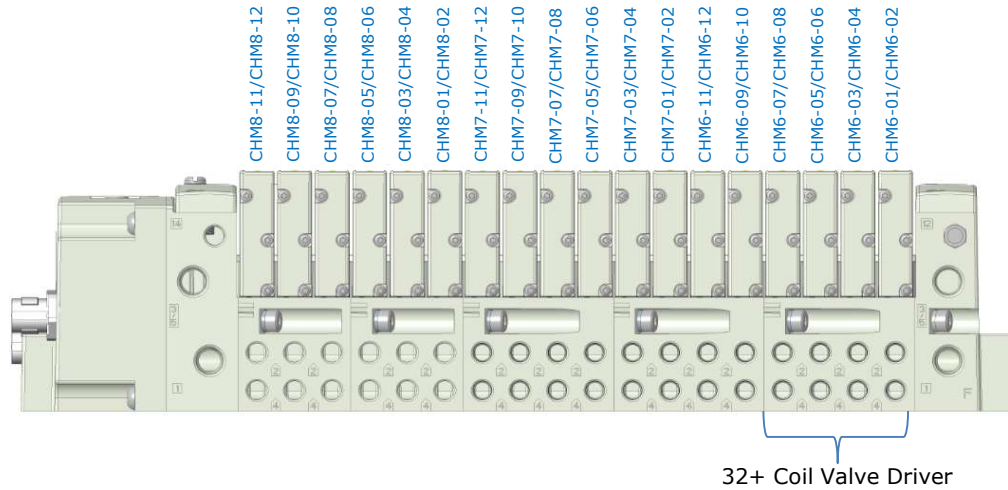


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4.5 36 Coil Optimization

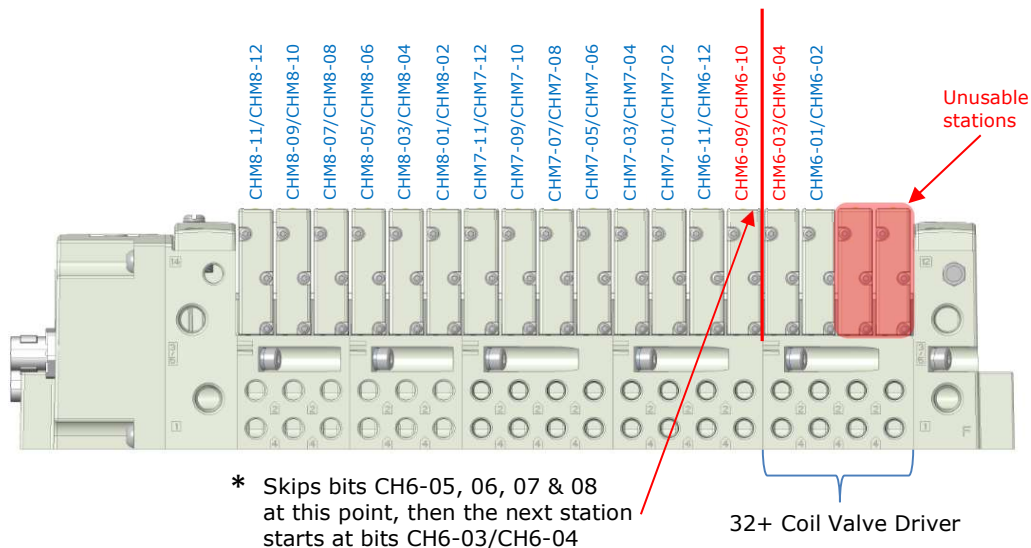
- If using address scheme "36 COIL OPT." the manifold **MUST** be a certain configuration and address must be set to 6-7-8 or 2-3-4 otherwise it will not function properly.
- The manifold **MUST** be a 501 Series and use all double Z-Boards™. It will utilize both 3 & 4 station manifold blocks along with a 32+ Valve Driver block.

36 Coil Manifold without Blank Stations & "36 COIL OPT." enabled Addressing Scheme:



- 18 station manifold with all stations usable when address is set to 6-7-8 or 2-3-4.

36 Coil Manifold without Blank Stations & "STANDARD" or "REVERSE" Addressing Scheme:



18 station manifold with two stations that are unusable and missing bits (CH6-05 thru CH6-08) at the end of the first 32 coils when address is set to 6-7-8 or 2-3-4.

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4.6 PWM Control (Coils)

Pulse Width Modulation (PWM) is set to "DISABLED" from the factory. If this needs to be changed it can be done by referencing the menu selections below.



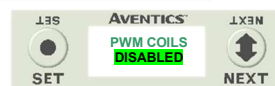
1. Press the **SET** button to enter the ADVANCED SETTINGS menu.



2. Press the **NEXT** button to advance to the ADVANCED MENU PWM screen.



3. Press the **SET** button to enter the PWM COILS sub menu.



4. Press the **NEXT** button to change this selection.



- a. DISABLED
- b. ENABLED
- c. RETURN



Press the **SET** button to confirm selection



- When changing the PWM setting from "Enabled" to "Disabled" a power cycle is required after the change has been made on the module. The LCD screen will flash when a power cycle is required.

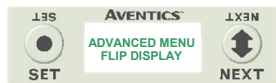
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4.7 Advanced Settings Menu – Parameters

This menu allows the enabling / disabling of the Parameters setting. By setting the PARAMETERS LOCKED function all user settable parameters on the node will be locked out via the graphic display.



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



2. Press the **NEXT** button to advance to the ADVANCED MENU PARAMETERS screen.



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



4. Press the **NEXT** button to change this selection
 - a. UNLOCKED
 - b. LOCKED
 - c. RETURN



5. Press the **SET** button to confirm your selection.



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4.8 Factory Defaults



1. The Factory Defaults option is there to allow the user to return all of the parameters to how they were set at the factory.



2. Press the **SET** button to enter the FACTORY DEFAULTS sub-menu.
3. Press the **NEXT** button to select **YES** or **NO**
4. Press the **SET** button to confirm selection

4.9 Diagnostic Menu



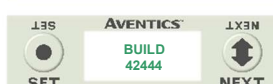
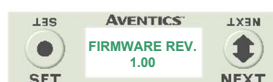
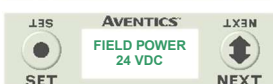
1. All diagnostic information is read only
2. Press the **SET** button to enter DIAGNOSTICS sub-menu.



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



- a. OUTPUT INDICATION
i.- Displays the coils actuated. Press NEXT to view the second word of data.
- b. SET SELF TEST
i.- Please see following page for description
- c. FIELD POWER
i.-For service personnel.
- d. FIRMWARE REV.
i.- For service personnel.
- e. BUILD
i.-For service personnel.
- f. BOOTCODE REV.
i.- For service personnel.



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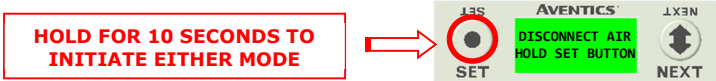
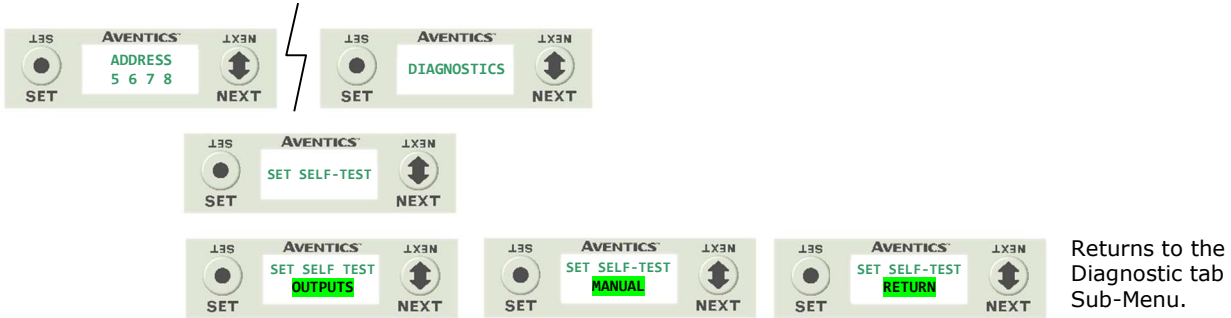
4.10 Coil "Self Test" Mode

An internal diagnostic tool can be enabled on the 580 (node) using the graphic display. This tool allows the user to confirm that all 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.

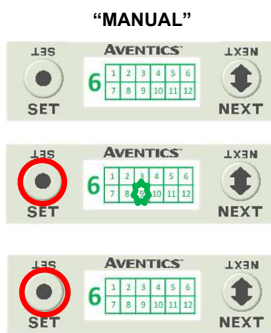
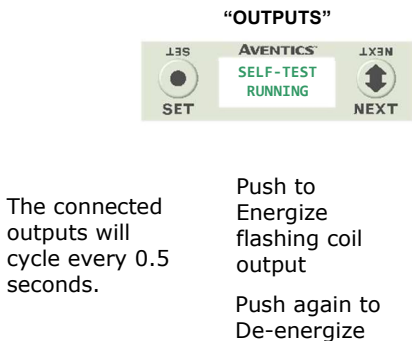
To use the SELF TEST MODE, the user must first set some initial conditions. Follow these steps to initiate the SELF TEST MODE for either "OUTPUTS", or "MANUAL".



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



The first available 12 coils (outputs) will appear. There are a total of (96) coils that can be individually or simultaneously energized. If less than 96 coils are present, there will be some delay before the next cycle.



Press NEXT button to advance to the desired coil to be actuated. The desired coil indicator will flash. Press the SET button to turn on the coil, the indicator will flash until the cursor is moved and then it will remain solid to indicate an actuated coil. Pressing the SET button again will turn the coil off. If you choose to leave the coil actuated, press the next button and move to the next desired coil. You have the ability to actuate all 96 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 coil SELF TEST MODE.



A Power Cycle is required to Deactivate SELF TEST MODE

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

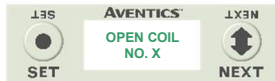
AVENTICS™ 580 CHARM Technical Manual

4.11 Error Messages

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



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



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



Displayed when +24 VDC on Pin No. 1 is not present.

5. CHARM Output Configuration

The following chart identifies the three different output functionalities which can be selected in the properties of each CHARM output configured using DeltaV Explorer:

CHARM Functionality	Description	Function block use
Discrete Output	Drives the output to a discrete value written by the controller and holds the output at that value. Outputs immediately reflect the output value that was received. Upon receiving a configuration that indicates a change from one type of output to another, the outputs switch to the off state.	Used with DO and Device Control function blocks as output I/O references when driving as discrete signal.
Momentary Output	Produces a momentary pulse by driving the output active for a specified time period each time the controller writes a value of TRUE (1, On). Upon receiving a new pulse value, the existing pulse is allowed to terminate normally before the new value is written. Upon receiving a configuration that indicates a change from one type of output to another, the outputs switch to the off state.	Used with DO and Device Control function blocks as output I/O references to output a fixed-duration pulse whenever the block writes a TRUE (1) value to the channel.
Continuous Pulse Output	Produces a continuous pulse by driving the output active for a percentage of a specified time period. Upon receiving a new continuous pulse value, the existing pulse is allowed to terminate normally before the new value is written. Upon receiving a configuration that indicates a change from one type of output to another, the outputs switch to the off state.	Used with AO and PID function blocks as output I/O references when driving an actuator requiring discrete pulse input.

5.1 Charm Configuration Options

Depending on the output functionality chosen for each CHARM, different configuration options may be selected in DeltaV Explorer:

CHARM functionality	Parameter	Description
Discrete Output	FAIL_ACTION_MODE	"Hold last value" – output is held at last value received from the controller before the failure condition occurred. "Go to configured failure action value" – output goes to FAIL_ACTION_VAL.
	FAIL_ACTION_VAL	Boolean value ("True" or "False") that the output goes to upon failure condition if FAIL_ACTION_MODE is set for "Go to configured failure action value."
	INIT_VAL	Boolean value ("True" or "False") that the output goes to upon initial download before any function block action.
Momentary Output	FAIL_ACTION_MODE	"Hold last value" – output will finish out the duration of the current pulse. "Go to configured failure action value" – output goes to FAIL_ACTION_VAL.
	FAIL_ACTION_VAL	Boolean value ("True" or "False") that the output goes to upon failure condition if FAIL_ACTION_MODE is set for "Go to configured failure action value."
	PULSE_DURATION	Specifies the length of time (in seconds) that the output is held ON after the output value is set to "True."
Continuous Pulse Output	FAIL_ACTION_MODE	"Hold last value" – output will continue to pulse using the last period and duty cycle received from the controller before the failure condition occurred. "Go to configured failure action value" – output goes to FAIL_ACTION_VAL.
	FAIL_ACTION_VAL	Boolean value ("True" or "False") that the output goes to upon failure condition if FAIL_ACTION_MODE is set for "Go to configured failure action value."
	INIT_ON_TIME	The percentage of the PULSE_PERIOD that the output is ON during initial download before any function block action. Set INIT_ON_TIME to zero for no pulse.
	PULSE_PERIOD	The length of time between pulses of the output, from 0.1 to 100 seconds. The module should execute at some multiple of the PULSE_PERIOD.

6. CHARM Mapping

6.1 Outputs (Valves)

The maximum number of valve solenoid coils is 96 for 501 Series and 64 for 502 & 503 Series.

6.2 Output Mapping

The following is a breakdown of the bit mapping associated with the Aventics 580 CHARM Valve Manifold.

- 1) Solenoid coil outputs are connected to the valve coils using the Z-Boards™.
- 2) The number of valve solenoid coils allocated is determined by the bank address assigned to the manifold.

<u>Bank Address</u>	-		
8	-	Allocates 12 valve solenoid coils	} First 24 Station Manifold
7•8	-	Allocates 24 valve solenoid coils	
6•7•8	-	Allocates 36 valve solenoid coils	
5•6•7•8	-	Allocates 48 valve solenoid coils	
4	-	Allocates 60 valve solenoid coils	} Second 24 Station Manifold
3•4	-	Allocates 72 valve solenoid coils	
2•3•4	-	Allocates 84 valve solenoid coils	
1•2•3•4	-	Allocates 96 valve solenoid coils	

- 3) Each manifold station allocates 1 or 2 outputs. This is dependent on the Z-Board™ type installed. A single Z-Board™ allocates 1 output. A double Z-Board™ allocates 2 outputs.
- 4) 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 three stations.



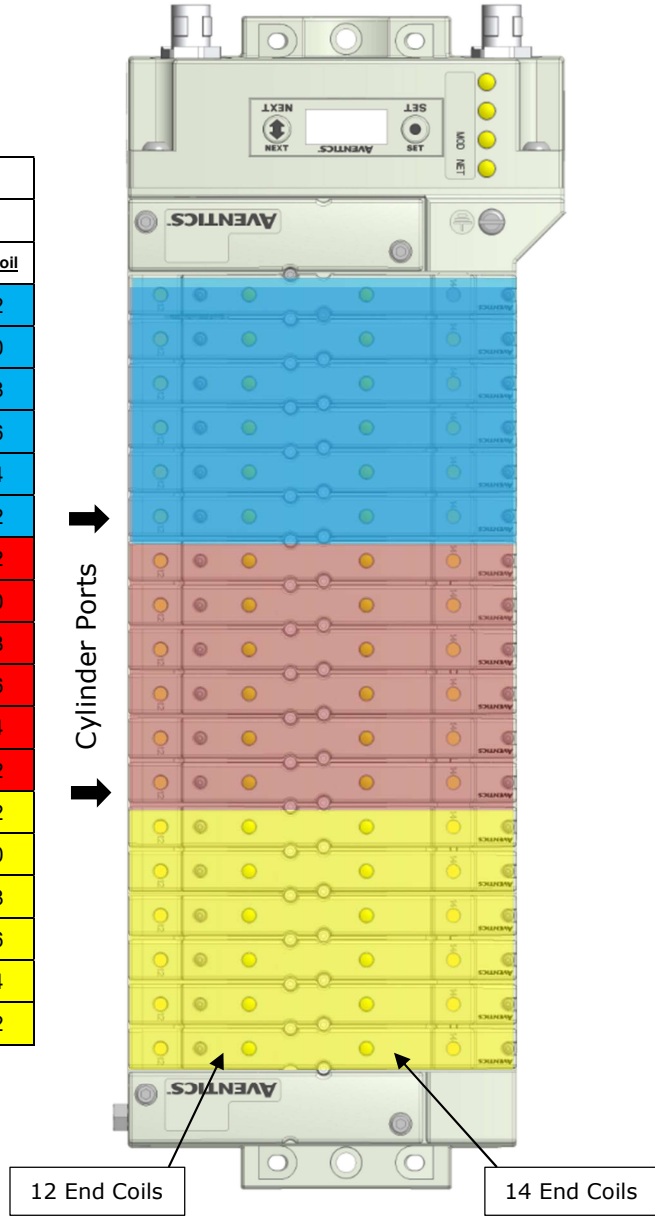
Single solenoid valves can be used with double Z-Boards™. However, one of the two available outputs will remain unused. Refer to the Mapping Examples on the following pages.

6.3 Mapping Example for 36 Coils

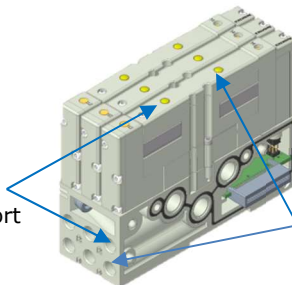
Assumed Settings

- 501 Manifold
- Double Z-Boards™ used with all valves
- Address set to 6-7-8
- 36 COIL OPT. has been Enabled

Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
8	6	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
7	7	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
6	8	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02



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



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

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6.4 Mapping Example for 48 Coils

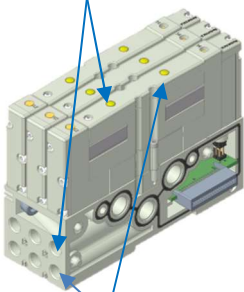
Assumed Settings

- 501 Manifold
- Double Z-Boards™ used with all valves
- Address set to 5-6-7-8

Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
8	5	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
7	6	12	11	01	02
		02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
6	7	10	09	03	04
		02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
5	8	12	11	01	02
		02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06

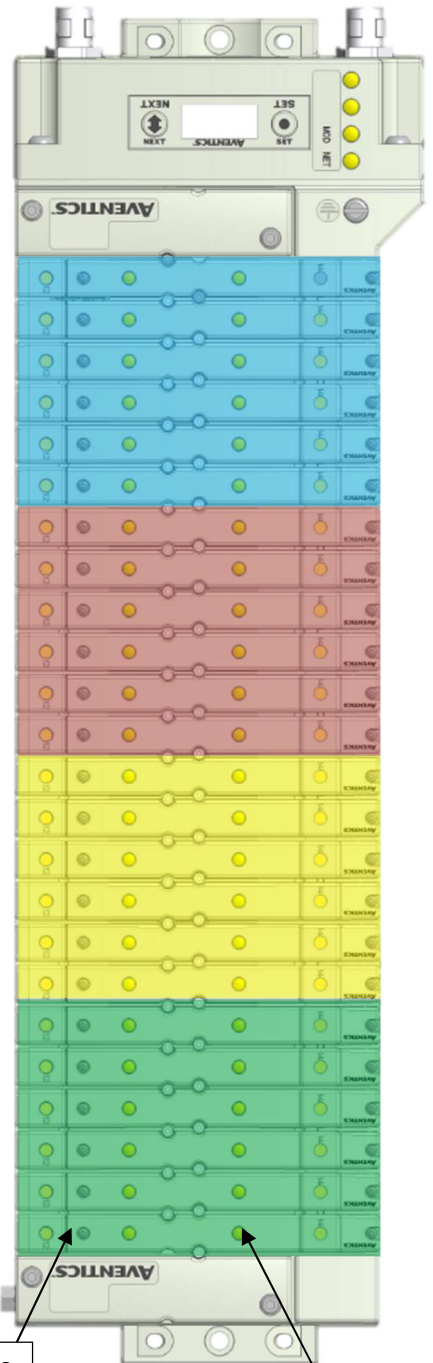


When the **12** End Solenoid is Energized, the **2** port is pressurized



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

Cylinder Ports



12 End Coils

14 End Coils

6.5 Mapping Example for 64 Coils

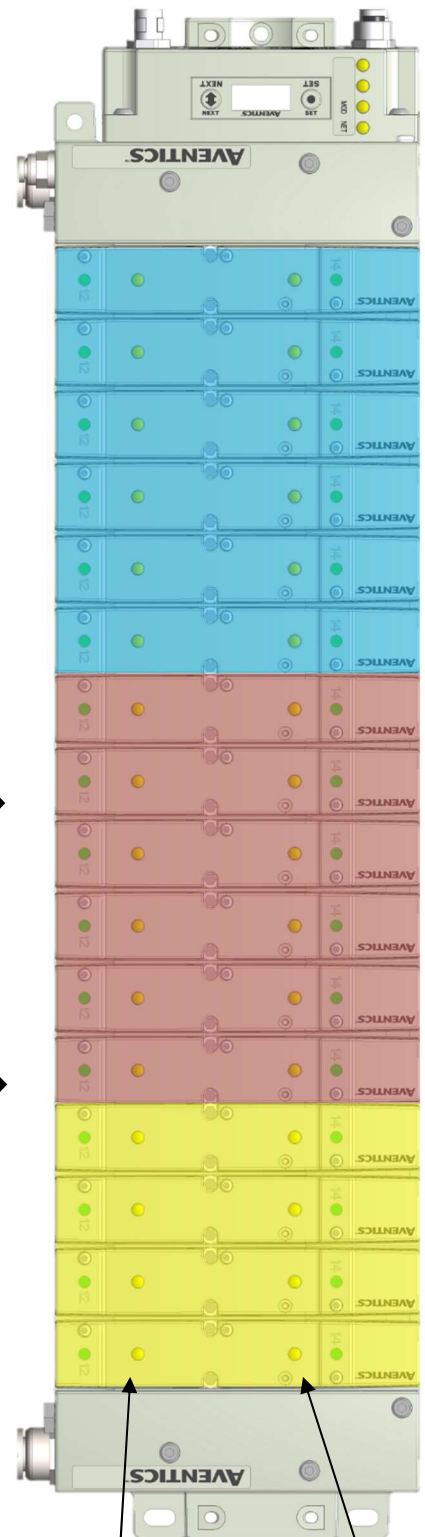
Manifold #1

Assumed Settings

- 503 Manifolds
- Double Z-Boards™ used with all valves
- Address on manifold #1 set to 6-7-8
- Address on manifold #2 set to 2-3-4

Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
8	6	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
7	7	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
6	8	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10 RESERVED	09 RESERVED	03 RESERVED	04 RESERVED
		12 RESERVED	11 RESERVED	01 RESERVED	02 RESERVED

Cylinder Ports



12 End Coils

14 End Coils



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

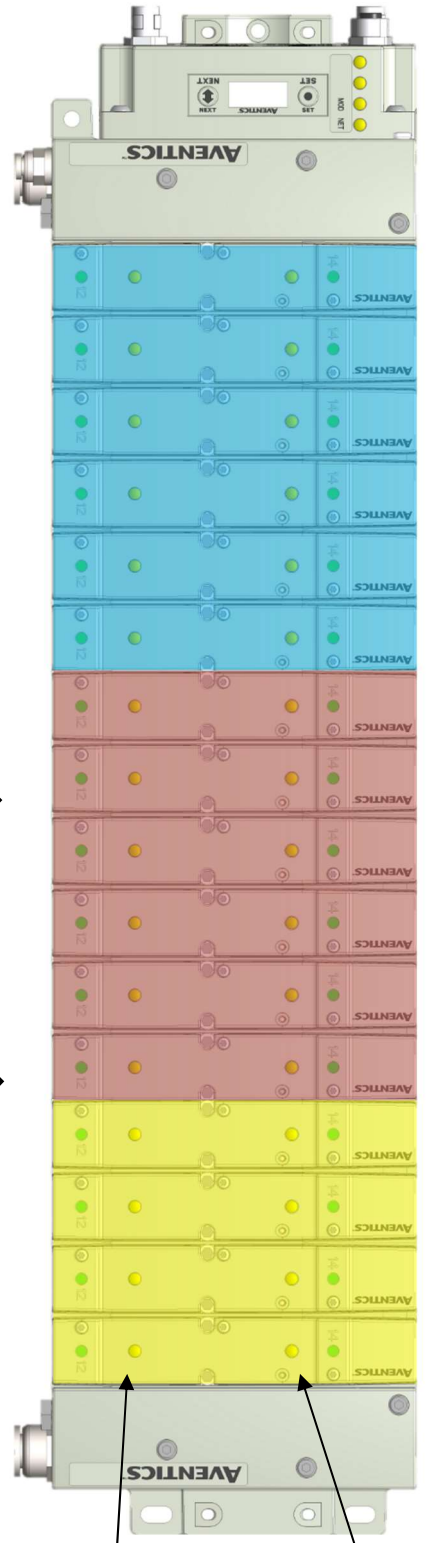
When the **14** End Solenoid is Energized, the **4** port is pressurized

Mapping Example for 64 Coils Cont.

Manifold #2

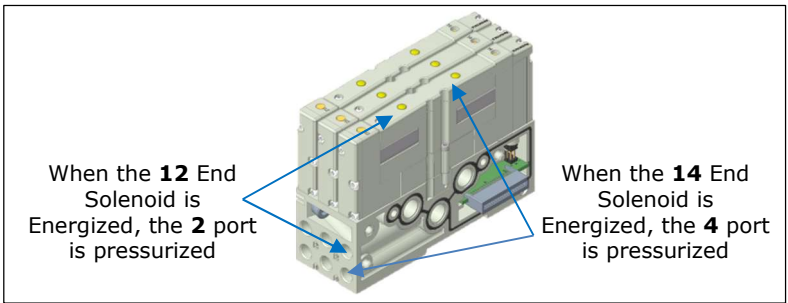
Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
4	2	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
3	3	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
2	4	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10 RESERVED	09 RESERVED	03 RESERVED	04 RESERVED
		12 RESERVED	11 RESERVED	01 RESERVED	02 RESERVED

↑
Cylinder Ports
↓



12 End Coils

14 End Coils



6.6 Mapping Example for 96 Coils

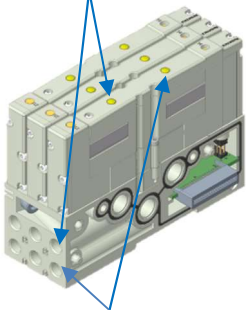
Assumed Settings

- 501 Manifold
- Double Z-Boards™ used with all valves
- Address on manifold #1 set to 5-6-7-8
- Address on manifold #2 set to 1-2-3-4

Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
8	5	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
7	6	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
6	7	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
5	8	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02



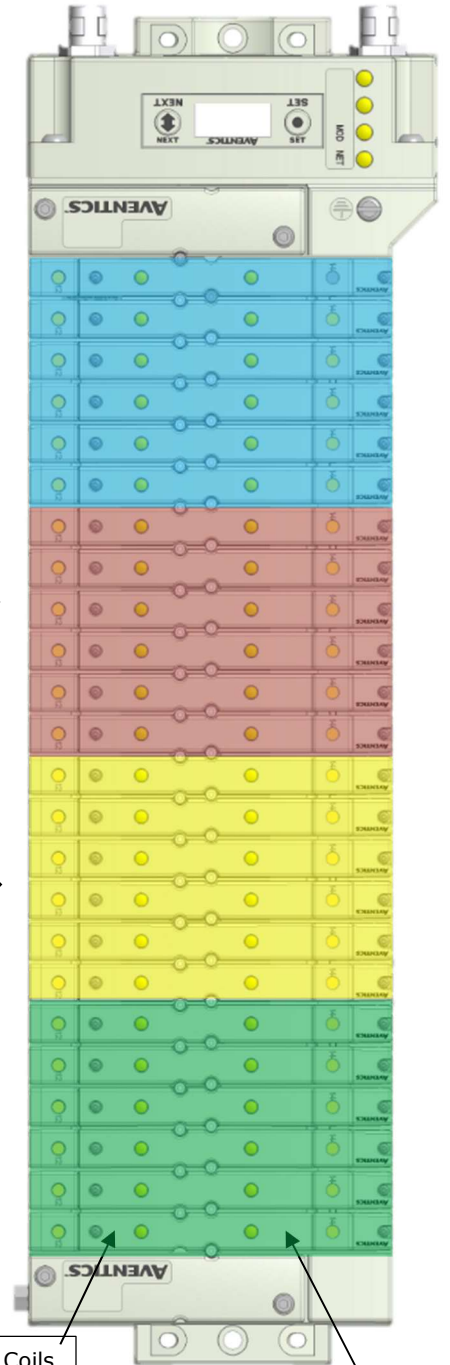
When the **12** End Solenoid is energized, the **2** port is pressurized



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

Cylinder Ports

Manifold #1



12 End Coils

14 End Coils

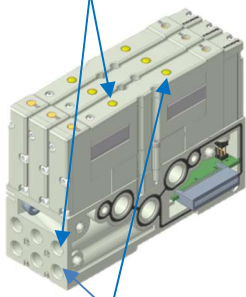
Mapping Example for 96 Coils Cont.

Manifold #2

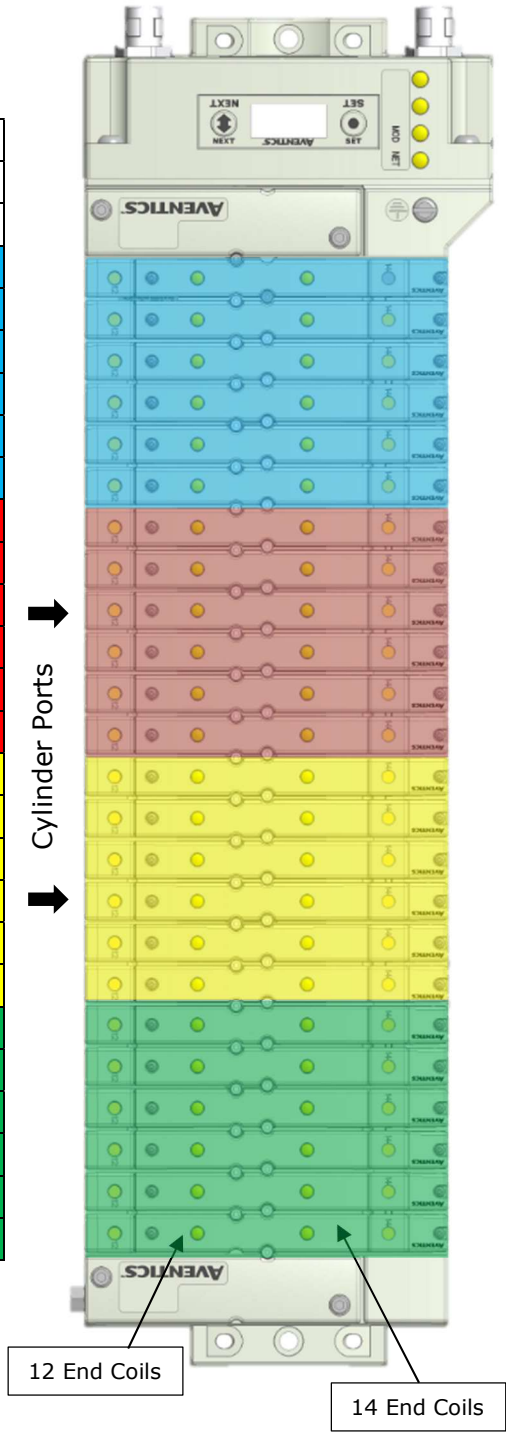
Bank Order		CHARM Order			
		Reverse		Standard	
Standard	Reverse	12 Coil	14 Coil	12 Coil	14 Coil
4	1	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
3	2	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
2	3	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02
1	4	02	01	11	12
		04	03	09	10
		06	05	07	08
		08	07	05	06
		10	09	03	04
		12	11	01	02



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



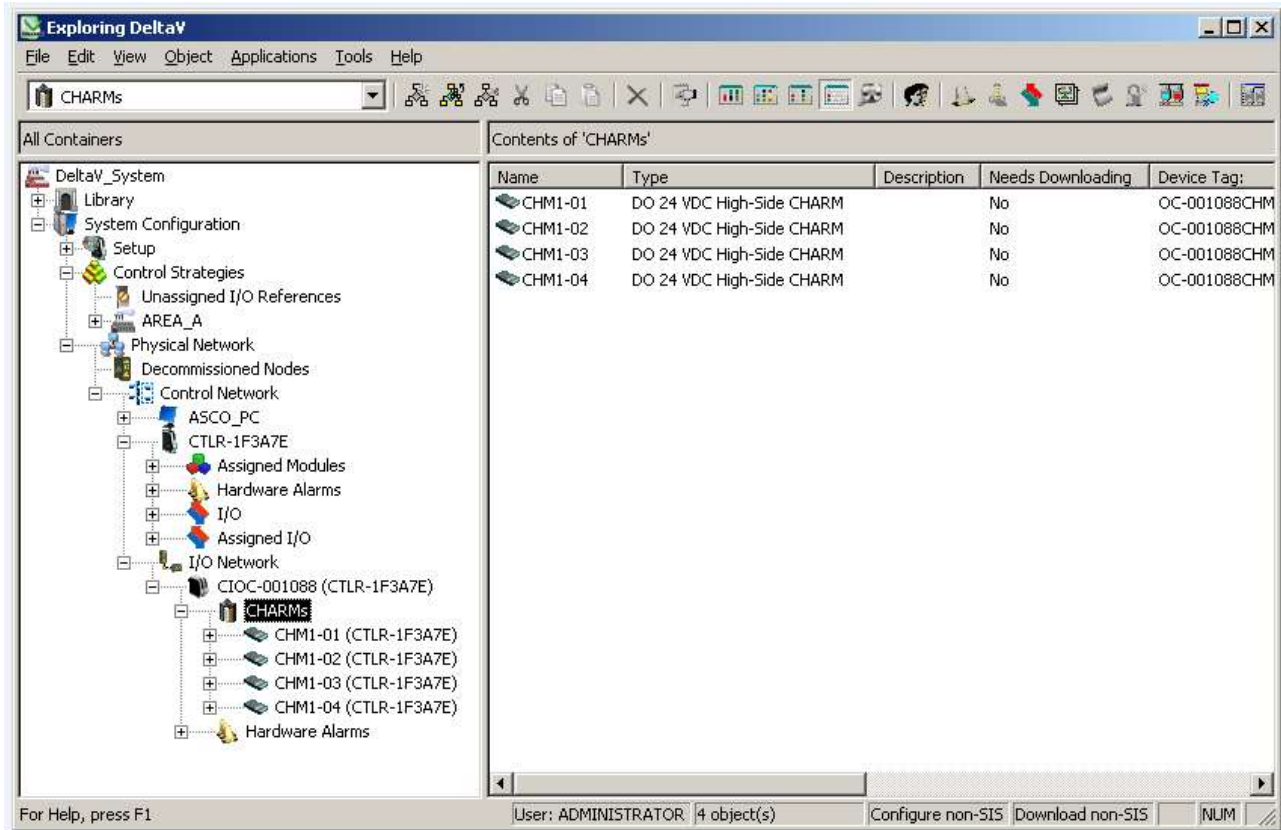
When the **14** End Solenoid is energized, the **4** port is pressurized



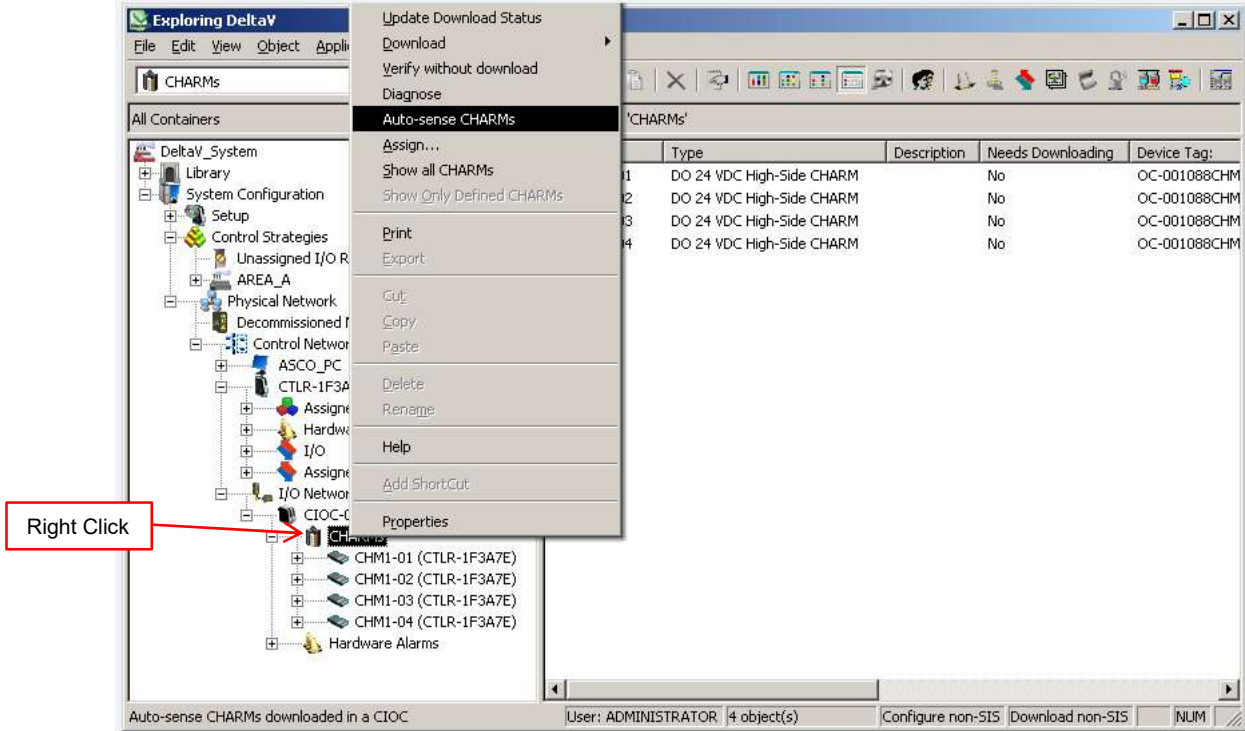
6.7 Commissioning CHARM Node with DeltaV Software

This procedure assumes that the user has their DeltaV system up and running properly with standard CHARMS and all they are trying to do is add the Aventics 580 CHARM manifold.

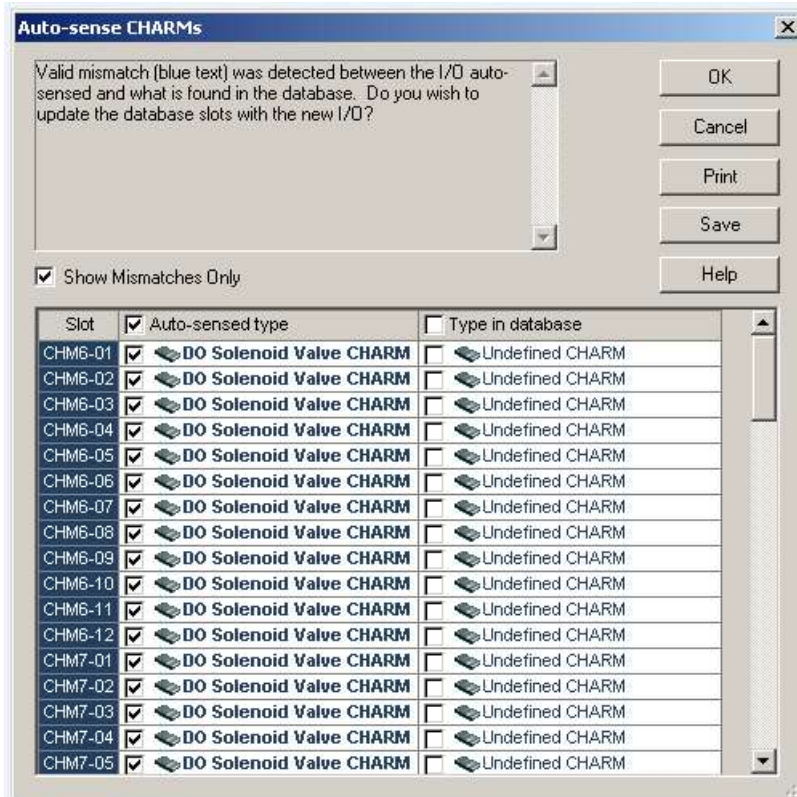
- 1) DeltaV Explorer view is set to "Details". This shows a basic DeltaV system with four standard DO CHARMs installed.



2) Right click on CHARMS and select "Auto-sense CHARMS".

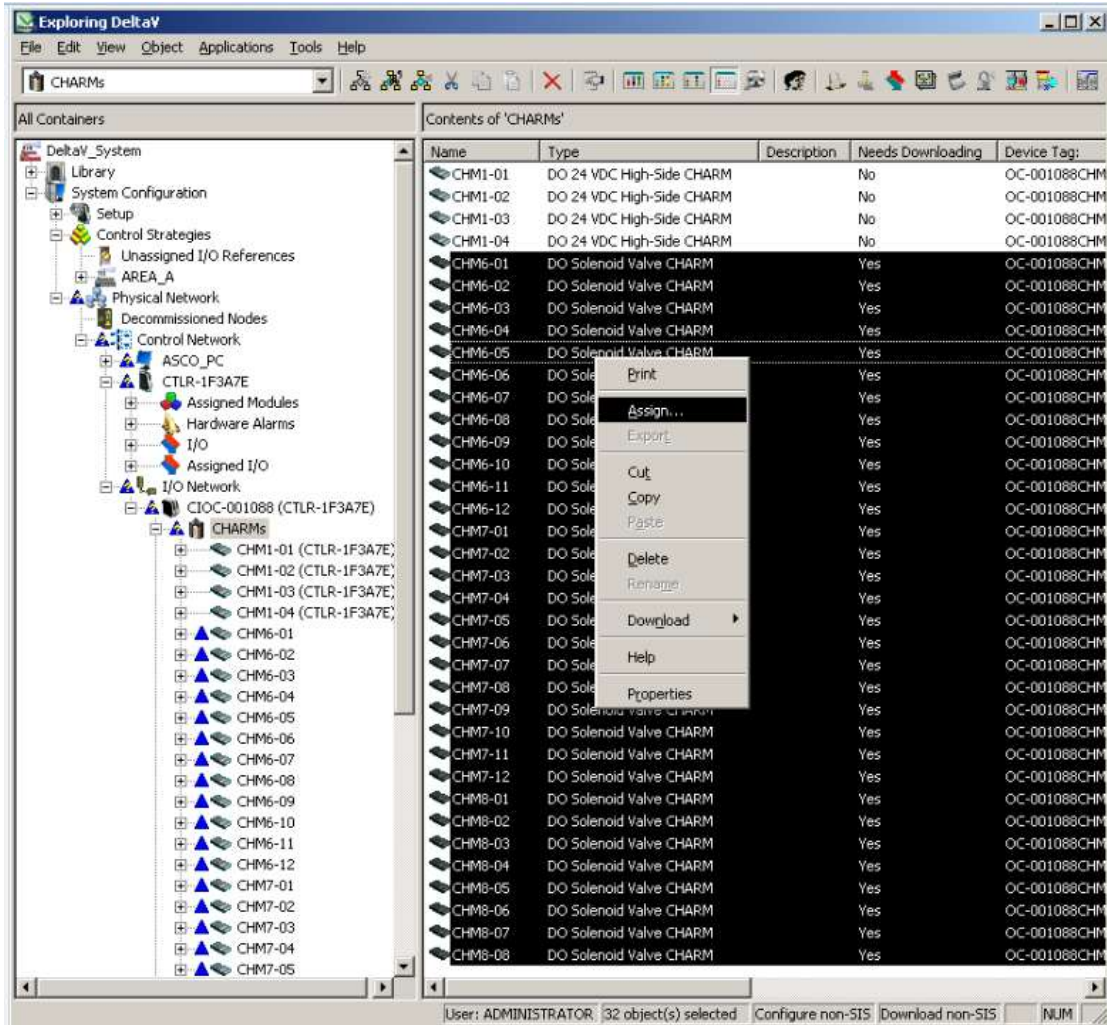


3) Verify that all desired "DO Solenoid Valve CHARM" items are checked and click "OK".

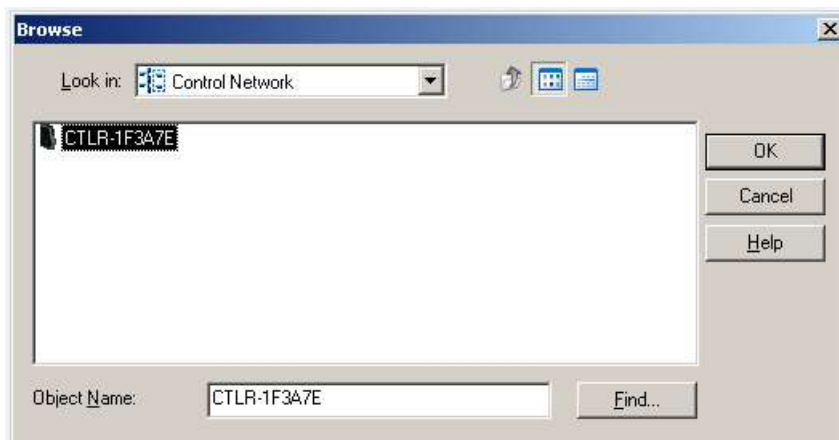


- 4) Highlight all DO Solenoid Valve CHARMS

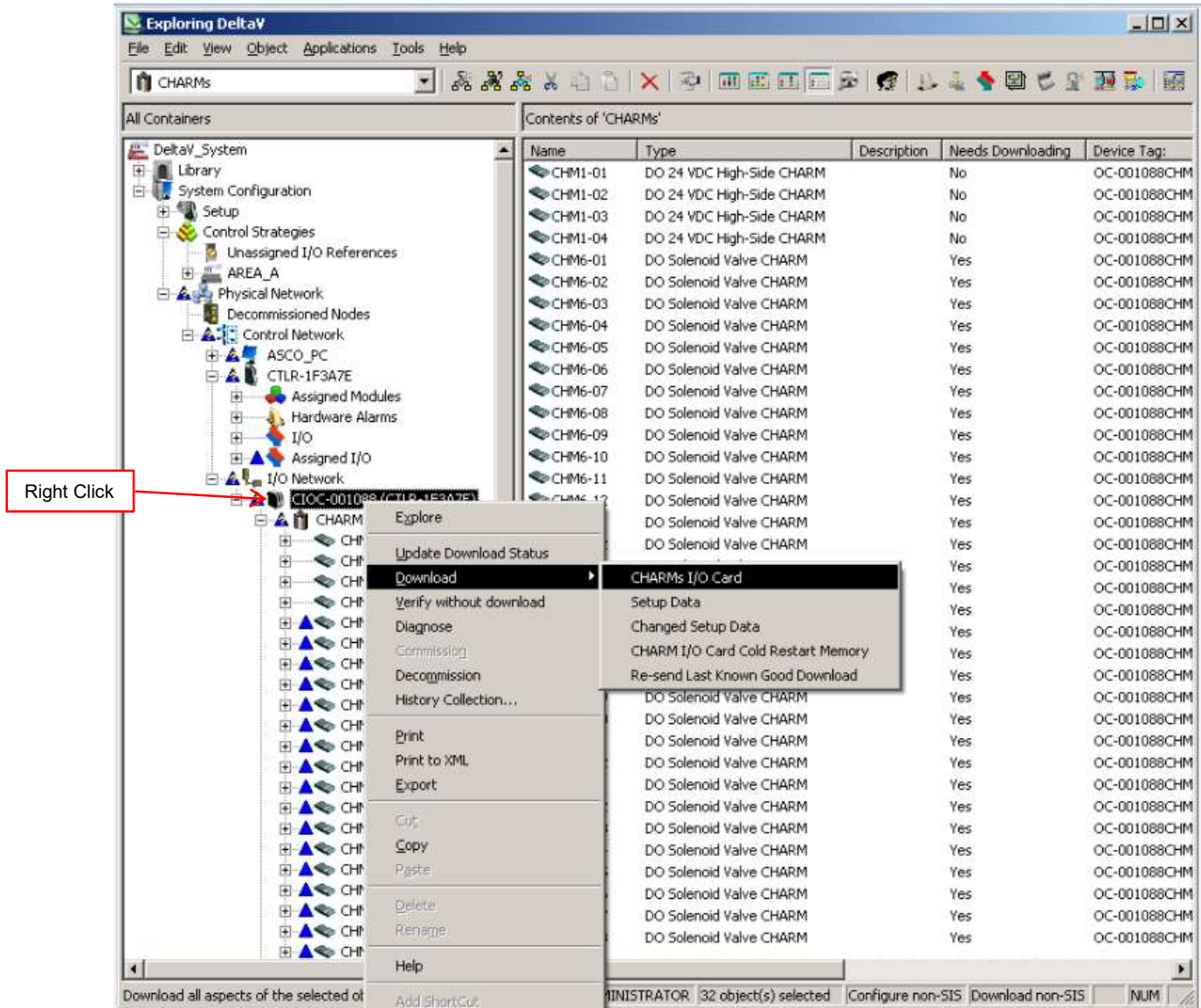
Right click on them and select "Assign...".



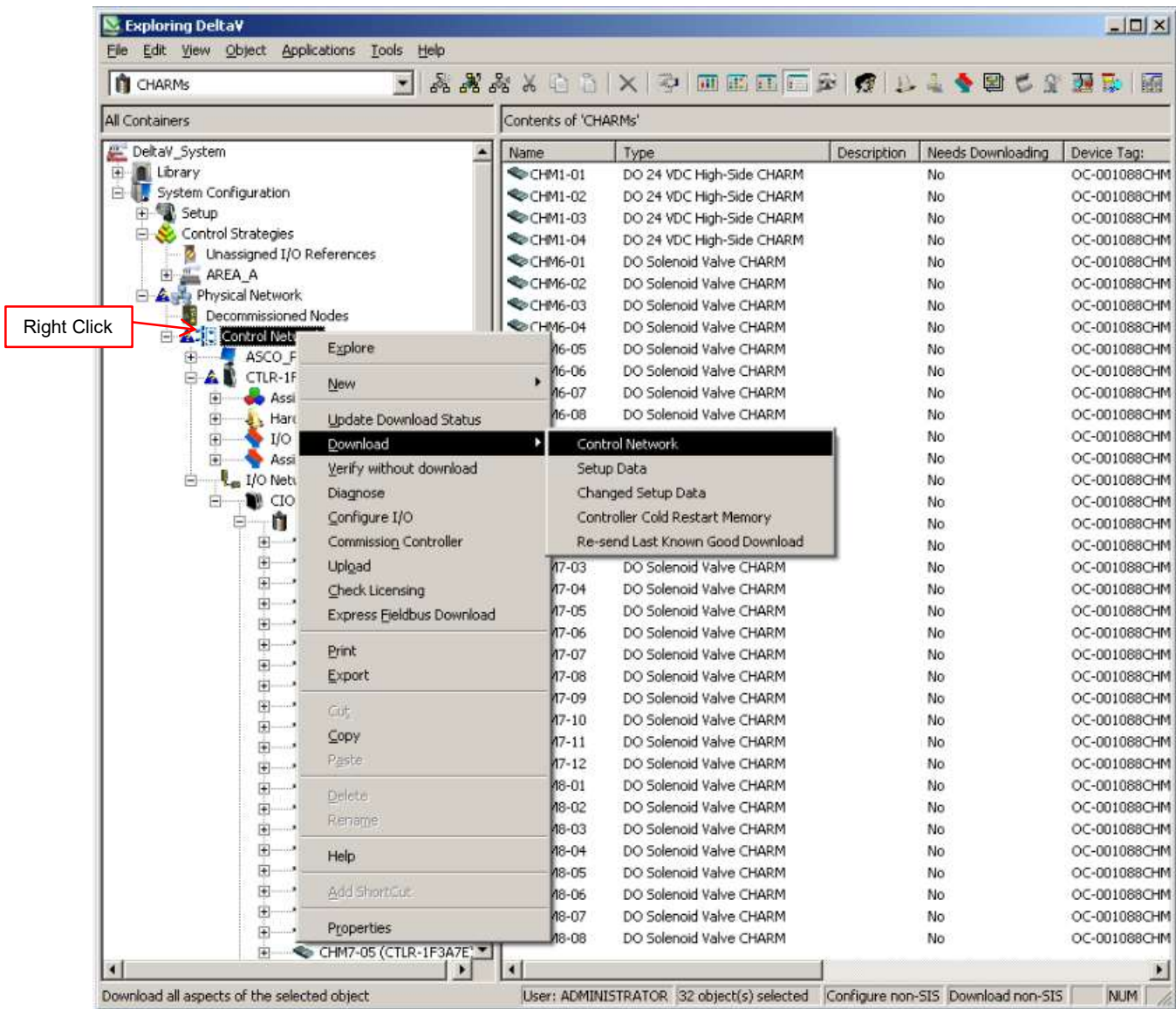
Select the desired Controller and click OK.



- 5) Right click on the CIOC that our device is connected to and select "Download > CHARMs I/O card". Agree to confirmation window and verify download success.



- 6) Right click on Control Network and select "Download > Control Network". Agree to confirmation window and verify download status.



- 7) At this point, if there are no warning icons overlaying anything, all CHARMs that make up the Aventics 580 CHARM Node should be recognized, configured with default settings, and ready to use outputs.

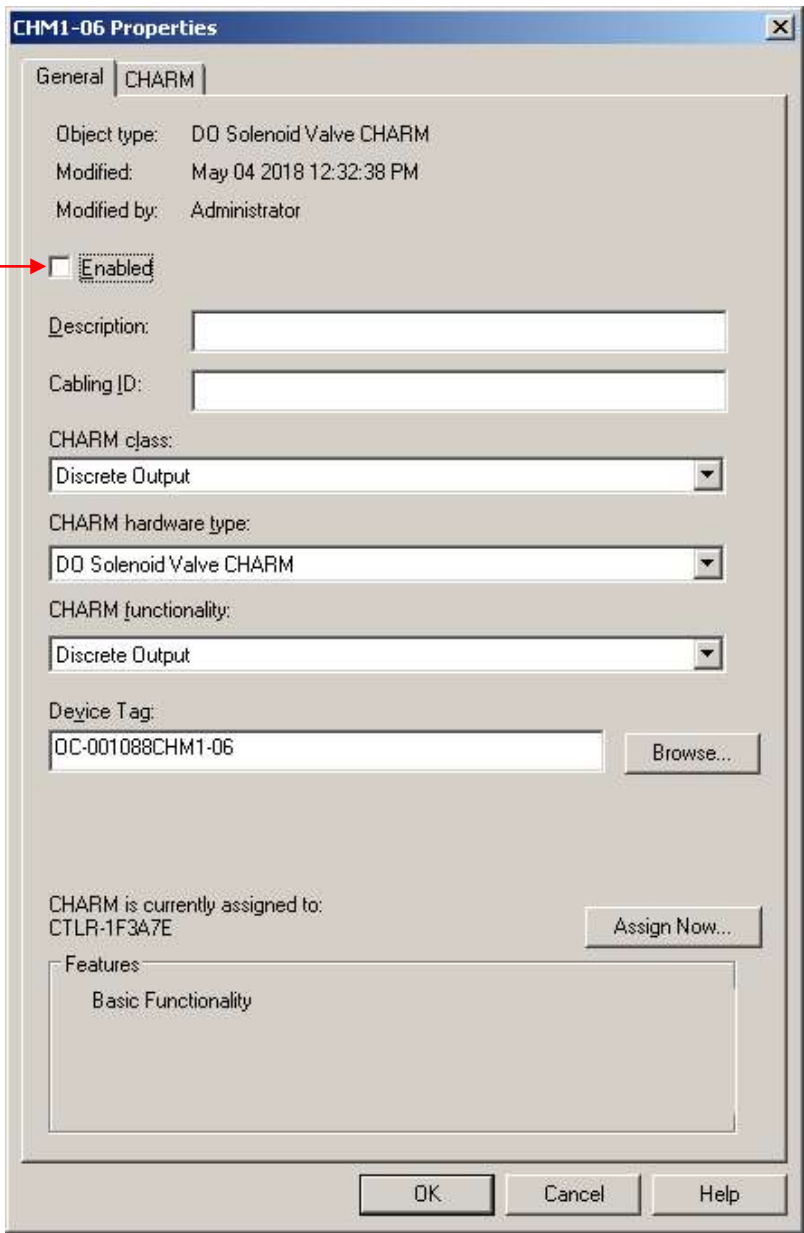
6.8 580 CHARM Module Changes

If changes need to be made to the 580 CHARM module after initial set-up has been done the following steps must be completed. There are two different ways to complete this based on the DeltaV revision. Anything at or before version 12 needs to utilize option 1 to disable a CHARM, the versions 13 or later after can utilize either option 1 or option 2 to disable CHARM's.

OPTION 1:

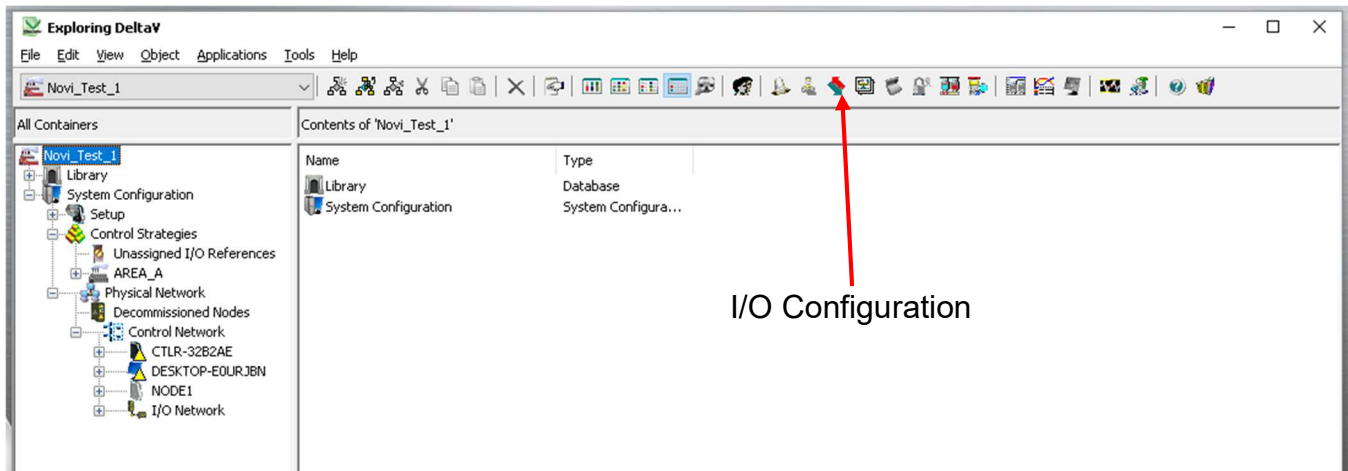
- Right click on the 580 CHARM in DeltaV Explorer and select "Properties" to bring up to appropriate window.
- The "Enabled" box must be unchecked on all 580 CHARM's and then the changes can be downloaded to the CIOC. This must be done in order for LCD menu changes to be made.
- After LCD menu changes have been made the "Enabled" check box must be checked again and then the changes downloaded to the COIC for normal operation.

This box must be unchecked and re-checked when complete.



OPTION 2:

- Launch the I/O Configuration in DeltaV Explorer.
- Select the CHARM or CHARM's that you want to "Disable" and then right click on the selection and click the disable option. You must download the changes for them to take effect. You can select individual or a group all at once using this option.
- After LCD menu changes have been made the CHARM's must be "Enabled" again and then the changes downloaded to the COIC for normal operation.

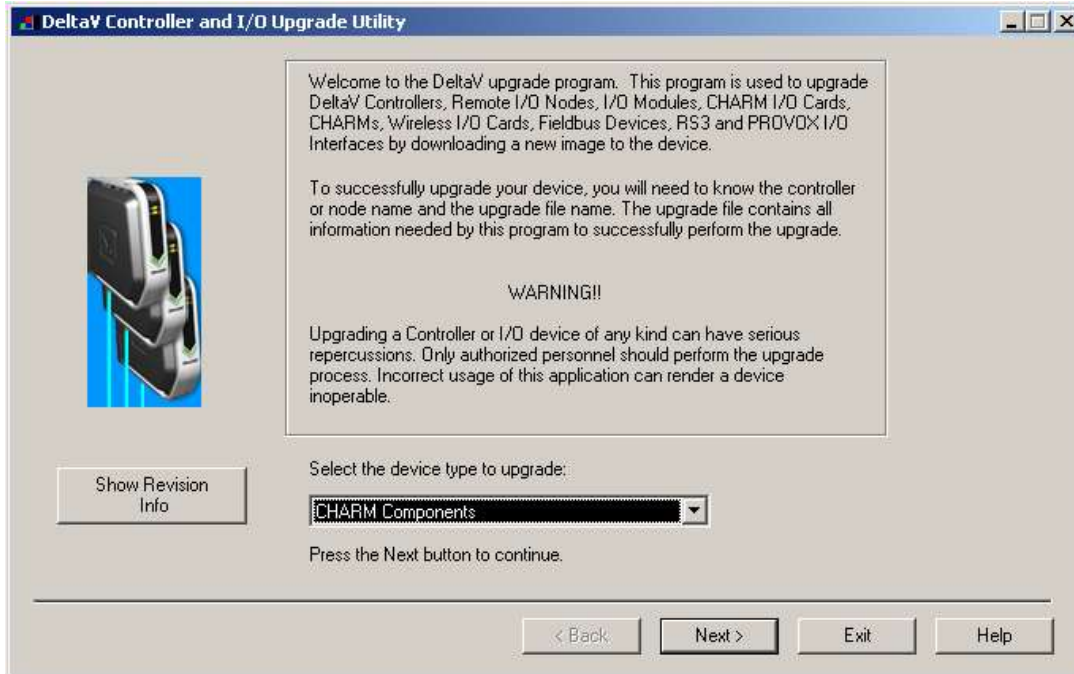


Path	Type	Device Tag	Referenced By	Enabled	Description	Node Assignment	Cabling ID	HART Long Tag	CHARM Class	CHARM Functionality
CTLR-32B2AE										
IO1										
Assigned I/O										
CI0C-257642										
CHARMs										
CHM1-01	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-02	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-03	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-04	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-05	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-06	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-07	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-08	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-09	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-10	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-11	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM1-12	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-01	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-02	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-03	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-04	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-05	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-06	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-07	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-08	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-09	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-10	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-11	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM2-12	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-01	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-02	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-03	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-04	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-05	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-06	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-07	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output
CHM3-08	DO Solenoid Valve CHARM	OC-257642CH...	TOGGLE_1_2_3...	Yes		CTLR-32B2AE			Discrete Output	Discrete Output

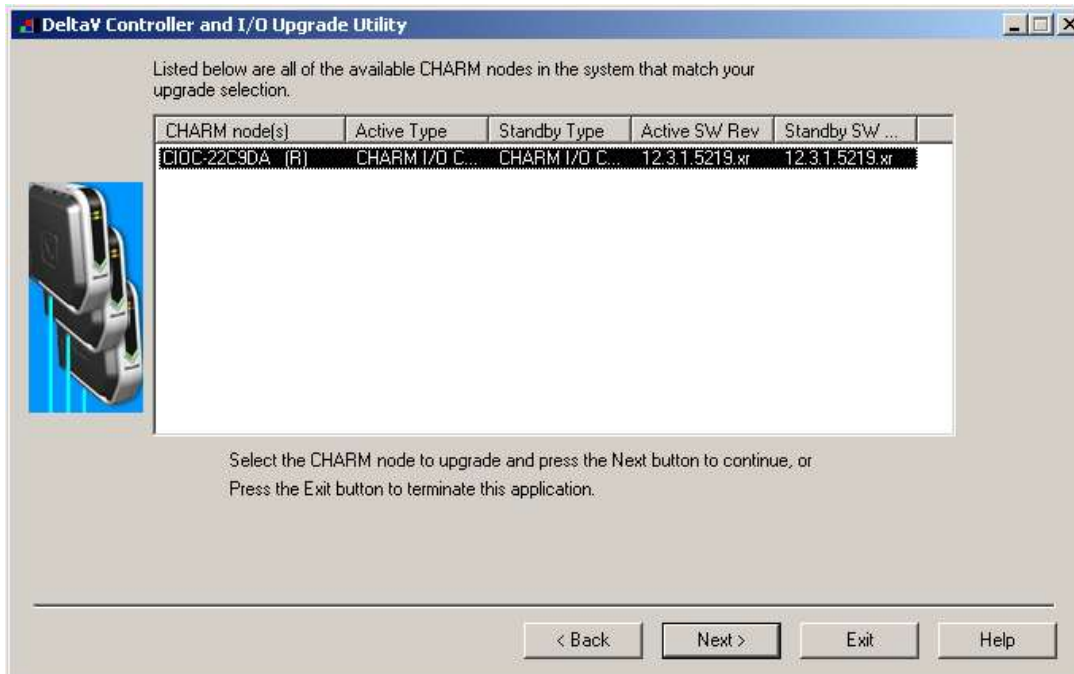
7. Firmware Upgrade

7.1 Procedure to upgrade the 580 Charm node firmware

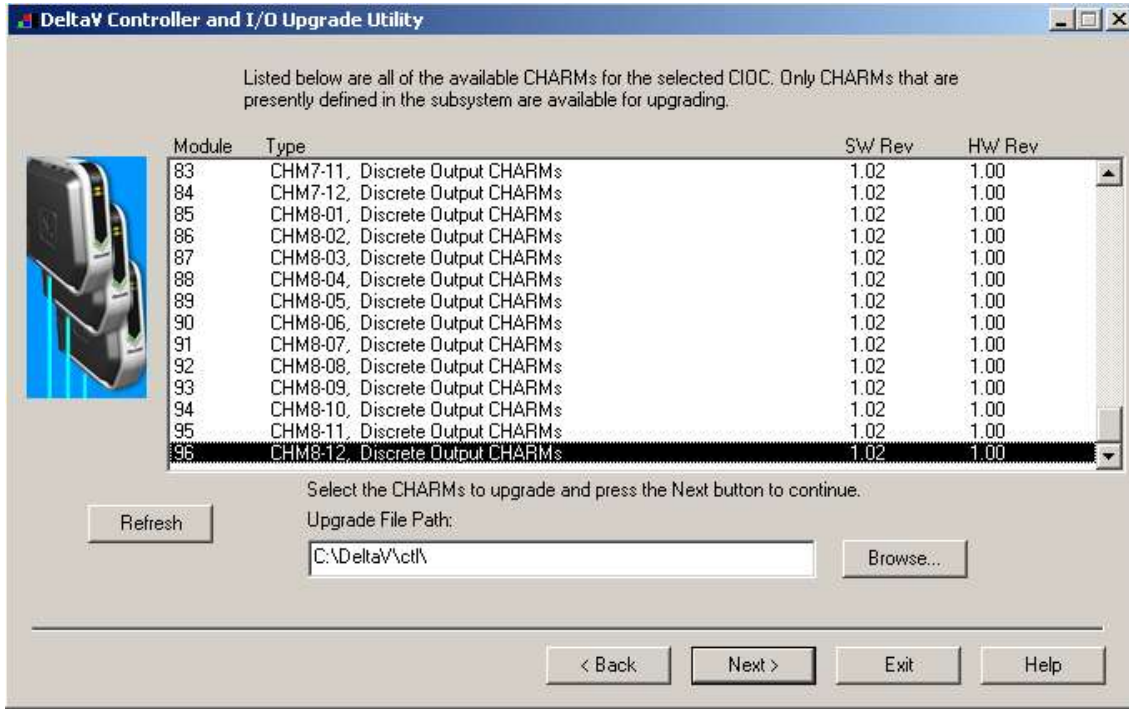
Select START>DeltaV>Installation>Controller Upgrade Utility
Select CHARM Components



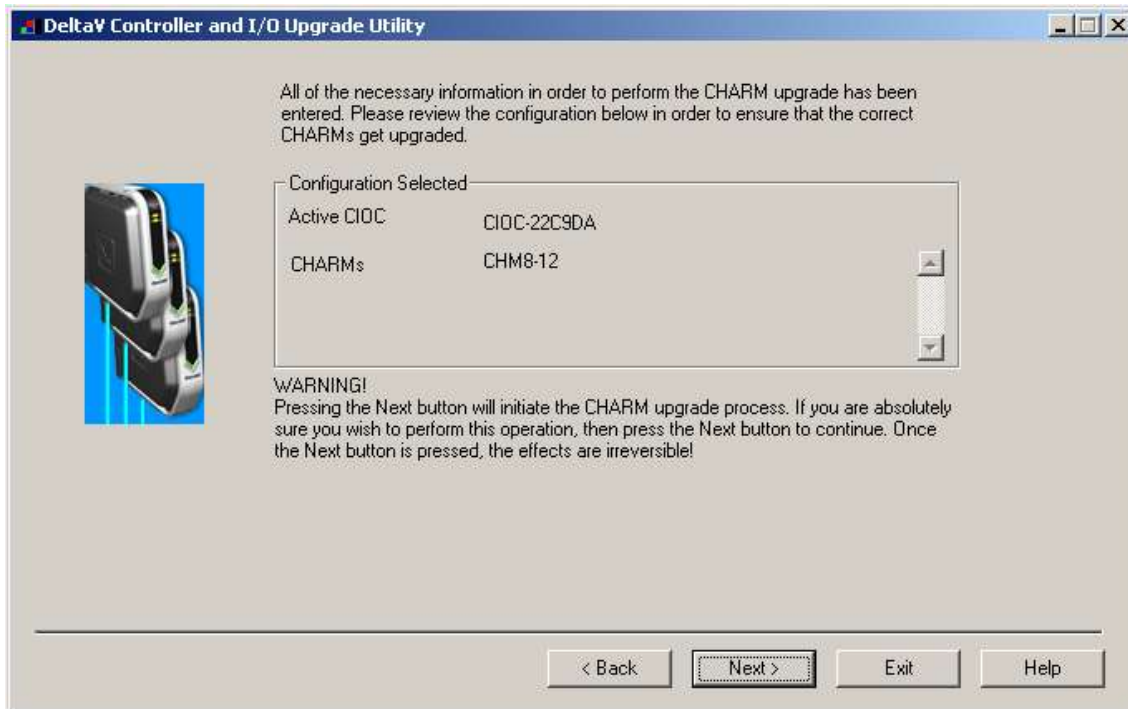
Select the CIOC to which the 580 CHARM node is connected.



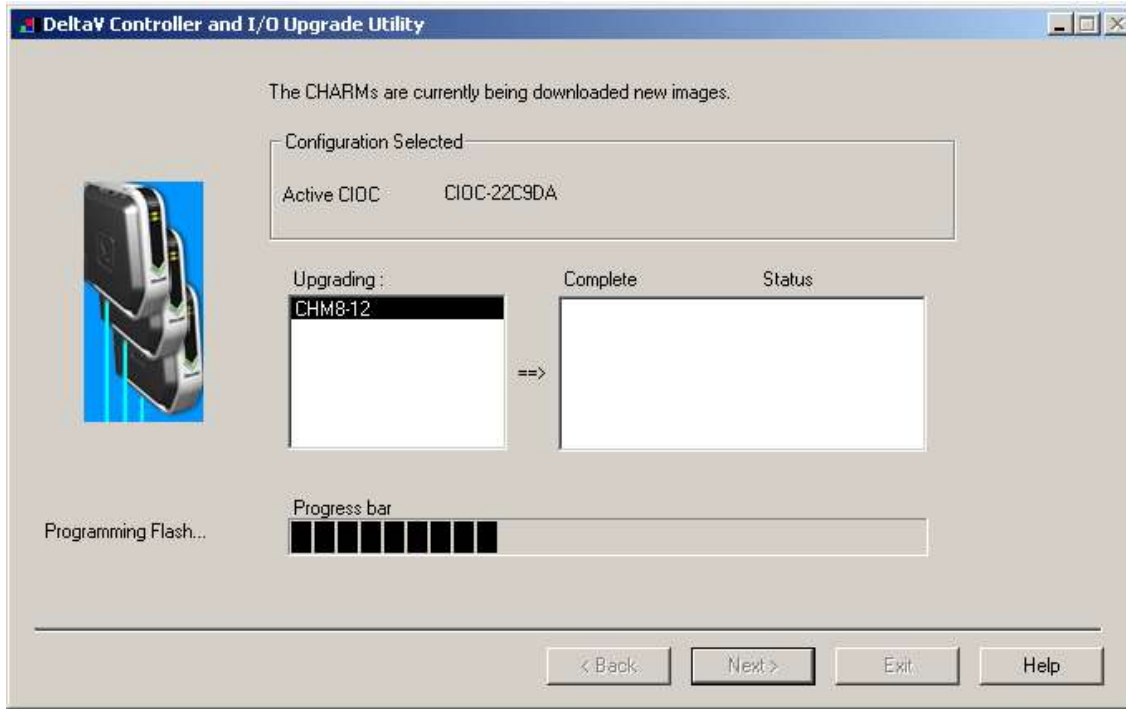
Select one of the integral CHARMS (there is no need to upgrade every CHARM, upgrading one will upgrade all



Confirm CHARM selection



Wait for programming to complete



- When a power cycle is required after a firmware change has been made on the module, the LCD screen will flash a message stating that it is required.



8. Appendix

8.1 System Specifications

<i>Electrical</i>	
Supply Voltage	Valves (501, 502, 503): 24 VDC + 10%, -15% Node: 6.3 VDC ± 10%
Current	Total current on the Power Connector ("Valves" and "Node" Pins) must not exceed 4 Amps.
Reverse Polarity	Reverse polarity protection is provided on both Node and Valve power.
Spike Suppression	Output spike suppression is internally provided for valve outputs.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	10 to 115°F (-23 to 46°C)

8.2 Factory Default Settings

<i>Description</i>	<i>Default</i>
Node Address	5 • 6 • 7 • 8
Addressing Scheme	Standard
Parameters Lock	Unlocked
Flip Display	No

8.3 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.
Valve outputs do not energize.	Output power not present or connected improperly on Power connector.	Check for 24 VDC on Pin 1 (Valve Power) of the M12 cable connector(s)

8.4 Glossary of Terms

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

Term	Description
CHARM	Characterization module for each field signal.
CIOC	CHARM I/O card.
Ground	This term is used to indicate an earth ground.
I/O	Any combination of Inputs and Outputs.
NEMA	National Electrical Manufacturers Association.
Z-Board™	Circuit board installed in the valve sub-base which electrically connects the valve solenoid to the electronics interface. Available in single or double solenoid versions.

8.5 Technical Support

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

Information on device files, technical manuals, local distributors, and other ASCO, Aventics or Numatics products and support issues can be found on the Aventics web site at www.emerson.com