numatics

G3 Series
EtherNet/IP™
Technical Manual

EMERSON
Industrial Automation

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Subject to change without notice

www.numatics.com/g3

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About EtherNet/IP

Overview

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

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

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

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

G3 EtherNet/IP™ Features

Features	*Description*
EtherNet/IP™ Spec. Supported	Designed to EtherNet/IP™ Specification
Bus Topology	Star and Multi-Star
Baud Rates Supported	10/100 Mbps and Autobaud
CE	CE Compliant
Duplicate Address Detection	If a duplicate address is detected on power up, duplicates will not progress to run mode
Address Setting	Via DHCP/BOOTP, Web Page Configuration, Graphical Display or optional Manual Configuration Module (MCM)
Duplex	Half and Full supported
Conformance Tested	Tested by ODVA for conformance.
Connection Type	Multicast

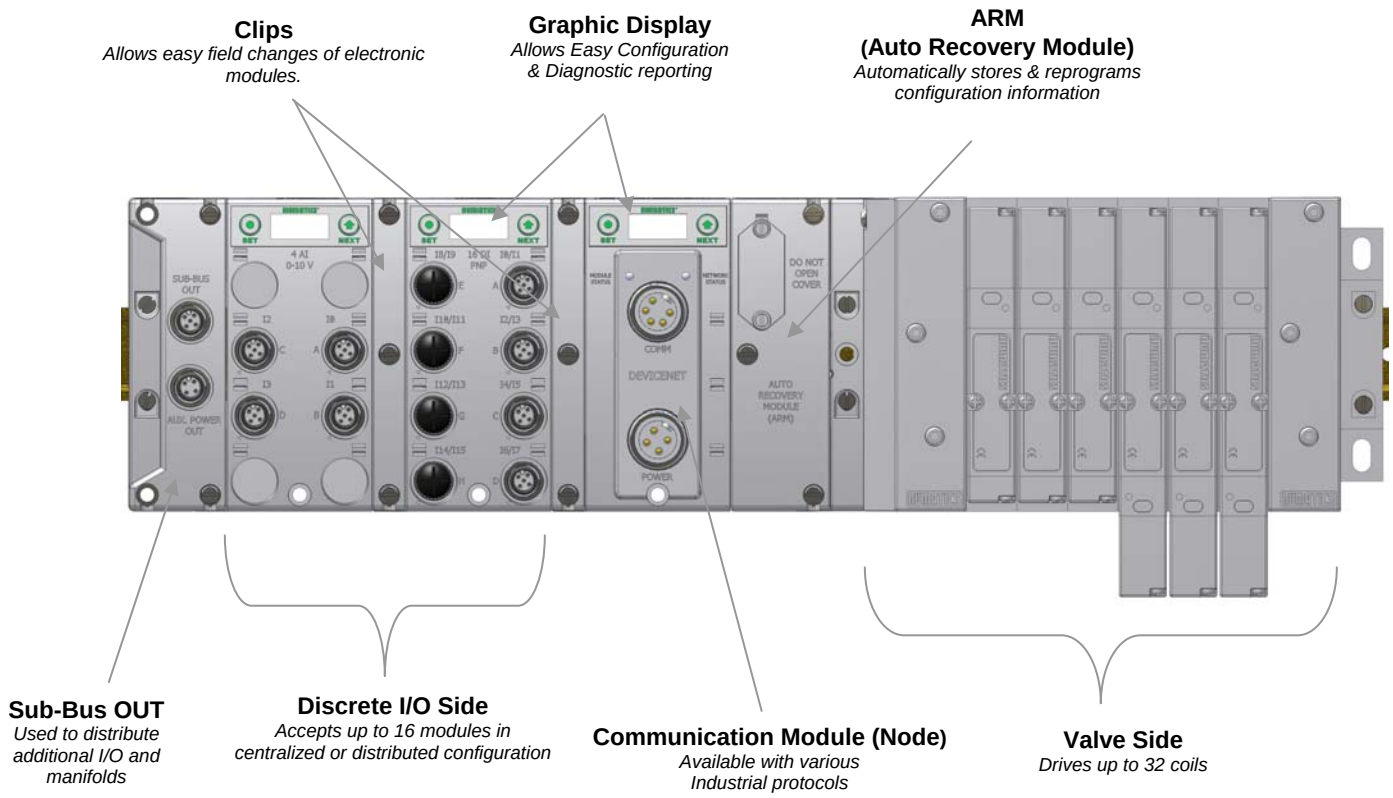
G3 Introduction

The G3 Series is an electronic product platform that features an integrated graphic display for simple commissioning and displaying of diagnostic information. In addition it has an innovative distribution capability which allows the same I/O components that make up a centralized manifold configuration to be used as the distribution components as well, decreasing the need for duplicate components on centralized and distributed applications. The G3 platform interfaces to a variety of valve series and fieldbus interface protocols and is capable of addressing a total of 1200 I/O points (150 bytes). With proper assembly and termination the G3 modules will have an IP65 / IP67 rating.

The manifold can be viewed as having two sections to it, the *Valve Side* and the *Discrete I/O Side*. The *Valve Side* supports a maximum of 32 solenoid coils and the *Discrete I/O Side* supports a maximum of 16 modules capable of addressing up to 1200 outputs, 1200 inputs or various combinations.

Various discrete modules with integrated graphic display are available. They include digital I/O, analog I/O, and specialty modules which cover various application needs. Pin-outs for all connectors are labeled on the side of the respective modules and are also detailed in the module section of this document.

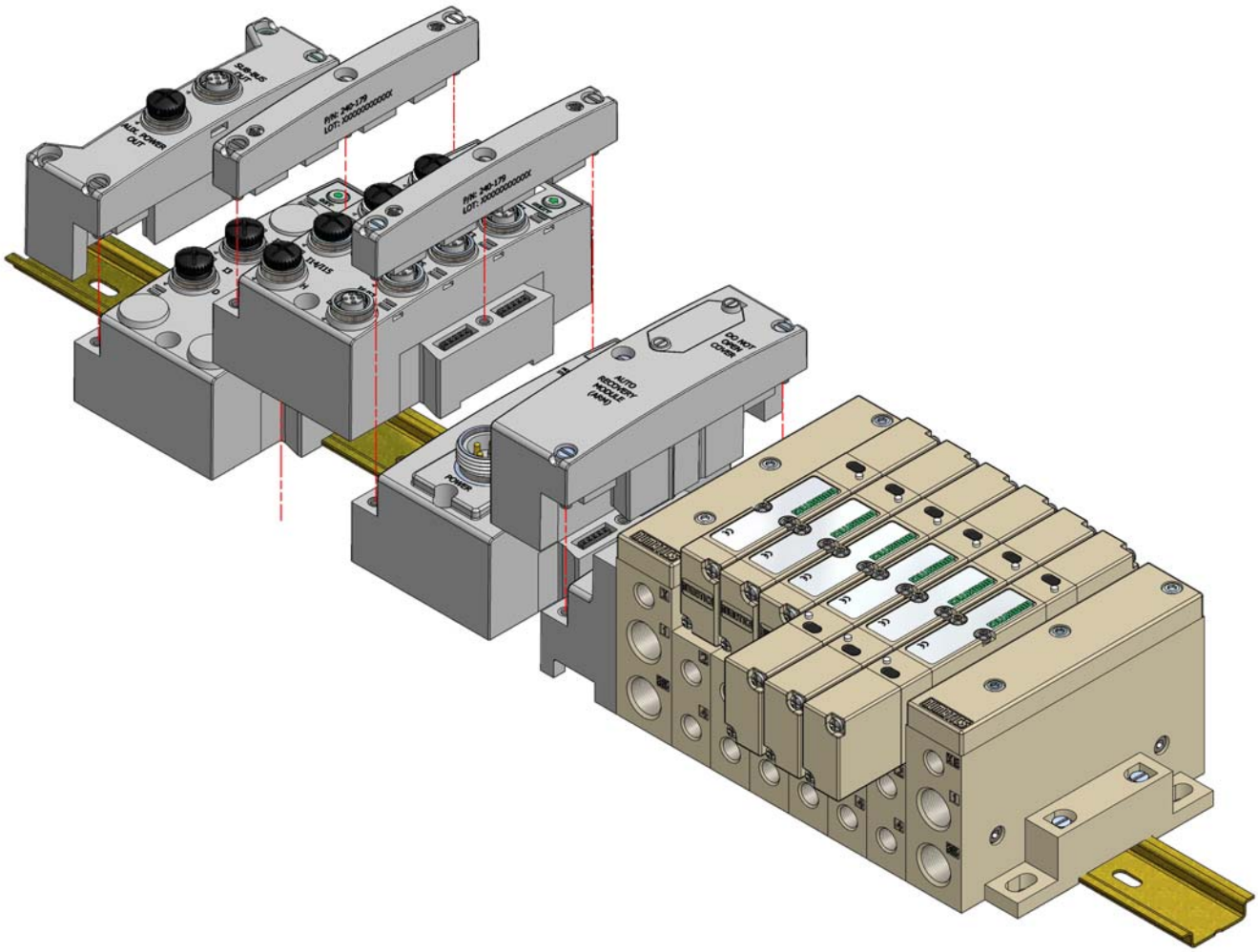
This manual details specific information for configuring and commissioning the Numatics G3 Series product line. For more information relating to pneumatic valving and valve manifold assemblies, please refer to the Numatics *In Control* Catalog at www.numatics.com .



G3 Electronics Modularity

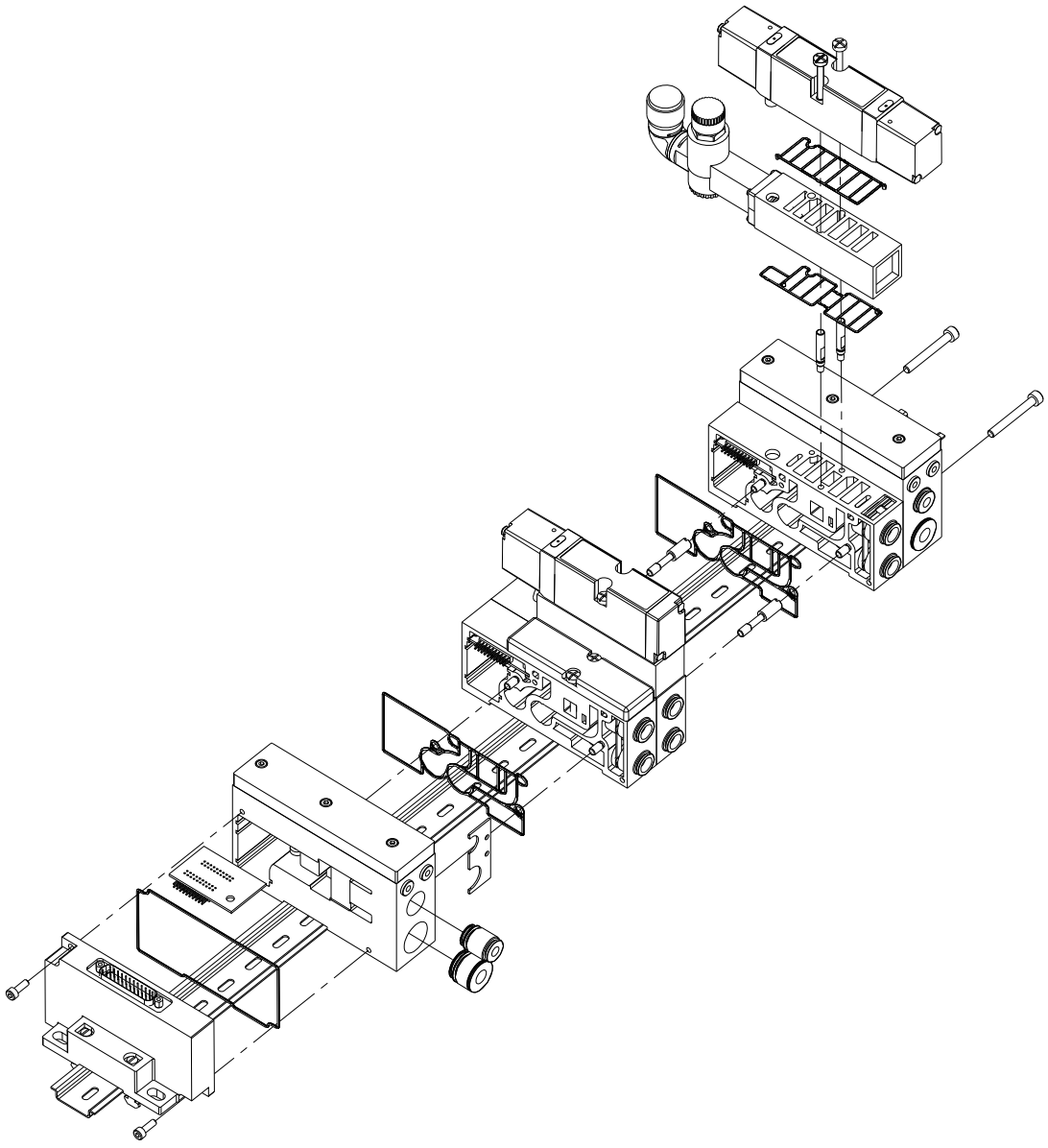
Discrete I/O

The G3 Series product line is a completely modular and scalable system. As shown below, all of the G3 electronic modules plug together, via mechanical clips, allowing easy assembly and field changes.



Pneumatic Valve Manifold

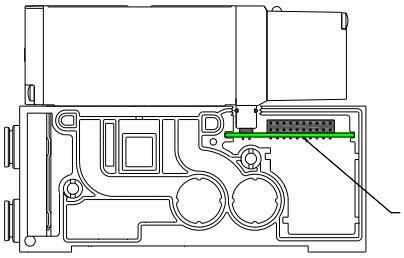
The pneumatic valve manifold with Internal Circuit Board Technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards, which allow internal connection from solenoid coils to output drivers without the use of wires). This allows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



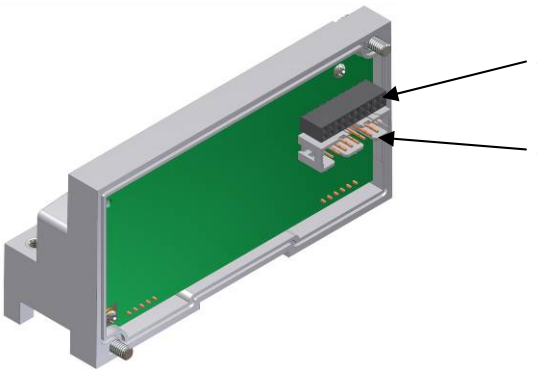
Manifold Connectors

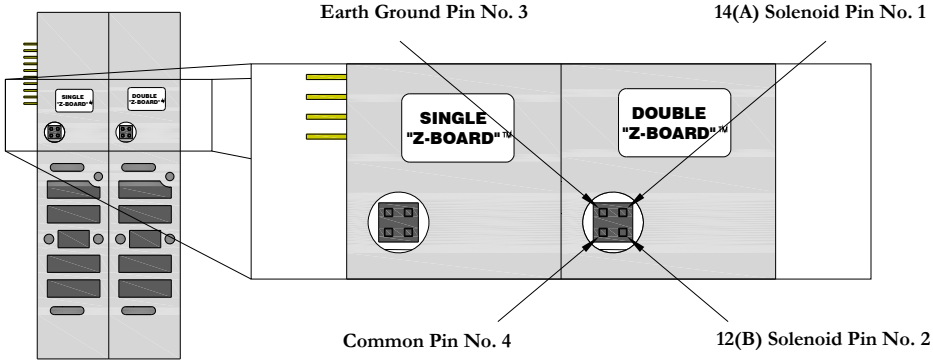
Solenoid Coil Connections using Z-Board™ technology

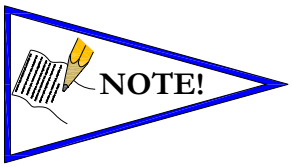
Z-Board™ plug together technology connects all valve solenoids to the valve coil output driver board, located in the valve adapter. The 32 available coil outputs are divided into 2 separate connector groups. Output group No. 1 is comprised of the first output word, bits 0-15, and output group No. 2 is comprised of the second output word, bits 16-31. Output group No. 1 connects directly to the Z-Boards™. Output group No. 2 is connected to the Z-Boards™ via an internal ribbon cable or valve side Sub-D. The first output (bit 0) connects to the "14" (A) solenoid on the valve closest to the communication node. The 17th – 32nd solenoids interconnect via the Z-Boards™ to output group No. 2. For the maximum capability of 32 solenoids on the same manifold, the 16th and 17th solenoid coils must NOT be on the same sub-base.



Plug-in Manifold with Intergral "Z-Board" Eliminates Wiring



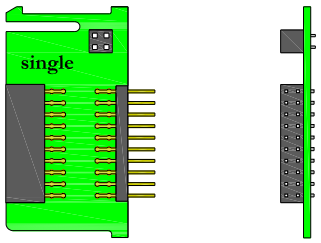
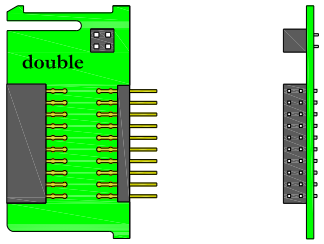
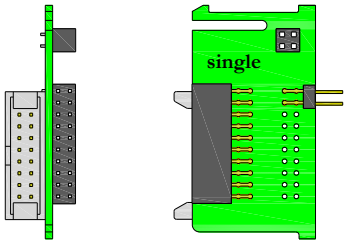
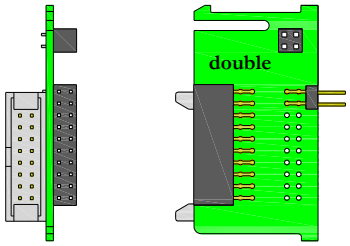


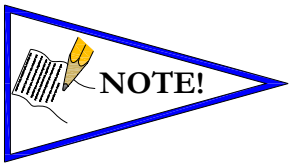


A single solenoid valve's coil is always on the "14" end.

Z-Board™ Connectors

The 2005/2012/2035 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.

Single Z-Board™	*Double Z-Board™*
	
Ribbon Connection Single Z-Board™	***Ribbon Connection Double Z-Board™***
	

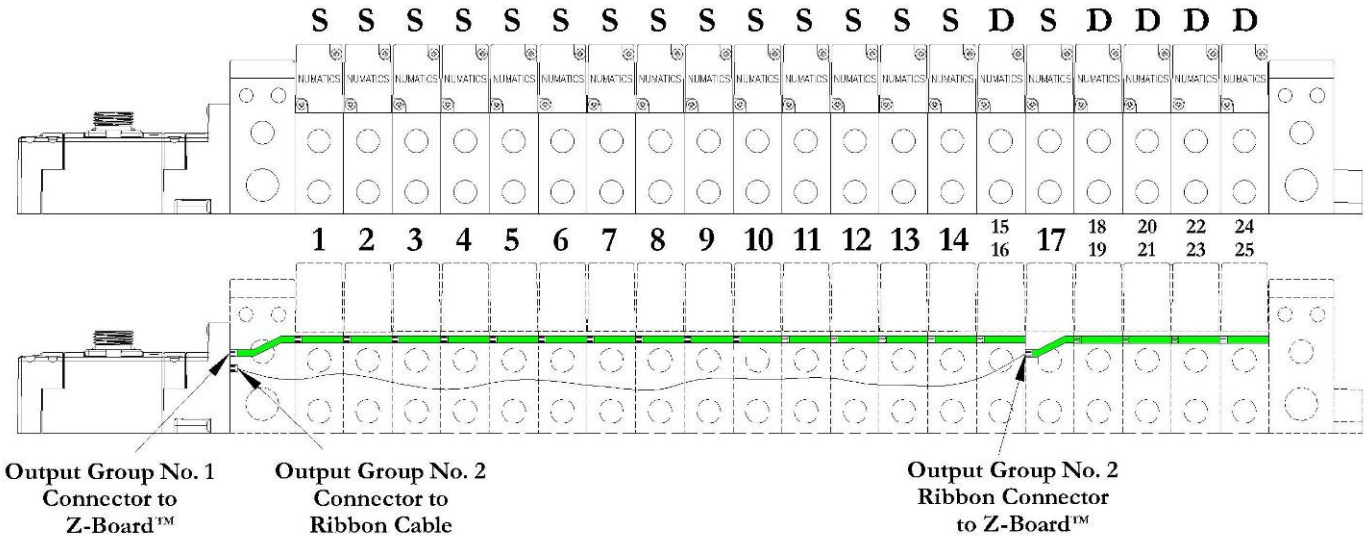


The 17th solenoid (output group No. 2's first bit) must be accessed via either the valve side Sub-D output module or a ribbon connector type Z-board.

Z-Board™ and Ribbon Cable Example

If fourteen (14) single solenoid and one (1) double solenoid valves are connected directly to the communication node via their Z-Boards™, and one (1) single solenoid and four (4) double solenoid valves are connected to the communication node via the ribbon cable, the following would be the valve side bit map:

S = Single Solenoid with Single Z-Board™
D = Double Solenoid With Double Z-Board ™



Output Word	0								1							
Output Byte	0								1							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

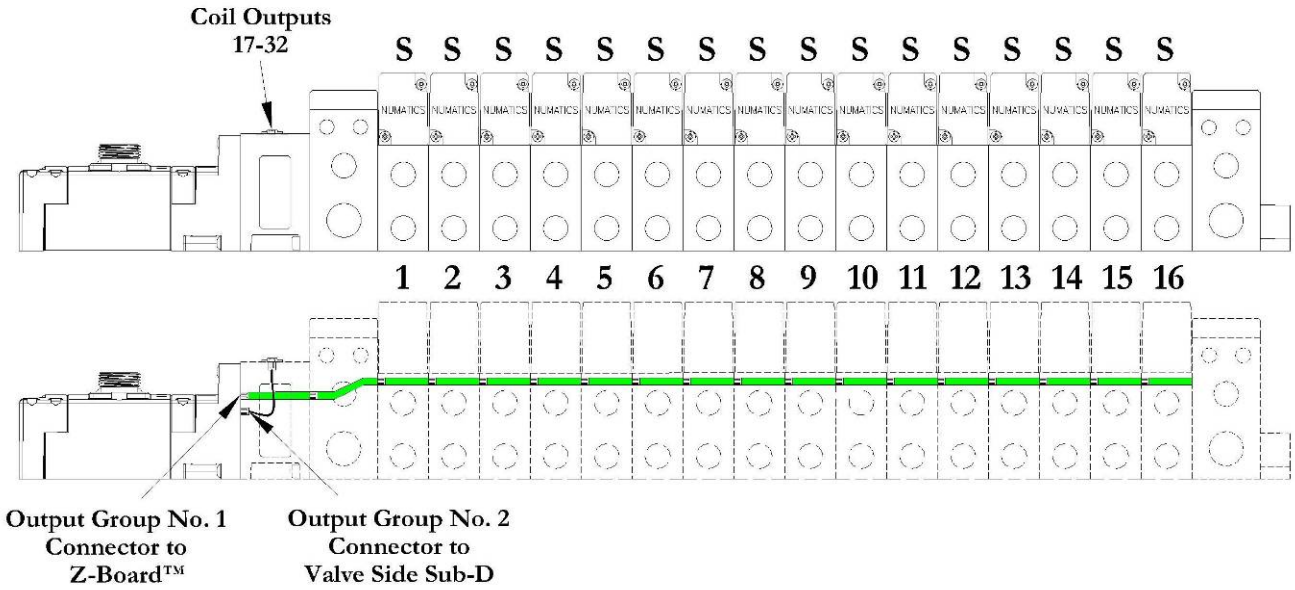
Output Word	1															
Output Byte	2								3							
Output Bit No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	17	18	19	20	21	22	23	24	25	n/a						

In the above example, Output Bits No. 25 thru No. 31 are allocated but not used. Allocation may be changed by configuration changes in the communication module (node). Refer to page 23 in this manual.

Z-Board™ with Valve Side Sub-D Example

If sixteen (16) single solenoid valves are connected directly to the communication node via their Z-Boards™, and a valve side Sub-D connector is connected to the communication node via the output Group No. 2 connector then the following would be the valve side bit map:

S = Single Solenoid with Single Z-Board



Output Word	0																1													
Output Byte	0								1								2								3							
Output Bit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid Coil Output No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Communication Module

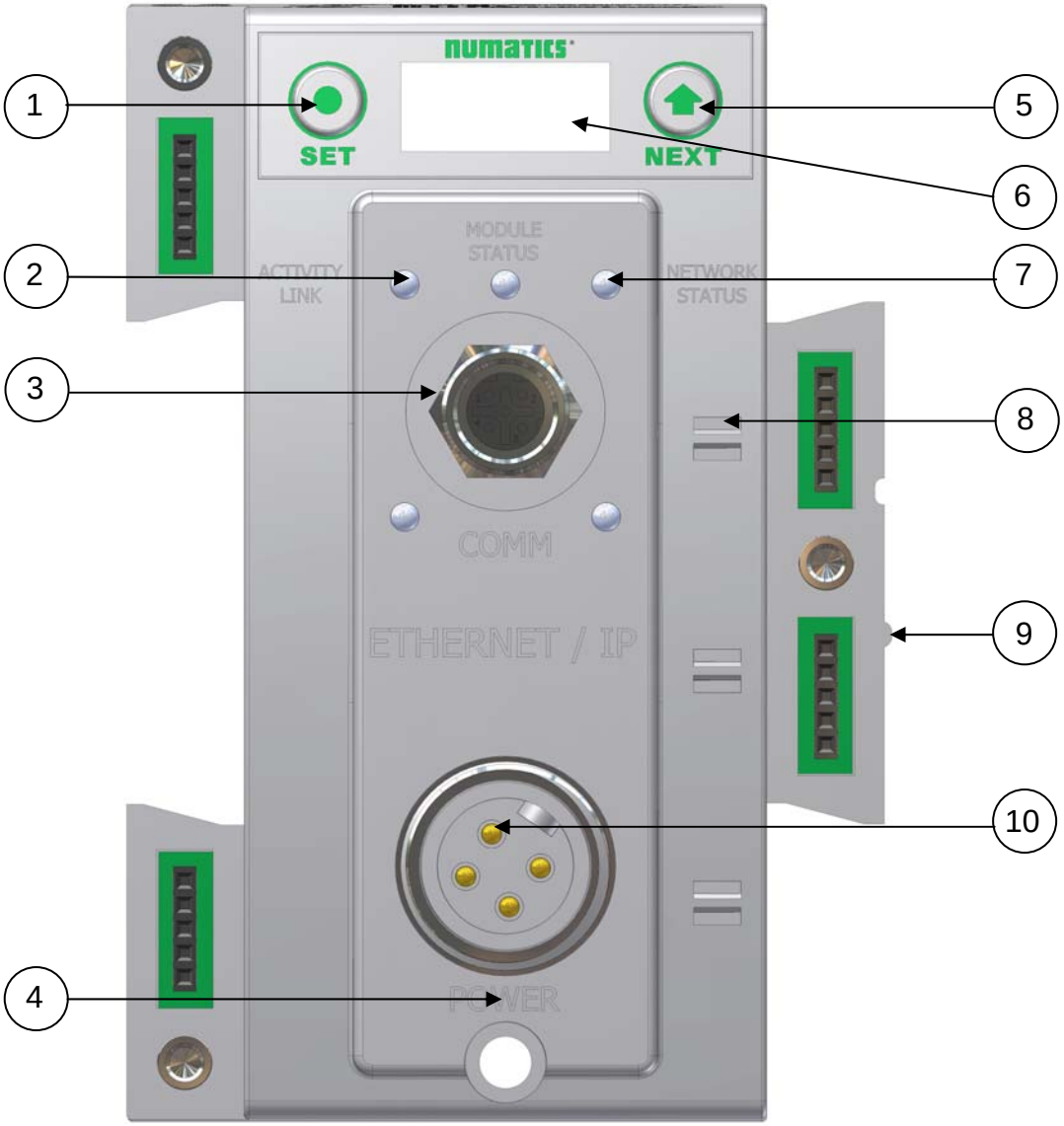
EtherNet/IP Communication Module (Node)

This module is the communication interface to the manifold. It contains communication electronics and internal short circuit protection for power. It can be configured via software, via the graphic display or manually via DIP switches through the optional Manual Configuration Module (MCM).

Communication Module Kit Part Number	
EtherNet/IP Communication module	**240-181**

Communication Module Description

Detail No.	Description
1	"Set" Button – used to navigate through user menus and to set parameters
2	Activity/Link Status LED
3	4 Pin M12 D-Coded Female Communication Connector
4	Mounting Hole
5	"Next" Button – used to navigate through user menus and to set parameters
6	Graphic Display – used to display parameter information
7	Network Status LED
8	Slot for text ID tags
9	Keying for preventing I/O module insertion
10	4 Pin MINI Male Power Connector



Connector Pin-Outs

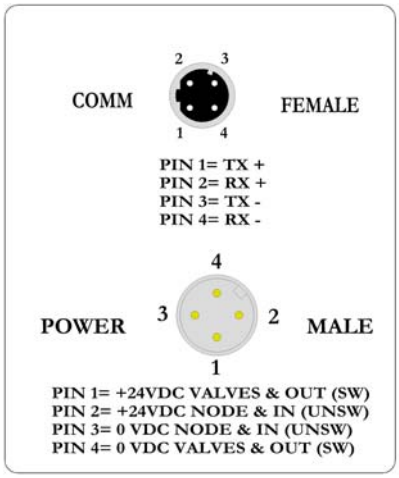
Industry standard connectors are used for communication and auxiliary power. The EtherNet communication connector is a D-coded keyway 4 pin female M12 connector. The Power connector is a single keyway 4 pin male 7/8" MINI connector.

EtherNet/IP Communication Connector Pin-Out

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

Power Connector with Cenelec Pin-Out

Cenelec Pin No.	*Function*	*Description*
1	+24 VDC (Valves and Outputs)	Voltage used to power outputs (valve coils and discrete outputs) SW
2	+24 VDC (Node and Inputs)	Voltage used to power discrete inputs and node electronics UNSW
3	0 VDC (Node and Inputs)	0 VDC Voltage used to power discrete inputs and node electronics UNSW
4	0 VDC (Valves and Outputs)	0 VDC Voltage used to power outputs (valve coils and discrete outputs) SW



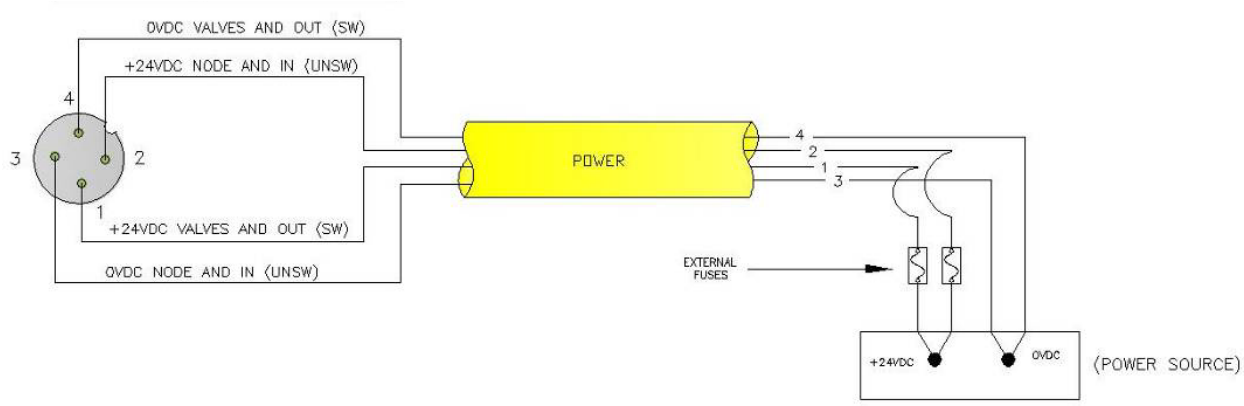
ATTENTION

- *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 combined draw of the +24VDC Valves and Outputs and +24VDC Node and Inputs pins cannot exceed 8 Amps, at any given moment in time.*
- *The Node and Inputs pin supplies power to the node electronics. This pin must be powered at all times for communication node to be functional.*

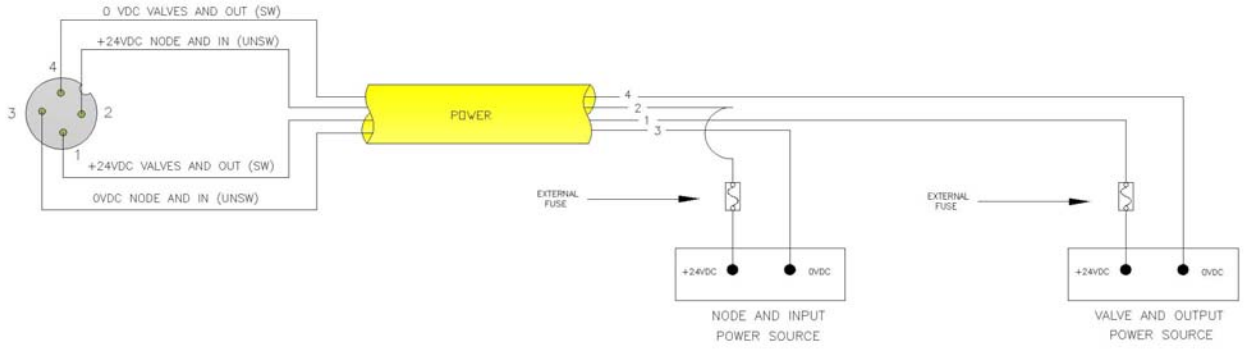
Electrical Connections

Power Connector Wiring Diagram

Power Supply Example (Non-isolated commons)



Power Supply Example (Isolated commons)



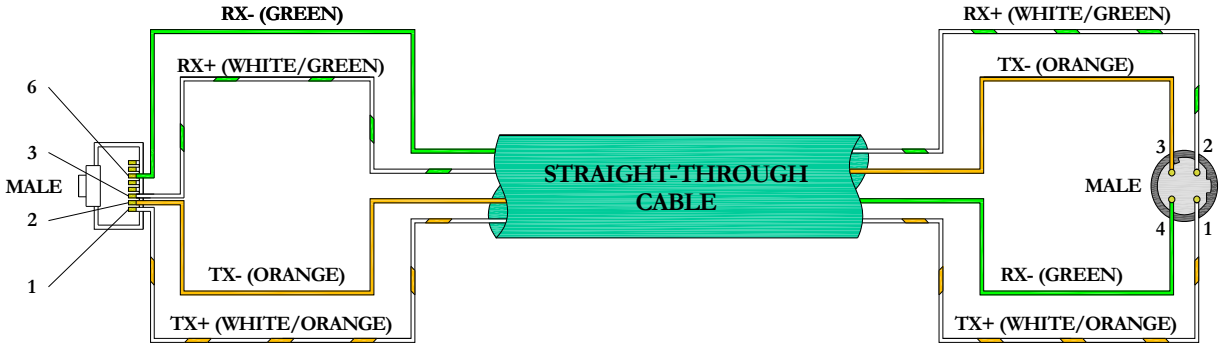
ATTENTION

- *Please see page 17 for external fuse sizing guide.*
- *When using molded connector power cables, Do Not rely on wire colors for Pin-Out. Always use pin number references.*

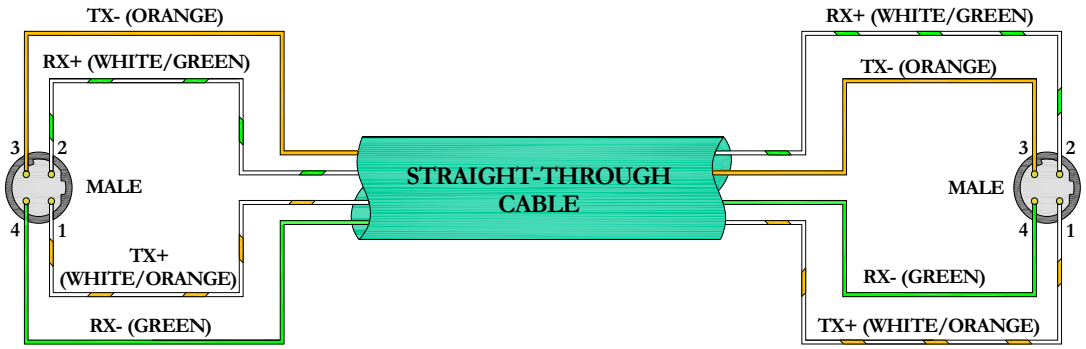
EtherNet/IP™ Straight-Through Cabling Diagrams

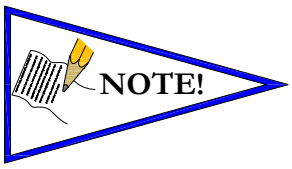
Straight-Through Ethernet cable is used when connecting an Ethernet node to a basic media component (router, switch, hub, etc.). Here are some basic wiring examples of Straight-Through cabling.

RJ45 to M12 D Coded Cable



M12 D Coded to M12 D Coded Cable



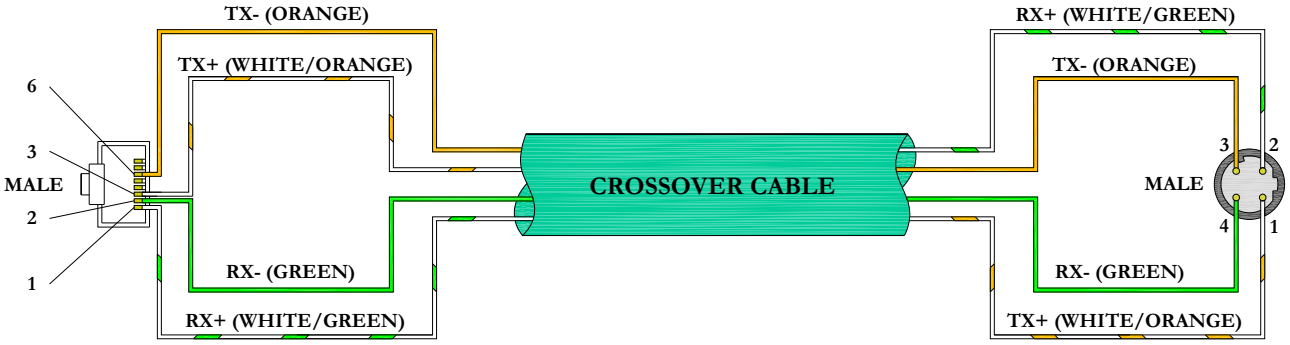


- *These are examples only. For appropriate network cabling information, please see the ODVA document titled, "EtherNet/IP™: Media Planning and Installation Manual".*
- *RJ45 shown as T-568B standard.*

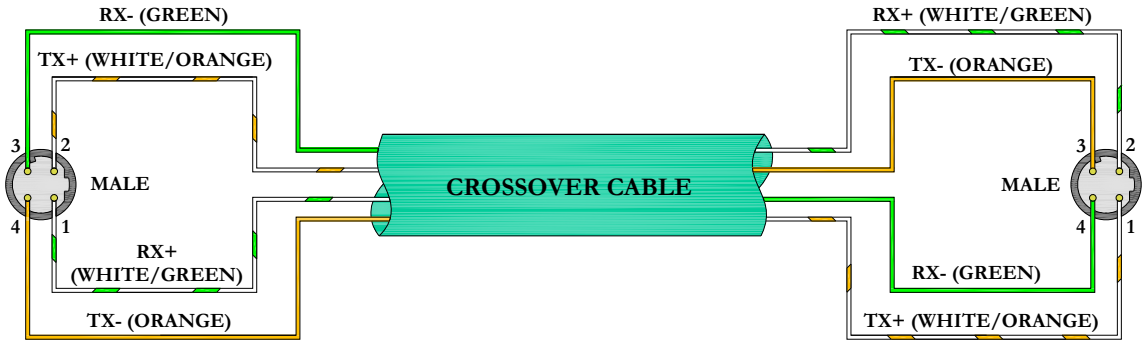
EtherNet/IP™ Crossover Cabling Diagrams

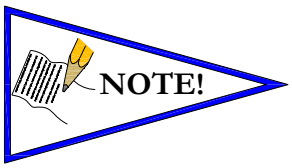
A Crossover Ethernet cable is used when connecting two Ethernet nodes directly together. For example, when you connect a computer directly to a Numatics' valve manifold, a Crossover cable would be used. Here are some basic wiring examples of Crossover cabling.

RJ45 to M12 D Coded Cable



M12 D Coded to M12 D Coded Cable





- ***These are examples only. For appropriate network cabling information, please see the ODVA document titled, "EtherNet/IP™: Media Planning and Installation Manual".***
- ***RJ45 shown as T-568B standard.***

Power Consumption

Power Connection

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

Power Rating

- The maximum system current capability is 8 Amps. Care should be taken not to exceed 8 Amp draw through the 0VDC common pin (Current through both +24 VDC Pins combined).
- Discrete I/O current draw is dependent on the device(s) connected. It is critical to know what these values are in order to remain safely within the 8 Amp limitations.
- Loads should not draw more than 0.5 Amps of current from any one individual discrete output point (Contact factory for higher current capability requirements).

Component	*Voltage*	*Tolerance*	*+24VDC (Valves and Outputs) Pins 1 & 4*		*+24VDC (Node and Inputs) Pins 2 & 3*	
			Current	*Power*	*Current*	*Power*
Solenoid Valve Coil 2002 (Each)	24 VDC	+10%/-15%	0.021 A	0.5 W	0 A	0 W
Solenoid Valve Coil 2005 (Each)	24 VDC	+10%/-15%	0.056 A	1.35 W	0 A	0 W
Solenoid Valve Coil 2012 (Each)	24 VDC	+10%/-15%	0.105 A	2.5 W	0 A	0 W
Solenoid Valve Coil 2035 (Each)	24 VDC	+10%/-15%	0.105 A	2.5 W	0 A	0 W
Solenoid Valve Coil ISO - SPA	24 VDC	+10%/-15%	0.167 A	4.0 W	0 A	0 W
Valve Adapter (Driver)	24 VDC	+/- 10%	.134 A	3.22 W	0 A	0 W
Discrete Digital Input Module	24 VDC	+/- 10%	.012 A	.29 W	.085 A*	2.04 W*
Discrete Digital Output Module	24 VDC	+/- 10%	.051 A	1.2 W	.060 A*	1.44 W*
Discrete Digital I/O Module	24 VDC	+/- 10%	.035 A	0.84 W	.076 A*	1.82 W*
Discrete Analog Input Module (V & C)	24 VDC	+/- 10%	.012 A	0.288 W	.077 A*	1.85 W*
Discrete Analog I/O Module (V & C)	24 VDC	+/- 10%	.018 A	0.432 W	.087 A*	2.08 W*
Communication Module (Node)	24 VDC	+/- 10%	.006 A	0.144 W	.091 A*	1.7 W*
Sub-Bus Valve Module	24 VDC	+/- 10%	.012 A	0.288 W	.066 A*	1.58 W*
Auto Recovery Module (ARM)	24 VDC	+/- 10%	0A	0 W	.022 A	.53 W
Manual Configuration Module (MCM)	24 VDC	+/- 10%	0 A	0 W	.022 A	.53 W

* Current depends on graphic display brightness setting. Max. value shown with high brightness. Values decrease by approx. 12% for Medium and 25% for Low brightness settings.

- *Total power consumption for each Discrete I/O point is dependent on the specific current draw of input sensor devices and output loads.*

Recommended External Fuses

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

External Fuse Sizing Chart

Power Consumption - Power Connector Pin for Valves and Outputs		
Description		***Current***
Number of Solenoid Valve Coils Energized Simultaneously ___ X 0.167 A (ISO - SPA Series)	=	_____Amps
___ X 0.105 A (2012 and 2035 Series)	=	_____Amps
___ X 0.056 A (2005 Series)	=	_____Amps
___ X 0.021 A (2002 Series)	=	_____Amps +
Total load current drawn by simultaneously energized Discrete Outputs	=	_____Amps +
Number of I/O modules installed ___ X 0.008 A	=	_____Amps +
Valve Adapter	=	.134 Amps +
Communication Node Power Consumption	=	.006 Amps +
Total:		_____Amps
Surge Compensation:	X	1.25
Suggested External +24 VDC (Valves and Outputs) Fuse Value:		_____Amps

Power Consumption – Power Connector Pin for Node and Inputs		
Description		***Current***
Communication Node Power Consumption	=	.091 Amps +
Total load current drawn by Sensor Devices from Discrete Inputs source	=	_____Amps +
Number of I/O modules installed ___ X 0.080 A	=	_____Amps +
Total:		_____Amps
Surge Compensation:	X	1.25
Suggested External Pin +24 VDC (Node and Inputs) Fuse Value:		_____Amps

*Factory Default Settings

- *The Node and Inputs Aux Power pins supply power to the node electronics. These pins must be powered at all times for communication node and Inputs to be functional.*
- *The internal electronic fuses exist to protect against damage due to catastrophic failure of internal components. External fuses are always recommended for protection against power supply failure, over-current conditions, etc…*

Diagnostics

Communication Module LED Functions

Upon power up, the LEDs indicate the status of the unit. There are three LEDs on the G3 EtherNet node. These LEDs are described below.

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

Output Short Circuit Protection

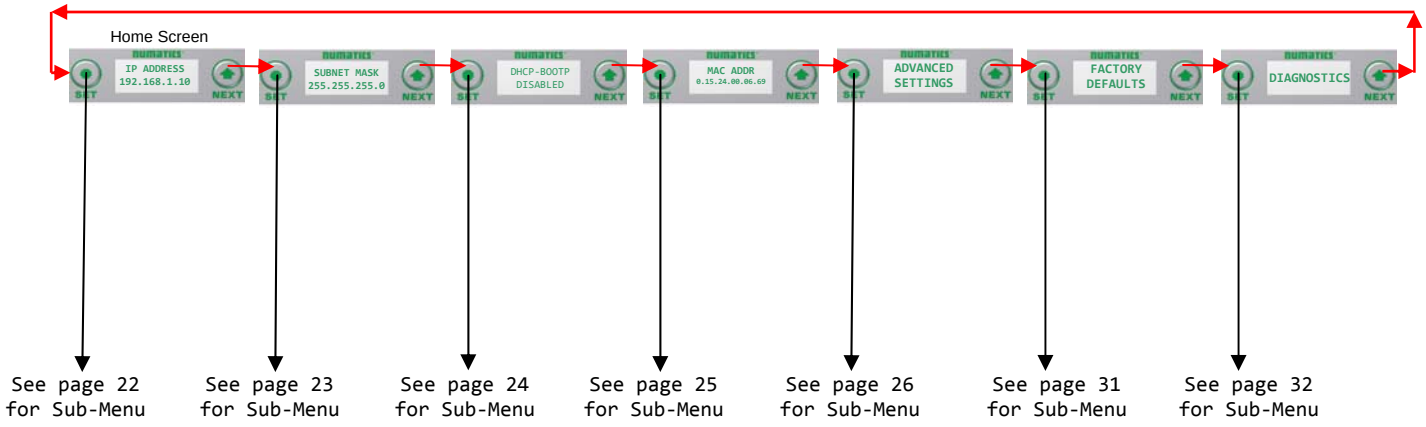
Status Bit Action During Fault Condition

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
Discrete Outputs	ON	No Fault	0
		Fault - Short Circuit, Over Temp/Over Current	1

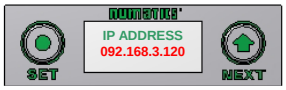
G3 Graphic Display

The G3 Communication and I/O modules have an integrated graphic display that may be used to configure the parameters of the modules as well as showing diagnostic information.

The following graphic displays represent the main menu selections of the DeviceNet communication module (node). Use the NEXT button to scroll through the Main menu headings shown below. At this level pressing the SET button allows access 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!***



IP Address Sub-Menu



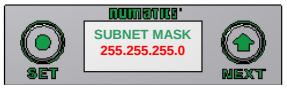
Steps to Set IP Address

1. Press the SET button to enter the IP ADDRESS sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octect to accept the entire IP Adress
4. Press the SET button to input the address shown on the display,
5. Press the NEXT button to select **Y**es or **N**o to accept the IP Address shown on the display..
   a. Selecting **N**o will bring you back to the main Address menu.
   b. Selecting **Y**es will take you to the following SAVE SETTINGS menu
6. Press the NEXT button to select either NOW or LATER.
   a. Selecting NOW will cause the node to reset and apply the new setting.
   b. Selecting LATER will cause the new Address to be saved in temporary memory to allow you to make additional parameter changes before the node is reset. However, you must ACCEPT the saved changes before your next power cycle otherwise they will be lost.

   Press the SET button to confirm your choice.

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

Subnet Mask Sub-Menu



Steps to Set Subnet Mask

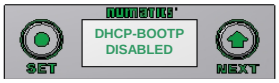
1. Press the SET button to enter the Subnet Mask sub-menu.
2. Press the NEXT button to select the octet that you would like to change.
   Press the SET button to change the value.
3. Press the SET button to scroll through the hundred, tens and ones digits of the octet.
   Press the NEXT button to scroll through the valid digits (0-9).
   Press the SET button to advance through the octet.
   Press the NEXT button to advance to the next octet, scroll pass the fourth octect to accept the entire Subnet Mask
4. Press the SET button to input the value shown on the display,
5. Press the NEXT button to select **Y**es or **N**o to accept the Subnet Mask shown on the display..
   c. Selecting **N**o will bring you back to the main Subnet Mask menu.
   d. Selecting **Y**es will take you to the following SAVE SETTINGS menu
6. Press the NEXT button to select either NOW or LATER.
   c. Selecting NOW will cause the node to reset and apply the new setting.
   d. Selecting LATER will cause the new Address to be saved in temporary memory to allow you to make additional parameter changes before the node is reset. However, you must ACCEPT the saved changes before your next power cycle otherwise they will be lost.

   Press the SET button to confirm your choice.

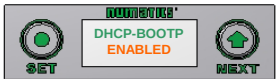
- ***Factory default subnet mask is 255.255.255.0***

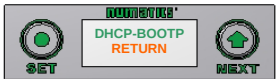
DHCP-BOOTP Sub-Menu

DHCP-BOOTP Steps



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





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

   Press the SET button to confirm your choice.

3. Press the NEXT button to select **Y**es or **N**o to accept the selection.
   a. Selecting **N**o will bring you back to the main menu.
   b. Selecting **Y**es will take you to the following apply changes menu.

   Press the SET button to confirm your choice.

Apply Changes Steps

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

   Press the SET button to confirm your choice.

- ***Factory default setting for DHCP-BOOTP is enabled.***

MAC ADDR Menu

I/O Allocation Steps

1. The MAC Address is a fixed value that can not be edited.

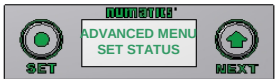
The actual MAC ADDR has an extra leading zero. The actual number in the example shown is 00-15-24-00-06-69

- ***The MAC ADDR can not be edited***
- ***Please note that the leading 0 in this number has been left off***

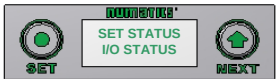
Advanced Settings - I/O Diag. Menu

I/O Status Steps

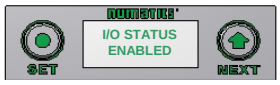
1. Press the SET button to enter the ADVANCED SETTINGS sub-menu.



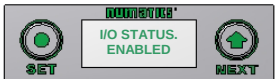
2. Press the SET button to enter the ADVANCED MENU / SET STATUS.

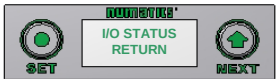


3. Press the SET button to enter the SET STATUS / I/O STATUS.



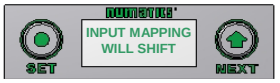
4. The current state of the parameter is shown.





5. Press the SET button to change this parameter
   Use the NEXT button to scroll through the choices to enable/disable the Diagnostic status for I/O.
   a. ENABLED (Factory Default)
   b. DISABLED
   c. RETURN (this will return you to the SET STATUS menu)

   Press the SET button to confirm your choice.



6. Press NEXT to confirm the warning message.

7. Press the NEXT button to select **Y**es or **N**o to accept the selection
   a. Selecting **N**o will bring you back to the main SET STATUS menu.
   b. Selecting **Y**es will take you to the following saved settings menu.

   Press the SET button to confirm your choice.

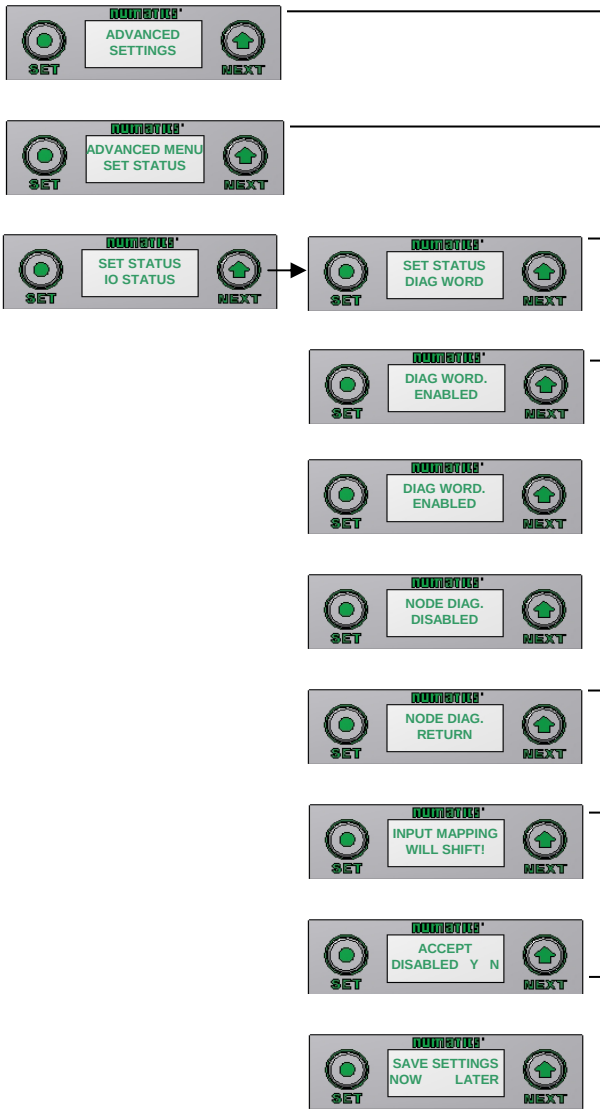
Save Settings Steps

8. 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 I/O STATUS 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.

I/O Status Bits are diagnostic bits. They include the valve coil status bits, AUX Power status bits, and Short Circuit & Alarm status bits of various I/O modules.

Advanced Settings - Diagnostic Word



Diag. Word Status Settings

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

10. Press the SET button to enter the ADVANCED MENU /SET STATUS.

11. Press the NEXT button to scroll to the SET STATUS / DIAG WORD menu.
    Press the SET button to enter the SET STATUS / DIAG WORD menu.

12. The current state of the parameter is shown.

13. Press the SET button to change this parameter
    Use the NEXT button to scroll through the choices to enable/disable the Diagnostic Word status for.
    a. ENABLED (Factory Default)
    b. DISABLED
    c. RETURN (this will return you to the SET STATUS menu)

    Press the SET button to confirm your choice.

14. Press Next to confirm the warning message.

15. Press the NEXT button to select **Y**es or **N**o to accept the selection
    a. Selecting **N**o will bring you back to the main SET STATUS menu.
    b. Selecting **Y**es will take you to the following saved settings menu.

    Press the SET button to confirm your choice.

Save Settings Steps

16. 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 NODE DIAG 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.

Diagnostic Word Format								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0 (Comm. Status)	**Reserved**	**Reserved**	**Reserved**	**Reserved**	**Reserved**	**Sub-Bus Error (1=Error)**	**UnSwitched Power Status (1=Error)**	**Switched Power Status (1=Error)**
1 (Sub-Bus Status)	**Error Code**	**Error Code**	**Error Code**	**Station Address**	**Station Address**	**Station Address**	**Station Address**	**Station Address**

Advanced Settings - Fault Action

Fault Action Settings

1. Press the SET button to enter the ADVANCED SETTINGS menu.
2. Press the NEXT button to scroll to the ADVANCED MENU / SET FAULT IDLE.
3. Press the SET button to enter the ADVANCED MENU / SET FAULT IDLE.
4. Press the SET button to enter the SET FAULT IDLE / FAULT ACTION menu.
5. The current state of the parameter is shown
6. Press the SET button to change this parameter
   Press the NEXT button to scroll the choices for the desired output action during a fault state.
   a. OFF (Factory Default)
   b. HOLD LAST STATE
   c. RETURN (this will return you to the SET FAULT/IDLE menu)

   Press the SET button to confirm your choice.
7. Press the NEXT button to select **Y**es or **N**o to accept the selection
   Press the SET button to confirm your choice
   a. Selecting **N**o will bring you back to the main SET FAULT/IDLE menu.
   b. Selecting **Y**es will take you to the following saved settings menu.

Save Settings Steps

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

   Press the SET button to confirm your choice.

- *See page 72 for more details.*
- *Factory Default is "ALL OFF"*

Advanced Settings - Idle Action

Idle Action Settings

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

10. Press the NEXT button to scroll to the ADVANCED MENU / SET FAULT IDLE.
11. Press the SET button to enter the ADVANCED MENU / SET FAULT IDLE.

12. Press the NEXT button to scroll to the IDLE ACTION menu
13. Press the SET button to enter the SET FAULT IDLE / IDLE menu.

14. The current state of the parameter is shown

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

    Press the SET button to confirm your choice.

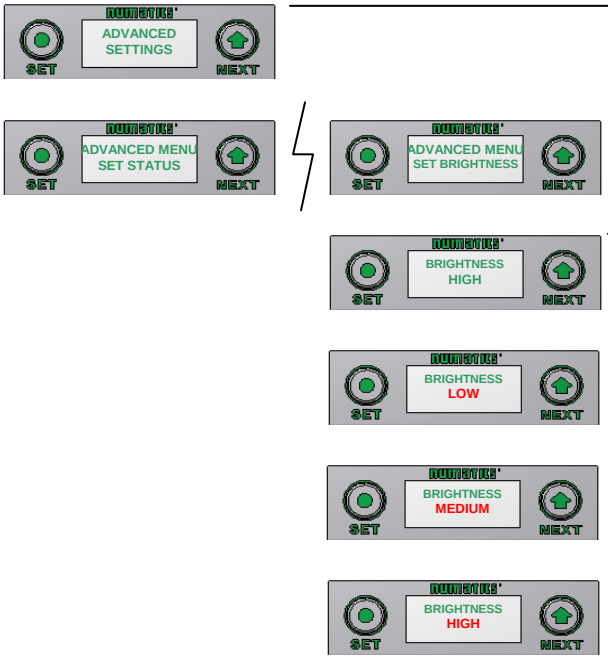
16. Press the NEXT button to select **Y**es or **N**o to accept the selection
    Press the SET button to confirm your choice
    c. Selecting **N**o will bring you back to the main SET FAULT/IDLE menu.
    d. Selecting **Y**es will take you to the following saved settings menu.

Save Settings Steps

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

- *See page 72 for more details.*
- *Factory Default is ALL OFF*

Advanced Settings - Brightness



Brightness Settings

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

2. Press the NEXT button to scroll to the CONFIG MENU / SET BRIGHTNESS.
   Press the SET button to enter the CONFIG MENU / SET BRIGHTNESS.

3. The current state of the parameter is shown

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

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

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

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

Factory Defaults

Factory Default Settings

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

2. Press the SET button to change this parameter

3. Press the NEXT button to select Yes or No.
   a. Selecting No will bring you back to the main FACTORY DEFAULTS menu.
   b. Selecting Yes will cause the node to reset and return all parameters to the factory default conditions.
   c. Selecting RETUTN will bring you back to the main FACTORY DEFAULS menu

   Press the SET button to confirm your choice.

FACTORY DEFAULT SETTINGS	
Description	***Default***
IP Address	**193.168.3.120**
Sub Net Mask	**255.255.255.0**
Diagnostic Word	**Enabled**
I/O Diagnostic Status	**Enabled**
Fault Action	**Reset to All Off**
Idle Action	**Reset to All Off**
Brightness	**High**

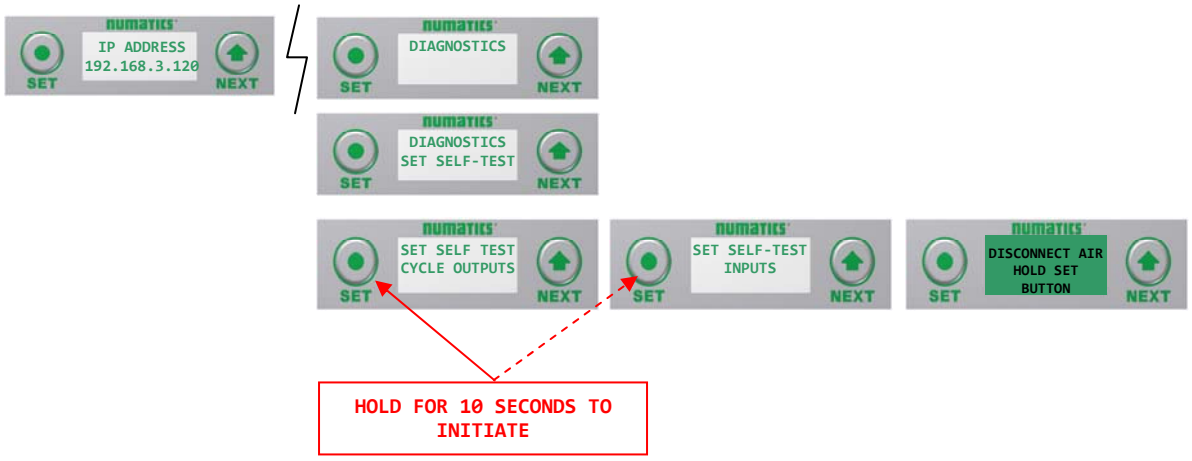
Diagnostics - Self Test Mode

An internal diagnostic tool can be enabled on the communication module (node) using the graphic display. This tool allows the user to confirm that all of the inputs and outputs on the manifold and any of the distributed modules are fully functional without needing a network connection or controller. There are two test modes that the user can choose. The **"CYCLE OUTPUTS"** test mode tests all the outputs by sequentially turning them ON and OFF for approximately .5 seconds. The **"INPUTS"** test mode tests the inputs by causing all of the outputs to toggle between even and odd values when any input is made. The Self Test mode on the communication module (node) is a global setting and will test all devices connected on the main manifold as well as any distributed modules and/or manifolds.

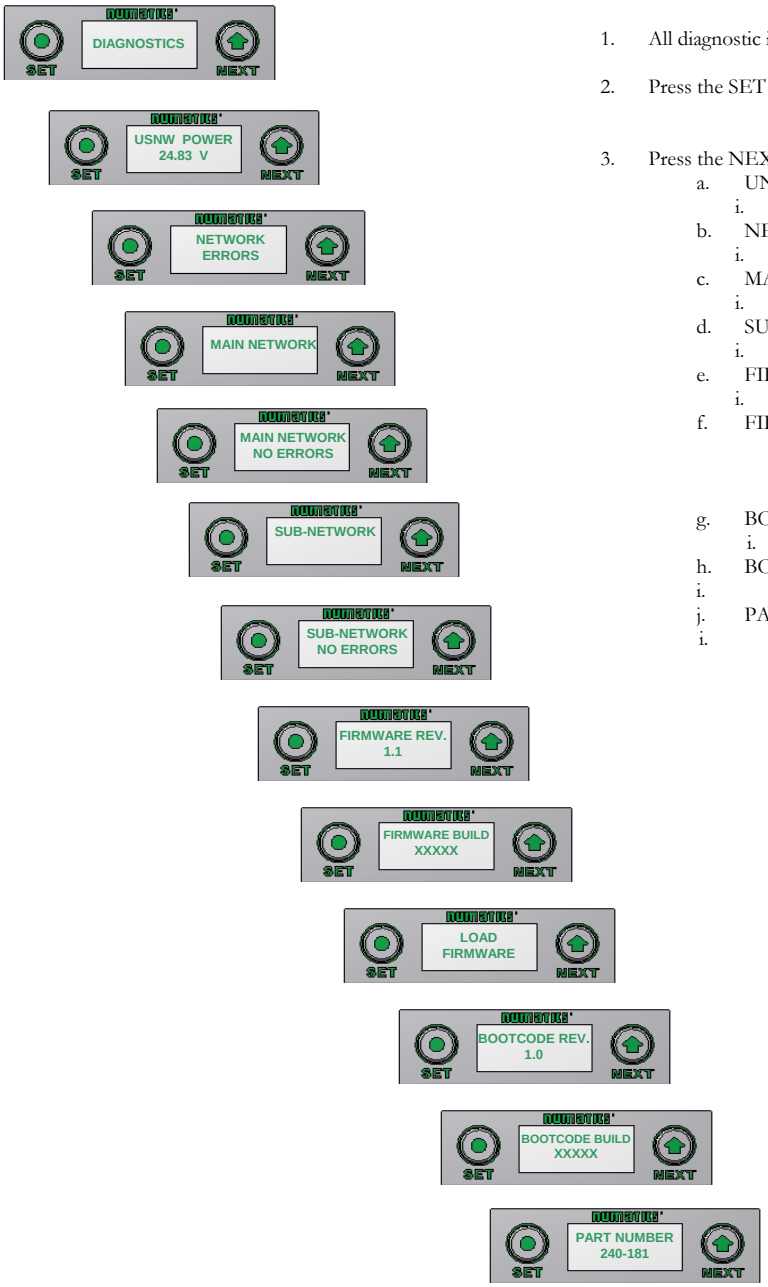
Similar "local" self tests are available on all output modules types. This "local" self test function allows any output module to be tested without affecting any other output module.
NOTE: The number of Valve outputs that are tested are affected by the I/O size settings.

To use the Self Test Mode, the user must first set some initial conditions. Follow these steps to initiate the self-test mode.

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** menu
5) Push NEXT to navigate to the desired test mode: **CYCLE OUTPUTS or INPUTS**
6) Push SET to select the desired test mode.
7) A message will appear: **DISCONNECT AIR HOLD SET BUTTON**
8) Hold the SET button down for approximately 10 seconds to enable the test. The Display will flash the above message while the button is pushed.
9) When the display stops flashing, the self-test mode will run and the Module Status LED will flash Red/Green while the display shows **SELF TEST RUNNING.**
10) The global self-test mode can only be disabled by disconnecting the power to the manifold.



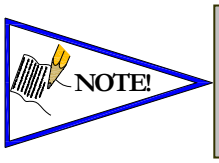
Diagnostics Cont.



1. All diagnostic information is read only

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

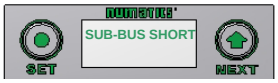
3. Press the NEXT button to scroll through the main diagnostic menu choices.
   a. UNSW POWER
      i. - Displays voltage level of unswitched power (Node & Inputs)
   b. NETWORK ERRORS - ERROR CODE
      i. - Displays fieldbus network errors
   c. MAIN NETWORK
      i. - Displays
   d. SUB-NETWORK
      i. - Displays log of network errors
   e. FIRMWARE REV.
      i. - For service personnel
   f. FIRMWARE BUILD
      i. For service personnel
   g. BOOTCODE REV.
      i. -For service personnel
   h. BOOTCODE BUILD
   i.
   j. PART NUMBER
   i. - Displays replacement part number of module



- **The UNSW POWER screen indicates the voltage level present on the UNSW (Node & Input) power pins (Pin No. 2 and 3) of the main power connector.**
- **A voltage level less than 19 volts will generate an error screen and an associated diagnostic bit (see 'Diagnostic' section for more details).**

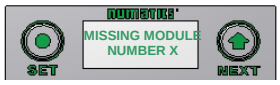
Error Messages

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

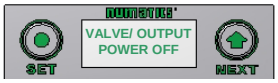


Displayed when a short circuit condition is detected on the Sub-Bus power lines.

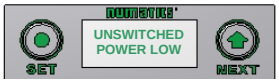
Displayed when a short circuit condition is detected on a valve coil



Displayed when a Sub-Bus module that had been previously installed becomes absent from the configuration

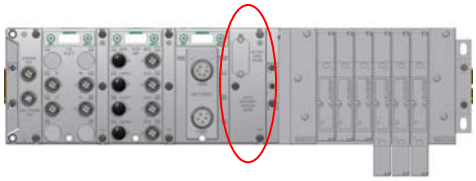


Displayed when +24 VDC on Pin No. 1 & 4 (Valves and Outputs) is not present or below 22 VDC



Displayed when +24 VDC on Pin No. 2 & 3 (Node and Inputs) is below 19 VDC

MCM – Manual Configuration Module (Optional)



The MCM is an optional module that is installed between the node and the valve adapter module and allows the user to manually set the last octet of the IP address without the need for software configuration or the use of the integrated graphic display in the node. If software configuration or configuration via the integrated graphic display in the node is preferred, this module is not necessary.

Description	*Replacement Part Number*
Complete Module	240-186

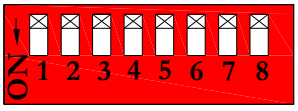
DIP Switch Settings

IP Address:

The DIP switches provide a manual way to configure the node's IP address. The values of the first, second and third octets are factory set to 192.168.001, respectively. The switches set the binary value of the last octet in the IP address. When all DIP switches are set to OFF, manual configuration is disabled and other means of setting the IP address must be used. DIP switch configuration settings require power to be cycled before any changes will take effect.

IP address:	**192.168.001.XXX (192.168.001.SW1)**
Subnet Mask	**255.255.255.0**
Gateway address:	**0.0.0.0 (no gateway set)**

XXX = DIP switch setting per the table below



All switches shown in the "OFF" position.

2^7=128 *SW-8*	2^6=64 *SW-7*	2^5=32 *SW-6*	2^4=16 *SW-5*	2^3=8 *SW-4*	2^2=4 *SW-3*	2^1=2 *SW-2*	2^0=1 *SW-1*	*Octet Value (Decimal)*
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0*
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	3
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	4
OFF	ON	ON	ON	ON	OFF	OFF	OFF	120
ON	ON	ON	ON	ON	ON	OFF	ON	253
ON	ON	ON	ON	ON	ON	ON	OFF	254
ON	ON	ON	ON	ON	ON	ON	ON	255*

***Not valid for fourth octet**

ARM – Auto Recovery Module (Optional)

The Auto Recovery Module (ARM) is an optional memory module that is installed between the node and the valve adapter module and is used to preserve the manifold configuration settings even during catastrophic failure. During the power-up process it reads the configuration of the manifold, including any user settable parameters of I/O modules, and stores the information in its non volatile memory. Once the information is stored, it automatically disconnects itself from the power circuits while still mechanically attached to the manifold. Upon power-up it reconnects itself and compares the stored configuration settings to the actual manifold configuration. If these settings are different it gives the user the option of:

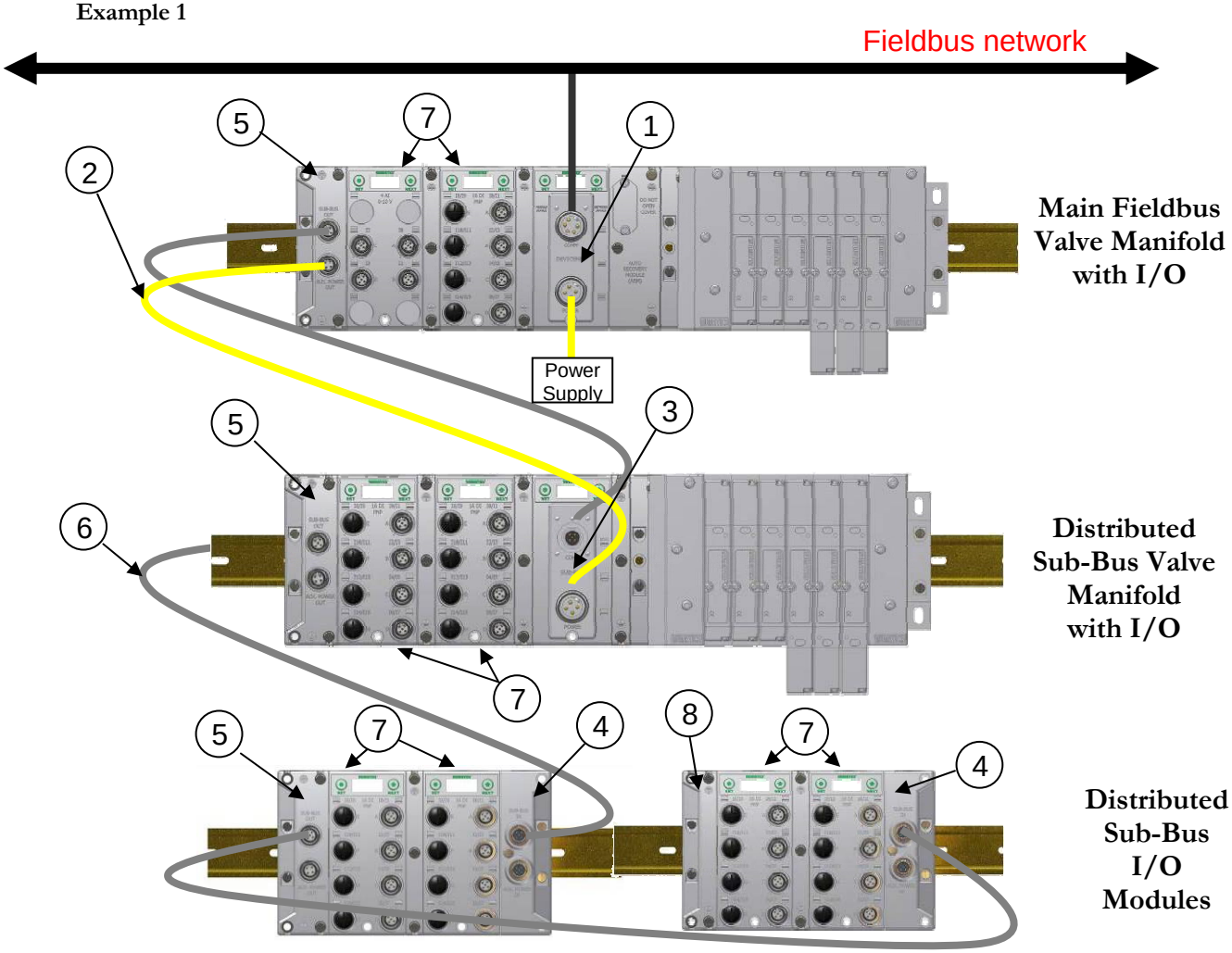
1. **Updating the manifold setting with the stored values**
2. **Updating the ARM module with the current settings**
3. **Continue operation with present configuration without updating ARM**

Description	*Replacement Part Number*
Complete ARM Module	240-182

Distribution

Distribution of I/O capability can be easily achieved with the G3 platform by means of Sub-Bus modules. I/O modules, valve manifolds and/or a combination of both can be simply separated from the main manifold and distributed via a sub-bus communication cable. The G3 platform uses the same I/O modules on the main manifold as on the distribution chain. The main communication module can control up to 16 I/O modules either on the main manifold or as part of the sub-bus connections. To utilize the sub-bus distribution capabilities the Sub-Bus OUT module must be located on the end of the main communication manifold and a Terminator Module must be located at the last sub-bus component.

Example 1



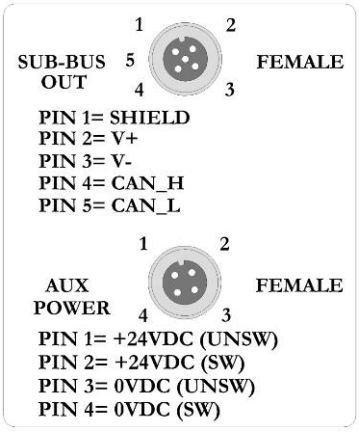
Detail No.	Description
1	Main Communication Module (Node)
2	Sub-Bus Power Cable (Can be connected to additional power supply)
3	Distributed Sub-Bus Valve Module
4	Sub-Bus IN module
5	Sub-Bus OUT module
6	Sub-Bus Communication Cable
7	I/O Modules
8	Terminator Module

Sub-Bus Distribution Modules

Sub-Bus OUT Module

- Used only when distributing the Sub-Bus to another assembly is required.
- SUB-BUS OUT - 5 pin M12 female communication connector.
  - Used to distribute the Sub-Bus to the next Sub-Bus assembly.
  - Carries 24 VDC power for electronics of the next module.
- AUX. POWER OUT - 4 pin M12 female aux. power connector.
  - Optional connection.
  - Used as a convenience way to distribute the power connection to the next Sub-Bus assembly.

Description	*Replacement Part Number*
Sub-Bus OUT Module with Din Rail Mounting	240-244
Sub-Bus OUT module without Din Rail Mounting	240-183



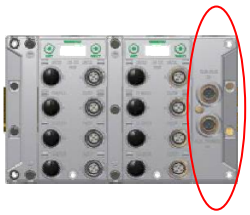
SUB-BUS IN Modules

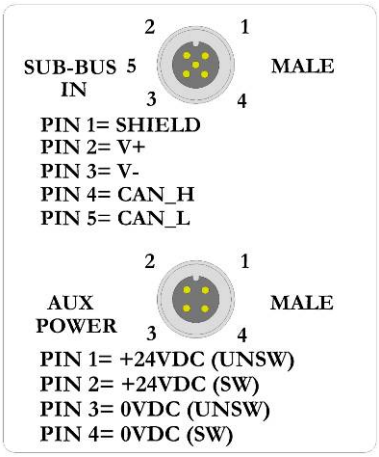
- Used to distribute I/O assemblies that do not have valves
  - Must be installed to the right of the I/O modules.

- SUB-BUS IN - 5 pin M12 male communication connector.
  - Must be connected to the Sub-Bus Out connector of the previous assembly
  - Carries 24 VDC power for electronics of module

- AUX. POWER IN - 4 pin M12 male connector.
  - Aux power is required for Output modules. This connection also allows Output power to be interrupted to all Output modules connected to this module.
  - Aux. Power is optional for Inputs. Power from the SUN-BUS IN connection is used to power sensors but can be augmented, if necessary, by adding additional power to this connector.

Description	*Part Number*
Sub-Bus IN module with Din Rail Mounting	240-246
Sub-Bus IN module without Din Rail Mounting	240-185

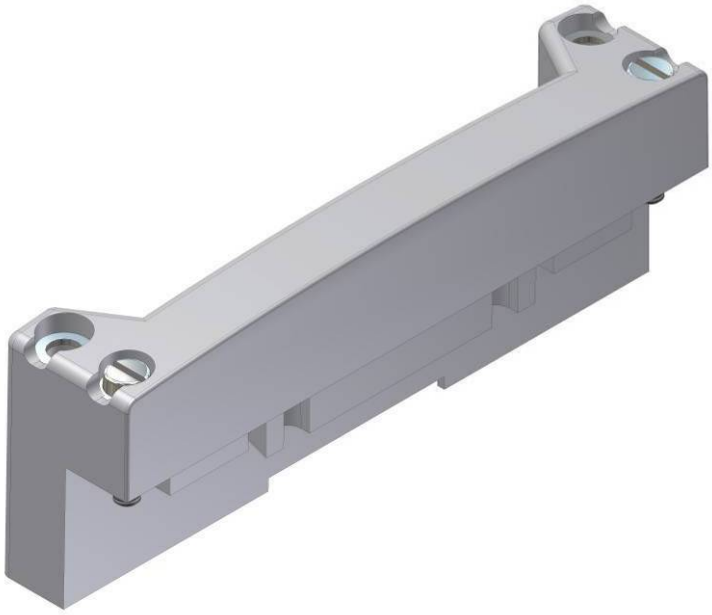


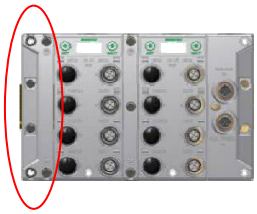


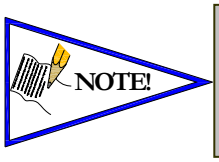
Terminator Module

- Used to terminate SUB-BUS connections.
  - Must be installed on the left side of the last Sub-Bus module.

Description	*Part Number*
Terminator Module with Din Rail Mounting	240-245
Terminator Module without Din Rail Mounting	240-184







The terminator module is required to be installed in the G3 system for proper operation

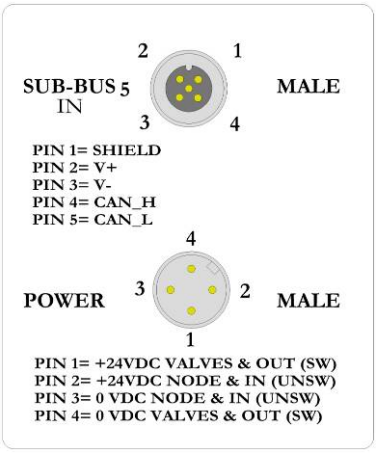
Sub-Bus Valve Module

- **COMM - 5 pin M12 male Sub-Bus input communication connector.**
  - **Must be connected to the SUB-BUS OUT connector of the previous assembly**
  - **Carries 24 VDC power for electronics of module**

- **POWER - 4 pin MINI male power connector.**
  - **Power is required for Outputs**

- **Used to distribute Valves on the Sub-Bus.**
  - **Can accepts discrete I/O module to allow a Sub-Bus Valve manifold with I/O**

Description	*Part Number*
Sub-Bus Valve Module	240-241

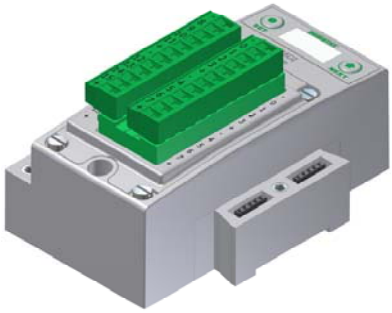


Digital I/O Module

Digital I/O Module Rules

The maximum number of modules that can be used on the Discrete I/O side of the manifold is 16. These modules can be centralized on the main fieldbus manifold, distributed or a combination of both. Modules can be connected in any combination of inputs, outputs and specialty up to the physical limitation of 16 modules.

Input Module Types



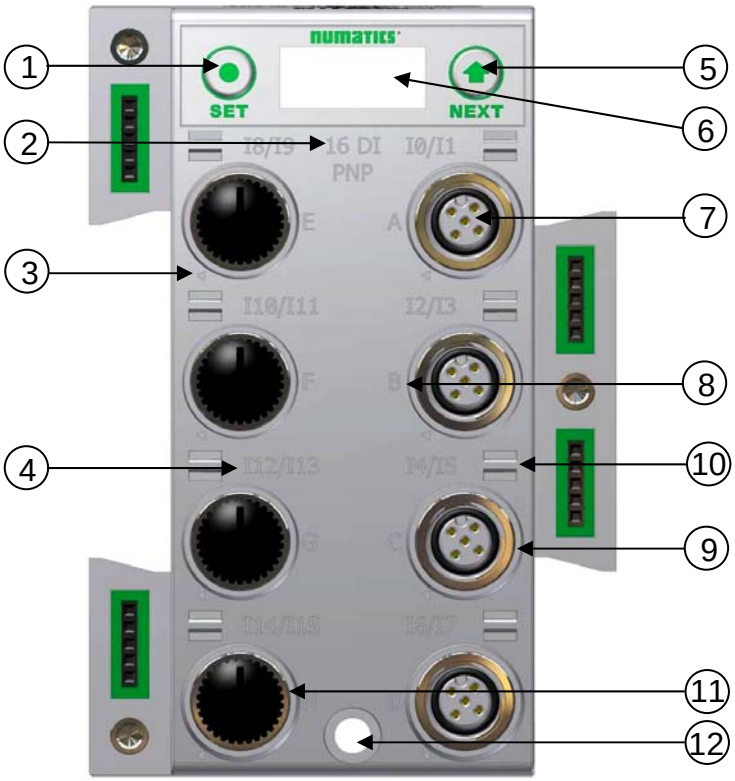
Output Module Types

Input/Output Module Types

Valve Side Output Module Types

I/O Module Descriptions and Menus

Detail No.	Description
1	"Set" Button – used to navigate through user menus and set parameters
2	Module Function (I/O Type)
3	Alignment arrow for SPEEDCON connector
4	Bit Designation for I/O
5	"Next" Button – used to navigate through user menus and set parameters
6	Graphic Display
7	5 Pin M12 female I/O connector
8	Connector designation
9	Metal threads for SPEEDCON connector
10	Slot for text ID tags
11	Dust Cover
12	Mounting hole



Menu

Digital Input Modules

One Digital Input per Connector – M12 Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-206	NPN (Sinking)	YES – Visual	YES – Optional	8
240-210	PNP (Sourcing)			

Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1 (Optional)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status

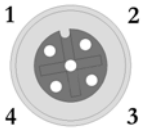
FEMALE

PIN 1= +24VDC (UNSW)
PIN 2= NOT USED
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

Two Digital Inputs per Connector – M12 Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-209	NPN (Sinking)	YES – Visual	YES – Optional	16
240-205	PNP (Sourcing)			

Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1 (Required)	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
X+2 (Optional)	Conn. H SCP Status	Conn. G SCP Status	Conn. F SCP Status	Conn. E SCP Status	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status



FEMALE

PIN 1= +24VDC (UNSW)
PIN 2= INPUT 2
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

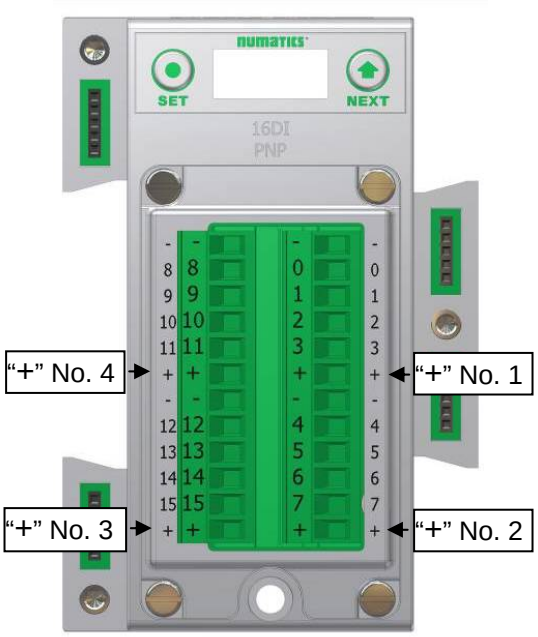
Sixteen Digital Inputs – Terminal Strip Modules

Specifications

- **Wire Range: 12 to 24 AWG**
- **Strip Length: 7mm**
- **Tightening Torque: 0.5 Nm**

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-203	PNP (Sourcing)	YES Visual and Logical Status Bits	4 user enabled bits monitor Short Circuits on the four different + voltage connections of terminal strip	16
240-204	NPN (Sinking)			

Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	**Input 7**	**Input 6**	**Input 5**	**Input 4**	**Input 3**	**Input 2**	**Input 1**	**Input 0**
X+1 (Required)	**Input 15**	**Input 14**	**Input 13**	**Input 12**	**Input 11**	**Input 10**	**Input 9**	**Input 8**
X+2 (Optional)	**Allocated and Reserved**	**Allocated and Reserved**	**Allocated and Reserved**	**Allocated and Reserved**	**SCP Status 1 = Fault "+" No. 4**	**SCP Status 1 = Fault "+" No. 3**	**SCP Status 1 = Fault "+" No. 2**	**SCP Status 1 = Fault "+" No. 1**

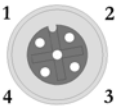


Digital Output Modules

One Digital Output per Connector - M12 Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-208	PNP (Sourcing)	YES – Visual	YES (8) – Optional	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Optional)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status



FEMALE

PIN 1= +24VDC (SW)
PIN 2= NOT USED
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

Two Digital Outputs per Connector - M12 Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-207	PNP (Sourcing)	YES – Visual	YES (8) – Optional	16

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
X+1 (Required)	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Optional)	Output 7 Status	Output 6 Status	Output 5 Status	Output 4 Status	Output 3 Status	Output 2 Status	Output 1 Status	Output 0 Status
X+1 (Optional)	Output 15 Status	Output 14 Status	Output 13 Status	Output 12 Status	Output 11 Status	Output 10 Status	Output 9 Status	Output 8 Status

FEMALE

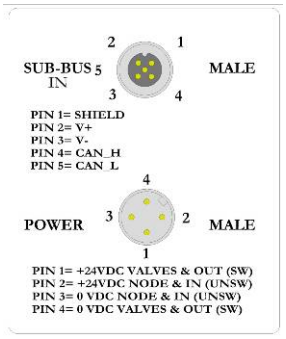
PIN 1= +24VDC (SW)
PIN 2= OUTPUT 2
PIN 3= 0VDC (SW)
PIN 4= OUTPUT 1

Sub-Bus Valve Module

Used to control a distributed valve manifold through the Sub-Bus. See page 42 for more information.

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*
240-241	NPN (Sinking)	YES – Visual	YES (32) – Optional	32

Output Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
X+1 (Optional)	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
X+2 (Optional)	Valve Coil No. 23	Valve Coil No. 22	Valve Coil No. 21	Valve Coil No. 20	Valve Coil No. 19	Valve Coil No. 18	Valve Coil No. 17	Valve Coil No. 16
X+3 (Optional)	Valve Coil No. 31	Valve Coil No. 30	Valve Coil No. 29	Valve Coil No. 28	Valve Coil No. 27	Valve Coil No. 26	Valve Coil No. 25	Valve Coil No. 24
Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Optional)	Coil 7 Status	Coil 6 Status	Coil 5 Status	Coil 4 Status	Coil 3 Status	Coil 2 Status	Coil 1 Status	Coil 0 Status
X+1 (Optional)	Coil 15 Status	Coil 14 Status	Coil 13 Status	Coil 12 Status	Coil 11 Status	Coil 10 Status	Coil 9 Status	Coil 8 Status
X+2 (Optional)	Coil 23 Status	Coil 22 Status	Coil 21 Status	Coil 20 Status	Coil 19 Status	Coil 18 Status	Coil 17 Status	Coil 16 Status
X+3 (Optional)	Coil 31 Status	Coil 30 Status	Coil 29 Status	Coil 28 Status	Coil 27 Status	Coil 26 Status	Coil 25 Status	Coil 24 Status

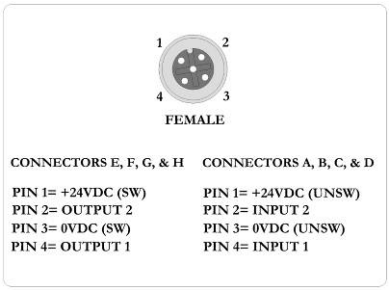


Digital Input/Output Modules

Two Digital I/O per Connector - 12mm Female Modules

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*	*Input Points*
240-211	PNP (Sourcing)	YES – Visual	YES (8) – Optional	8	8

Output Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Input Mapping								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X (Required)	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
X+1 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Conn. D SCP Status	Conn. C SCP Status	Conn. B SCP Status	Conn. A SCP Status
X+2 (Optional)	Output 7 Status Bit	Output 6 Status Bit	Output 5 Status Bit	Output 4 Status Bit	Output 3 Status Bit	Output 2 Status Bit	Output 1 Status Bit	Output 0 Status Bit

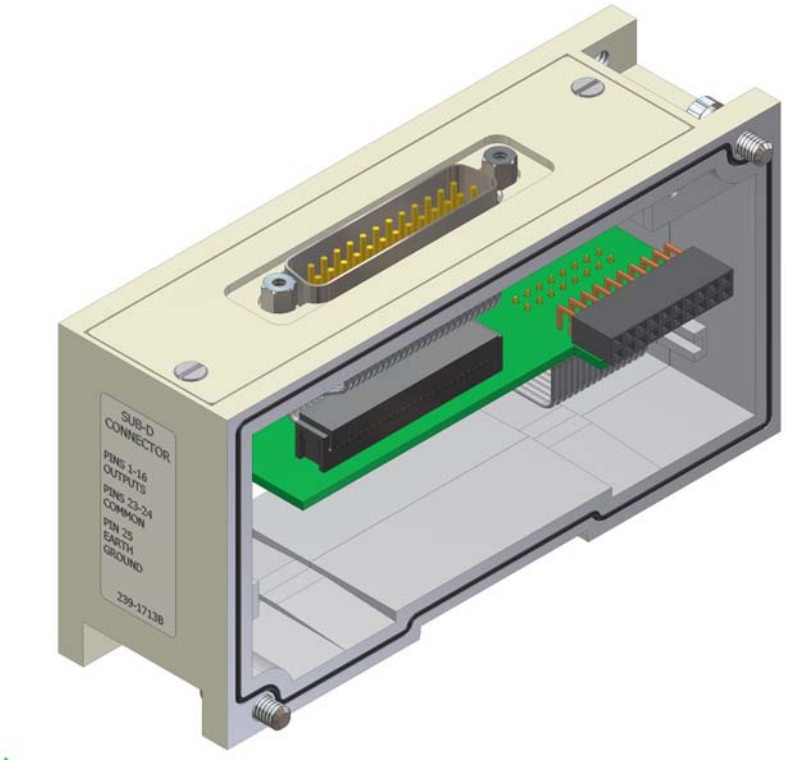


Valve Side Digital Output Modules

The valve side output module is used to distribute available valve side output points (i.e. when valves are located away from the rest of the electronics). These modules go to the right of the G3 valve aqdapter. The 16 bit output module utilizes the last 16 output bits on the valve side of the manifold (bits 16-31).

Sixteen Outputs per Connector - Sub-D 25 Pin Female Module

Module Part No.	*I/O Type*	*Short Circuit Protection*	*Internal Status Bits*	*Output Points*	*Module Size*
239-1713	NPN (Sinking)	Yes	16 – Optional	16	Narrow



Analog I/O Modules

Analog I/O Module Rules

The analog I/O modules follow the same rules as the digital I/O modules. The maximum total number of modules on the Sub-Bus is 16. The analog boards allow the user to control devices using an analog signal. The analog modules also allow the user to relay analog information from input devices. These modules are available in two analog signal types: 0-10 V and 4-20 mA. These two signal types are offered in two different I/O configurations: 2 analog input channels/ 2 analog outputs channels and 4 analog input channels.

Four I/O - 12mm Female Modules

Specifications

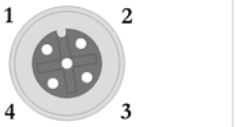
- Input Resolution: 16 bit (65,536 Counts),
- Output Resolution: 16 bit (65,536 Counts)
- Settling Time: 3 ms Max
- Absolute Precision: ≤ 1.0% of Signal
- Voltage Input Impedance: 0-10VDC – 40K Ohms
- Current Input Impedance: 250 Ohms
- Input Cutoff Frequency: 100 Hz

Module Part No.	*Signal Type*	*Input Points*	*Output Points*	*Short Circuit Protection*
240-212	0 - 10V	4	0	Yes
240-213	0 - 10V	2	2	
240-214	4 - 20mA	4	0	
240-215	4 - 20mA	2	2	

One Analog Input per Connector – M12 Female Modules

Module Part No.	*Signal Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Input Points*
240-212	0-10 VDC	YES – Visual	YES (4) – Optional	4
240-214	4-20 mA			

Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)
X+1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1
X+2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)
X+3 (Required)	Input No. 2 (MSB)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2
X+4 (Required)	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3 (LSB)
X+5 (Required)	Input No. 3 (MSB)	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3	Input No. 3
X+6 (Required)	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4 (LSB)
X+7 (Required)	Input No. 4 (MSB)	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4	Input No. 4
X+8 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
X+9 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A



FEMALE

PIN 1= +24VDC (UNSW)
PIN 2= NOT USED
PIN 3= 0VDC (UNSW)
PIN 4= INPUT 1

One Analog I/O per Connector – M12 Female Modules

Module Part No.	*Signal Type*	*Short Circuit Protection*	*Short Circuit Protection Status Bits*	*Output Points*	*Input Points*
240-213	0-10 VDC	YES – Visual	YES (4) – Optional	2	2
240-215	4-20 mA				

Output Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1 (LSB)
X+1 (Required)	Output No. 1 (MSB)	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1	Output No. 1
X+2 (Required)	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2 (LSB)
X+3 (Required)	Output No. 2 (MSB)	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2	Output No. 2
Input Mapping								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
X (Required)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1 (LSB)
X+1 (Required)	Input No. 1 (MSB)	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1	Input No. 1
X+2 (Required)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2 (LSB)
X+3 (Required)	Input No. 2 (MSB)	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2	Input No. 2
X+8 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
X+9 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A

FEMALE

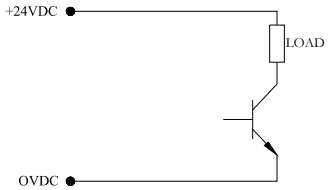
CONNECTORS C & D	CONNECTORS A & B
PIN 1= +24VDC (UNSW)	PIN 1= +24VDC (UNSW)
PIN 2= OUTPUT	PIN 2= NOT USED
PIN 3= 0VDC (UNSW)	PIN 3= 0VDC (UNSW)
PIN 4= INPUT	PIN 4= INPUT

I/O Module(s) Wiring Diagrams

NPN/PNP Definitions

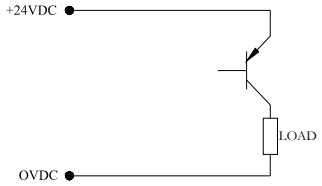
NPN Descriptions

- Sinking
- Switching Negative
- Positive Common



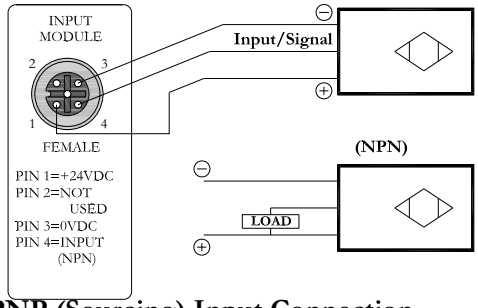
PNP Descriptions

- Sourcing
- Switching Positive
- Negative Common

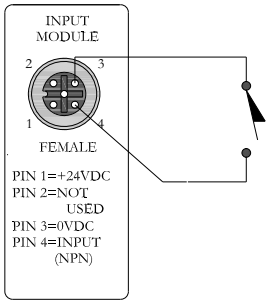


NPN (Sinking) Input Connection

Electric Sensor Type

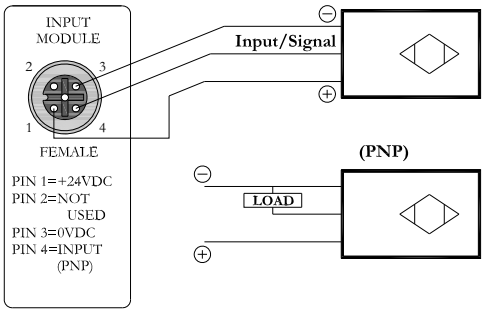


Mechanical Sensor Type

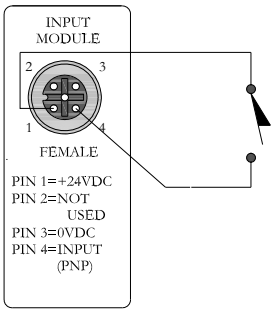


PNP (Sourcing) Input Connection

Electric Sensor Type

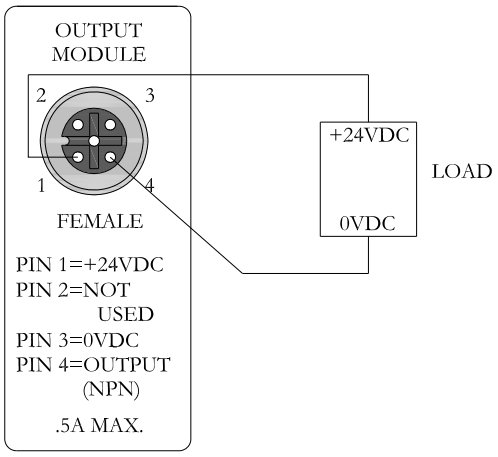


Mechanical Sensor Type

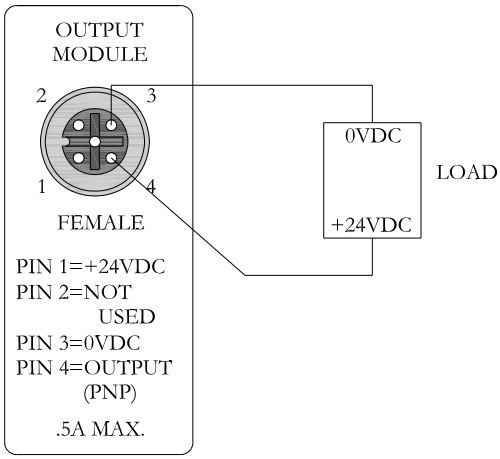


I/O Module(s) Wiring Diagrams Continued

NPN (Sinking) Output Connection



PNP (Sourcing) Output Connection



EtherNet/IP™ Configuration and Mapping

EDS File

The EDS file contains configuration information about the Numatics valve manifold. EDS files are available on the Numatics, Inc., website at www.numatics.com/fieldbus.

Connecting to a G3 Series EtherNet/IP™ Node

This section will discuss how to connect a computer to a G3 Series EtherNet/IP™ node. There are multiple ways to complete this task, so only two will be discussed. All computer commands are shown in Windows XP.

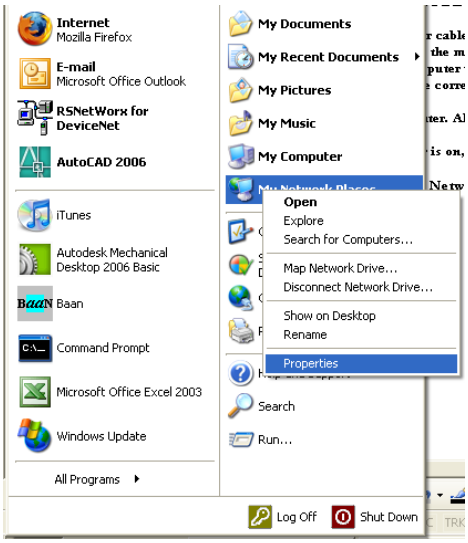
1. Connect a 24VDC power supply to the valve manifold. The power pin-out can be found on the side of the EtherNet/IP™ node or on page 12 of this document. (Note: 24VDC only needs to be applied to the "+24VDC (NODE & INPUTS)" pin to power the node.)

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

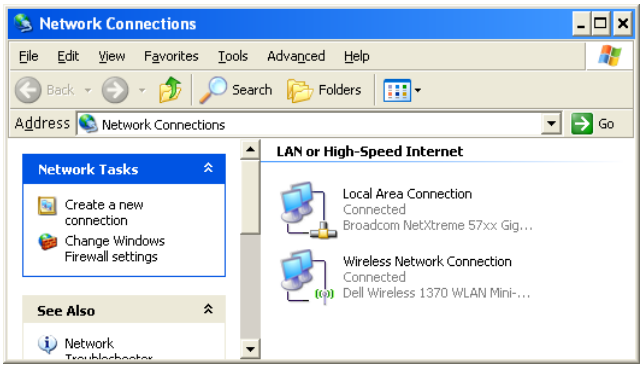
3. Turn on the computer. Also, make sure the manifold and the router, hub, or switch has power.

4. To communicate with an EtherNet/IP™ manifold the IP address of your computer must be known. To start this process, left click on the "Start" button.

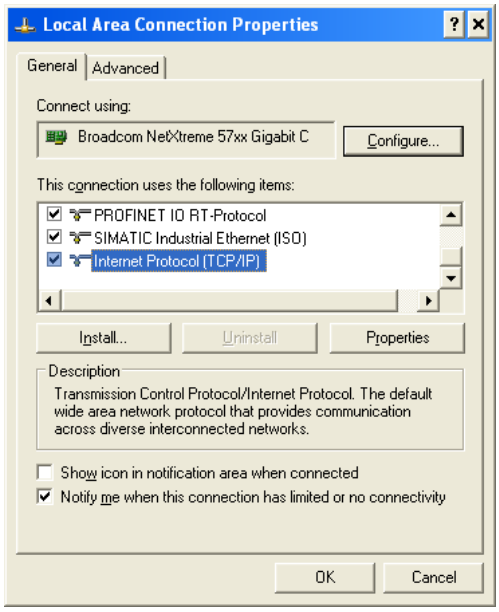
5. Right click on "My Network Places" and then scroll down to "Properties". Left click on "Properties".



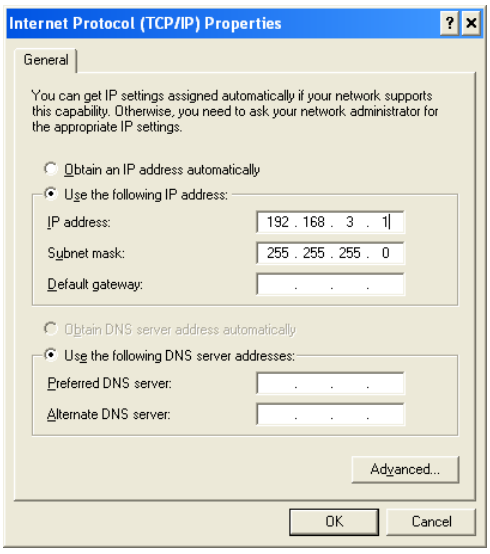
6. The "Network Connections" window will open. Right click on "Local Area Connection".



7. **The "Local Area Connection Properties" window will now open. Scroll down in the box labeled, "This connection uses the following items". Locate the "Internet Protocol (TCP/IP)" option and highlight it.**



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

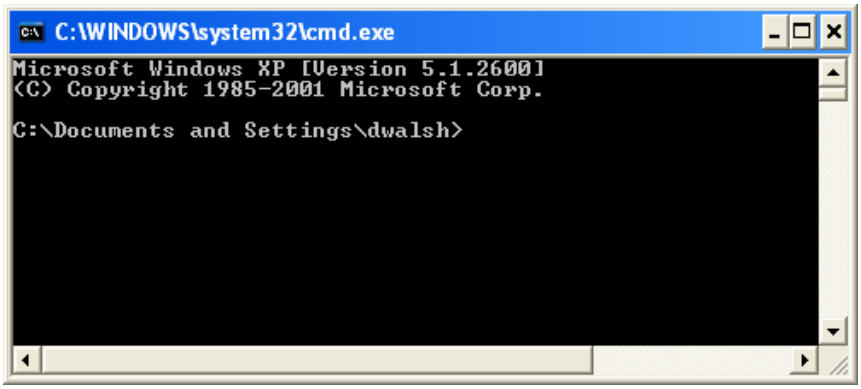


9. **Left click "OK" in the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection" windows for the changes to take effect on the computer. Close out of any open windows.**

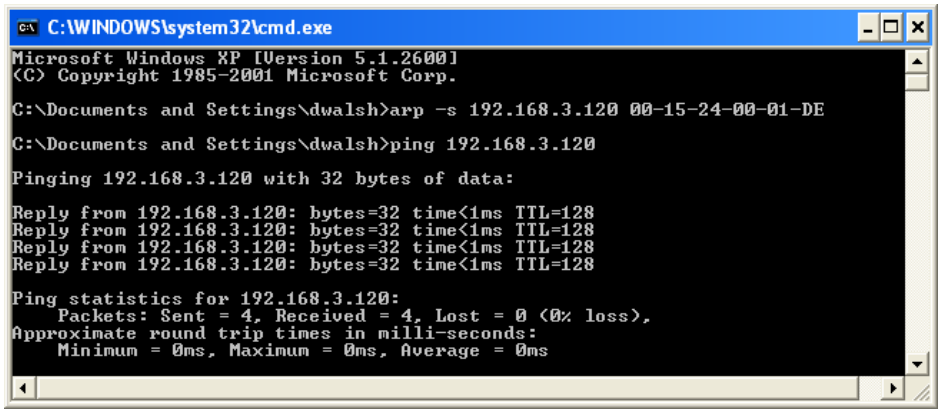
10. Once the IP address for the computer is known, you can set the IP address of the Numatics manifold using one of the methods described on page 67 .

11. Left click on "Run". This will open up the "Run" window.

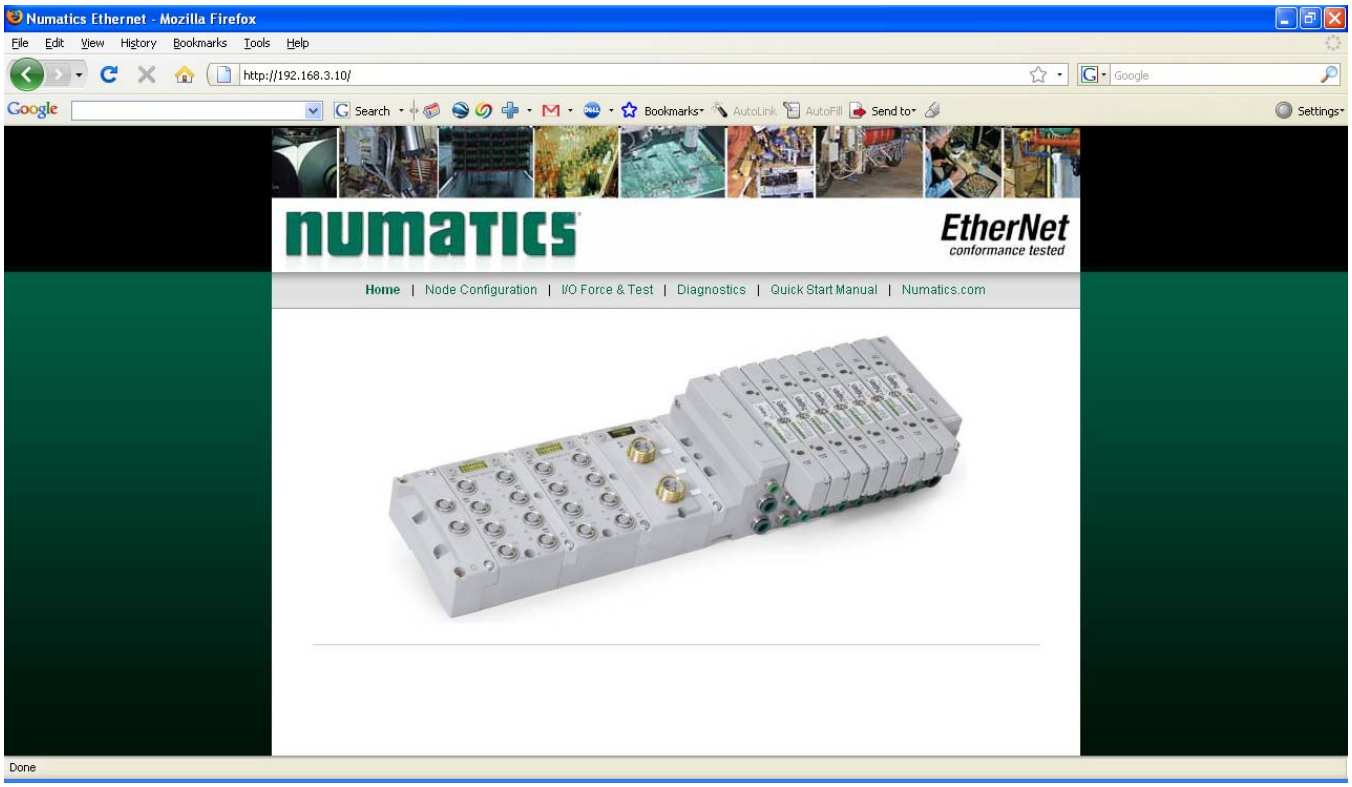
12. Type "cmd" on the command line and left click "OK". The command prompt will open.



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



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



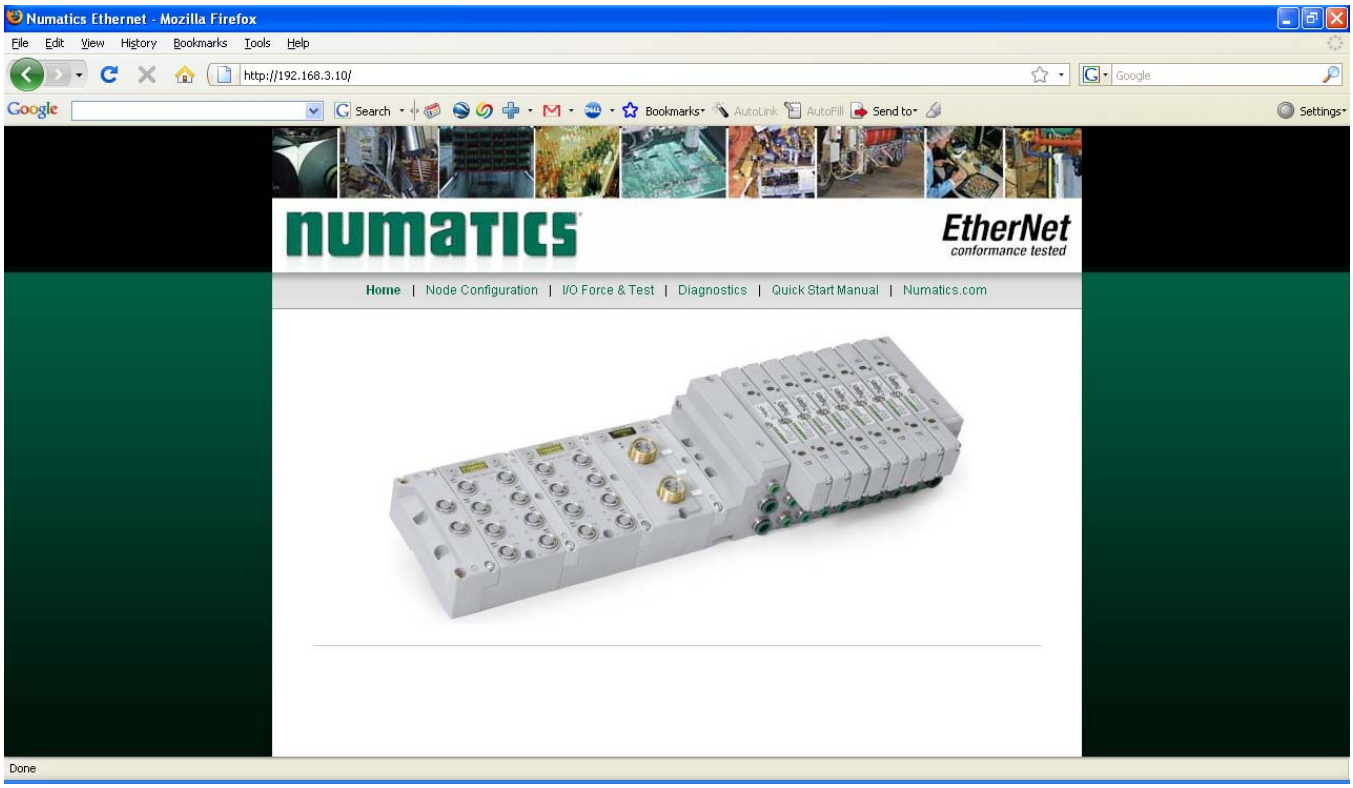
15. **You have successfully connected a computer to a Numatics EtherNet/IP™ manifold.**

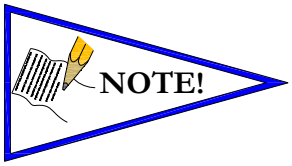
Using the Functionality of the G3 Series EtherNet/IP™ Web Server

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

Home

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

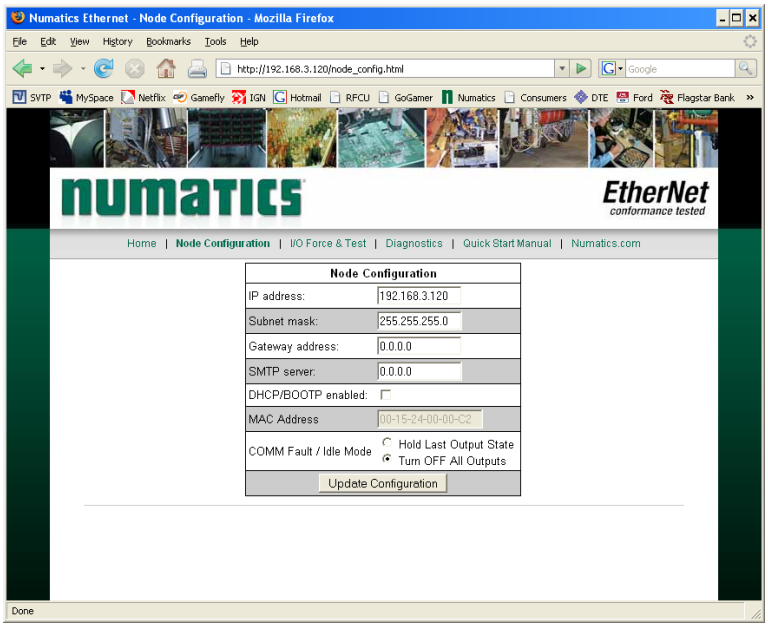




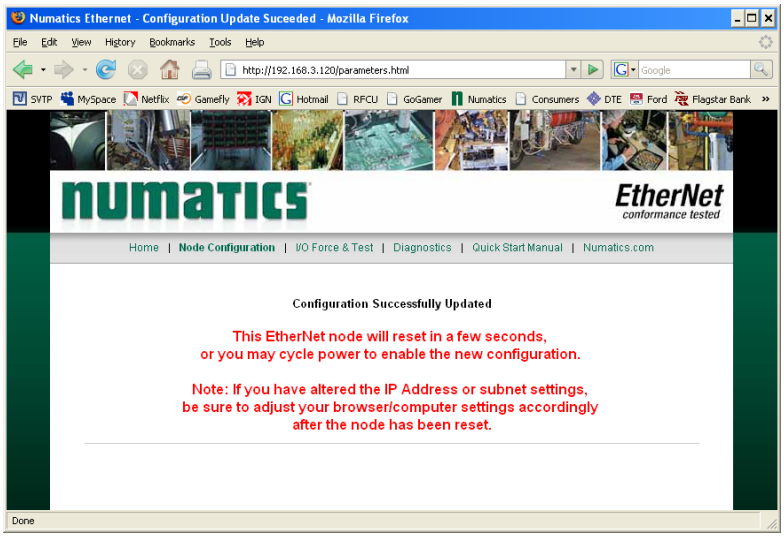
- ***The 1st three octets of the IP address of the computer MUST match the IP address of the node.***

Node Configuration

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

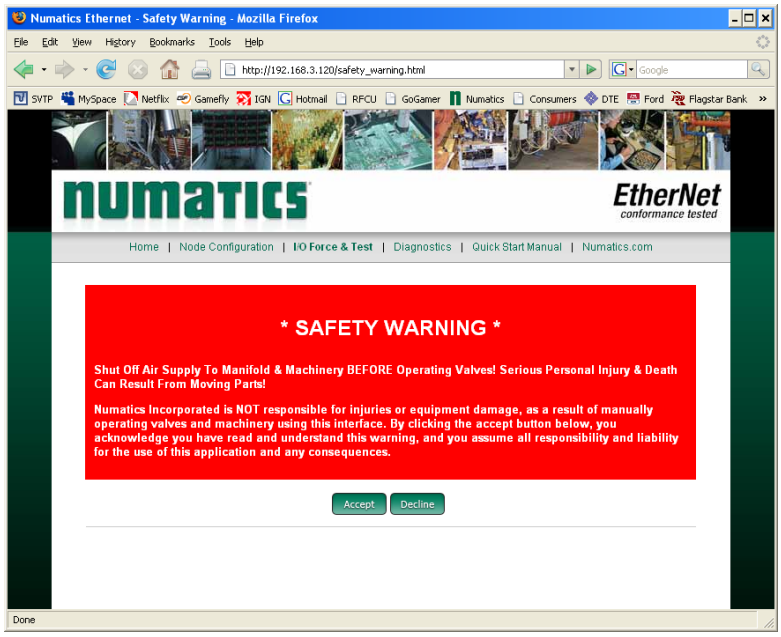


Once the changes have been made, left click on the "Update Configuration" button. The "Configuration Successfully Updated" window will appear. The Ethernet/IP™ node will reset in a few seconds, or the user may cycle power to enable the new configuration.

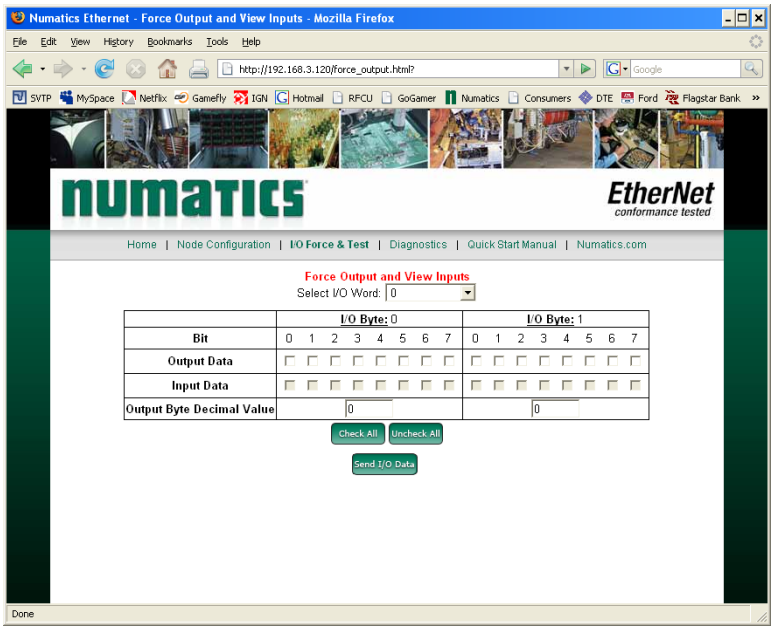


I/O Force and Test

The "I/O Force and Test" window allows the user to test the outputs and inputs of the manifold. A Safety Warning will appear telling the user to shut off the air supply to the valve manifold. Once the air is shut off, left click on "Accept".

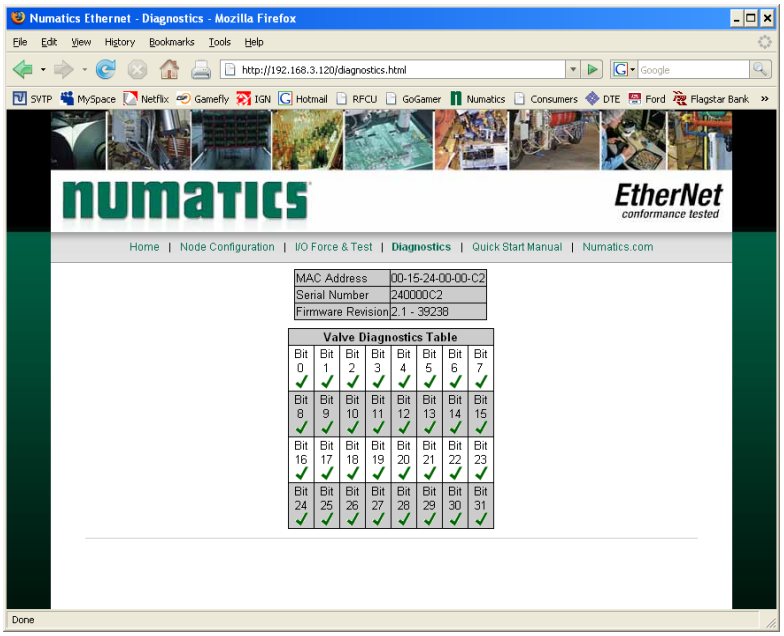


The "Force Outputs and View Inputs" window will open. This window lets the user turn on outputs and monitor the status of inputs that are connected to the manifold. Use the drop box to choose which I/O word to control/monitor. Output forces can be applied using either the check boxes or "Output Byte Decimal Value". Left click on "Send I/O data" to force the outputs on/monitor the inputs.



Diagnostics

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



Numatics.com

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

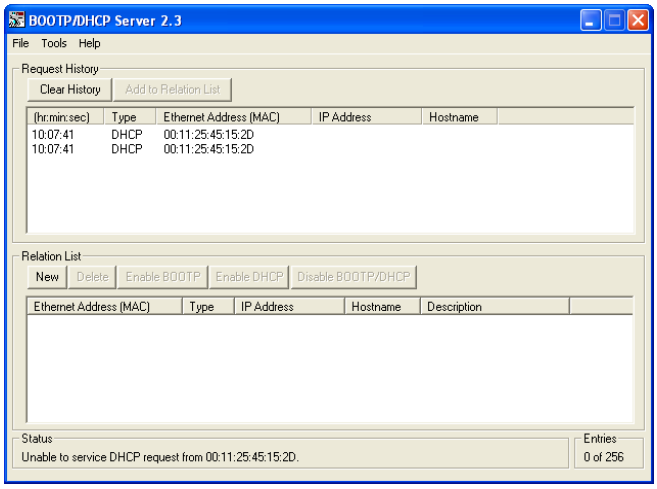
IP Address Configuration

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

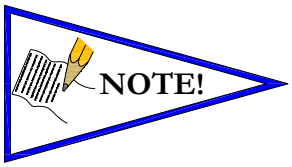
- DHCP/BOOTP
- Integrated Web Page Configuration
- Manual Configuration via DIP Switch
- Graphical display

DHCP / BOOTP

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



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



If the optional MCM module is installed, for the DHCP/BOOTP feature is disabled.

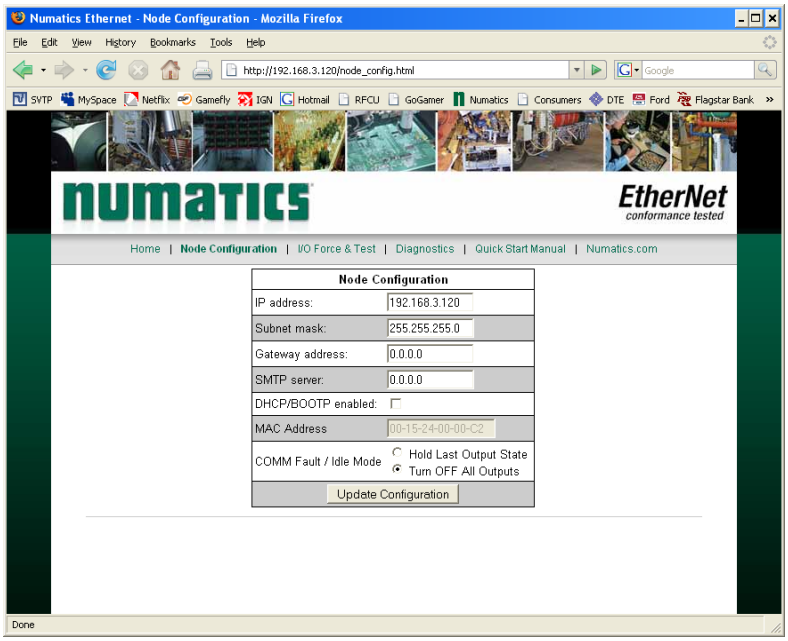
Integrated Web Page Configuration

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

ATTENTION

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

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



ATTENTION

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

Manual Configuration via DIP Switch

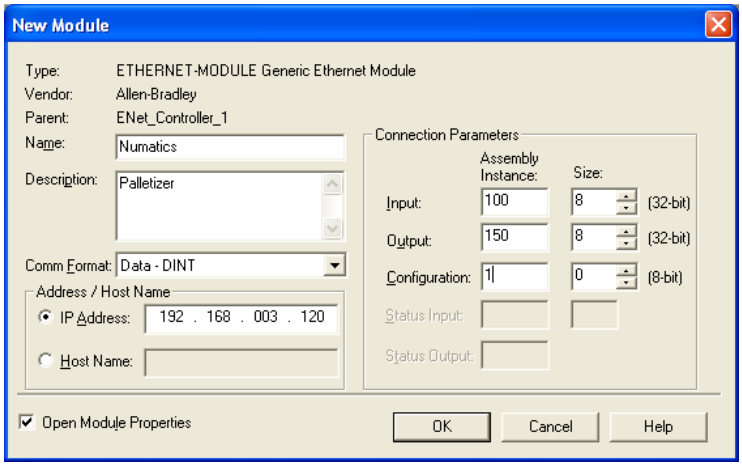
Please see page 35 for Manual Configuration Module information and settings.

Graphic Display

Please see page 21 for graphical display settings

Configuration with RSLogix 5000

When commissioning your EtherNet/IP™ network, specific values must be entered into the "Connection Parameters" section of the "Assembly Instance" column. These values include: "Input Size", "Output Size", and "Configuration". The "Size" values are determined from the actual physical configuration of the manifold (i.e. how many and which I/O modules are installed on the manifold, see page 74). The size values are a minimum value; higher values can be used if future manifold I/O expansion is required. Below is a sample screenshot taken from Allen Bradley's RSLogix 5000 programming software. It shows where the appropriate values for the *IP Address, Assembly Instance, Size,* and *Configuration* must be entered.



Module Properties

Comm. Format

Description	*Data*
Comm. Format	Data – DINT
	Data – INT
	Data - REAL
	Data – SINT

Connection Parameters

Description	*Assembly Instance Values*	*Size* (depends on data format)
Input	100 (Decimal) or 64 (Hexadecimal)	Total input byte value from the physical manifold configuration (including status input bits). This is a minimum value. Larger values may be specified for future expansion purposes.
Output	150 (Decimal) or 96 (Hexadecimal)	Total output byte value from the physical manifold configuration. This is a minimum value. Larger values may be specified for future expansion purposes.
Configuration	1 (Decimal) or 1 (Hexadecimal)	0

User Configurable Device Parameters

The Numatics' G3 DeviceNet node allows the user to set many user options which define how the manifold behaves in certain instances. The following is a description of these device parameters.

		Settable Via		
Name	*Description*	*Display*	*Web Server*	*MCM*
IP Address	Node address	√	√	√
Diagnostic Word	Enables / Disables the diagnostic word	√	X	X
I/O Diagnostic Status	Allocates I/O diagnostic status bits	√	X	X
Gateway Address	Network gateway address	X	√	X
DHCP Boot-P	Enables / Disables DHCP/Boot-P functionality	√	√	X
Output Idle Action	Determines whether to use idle value attribute or hold last state	√	√	X
Output Fault Action	Determines whether to use idle value attribute or hold last state	√	√	X

Communication Fault/Idle Mode Parameter

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

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

The two behavior options are:

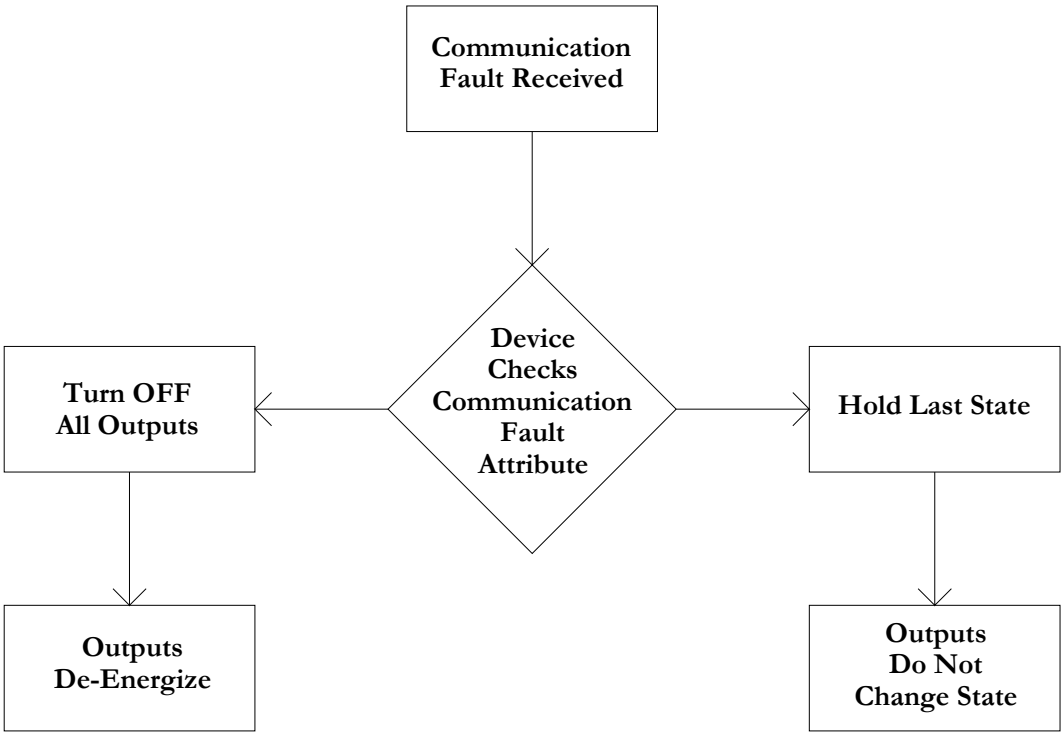
1. Hold Last State
2. Turn Off All Outputs

Communication Fault / Idle Mode Sequence

The Communication Fault/Idle Mode parameter determines the output state if the device encounters a communication fault and/or idle action. A Communication Fault is defined as an inability for the master node to communicate with a slave node on a network. Idle Mode is a condition when the processor is in program mode.

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

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



EtherNet/IP™ Mapping

I/O Sizes

Manifold

Outputs

Outputs are defined as any valve solenoid coil and/or any discrete output point from any output module. The output size depends upon the physical configuration of the manifold (i.e. module type and how many are used). Please reference the following pages for a detailed explanation for calculating the output size.

Inputs

Inputs are defined as physical input bits from input modules and status bits (i.e. diagnostic word generated by the node, status input bits produced by output drivers and SCP status bits). Thus, the input size will include physical input points, as well as status input bits. Please reference the following pages for a detailed explanation for calculating the input size.

Valve Side

The size for the "valve side" of the manifold consists of an output bit for each valve solenoid coil driver and an input bit for the corresponding diagnostic status input bit. This value for the valve side size is 4 bytes of inputs and 4 bytes of outputs.

Discrete Side

The discrete side of the manifold is defined as all I/O modules connected to the left of the communication node. This includes physically attached modules as well as any distributed sub-bus modules. I/O sizes for the discrete side are automatically configured based on the I/O module type installed. However, the user can affect these sizes manually via settable parameters on the node. The output value consists of physical outputs (i.e. output bit for each output point). The input value consists of physical inputs (i.e. input bit for each input point) and user settable status input bits for corresponding physical outputs and SCP status bits.

Total I/O Size

The overall size of the I/O data for the manifold will consist of the valve size plus the discrete I/O size and all enabled Diagnostic bits. The I/O size can vary greatly, due to the many physical configuration and user settable parameters combinations. The worksheet on page 74 will allow accurate sizing of the I/O data.

Manifold and I/O Data Sizing Worksheet

Step

1 : Choose appropriate value and place the corresponding Rx and Tx values in the boxes labeled, "Valve Byte Requirements" at the bottom of the page

2 : Choose up to sixteen modules to be included on the discrete I/O side of the manifold and place sum of the corresponding input bytes and output bytes in the boxes labeled, "Sub-Bus Byte Requirements" at the bottom of the page.

3 : Total the input bytes and output bytes values from the boxes labeled "Sub-Bus Byte Requirements" and "Valve Byte Requirements" in the boxes labeled "Total Input and Output Bytes for Manifold. This is the total input and output byte values required for the configured manifold.

Valve Side					
Step	*Valve Side*		*Input Bytes (Rx)*		*Output Bytes (Tx)*
			Status Enabled	*Status Disabled*	
1	Up to 32 Solenoid Coils		4	0	4

Digital Modules					
Step	*Module No.*	*Description*	*Input Bytes (Rx)*		*Output Bytes (Tx)*
			Status Enabled	*Status Disabled*	
2	240-203/204	16 Inputs - Terminal Strip	3	2	0
	240-205/209	16 Inputs - 8 x 12mm	3	2	0
	240-206/210	8 Inputs - 8 x 12mm	2	1	0
	240-207	16 Outputs - 8 x 12mm	2	0	2
	240-208	8 Outputs - 8 x 12mm	1	0	1
	240-211	8 Inputs / 8 Outputs - 8 x 12mm	3	1	1
	240-241	Sub – Bus Valve Output	4	0	4

Analog Modules				
Step	*Module No.*	*Description*	*Input Bytes (Rx)*	*Output Bytes (Tx)*
2	240-212/214	4 Inputs	8	0
	240-213/215	2 Inputs/ 2 Outputs	4	4

Total Input/Output Size Calculation				
Step	*Module Position*	*Model Number*	*Input Bytes (Rx)*	*Output Bytes (Tx)*
2	1st			
	2nd			
	3rd			
	4th			
	5th			
	6th			
	7th			
	8th			
	9th			
	10th			
	11th			
	12th			
	13th			
	14th			
	15th			
	16th			
		Sub-Bus Byte Requirements:		
		Optional Diagnostic Word:	2	0
1		Valve Byte Requirements:		
3		Total Input and Output Bytes for Manifold		

Bit Mapping Rules

The bit mapping for a G3 manifold varies with the physical configuration of the manifold. The following is a breakdown of the bit mapping rules associated with the Numatics valve manifold.

Valve Side

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

2) The valve solenoid coil output portion of the total output size is fixed at 4 bytes.

3) Each solenoid coil output has an associated status input bit (refer to the section labeled, "Output Short Circuit Protection", on page 20 for functional details). The solenoid coil status input size is fixed at 4 bytes.

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

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) as long as output group No.1 and output group No. 2 bits do not overlap (i.e. combinations of Z-Boards™ could exist where the physical configuration of the manifold could exceed the output capacity.

Single solenoid valves can be used with double Z-Boards™. However, one of the two available outputs will remain unused.

Discrete I/O Side

Outputs

1) The Sub-Bus output byte size portion is self-configuring in byte increments, after an output module is installed on the Sub-Bus and power is applied.

2) Outputs are mapped consecutively by module. The output bits from the 1st module will be mapped directly after the bits from the valve coils. The output bits from the second module will be mapped directly after the output bits from the 1st module and so on.

Inputs

1) The Sub-Bus input byte size portion is self-configuring in byte increments, after an input module is plugged into back plane and power is applied.

2) Inputs are mapped consecutively by module. The input bits from the 1st module will be mapped directly after the status bits from the valve side. The input bits from the second module will be mapped directly after the input bits from the 1st module and so on.

3) All of the modules have associated internal status bits, which will affect the total value of input bytes..

4) When a module has discrete and status inputs, the status bits are mapped after the discrete input bits.

I/O Mapping Examples

Assumed Settings

Example No. 1

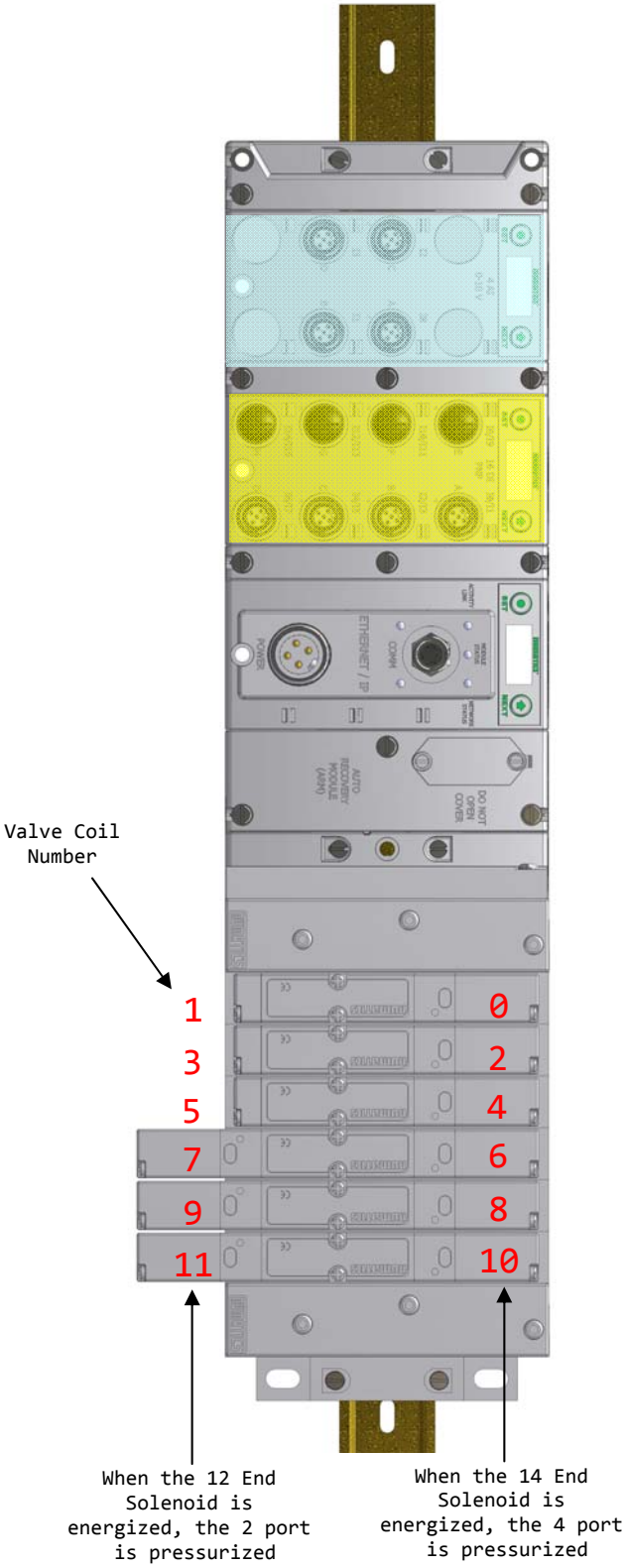
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled

Manifold I/O Configuration

Pos No.	Module Type	Part No.	In Bytes	Out Bytes
1	16I PNP	240-205	3	0
2	4AI Analog	240-212	10	0
	Diagnostic Word		2	0
	Local Valve Size		4	4
		Total:	19	4

How to Order

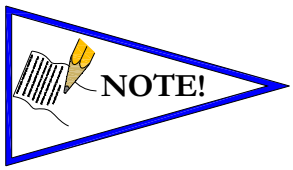
Qty	Part Number
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3EP102R0G32
1	240-205
1	240-212
	ASSEMBLED



Example No. 1 Table

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 (Optional)	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit
1 (Optional)	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
5 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
10	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
11	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
12	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
13	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
14	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
15	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
16	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A

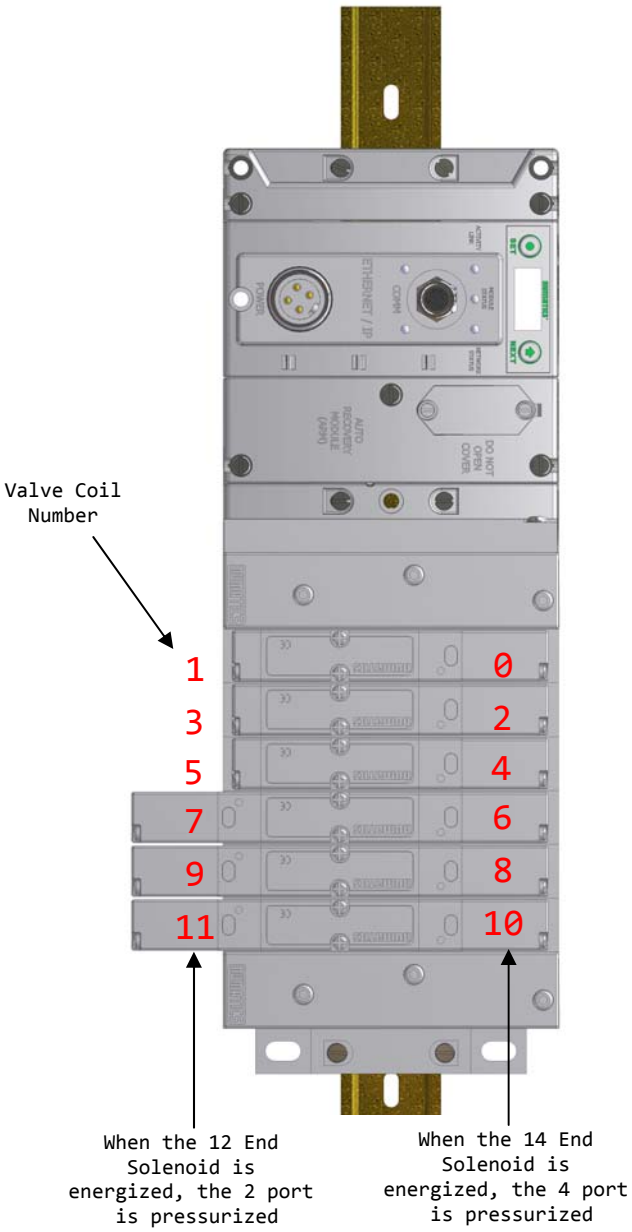


The Comm. Module Diagnostic Bits, Sub-Bus Diagnostic Bits, Coil Status Bits and Power Status Bits are optional. The factory default condition is Diagnostic bits enabled. These bits may be disabled to optimize the logical size of the manifold.

Assumed Settings

Example No. 2

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled



Manifold I/O Configuration

Pos. No.	*Module Type*	*Part No.*	*In*	*Out*
			Bytes	
		Diagnostic Word	2	0
		Local Valve Size:	4	4
		Total:	6	4

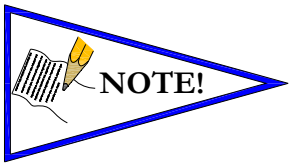
How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3EP100R0G32
	ASSEMBLED

Example No. 2 Table

Output Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0 (Optional)	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit
1 (Optional)	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	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



The Comm. Module Diagnostic Bits, Sub-Bus Diagnostic Bits, Coil Status Bits and Power Status Bits are optional. The factory default condition is Diagnostic bits are enabled. These bits may be disabled to optimize the logical size of the manifold

Assumed Settings

Example No. 3

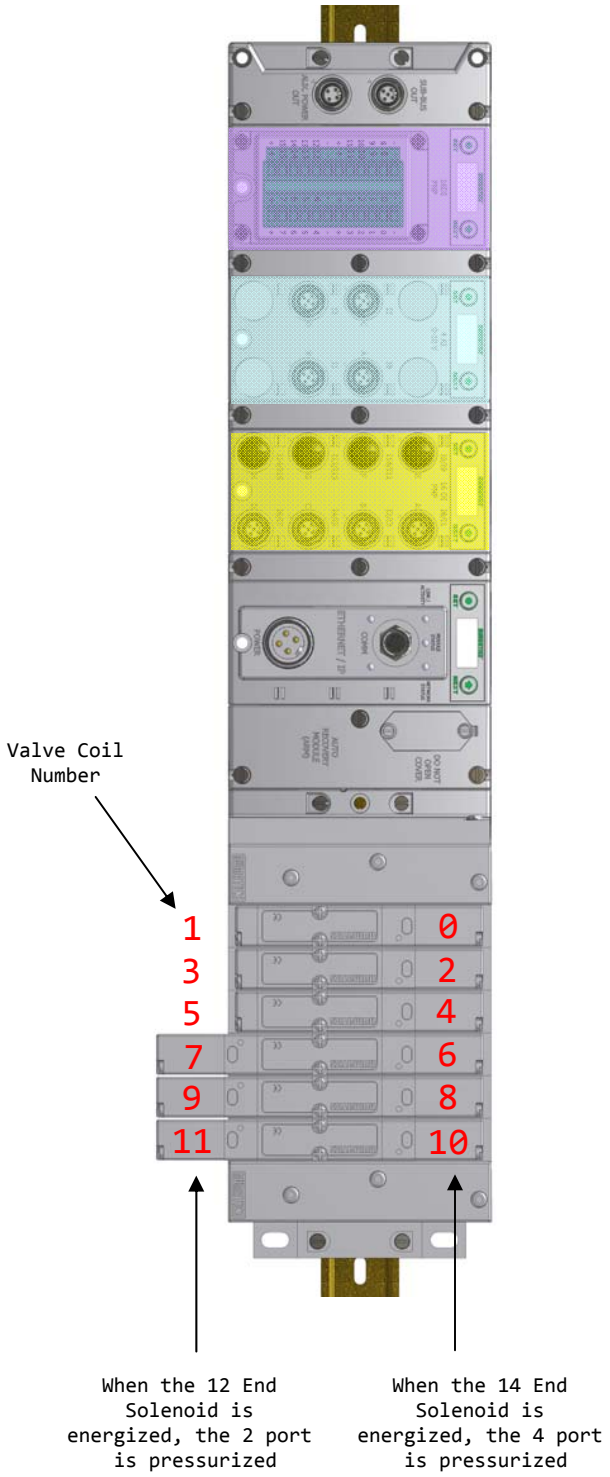
- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled

Manifold I/O Configuration

Pos No.	*Module Type*	*Part No.*	*In*	*Out*
			Bytes	
1	16I PNP	240-205	3	0
2	4AI Analog	240-212	10	0
3	16I PNP	240-203	3	0
	Diagnostic Word		2	0
	Local Valves:		4	4
		Total:	22	4

How to Order

Qty	*Part Number*
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3EP103D0G32
1	240-205
1	240-212
1	240-203
	ASSEMBLED



Example No. 3 Table

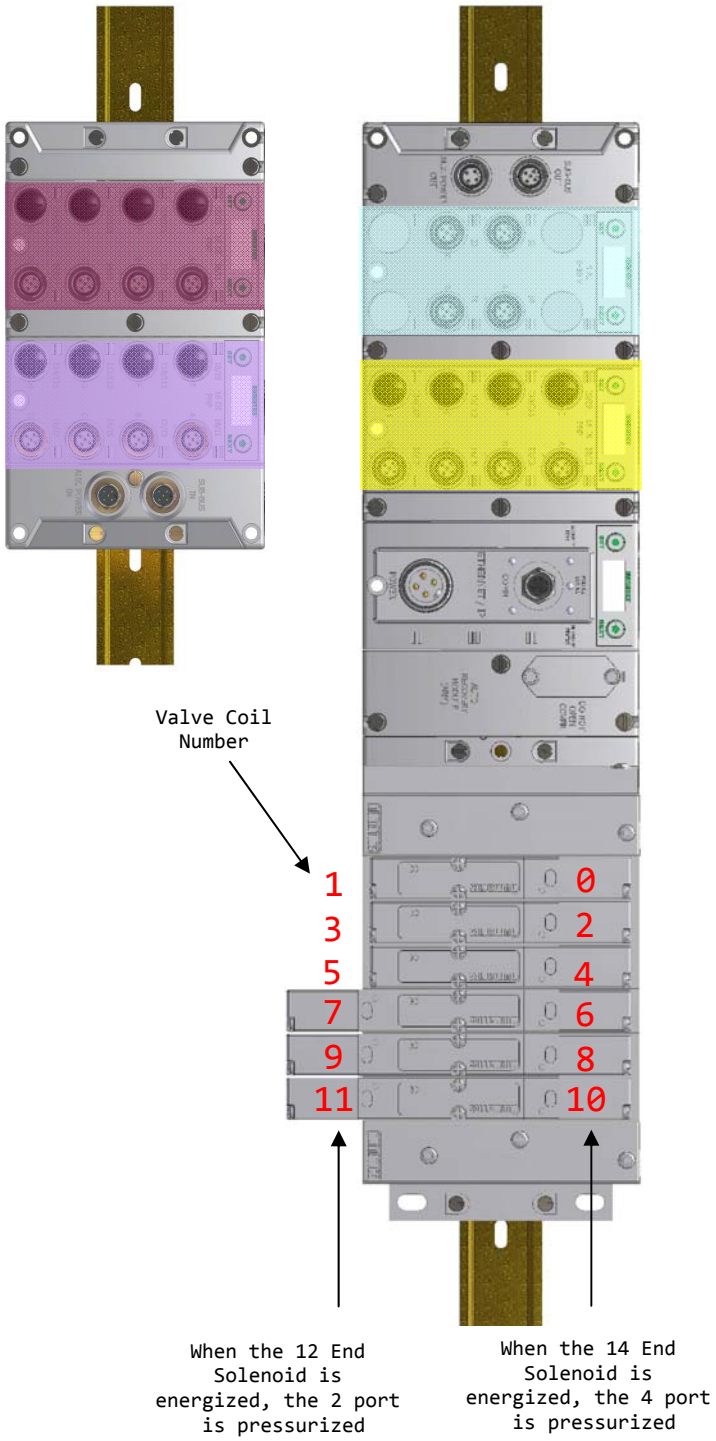
Output Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0 (Optional)	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit
1 (Optional)	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	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
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
10	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
11	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
12	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
13	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
14	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
15	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
16	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
19	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
20	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
21 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A

Assumed Settings

Example No. 4

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled



Manifold I/O Configuration

Pos No.	Module Type	Part No.	In Bytes	Out Bytes
1	16I PNP	240-205	3	0
2	4I Analog	240-212	10	0
3	16I PNP	240-205	3	0
4	16I PNP	240-205	3	0
	Diagnostic Word		2	0
	Local Valves:		4	4
		Total:	18	4

How to Order

Qty	Part Number
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3EP102R0G32
1	240-205
1	240-212
	ASSEMBLED

1	G3DS302D0DRM
1	240-205
1	240-205
	ASSEMBLED

Example No. 4 Table

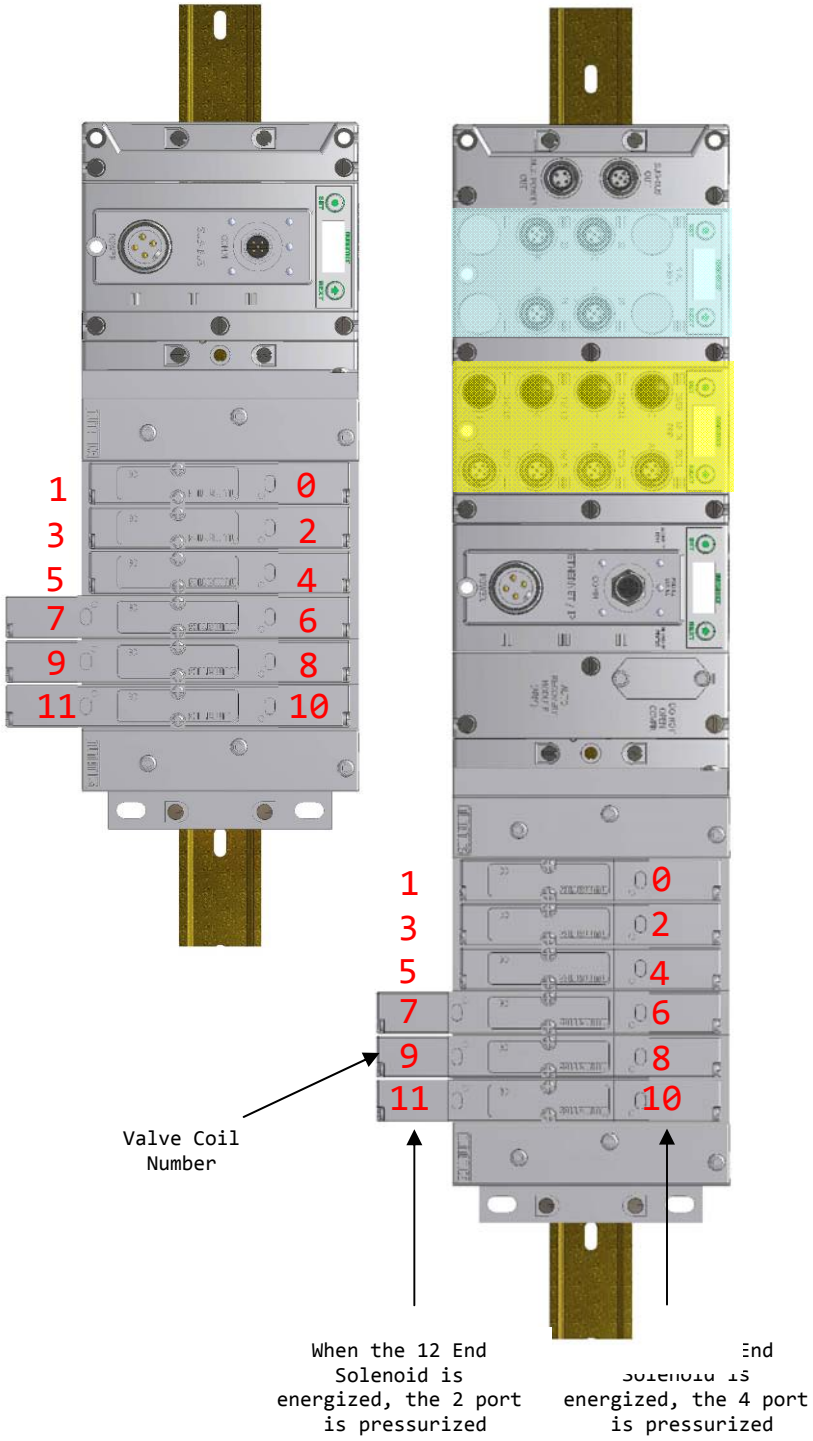
Output Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved

Input Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0 (Optional)	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit
1 (Optional)	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	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
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
10	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
11	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
12	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
13	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
14	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
15	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
16	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
19	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
20	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
21 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
22	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
23	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
24 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A

Assumed Settings

Example No. 5

- Double Z-Boards™ used with all valves
- I/O Modules and mapping schemes are identified by their corresponding color.
- I/O Status bits are enabled
- Diagnostic Word is enabled



Manifold I/O Configuration

Pos No.	Module Type	Part No.	In Bytes	Out Bytes
1	16I PNP	240-205	3	0
2	4I Analog	240-212	10	0
	Diagnostic Word		2	0
	Local Valves (DeviceNet)		4	4
	Local Valves (Sub-Bus)		4	4
		Total:	23	8

How to Order

Qty	Part Number
1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3DN102D0G32
1	240-205
1	240-212
	ASSEMBLED

1	AK3EF00003NDRM
3	051BA4Z2MN00061
3	051BB4Z2MN00061
1	G3DS202R0DRM
	ASSEMBLED

Example No. 5 Table

Output Table								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
3	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
4	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
5	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
6 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
7 (Optional)	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								
BYTE	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0 (Optional)	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit	Comm. Module Diagnostic Bit
1 (Optional)	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit	Sub-bus Diagnostic Bit
2 (Optional)	Coil No. 7 Status	Coil No. 6 Status	Coil No. 5 Status	Coil No. 4 Status	Coil No. 3 Status	Coil No. 2 Status	Coil No. 1 Status	Coil No. 0 Status
3 (Optional)	Coil No. 15 Status	Coil No. 14 Status	Coil No. 13 Status	Coil No. 12 Status	Coil No. 11 Status	Coil No. 10 Status	Coil No. 9 Status	Coil No. 8 Status
4 (Optional)	Coil No. 23 Status	Coil No. 22 Status	Coil No. 21 Status	Coil No. 20 Status	Coil No. 19 Status	Coil No. 18 Status	Coil No. 17 Status	Coil No. 16 Status
5 (Optional)	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
6	Discrete Input No. 7	Discrete Input No. 6	Discrete Input No. 5	Discrete Input No. 4	Discrete Input No. 3	Discrete Input No. 2	Discrete Input No. 1	Discrete Input No. 0
7	Discrete Input No. 15	Discrete Input No. 14	Discrete Input No. 13	Discrete Input No. 12	Discrete Input No. 11	Discrete Input No. 10	Discrete Input No. 9	Discrete Input No. 8
8 (Optional)	Power Status for Conn. H	Power Status for Conn. G	Power Status for Conn. F	Power Status for Conn. E	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
9	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1 (LSB)
10	Analog Input No. 1 (MSB)	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1	Analog Input No. 1
11	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2 (LSB)
12	Analog Input No. 2 (MSB)	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2	Analog Input No. 2
13	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3 (LSB)
14	Analog Input No. 3 (MSB)	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3	Analog Input No. 3
15	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4 (LSB)
16	Analog Input No.4 (MSB)	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4	Analog Input No. 4
17 (Optional)	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Power Status for Conn. D	Power Status for Conn. C	Power Status for Conn. B	Power Status for Conn. A
18 (Optional)	High Alarm for Conn. D	Low Alarm for Conn. D	High Alarm for Conn. C	Low Alarm for Conn. C	High Alarm for Conn. B	Low Alarm for Conn. B	High Alarm for Conn. A	Low Alarm for Conn. A
18 (Optional)	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
19 (Optional)	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
20 (Optional)	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
21 (Optional)	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

Appendix

System Specifications

Electrical	
Supply Voltage	Valves (2005, 2012, 2035): 24 VDC + 10%, -15% Node and Discrete I/O: 24 VDC ± 10%
Current	Total current on the Auxiliary Power Connector ("Valves and Outputs" and "Node and Inputs" Pins) must not exceed 8 Amps.
Internal Electronic Resettable Fuses	The Auxiliary Power Connector pins are each internally fused with an electronically resettable fuse. These fuses are set to the maximum current allowable through the G3 electronics.
Recommended External Fuse	External fuses should be chosen depending upon manifold configuration. Please refer to power consumption chart on page 18 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for both discrete and valve outputs.
Discrete Outputs	Maximum 0.5 Amps per output. All outputs are short circuit protected and have internal spike suppression. Contact factory for higher current requirements.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	23 to 114°F (-5 to 50°C)

Factory Default Settings

Description	*Default Settings*
IP address	192.168.3.120 in FLASH
MAC Address	A unique alpha-numeric code for each node (00-15-24-XX-XX-XX).
Baud Rate	10/100 Mbit per sec. (Autobaud)
DHCP/BOOTP	Enabled
Communication Method	Full/Half Duplex (Auto Detect)
Valve Side Output Bytes	4 Bytes (32 Allocated Valve Coil Outputs)
Discrete I/O Side - I/O Bytes	Self-Configuring based on the I/O modules installed.

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. Check that ribbon cable (Output group No. 2) is connected to appropriate valve station. See page 75 for bit mapping rules
Valve outputs do not energize.	Output power not present or connected improperly on Auxiliary Power connector.	Check for 24VDC on the +24 VDC (Valves and Outputs) pin of the MINI Auxiliary Power connector of the Comm. module.
Unable to go to the manifold's web page.	Bad cabling, incorrect computer settings, etc.	Please see pages 59-62.
No Activity/Link LED	No network connection	Verify the type of cable (straight-thru or crossover) that is being used. Also, verify the wiring of the cable.

I/O Modules

Symptom	*Possible Cause*	*Solution*
Outputs remain on when communication is lost and/or PLC is in "Program" mode.	Communication Fault parameters are set incorrectly. See pages 72.	Check the communication fault/idle mode parameter setting to ensure that it is not set to "Hold Last Output State".

Glossary of Terms

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

Term	*Description*
Address Resolution Protocol (ARP)	A protocol used to set an IP address using a MAC Address hardware address. This can be done in the command prompt window.
Bit	Smallest unit of digital information either a "0" or "1"
Bit Mapping	Chart showing which bit is connected to which physical input or output point.
BOOTstrap Protocol (BOOTP)	A protocol used to set an IP Address, Subnet Mask, and Gateway using a server.
Broadcast	A transmission method that sends packets to multiple unspecified devices.
Byte	8 bits (1/2 word)
Comm. Fault	One or more of the I/O connections have timed out.
Discrete I / O	The inputs / outputs that are available via the "Discrete I/O" side of manifold.
Dynamic Host Configuration Protocol (DHCP)	A protocol used by a node to obtain an IP Address, Subnet Mask, and Gateway Address from a server.
EDS File	Electronic Data Sheet. A text file, which contains specific product information, definitions of product capabilities and configurable parameters necessary for operation on an EtherNet/IP™ network.
Explicit Messaging	Messaging that sends data to perform request/response functions.
Ground	This term is used to indicate an earth or chassis ground.
I/O	Any combination of inputs and outputs
Idle	A zero (0) length poll message (i.e.: scanner in program mode)
IGMP Snooping	See Implicit Messaging
Implicit Messaging	A function that that can control I/O messaging to another I/O device.
Internet Group Management Protocol (IGMP)	A protocol used to keep local switches informed in a multicast group. Nodes that leave the group will no longer be sent packets of information from switches and routers.
Layer 2 (data link layer or level)	The data layer that physically refers to the frame format and addressing. A layer 2 address is an Ethernet address.
Layer 3 (network layer or level)	The data layer that refers to IP and the IP packet format. A layer 3 address is an IP address.
Link	A group of nodes with different MAC addresses. Segments connected by repeaters make a link. Links that are connected by routers make up a network.
MAC Address	Media Access Connection Address
MCM	Manual Configuration Module. A module that allows configurable parameters to be set manually via DIP switches and rotary switches. Not required if software configuration is used.
Multicast	A transmission where a packet is sent to all possible nodes of a certain subset.

Glossary of Terms Continued

Term	*Description*
NEMA	National Electrical Manufacturers Association
Network	A group of nodes connected by a communication medium through repeaters, router, and gateways.
Node	A device on the network that contains a single MAC Address, which can communicate over a subnet.
Octet	8 bits of information. An IP address is made up of four octets.
ODVA	Open DeviceNet Vendor Association (www.odva.org)
Ping	A group of messages sent between a master and a slave that coordinates time.
Ping Request	A request to see if a device has received a message.
Ping Response	Response to a ping request.
Requested Packet Interval (RPI)	The frequency measure of the required transmission of data from the originating device to the target device.
RSNetWorx	Rockwell Automation's configuration software
Segment	Nodes connected to a continuous section of communication media.
Simple Network Management Protocol (SNMP)	A protocol used to monitor EtherNet devices, switches, routers, and networks connected by communication media.
Sinking (NPN)	Method of connecting electrical circuits in which the zero (0) volt DC side is switched and the common is positive
Sourcing (PNP)	Method of connecting electrical circuits in which the positive side is switched and the common is zero (0) volts DC.
Status Input bit	A bit in the input table that reports the health of a corresponding output. Indicates short circuit or open coil (load) diagnostics
Subnet	Nodes using the same protocol and shared media access arbitration.
System	Contains one or more domains.
Time to Live (TTL)	A method used in best-effort delivery systems to negate endlessly looping packets.
Unicast	A transmission where a packet is sent to a single node.
Word	2 Bytes (16 bits)
Z-Board™	Circuit board installed in the valve manifold which electrically connects the valve solenoid to the electrical /electronics interface. Available in single or double solenoid versions.

Technical Support

For technical support, contact your local Numatics distributor. If further information is required, please call Numatics Inc. Technical Support Department at (248) 596-3333.

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 Numatics, Inc. products and support issues can be found on the Numatics, Inc's. WEB site at www.numatics.com