AVENTICS™

580 Series
CANopen™
Technical Manual

CANopen®

Conditions for use of this product

(1) AVENTICS Manifold ("the PRODUCT") shall be used in conditions;

    i) Where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident.

    ii) Where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

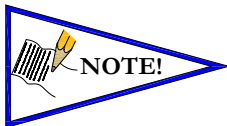(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

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

Safety precautions

Before using this product, please read this manual and the relevant manuals carefully and pay attention to safety and product application. The following symbols are used in the manual to identify important safety, installation and application information.

CAUTION

Caution symbol indicates a possible hazard which may cause injury or equipment damage.

NOTE!

Note symbol indicates important information regarding equipment installation and setup.

TD580COTM1-2EN   2/22
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Page 1-2

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Electrical installation and operational guidelines

CAUTION

- *To be connected to Class 2 power source only.*
- *All AVENTICS communication nodes should be grounded during the installation process. These grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.*
- *All AVENTICS G3 Electronics Products to be installed or wired in accordance with AVENTICS' published instructions and applicable electrical codes.*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection.*
- *Sources shall be Listed and rated suitable for parallel interconnection.*
- *CLASS 2 WIRING: All field wiring shall be suitable for Class 1, Electric Light and Power, or Class 2, 3 wirings are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) Limited energy circuit conductors from unlimited energy circuit conductors.*
- *Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.*
- *When using molded connector power cables, <u>Do Not</u> rely on wire colors for Pin-Out. <u>Always use pin number references.</u>*
- *Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection.*
- *Sources shall be Listed and rated suitable for parallel interconnection.*

AVENTICS™   580 CANopen™ Technical Manual

Table of Contents

1. About CANopen™

1.1 Overview

CANopen™ is an open protocol based on the CAN (Controller Area Network) protocol.   It was designed for motion orientated machine control but has migrated to various industrial applications. CAN in Automation (CIA) is the international users' and manufacturers' organization that develops and supports CAN-based protocols.

AVENTICS 580 nodes for CANopen™ have an integrated graphic display and are capable of addressing up to 32 coil outputs.

More information about CANopen™ and CIA can be found at: www.can-cia.org

1.2 580 CANopen™ Features

Features	Description
CANopen™ Spec. Supported	Designed to CANopen™ specification 301 v4.0.2
Bus Topology	Straight with restricted drops; trunkline-dropline configuration
Baud Rates Supported	125 Kbps, 250 Kbps and 500 Kbps and 1Mbps
Duplicate address detection	If duplicate address detected on power up, duplicates will not progress to run mode
Error Correction	Yes, if error detected, sender is requested to repeat the message
Address Setting	Via graphic display or software
PDO's supported	1 transmit and 1 receive PDO
SDO's supported	1 system diagnostic SDO
Termination Resistor (external)	A 120Ω, 1%, 0.25W resistor is required at each end of the trunk line

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

Cable Lengths

Baud Rate	Maximum Bus Length	Maximum Drop Length	Cumulative Drop Length
125 Kbps	500 m (1640 ft)	22 m (72 ft)	110 m (360 ft)
250 Kbps	250 m (820 ft)	11 m (36 ft)	55 m (180 ft)
500 Kbps	100 m (328 ft)	5.5 m (18 ft)	27.5 m (90 ft)
1 Mbps	25 m (82 ft)	1.5 m (5 ft)	7.5 m (24 ft)

2. 580 Introduction

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

This manual details specific information for configuring and commissioning the AVENTICS 580 CANopen™ Node. For more information relating to pneumatic valving and valve manifold assemblies, please refer to the AVENTICS *500 Series Catalogs* at www.ASCO.com.

580 CANopen Node   **Valve Side**
Drives up to 32 coils
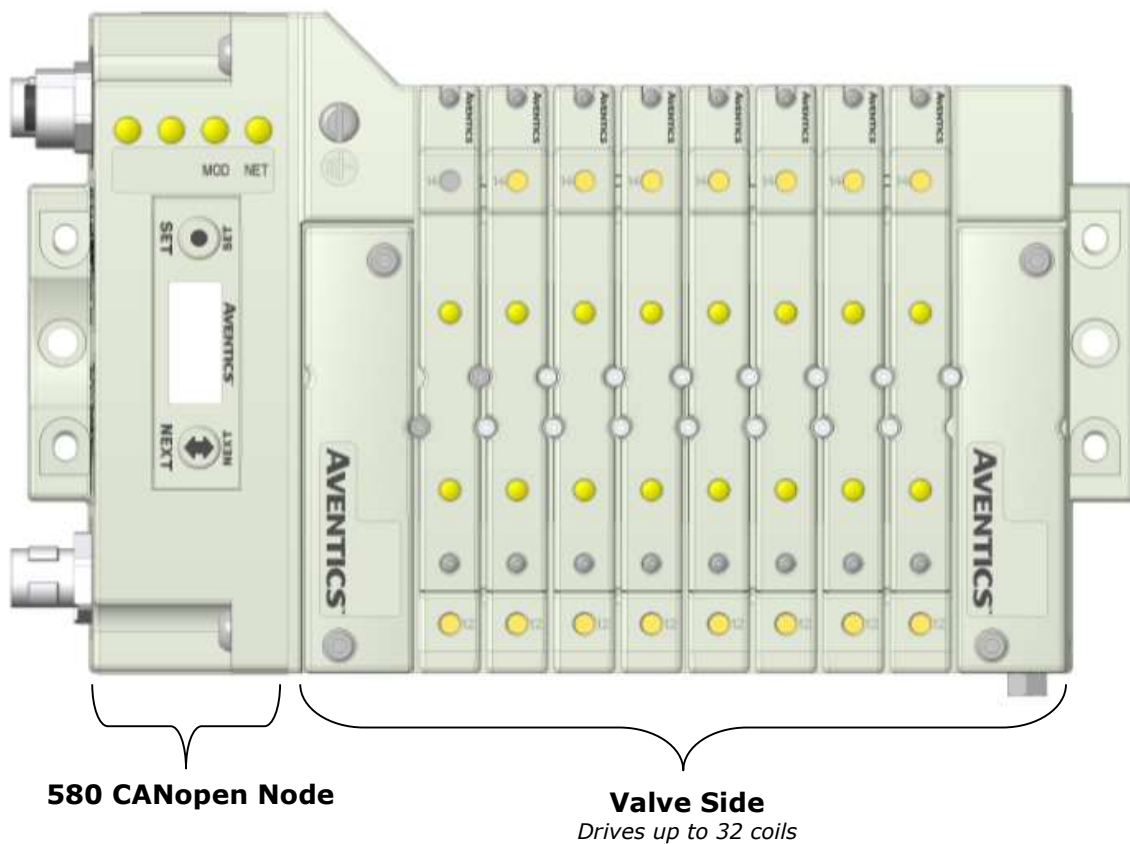
2.1   Pneumatic Valve Manifold – 501 Series shown

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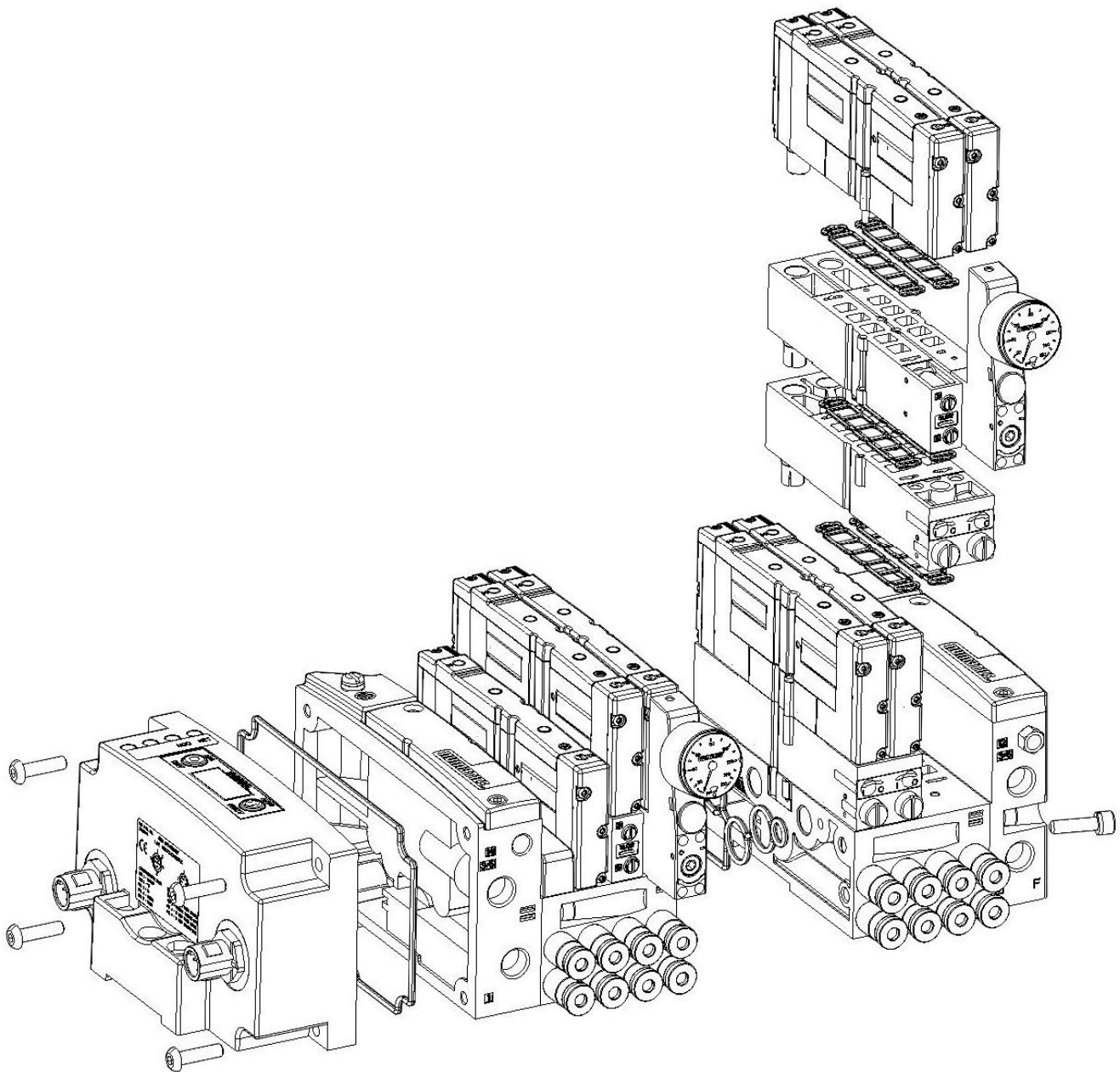
2.2   Manifold Connectors

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 32 coil outputs available on the complete manifold assemblies. The 32 available outputs are accessed on the 501 series valves utilizing 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.

Manifold Z-Boards™

580 Node Connection to Z-Boards™

Not Used,
Pin No. 3

14 Solenoid,
Pin No. 1

Common,
Pin No. 4

12 Solenoid,
Pin No. 2

Pinout of integral plug is the same for 501, 502, and 503 Series valves manifolds
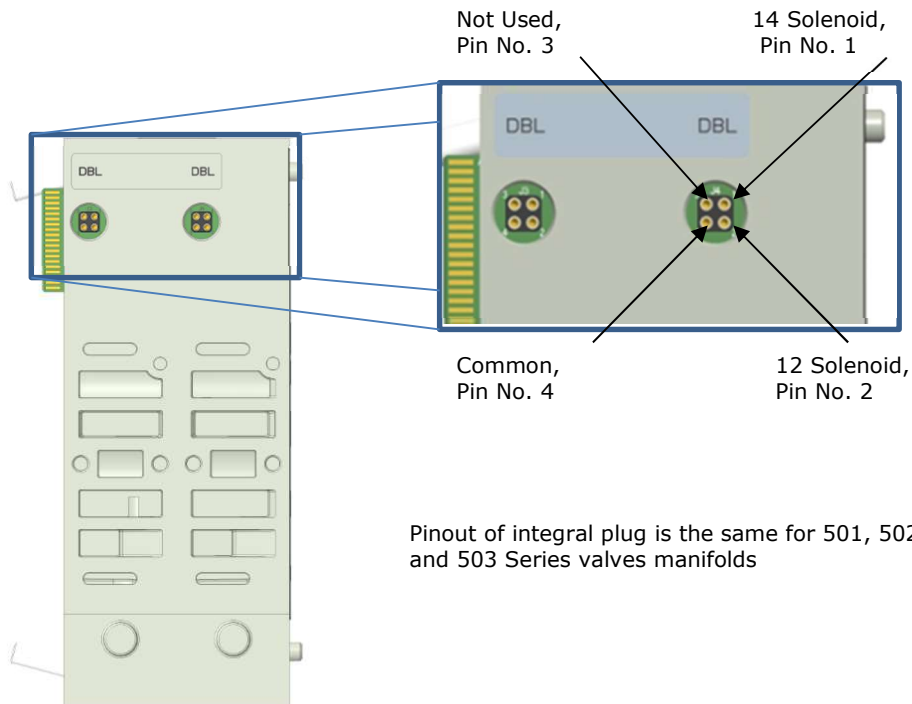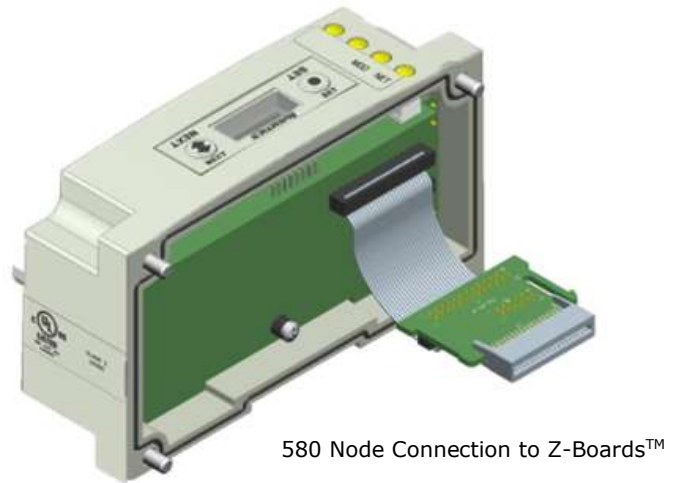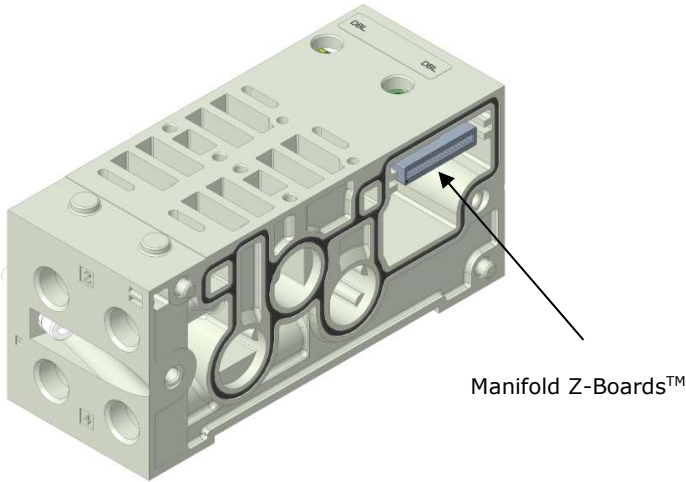
NOTE! *A single solenoid valve's coil is always on the "14" end.*

TD580COTM1-2EN   2/22
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Page 2-8

2.3   Z-Board™ Connectors

The 501/502/503 valve series utilize 2 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 32 single, 16 double, or various combinations of valve coil output capabilities. The 501 Z-Board™ is minimum (3) or (4) station, the 502 and 503 Z-Board™ is minimum (2) stations.

501 Series

502 Series

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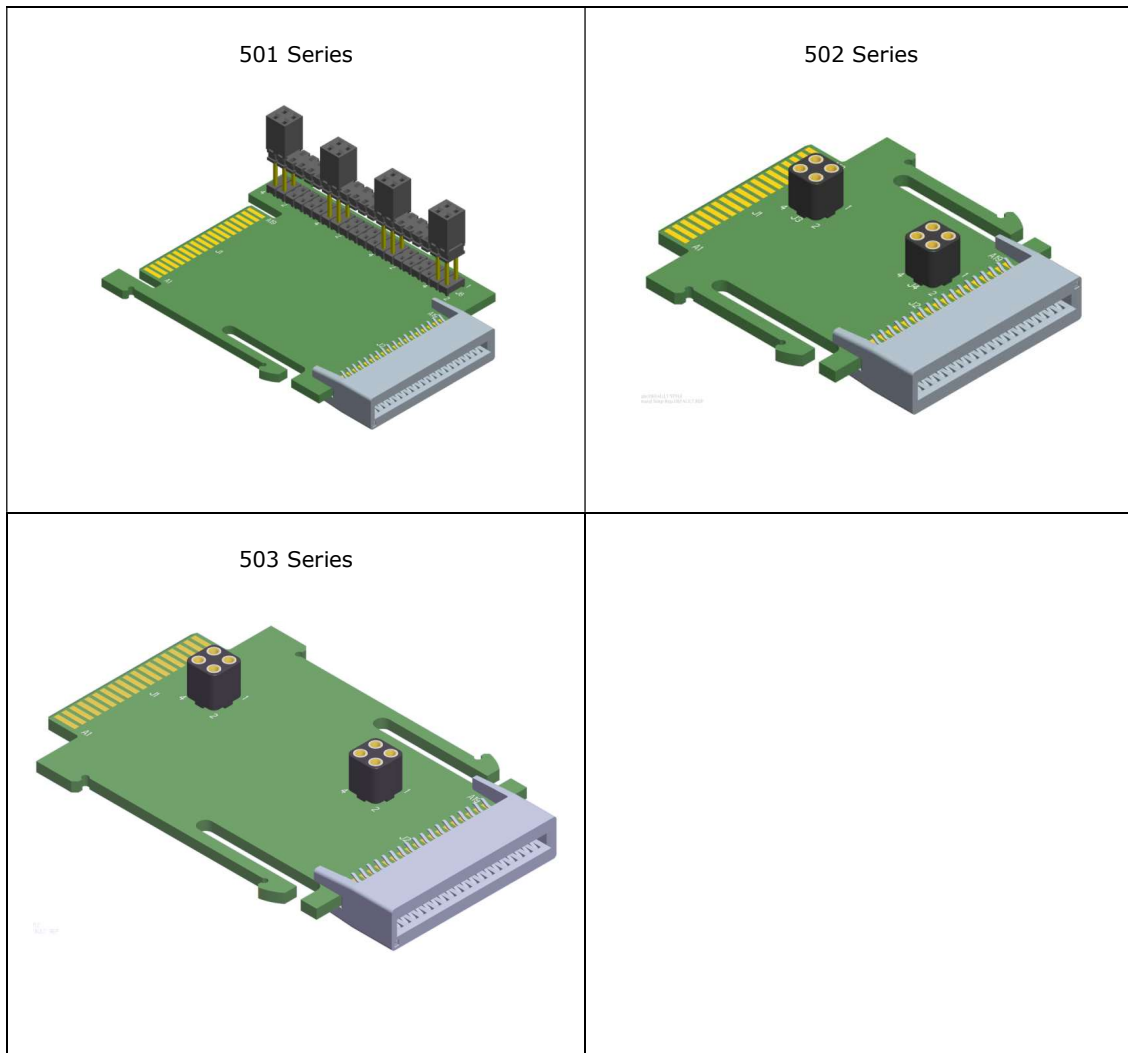
NOTE! Each series Z-Board™ can be selected in either SINGLE or DOUBLE output (coil) versions. The SINGLE and DOUBLE output function cannot be mixed on the Z-Boards™

TD580COTM1-2EN   2/22
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Page 2-9
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3. Communication Node

3.1 CANopen™ Node

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

Communication Node	Part Number
580 CANopen™ Node	P580AECO1010A00
580 CANopen™ Node w/DIN Rail Clips	P580AECO1010DRM

TD580COTM1-2EN   2/22
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Page 3-10
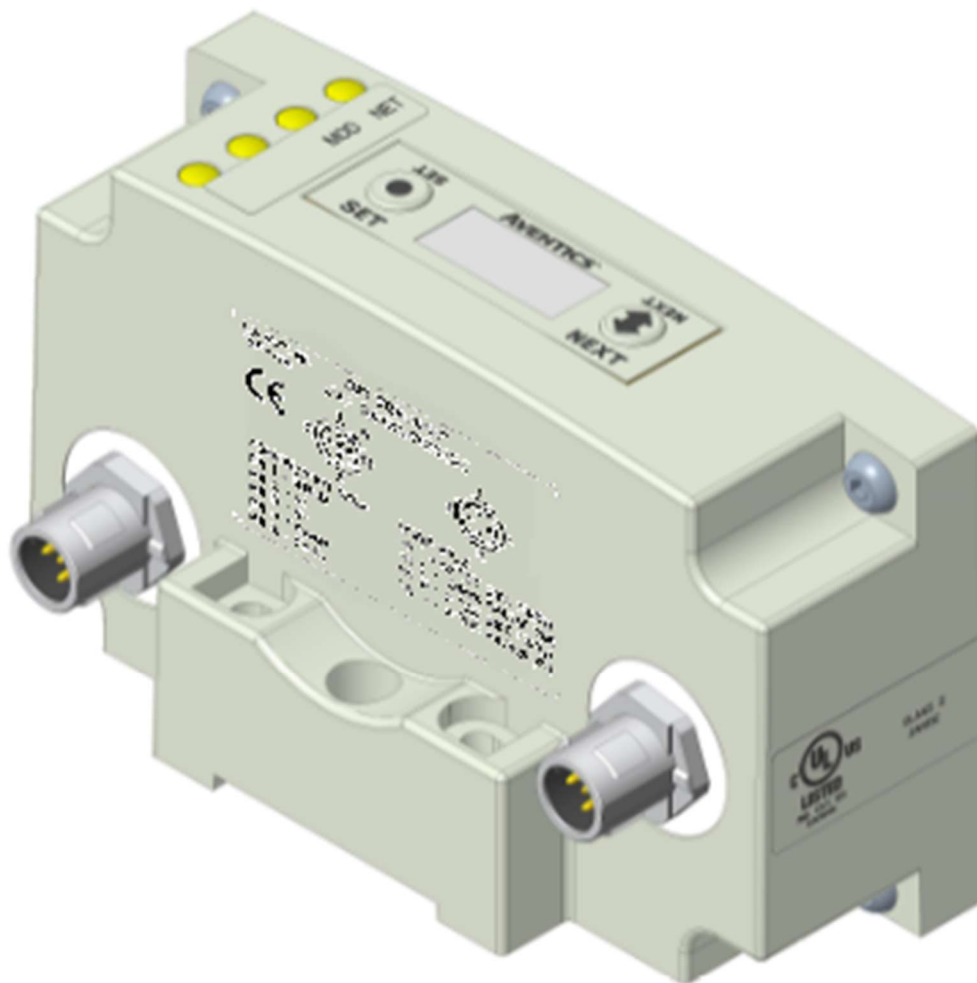
3.2   CANopen™ Node Description

Detail No.	Description
1	5 Pin M12 Male Communication Connector
2	Mounting Hole
3	4 Pin M12 Male Power Connector
4	ERROR LED
5	RUN 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

TD580COTM1-2EN   2/22
Subject to change without notice

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www.AVENTICS.com   Page 3-11
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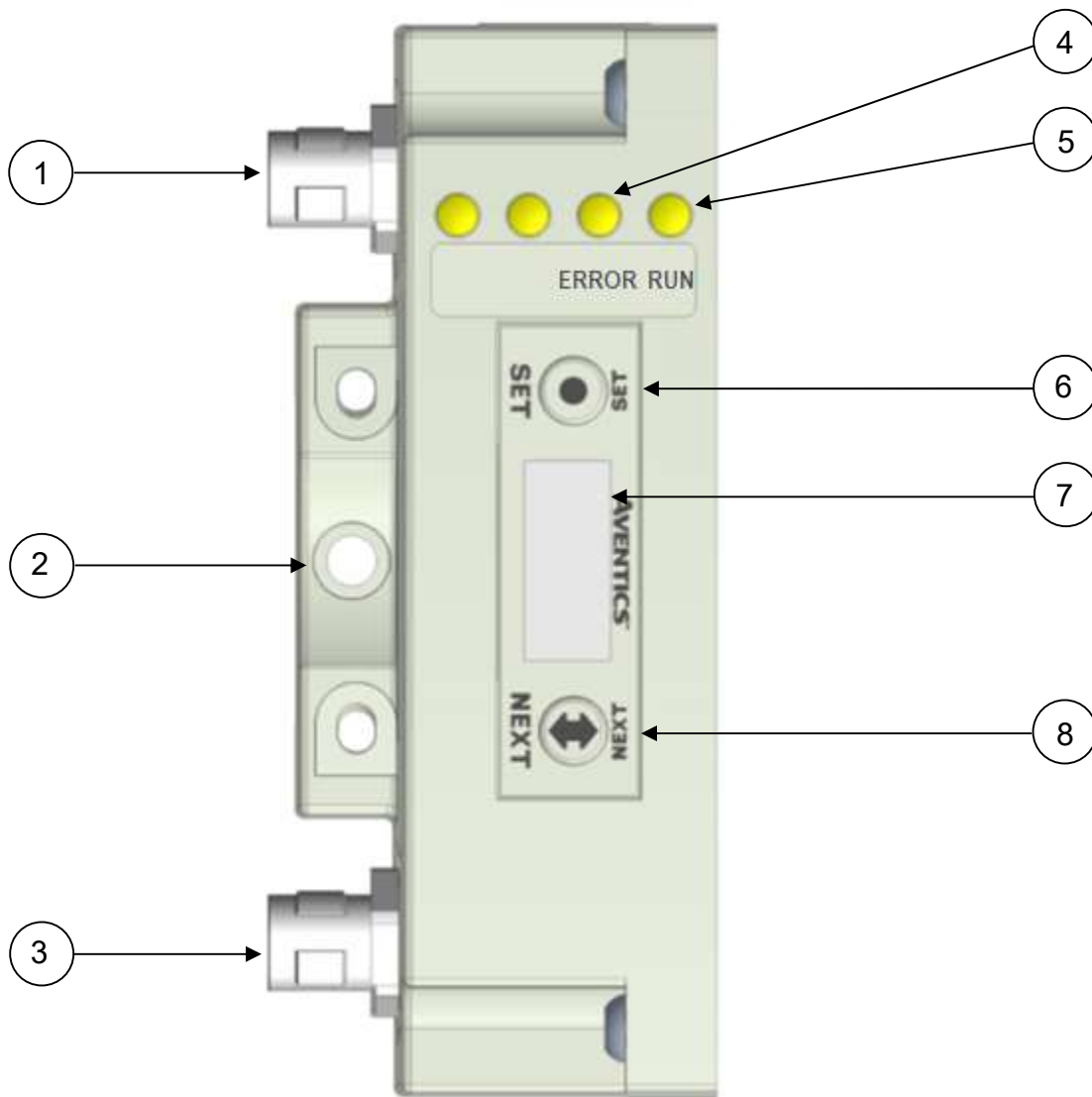
3.3   Connector Pin-Outs

Industry standard M12 connectors are used for communication and power.
The CANopen™ communication connector is a single keyway 5 pin male connector.
The Power connector is a single keyway 4 pin male connector.

CANopen™ Communication Connector Pin-Out
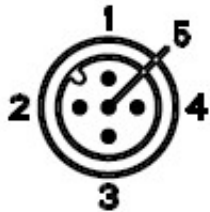
Pin No.	Function	Description
1	Shield	Cable shield
2	V+	Bus Power 11-25VDC
3	V-	Bus Power Common (0 VDC)
4	CAN_H	Controller Area Network High Communication Line
5	CAN_L	Controller Area Network Low Communication Line

Power Connector Pin-Out

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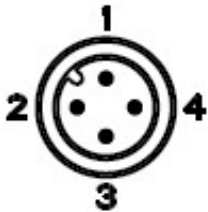
ATTENTION

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

TD580COTM1-2EN   2/22
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www.AVENTICS.com   Page 3-12
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3.4   Electrical Connections

Standard Power Connector Wiring Diagram Examples

Single Power Supply Example (Non-isolated commons)

Male connector view

Separate Power Supply Example (Non-isolated commons)

Male connector view

TD580COTM1-2EN   2/22
Subject to change without notice

EMERSON™   www.AVENTICS.com   Page 3-13
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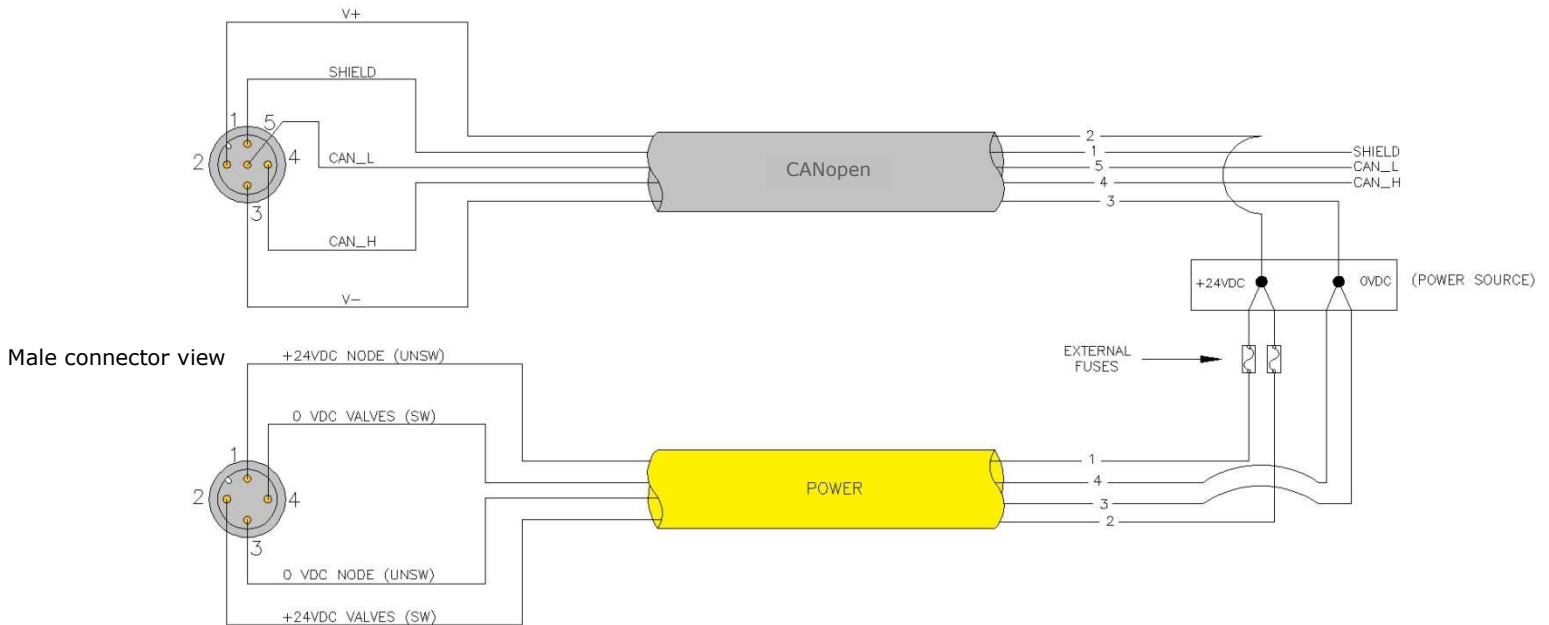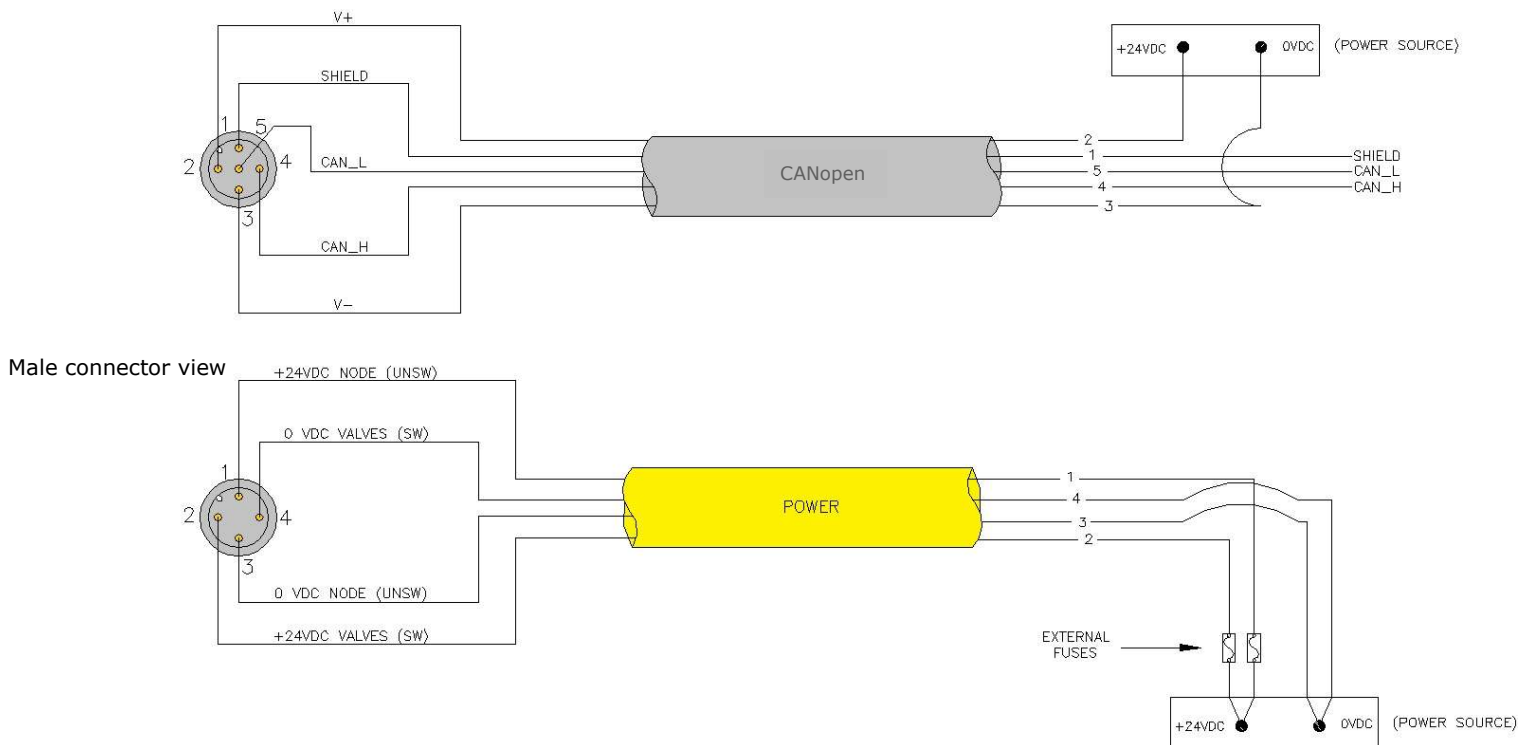
Separate Power Supply Example (Isolated commons)
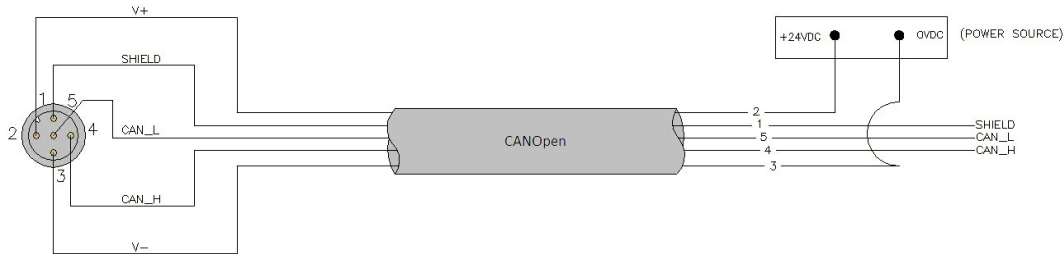
Male connector view
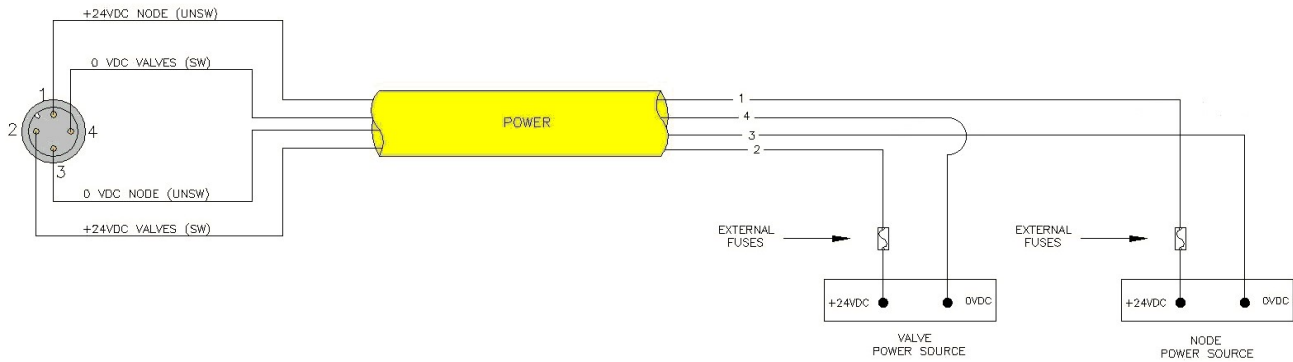
<table>
<tr><td rowspan="7" align="center">⚠️
ATTENTION</td><td>

- *Please see page 3-17 for external fuse sizing guide.*
- *When using molded connector power cables, <u>Do Not</u> rely on wire colors for Pin-Out. <u>Always use pin number references.</u>*
- *To be connected to a Class 2 power source only!*
- *Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.*
- *Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.*
- CLASS 2 WIRING: All filed wiring shall be suitable for class 1, Electric Light and Power, or Class 2, Class 3 wirings are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) limited energy circuit conductors from unlimited energy circuit conductors.
- MULTIPLE CLASS 2 POWER SOURCES: When interconnects, Class 2 sources shall be listed and rated suitable for parallel interconnection.

</td></tr>
</table>

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3.5   Chassis Ground

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

CHASSIS GROUND CONNECTION POINT,
501 VALVES

CHASSIS GROUND CONNECTION
POINT, **502 & 503** VALVES
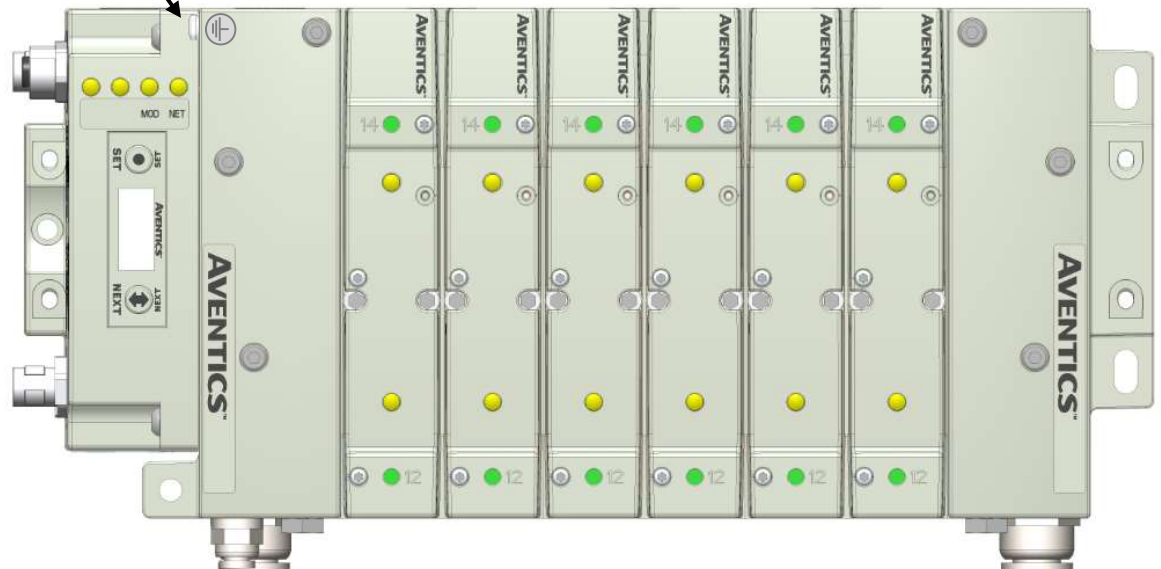
CAUTION

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

3.6   Power Consumption

Power Connection

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

Power Rating

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

Component	Voltage	Tolerance	+24VDC (Valve) Pins 2 & 4		+24VDC (Node) Pins 1 & 3	
			Current Per Coil	Power Per Coil	Current	Power
Solenoid Valve Coil 501 (Each)	24 VDC	+10%/-15%	0.03 Amps	0.8 Watts	NA	NA
Solenoid Valve Coil 502 (Each)	24 VDC	+10%/-15%	0.06 Amps	1.3 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 Amps	1.7 Watts	NA	NA
580 CANopen™ Node	24 VDC	+/- 10%	NA	NA	0.05 Amps	1.2 Watts

CANopen™ Connector

Pin No.	Function	Description
1	Shield	Cable shield
2	V+	Bus Power 11-25VDC
3	V-	Bus Power Common (0 VDC)
4	CAN_H	Controller Area Network High Communication Line
5	CAN_L	Controller Area Network Low Communication Line

Component	Voltage	Tolerance	+24VDC (Network) Pins 2 & 3	
			Current	Power
580 CANopen™ Node	24 VDC	11-25 VDC	0.05 Amps	1.2 Watts

TD580COTM1-2EN   2/22
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Page 3-16
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3.7   Recommended External Fuses

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

External Fuse Sizing Chart

Power Consumption - Power Connector Pin for VALVES			
Description			Current
Number of Solenoid Valve Coils Energized Simultaneously			
_____ X 0.03 A (501 Series)	=		_____Amps
_____ X 0.06 A (502 Series)	=		_____Amps
_____ X 0.07 A (503 Series)	=		_____Amps
Total:			_____Amps
Surge Compensation:	X	1.25	
Suggested External +24 VDC (Valves) Fuse Value:			_____Amps
Power Consumption – Power Connector Pin for NODE			
Description			Current
Communication Node Power Consumption	=		0.050 Amps
Surge Compensation:	X	1.25	
Suggested External Pin +24 VDC (Node) Fuse Value:	=		0.060 Amps

NOTE!
- *The Node Power pins supply power to the node electronics. These pins must be powered at all times for the communication node to be functional. See page 3-12 for reference.*
- *Reverse polarity protection is provided.*

TD580COTM1-2EN   2/22
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Page 3-17
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3.8   Diagnostics – 580 CANopen™ Node LED Functions

Upon power up, the RUN and ERROR LEDs indicate the state of the unit. There are two LEDs on the 580 CANopen™ Interface. The LEDs functions are described in the table below.
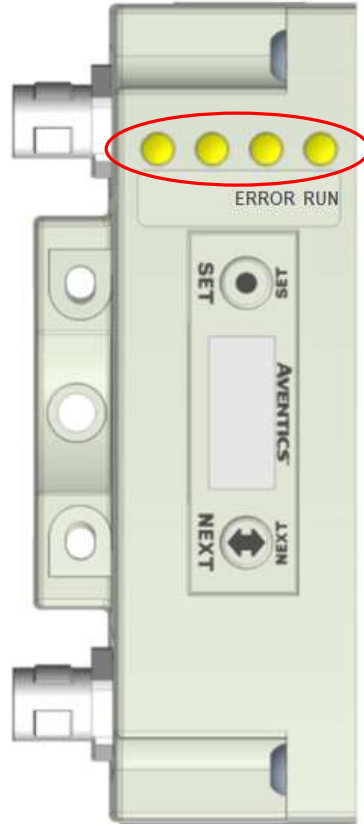
LED Name	Color	Status		Description
RUN	Green	OFF		Device is not currently powered.
		SINGLE FLASH	⎍⎍⎍	Normal operation. Device is on-line and has established a connection.
		BLINKING	⎍⎍⎍⎍	Device is on-line but has no established connections.
		ON		Operational – The Device is in the operational state.
ERROR	Red	OFF		No Error – Device is in working condition
		SINGLE FLASH	⎍⎍	Warning limit reached – at least one of the error counters of the CAN controllers has reached or exceeded the warning level (too many error frames)
		DOUBLE FLASH	⎍⎍⎍	Error Control Event – A guard event (NMT-slave or NMT-master) or a heartbeat event (Heartbeat consumer) has occurred
		TRIPLE FLASH	⎍⎍⎍⎍⎍⎍	Sync Error – The sync message has not been received within the configured communication cycle period time out (see Object Dictionary Entry 0x1006)
		ON		Bus Off – The CAN controller is Bus Off
	Green / Red	FLASHING		Module is in self-test mode. Cycle power to end self-test mode.

TD580COTM1-2EN   2/22
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3.9   Output / Short Circuit Protection Diagnostic Status Bits

Diagnostic Status Bit Action

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

TD580COTM1-2EN   2/22
Subject to change without notice

www.AVENTICS.com   Page 3-19
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4. CANopen™ Node Graphic Display

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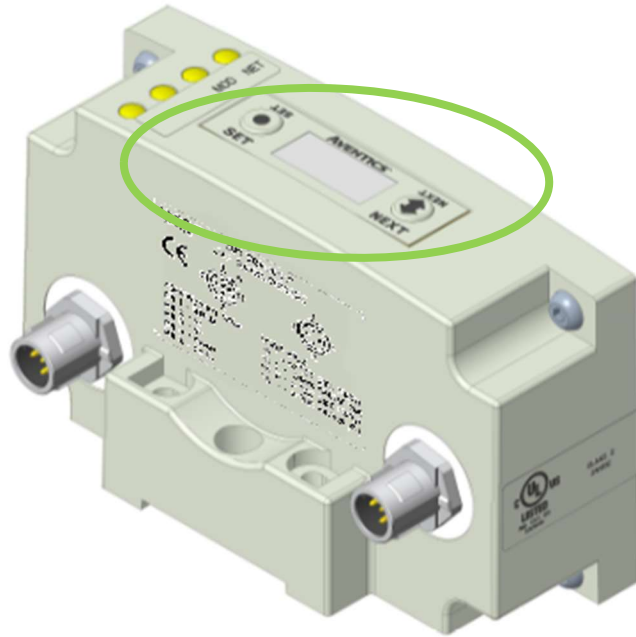
The following graphic displays represent the main menu selections of the 580 CANopen™ node. Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access to the Sub-Menus. Please see the appropriate pages referenced below for further details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

Home Screen

AVENTICS ADDRESS 63	**AVENTICS** I/O SIZE RX=6 TX=4	**AVENTICS** BAUD RATE 125K	**AVENTICS** MODEL NUMBER P580AECO1010	**AVENTICS** ADVANCE SETTINGS
See page 4-21 for Sub-Menu	See page 4-222 for Sub-Menu	See page 4-23 for Sub-Menu	See page 4-24 for Sub-Menu	See page 4-25 for Sub-Menu

AVENTICS FACTORY DEFAULTS	**AVENTICS** DIAGNOSTICS
See page 4-28 for Sub-Menu	See page 4-28 for Sub-Menu

TD580COTM1-2EN   2/22
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www.AVENTICS.com   Page 4-20
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4.1   Network Address Sub-Menu

Steps to Set Address

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

2. Press the NEXT button to scroll through the choices for the 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.
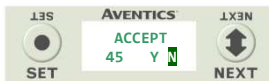
4. Press the NEXT button to select Yes or No to accept the address shown on the display,
   a. Selecting No will bring you back to the main Address menu.
   b. Selecting Yes will take you to the following SAVE SETTINGS menu.

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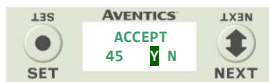
5. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new Address to be saved in temporary memory and allow you to make additional parameter changes before the node is reset. However, you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

Press the SET button to confirm your choice.

NOTE!
- *Only addresses 0-127 are valid.*
- *Address 0 is typically reserved for the master (i.e. PLC, IPC, etc…)*
- *Address 127 is the Factory Default node address.*

TD580COTM1-2EN   2/22
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www.AVENTICS.com   Page 4-21
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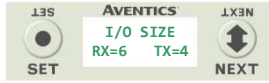
4.2   I/O Size

I/O Size of Manifold

1. The I/O Size is reference only.

4.3   Baud Rate Sub-Menu

Steps to Set Baud Rate

1. Press the SET button to enter the BAUD RATE sub-menu.
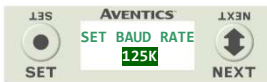
2. Press the NEXT button to scroll through the choices for the baud rate of the node:
   a.   125K (Factory Default)
   b.   250K
   c.   500K
   d.   1M
   e.   RETURN (this will return you to the top of BAUD RATE menu)
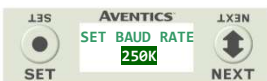
   Press the SET button to confirm your choice.
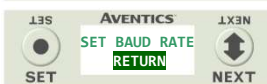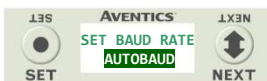
3. Press the NEXT button to select Yes or No to accept the baud rate shown on the display.
   a.   Selecting No will bring you back to the main Baud Rate menu.
   b.   Selecting Yes will take you to the following SAVE SETTINGS menu.

   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 new Baud Rate 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.

NOTE!
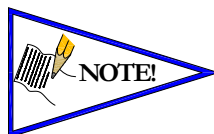
- *Node must be set to the same baud rate as the network master (i.e. PLC scanner, controller's communication module, etc.)*

TD580COTM1-2EN   2/22
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4.4   Model Number

Model Number

1. The Model Number is reference only.

4.5   Advanced Settings - Fault Action

This menu allows the enabling / disabling of the fault action parameter. The fault action parameter determines the behavior of the outputs (coils) during a communication fault. Please see page 5-322 for more details.

Fault Action Settings

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

2. Press the SET button to enter the FAULT ACTION setting screen.

3. Press the NEXT button to scroll through the choices for the desired output action during a fault state.

   a. OUTPUTS OFF (Factory Default)

   b. HOLD LAST STATE
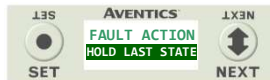
   c. RETURN (this will return you to the SET FAULT/IDLE menu)

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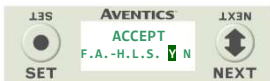
4. Press the NEXT button to select Yes or No to accept the selection
   Press the SET button to confirm your choice
   a. Selecting No will bring you back to the main SET FAULT IDLE menu.
   b. Selecting Yes will take you to the following saved settings menu.

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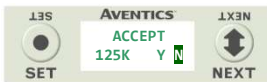5. Press the NEXT button to select either NOW or LATER.
   Press the SET button to confirm your choice.
   a. Selecting NOW will cause the node to reset and apply the new setting
   b. Selecting LATER will cause the new FAULT IDLE Action selection to be saved in memory, you must Accept the saved changes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

   Press the SET button to confirm your choice.

NOTE!
- *See page 5-32 for more details.*
- *Factory Default is "ALL OUTPUTS OFF"*

TD580COTM1-2EN   2/22
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4.6   Advanced Settings – Flip Display

Flip Display Settings

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

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

3. Press the SET button to enter the FLIP DISPLAY sub menu.
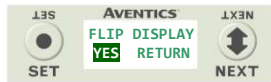
4. Press the NEXT button to change this selection.
   a. YES
   b. RETURN

5. Press the SET button to confirm your selection.

4.7 Advanced Settings – 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.

Parameters Settings

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.

TD580COTM1-2EN   2/22
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www.AVENTICS.com   Page 4-27
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4.8   Factory Defaults
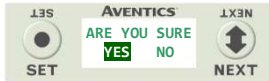
Factory Default Settings

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.

Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	*Default*
Node Address	127
Baud Rate	125K
Rx/Tx Values	Rx = 4 / Tx = 4 (non-settable)
Fault Action	Reset to All Outputs Off

4.9   Diagnostics

1. All diagnostic information is read only

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

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

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

TD580COTM1-2EN   2/22
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Page 4-28

4.10   Diagnostics - Self Test Mode

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

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

CAUTION

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 DISCONNECT AIR HOLD SET BUTTON 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.

Returns to the Diagnostic tab Sub-Menu.

HOLD FOR 10 SECONDS TO INITIATE EITHER MODE
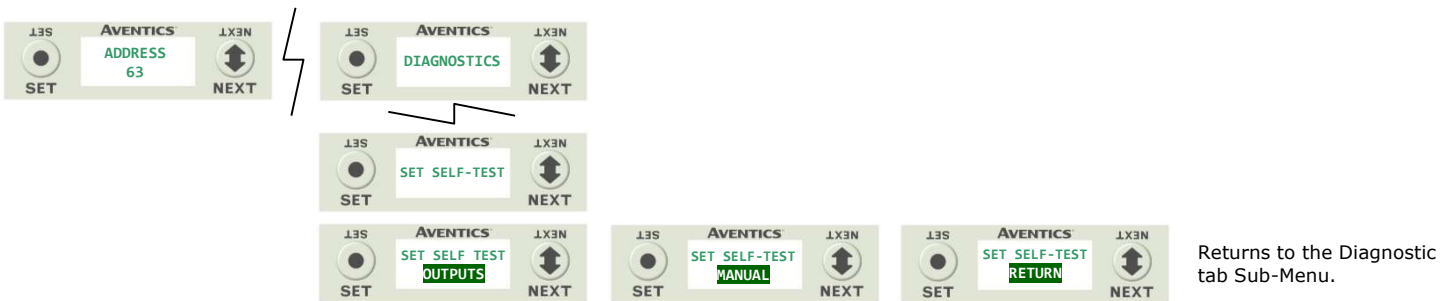
"OUTPUTS"

The connected outputs will cycle every 0.5 seconds.

"MANUAL"

Push to Energize flashing coil output

Push again to De-energize

NOTE!

A Power Cycle is required to Deactivate SELF TEST MODE
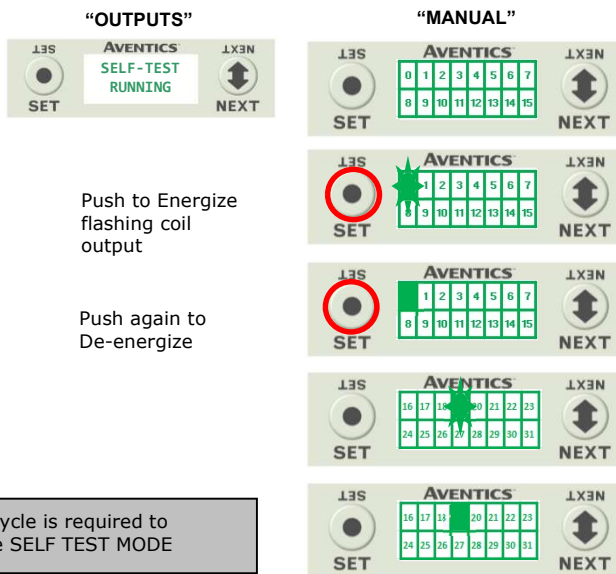
The first (16) available coils (outputs) will appear. There is a total of (32) coils that can be individually or simultaneously energized. If less than 32 coils are present, there will be some delay before the next cycle.

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

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

TD580COTM1-2EN   2/22
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4.11 Error Messages

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

SET • SHORTED COIL NO. X NEXT ↕	Displayed when a short circuit condition is detected on a valve coil.
SET • OPEN COIL NO. X NEXT ↕	Displayed when an open circuit condition is detected on a valve coil.
SET • VALVE POWER OFF NEXT ↕	Displayed when +24 VDC on Pin No. 2 and No. 4 (Valves) is not present.
SET • NO NETWORK POWER NEXT ↕	Displayed when +24 VDC on pin No. 2 and No. 3 of the Communication connector is not present.
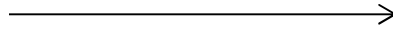
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TD580COTM1-2EN   2/22
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5. CANopen™ Configuration

5.1   EDS File

The EDS file contains configuration information required to establish communication to a node on a CANopen™ network. EDS files are available on the ASCO website at www.ASCO.com/G3.

5.2   User Configurable Device Parameters

The AVENTICS 580 CANopen™ Node allows the user to set many user options which define how the manifold behaves in certain instances. The following are descriptions of these device parameters. All of these configurable parameters can be adjusted using appropriate configuration software or by selecting the appropriate parameters in the node's graphic display screen.

Parameter Name	Description	Settable Via	
		Display	Software
MAC ID	Node address	√	X
Baud Rate	Network speed	√	√
Output Idle Action	Determines whether to use idle value attribute or hold last state	√	√
Output Fault Action	Determines whether to use idle value attribute or hold last state	√	√
Flip Display	Allows the user to "flip" the onboard display 180 degree's	√	X
Parameters Lock	Allows the user to "lock" all settable parameters	√	√

TD580COTM1-2EN   2/22
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5.3   Communication Fault Mode Parameter (Sec 4.5)

This parameter is used to set the behaviors of valves during a communication fault. The parameter shown below is used to determine what state/action the outputs (coils) will have during a "Fault" event. It will allow control of all valves on the manifold.

The user, through the graphic display or software, can determine how the outputs (coils) behave when a communication fault occurs. These settings are non-volatile and thus will not change upon loss of power.

The two behavior options are:

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

Communication Fault Mode Sequence

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

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

1.   The device receives a Communication Fault event.
2.   The device determines what action to take based on the Communication Fault Mode attribute setting.
3.   If the attribute is set to turn off all outputs, all of the outputs (coils) will turn off (Factory Default Setting).
4.   If the attribute is set to hold last state, all of the outputs (coils) will hold their last state.

```
                    ┌──────────────────┐
                    │   Communication  │
                    │  Fault Received  │
                    └──────────────────┘
                              │
                              ▼
                           �◇
                          Device
                          Checks
                       Communication
                          Fault
                         Attribute
         ┌──────────┐  ◀────       ────▶  ┌──────────────┐
         │ Turn OFF │                     │Hold Last State│
         │All Outputs│                    └──────────────┘
         └──────────┘                            │
              │                                  ▼
              ▼                          ┌──────────────┐
       ┌──────────┐                      │   Outputs    │
       │ Outputs  │                      │   Do Not     │
       │De-Energize│                     │ Change State │
       └──────────┘                      └──────────────┘
```

TD580COTM1-2EN   2/22
Subject to change without notice

www.AVENTICS.com   Page 5-32
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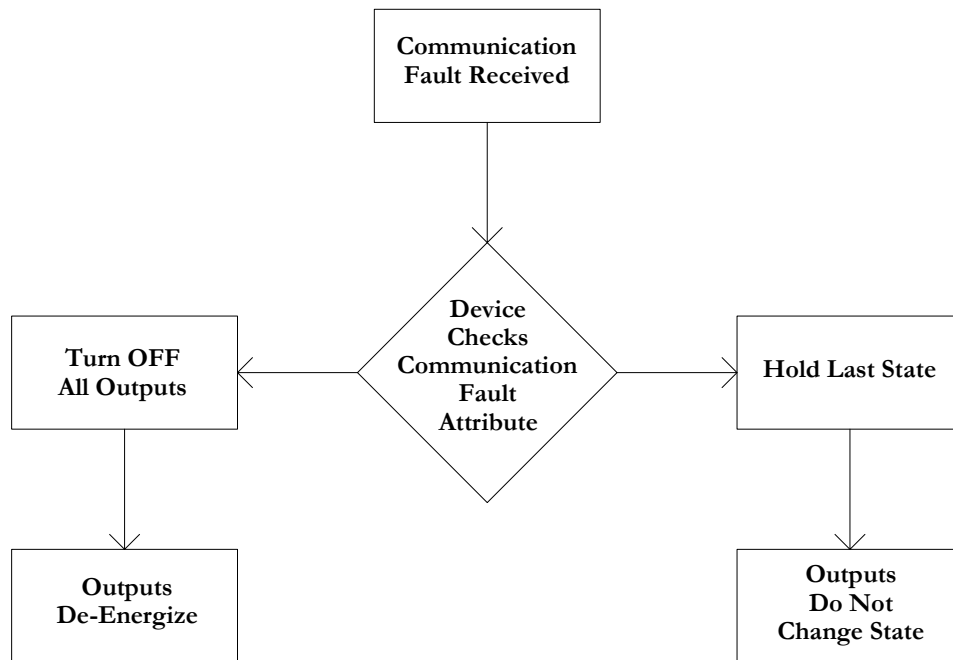
6. CANopen™ Mapping

6.1   I/O Sizes - Rx/Tx

Outputs (Valves)

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

Inputs (Status)

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

Total I/O Size

The total I/O size of the 580 CANopen™ Node is fixed: Inputs = 6 bytes, Outputs = 4 bytes.

6.2   PDOs

PDOs or Process Data Objects are used to transfer the real time data (I/O) with no protocol overhead. The 580 series supports one transmit and one receive PDOs defined in the Pre-Defined Connection Set. Each PDO can transfer up to eight bytes of data. Therefore, the logical maximum I/O size is 4 bytes of input and 4 bytes of output. The transmit PDOs have input objects mapped to them. The receive PDOs have output objects mapped to them.

$$0 \quad x \quad 6200 \quad 01 \quad 08$$

Number of bits of data in Sub-index (Hexadecimal)
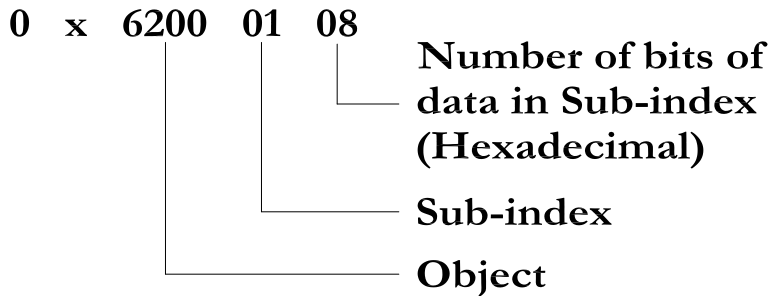
Sub-index

Object

Object:

Object		Sub-index (Hexadecimal)	Bit Value (Hexadecimal)
Value	Description		
6000	Digital Inputs	01-04	08
6200	Digital Outputs	01-04	08
3000	System Diagnostics	01	08

TD580COTM1-2EN   2/22
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6.3   Bit Mapping Rules

There is not much variation in the bit mapping for a 580 CANopen™ manifold, the only difference depends on whether a single of a double solenoid valve is used. The following is a breakdown of the bit mapping rules associated with the AVENTICS 580 CANopen™ Valve Manifold.

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

2) The valve size is fixed at 4 bytes (32 coils).

3) Each solenoid coil output has an associated status input bit (refer to the section labeled, "Output Short Circuit Protection", on page 3-19 for functional details).

4) Solenoid coil output addressing begins at the 1st manifold station nearest the node, using the "14" coil 1st and then, if applicable, the "12" coil, and continues in ascending order away from the communication node.

5) Each manifold station allocates 1 or 2 output bits. This is dependent on the Z-Board™ type installed. A single Z-Board™ allocates 1 output bit. A double Z-Board™ allocates 2 output bits.

6) Z-Boards™ can be used in any arrangement (all singles, all doubles, or any combination). Per station selection is limited based on the fact that 502 and 503 manifolds are a minimum of two stations, and the 501 is a minimum of four stations.

> **NOTE!** *Single solenoid valves can be used with double Z-Boards™. However, one of the two available outputs will remain unused. Refer to the Mapping Examples on the following pages.*
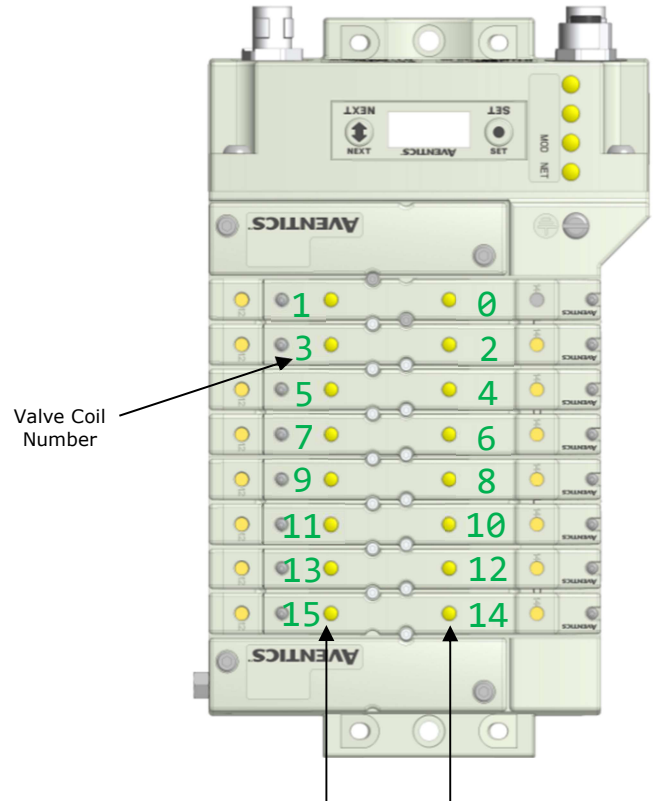
TD580COTM1-2EN   2/22
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Page 6-34
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6.4   Mapping Example #1

Assumed Settings

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

How to Order

Qty	Part Number
1	8501AV8H100VA00
4	R501A2B40MA00F1
1	H501AMM4BMA0010
4	R501A2B40MA00F1
1	H501AMM4BMA0010
1	P580AECO1010A00
	ASSEMBLED

Valve Coil Number

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

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

Output Table								
SUB-INDEX	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
6200 01 08	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
6200 02 08	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
6200 03 08	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
6200 04 08	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
SUB-INDEX	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000 01 08	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Valve Power Status
6000 01 08	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
6000 02 08	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
6000 03 08	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
6000 04 08	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

TD580COTM1-2EN   2/22
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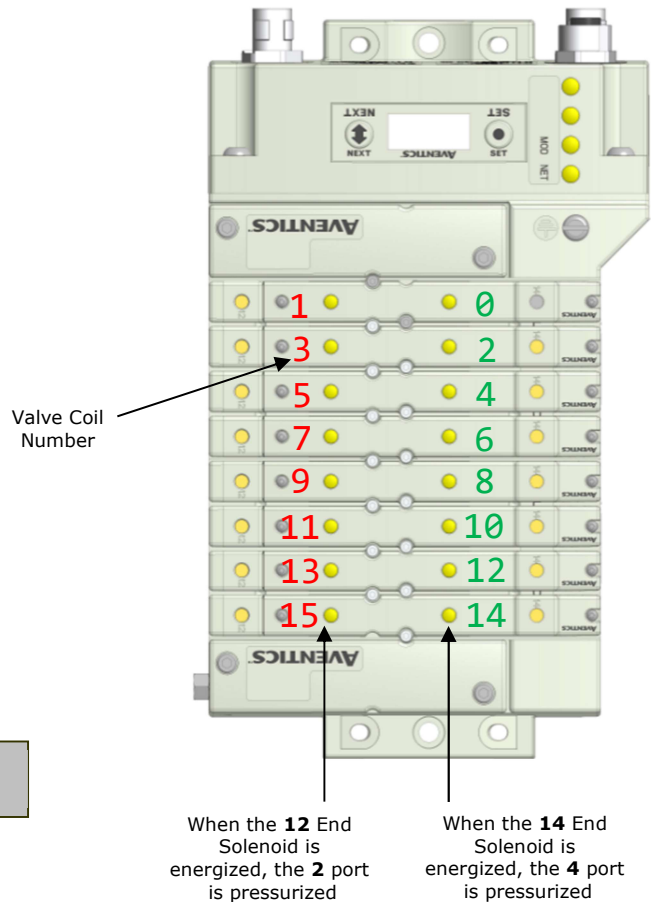Page 6-35

6.5   Mapping Example #2

Assumed Settings

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

How to Order

Qty	Part Number
1	8501AV8H100VA00
4	R501A2B10MA00F1
1	H501AMM4BMA0010
4	R501A2B10MA00F1
1	H501AMM4BMA0010
1	P580AECO1010A00
	ASSEMBLED

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

Valve Coil Number

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

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

Output Table							
SUB-INDEX	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
6200 01 08	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
6200 02 08	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
6200 03 08	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
6200 04 08	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table							
SUB-INDEX	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000 01 08	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Valve Power Status
6000 01 08	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
6000 02 08	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
6000 03 08	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
6000 04 08	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

TD580COTM1-2EN   2/22
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6.6   Diagnostic Word

Diagnostic Word Format								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
3000 01 08	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Valve Power Status (1=Error)
3000 02 08	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Byte 0 (Communication Status)

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

TD580COTM1-2EN   2/22
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Page 6-37
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7. Appendix

7.1   System Specifications

Electrical	
Supply Voltage	Valves (501, 502, 503): 24 VDC + 10%, -15% Node: 24 VDC ± 10%
Current	Total current on the Power Connector ("Valves" and "Node" Pins) must not exceed 4 Amps.
Reverse Polarity	Reverse polarity is protection is provided on both Node and Valve power.
Recommended External Fuse	External fuses should be chosen depending upon manifold configuration. Please refer to power consumption chart on page 3-17 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for valve outputs.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	-10 to 115°F (-23 to 46°C)

7.2   Factory Default Settings

Description	Default
Node Address	127
Baud Rate	125 KB
Rx/Tx Values	Rx = 4 / Tx = 4 (non-settable)
Diagnostic Word	Enabled (non-settable)
Valve Diagnostics	Enabled (non-settable)
Fault Action	Reset to Off
Brightness	(non-settable)

TD580COTM1-2EN   2/22
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7.3   Troubleshooting

Communication Node

Symptom	Possible Cause	Solution
The wrong valve solenoid coils are being energized.	Z-Board™ type mismatch. Single Z-Board™ present where double Z-Board™ expected or vice versa.	Check that correct Z-Board™ types are installed.
Valve outputs do not energize.	Output power not present or connected improperly on Power connector.	Check for 24VDC on the +24 VDC (Valves) pin of the M12 Power connector of the 580 Node.

7.4   Glossary of Terms

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

Term	Description
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)
CAN_H	Controller Area Network – High; Communication Line.
CAN_L	Controller Area Network – Low; Communication Line.
CANBUS	Serial communication BUS network based on CAN protocol.
Change of State	I/O message type in which either the expiration of the transmission timer or a change in input state triggers data production.
Comm. Fault	One or more of the I/O connections have timed out.
Cyclic	I/O message type in which data production is triggered by the expiration of the transmission timer.
Discrete I / O	The Inputs / Outputs that are available via the "Discrete I/O" side of manifold.
EDS file	Electronic Data Sheet. A text file, which contains specific product information, definitions of product capabilities and configurable parameters necessary for operation on a CANopen™ network.
EDS Stub file	An abridged version of the EDS file, which contains only the minimum information necessary to make the product functional on a CANopen™ network.
Ground	This term is used to indicate an earth ground.
I/O	Any combination of Inputs and Outputs.
Idle	A zero (0) length poll message (i.e.: scanner in program mode).
MAC ID	Media Access Connection Identification (00-63) – Node (network drop) address.
NEMA	National Electrical Manufacturers Association.
ODVA	Open DeviceNet™ Vendor Association (www.odva.org)
Polled	I/O message type in which the devise consumes I/O data from its master and produces I/O data when the master requests it.
Rx/Tx	Rx = Consumed byte size; analogous to Input byte size. Tx = Produced byte size; analogous to Output byte size.
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive.
SCP	Short Circuit Protection
Sourcing (PNP)	Method of connecting electrical circuits in which the positive side is switched and the common is zero (0) volts DC.
Status Input bit	A bit in the input table that reports the health of a corresponding output. Indicates short circuit or open coil (load) diagnostics.
Word	2 Bytes (16 bits)
Z-Board™	Circuit board installed in the valve sub-base which electrically connects the valve solenoid to the electrical /electronics interface. Available in single or double solenoid versions.

TD580COTM1-2EN   2/22
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7.5   Technical Support

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

Issues relating to network setup, PLC programming, sequencing, software related functions, etc. should be handled with the appropriate product vendor.

Information on device files, technical manuals, local distributors, and other AVENTICS products and support issues can be found on the ASCO website at www.ASCO.com.